

March and early April, by this species in numbers second only to the historic flight of 1939. Two hundred seventy-three new birds were trapped and banded, but not a single return was taken.—G. HAPGOOD PARKS, 99 Warrenton Ave., Hartford, Connecticut.

RECENT LITERATURE

Reviews by Donald S. Farner

BANDING STUDIES

1. The Age of the Blackbird. David Lack. 1943. *British Birds*, 36: 166-175. In the four years, 1931-1934, a total of 10,539 nesting Blackbirds, *Turdus merula merula* (Linn.) were banded; 192 (1.8%) were recovered dead. Of the Blackbirds trapped and banded during the same period 3.5% were recovered. The age determinations in this study are based on 592 birds banded as nestlings. It was found that 55% of the first-year birds die during the year whereas 38% of the second-year birds die during the year. In the third-, fourth-, and fifth-year age groups the death rate is about 40% per year. Hence assuming the population to be stable, for each 100 juveniles alive on August 1 there should be 46 second-year birds, 28 third-year birds, 14 fourth-year birds, etc. For every 100 juveniles alive on August 1 there are about 107 adults. This has been verified by field observations. On August 1 the life expectancy of the first-year birds is 1.6 years; for all other age-groups, 1.7-1.9 years. "Assuming that there are six males to every five females, 100 adult Blackbirds correspond to 45 breeding pairs. Therefore if the Blackbird population is stable, every 45 breeding pairs must produce 133 fledglings per year or just less than three fledglings per pair per year." This is reasonable in view of the fact that the Blackbird normally lays four or five eggs per nest and has two or three broods per season. The "potential age" (captive records) of the Blackbird is stated to be about twenty years. Two ten-year birds were recorded in this study. It is therefore to be concluded that the Blackbird's expectancy is only 8% of its potential life span. An interesting paper.

MIGRATION

2. The Migration of the Sandwich Tern. A. Lansborough Thomson. 1943. *British Birds*, 37: 62-69. The conclusions in this paper are based on 317 recoveries of banded Sandwich Terns, *Thalasseus sandvicensis sandvicensis* (Lath.). From 1909 to 1942 a total of 17,987 of this species was banded; 1.76% were recovered. There is a more or less random dispersion of some of the young as soon as they are able to fly. It is possible that there is a northward tendency in this dispersion. The southward migration follows the coasts of Europe and Africa to the Cape of Good Hope and then eastward and northward sometimes as far as Sicily. "Some of the first year birds remain in the North Temperate Zone in November, and many probably never cross the equator as there are records from the North Tropical Zone throughout the winter." It appears that the older birds reach Cape Province more frequently than do the young and that possibly only old birds reach Natal. "Some birds, of all ages, remain in the Tropics through-

out the breeding season instead of migrating northward; others return to their native area, perhaps frequently to the exact locality." Actually the author has but a single record of a change in colony. However, since there are only recoveries on the British Isles more data are needed to clarify these points. The small numbers of recoveries during the nesting season on the British Isles may indicate a very low mortality rate during the breeding season. The record age is that of a bird banded in June, 1917, and recovered in Southwest Africa in February, 1931.

3. Observations on Palearctic Waders and European Swallows in the Cape Peninsula. G. J. Broekhuysen and M. F. M. Meiklejohn. 1943. *The Ostrich*, Supplement No. 1, 38 pp. This paper is a significant compilation of information on the winter habits of some palearctic migrants. Observations were made at Zeekoe Vlei and Ronde Vlei, Cape Peninsula, Union of South Africa. The most common palearctic migrants at these stations were the Little Stint, *Calidris minuta* (Leisler) and the Curlew Sandpiper, *Calidris testacea* (Pallas). The Ruff, *Philomachus pugnax* (L.); Marsh Sandpiper, *Tringa stagnatilis* (Bechstein); and the Ringed Plover, *Charadrius hiaticula* L. were also common. There are abundant data on arrival dates, relative abundance at various times, and last dates observed.

ECOLOGY AND POPULATION STUDIES

4. Ruffed Grouse Management. Ralph T. King. 1943. *Roosevelt Wildlife Bulletin*, 8: 63-80. In this paper the author outlines fundamental concepts which must be observed in Ruffed Grouse (*Bonasa umbellus* (L.)) management. The information is drawn largely from his experience and investigations in north-central Minnesota. A basic consideration is the fact that Ruffed Grouse populations are fundamentally cyclic with large losses at approximately ten-year intervals. These losses may be as much as 90% of the population. Sound management requires that the periods of depletion be ascertained in advance so that closed seasons can be enforced in order to preserve the breeding stock. By censuses such declines can be detected as early as May, sufficiently early to resort to a closed season in fall. The maximum Ruffed Grouse breeding population density is one bird per four acres. Invariably larger fall densities reduce themselves to this figure during the winter. The exact reason for this limit is unknown although the author suggests that it may be accounted for by the "species intolerance of greater crowding" or the "exercise of individual territorial rights." On the basis of his experience the author regards 17% as the normal winter loss. "If the winter losses exceed 20% of the fall population the fault lies in the environment and must be sought for and corrected there. This fault is very likely to be in cover." From a management standpoint the allowable shootable population is the excess over the maximum breeding plus 20%.

In order to maintain the maximum breeding population it is necessary to have (1) A fall population 20% larger than the largest possible overwintering population. (2) A range containing all of the winter requirements for Ruffed Grouse. (3) "A degree of interspersed which will allow each unit of the range to produce and support its proportion of the total maximum population." The great single loss (aside from the periodic cyclic losses) is juvenile mortality which is normally at least 75%. In this category of juvenile mortality the author includes nest destruction (about 3% of all nests), loss of one or more eggs from clutch (about 30% of nests and amounting to 5% of all eggs observed), large chick losses during the first 30 days, loss of young due to predation (insignificant), and losses "due to a condition existing before they are hatched." The author feels that the last accounts for the greatest loss of young birds.

Concerning the nutrition of breeding birds the author makes the following statements: "At this time (breeding season) when food conditions are at their worst for the entire year, and immediately following the long rigorous period of winter, the birds are called upon to meet the greatest physical drain of the year, that is, mating and reproduction. Reasoning by analogy with domestic animals it seems logical to assume that such extreme conditions must of necessity result in reduced vitality of the subsequent broods. It is therefore highly probable that any improvement in food conditions during late winter and early spring will result in lessened juvenile mortality and a consequent increase in the survival rate." This is an interesting idea and should prove to be an interesting research problem. He suggests that clovers, strawberry, and fruit-bearing species which retain their fruits over winter and do not grow to a height that exposes the fruits above the snow during the winter are the best foods for this period. Artificial feeding has been unsatisfactory.

Cover is as important as food. The requirements for nesting cover, brooding cover, molting cover, and winter cover are discussed. Severe weather before there is sufficient snow or during periods when the snow is heavily crusted may result in considerable losses. Water requirements offer no problem except for a few weeks in late summer when there is no dew, frost, snow, or succulent vegetation.

The author emphatically denies the argument that heavy shooting during the upswing of the cycle would decrease the severity of the decline. He denies that there is any relation between overpopulation and cyclic declines. He further suggests the importance of saving a maximum number of the older age classes during the low point of the decline since "there is evidence to indicate that only those birds born four, five, and six years before the crash (decline in population) have sufficient stamina and reserve to carry them over the decline." "It is this group of older birds that makes up the group of survivors and furnishes the breeding stock responsible for the next cyclic recovery."

5. A Contribution to the Breeding Ecology of *Euplectes* (Bishop-birds) in Tanganyika Territory. N. R. Fuggles-Couchman. 1943. *The Ibis*, 85: 311-326. The author records his observations made in 1938 on the breeding habits of *Euplectes hordeacea* (L.) and *E. nigroventris* Cassin (Family Ploceidae). These observations were made at Morogoro, Tanganyika (1600 ft.) at the foot of the Uluguru Mountains. In 1938 both species had a breeding season of about three and one-half months although *nigroventris* began nesting three weeks earlier than *hordeacea*. This season both species nested in strong, almost shrubby, growths of Ramie in spite of the proximity of suitable areas of grass, the normal nesting habitat. The reason for this anomalous nesting was not apparent. Territories of *nigroventris* varied from 120-510 square yards although the largest was eventually reduced to 300 square yards. The *hordeacea* territories were usually of about 500 square yards. Boundaries were preserved rather vigorously by the males against the males of either species. However, there was one instance, at least, when a *hordeacea* male (the larger species) usurped portions of *nigroventris* territories. Also the author states that later in the season *hordeacea* males showed some tolerance for the males of *nigroventris*. *Coliuspasser abonopasser* Neunzig was tolerated in the territories of both species of *Euplectes*. Incubation period for *nigroventris* was found to be 19 days; for *hordeacea*, 13½ days.

6. A Comparative Study of the Breeding Bird Population of the Shenandoah Mountains, Virginia. Robert E. Stewart. 1943. *The Auk*, 60: 388-396. A census of breeding birds in an area of 135 acres in the Shenandoah Mountains in Virginia was made during the month of June. A total of 2160 individual birds was recorded. The breeding fauna is a mixture of Austral and Boreal with the former predominating. The three most abundant species were the Ovenbird

(*Seiurus aurocapillus* (L.)), Red-eyed Vireo (*Vireo olivaceus* (L.)) and Towhee (*Pipilo erythrophthalmus* (L.)). *Seiurus*, *Dendroica*, and *Vireo* were the most abundant genera; 92% of the nesting species were passerines; 39% belonged to a single family, Compothlypidae. The two most important game birds, the Ruffed Grouse (*Bonasa umbellus* L.) and the Wild Turkey (*Meleagris gallopavo silvestris* Vieillot), constituted about 1.5% of the total breeding population. "The ratio of diurnal birds of prey to the smaller non-predatory forms was about 1 : 259."

7. Apparatus for Marking Wild Animals with Colored Dyes. James Moffitt. 1942. *The Journal of Wildlife Management*, 6: 312-318. The author describes an inexpensive apparatus designed for marking of birds or mammals when trapping is not desirable. The animals are sprayed with a dye solution by the use of compressed air. It is suggested that this paper be consulted by anyone who is confronted with the problem of marking birds by other means than banding.

REPRODUCTION

8. Notes on the Southern Robin (*Miro australis*). L. E. Richdale. 1942. Printed by the *Otago Daily Times*, New Zealand. 8 pp. This "Robin," one of the Muscicapidae, was once a common bird throughout New Zealand, "as far as its territorial mode of life would permit," but today it is rare. "Its disappearance is due largely to the destruction of its habitat before the advance of civilization, to the introduction of vermin, and, in particular, to the domestic cat." A few bred in the aviaries of Mr. W. D. King. In September, 1940, the female built her nest and incubated her two eggs which took 20 days to hatch, the male in the meantime feeding her. For the first 10 days after the hatching of the chicks the female fed them with food supplied her by her mate; after that he fed them directly. They left the nest at three weeks, but "were kept for eight days by the male" on a particular branch. (The male had driven his mate back to incubating duties and chased her if she tried to get food for herself.) At one month the young began to pick up food for themselves and at 46 days were independent.

Mr. Richdale writes me that in 1941 the incubation period for the two eggs of this same female was seventeen days. Most unfortunately, the Department of Internal Affairs refused to allow these scientific experiments to continue, compelling Mr. King to release all his native birds.—M. M. Nice.

9. Nest Life of the Eastern Yellow Warbler. F. G. Schrantz. 1943. *The Auk*, 60: 367-387. This paper is based on the observations of forty-one nests of the Eastern Yellow Warbler, *Dendroica aestiva aestiva* (Gmelin), at West Okoboji Lake, Iowa. The mean dimensions for seventy eggs measured were 17.32 × 13.29 mm. The average weight at the end of egg laying was 1.57 gm. as compared to 1.40 gm. just before hatching. As a rule the last-laid eggs were heavier than the first-laid. Not more than one egg was laid per day. All of the incubating was done by the female; both parents shared in the feeding of the young. The incubation period is about eleven days. "The young averaged, when hatched, 1.27 gms.; at one day old, 1.87 gm.; at two days old, 2.95 gm.; at three days old, 4.36 gm.; at four days old, 5.57 gm.; at five days old, 7.26 gm.; at six days old, 8.20 gm.; and at seven days old, 8.78 gm."

10. Notes on the Breeding of the Pine Siskin. Richard Lee Weaver and Franklin H. West. 1943. *The Auk*, 60: 492-503. The unusual influx of the Pine Siskin, *Spinus pinus pinus* (Wilson), into New England during the winter and spring of 1941 was followed by the nesting of a few pairs at Hanover, New Hampshire. The author has recorded the observations made on four nests. Nesting behavior was found to be strikingly similar to that of the American

Goldfinch, *Spinus tristis tristis* (L.) in that the construction of the nest in both species requires five days and is done by the female only, although the male accompanies the female in the search of nesting material. In both species the incubation period is thirteen days and only the female incubates. The species are further similar in that in both the young are brooded only by the female; the male feeds the female by regurgitation; the young in turn are fed by the female until the latter part of the fledging period. The young of both species leave the nest fifteen days after hatching.

11. Some Notes on the Breeding of a Pair of Spotted Flycatchers. B. H. Ryves. 1943. *British Birds*, 37: 82-84. These are notes on a breeding pair of Spotted Flycatchers, *Muscicapa striata striata* (Pallas). On May 15, 1943, a male arrived, sang continuously all day, and frequently inspected a hollow in an old pine. The following day a female joined the male and both inspected the hole. On the 17th both inspected the hole again. Neither one was seen during the following two days. On the 20th the male reappeared and examined the hollow; on the 21st both birds were again present. Nothing further was seen of either birds until the 26th when excitement over the hollow became intense. Nesting began on the 30th and 31st when the female deposited some lichen in the bottom of the hollow. Inclement weather caused a discontinuance until the 6th when building was resumed; the nest was completed on the 9th. The four eggs were laid on successive days from the 12th to the 15th with occasional brooding during this period. The female alone incubated. At first incubation was for periods of 20-30 minutes, gradually lengthening to an hour as hatching approached; absences for feeding were 7-11 minutes or less in length. The eggs were hatched on June 29th, an incubation period of thirteen days.

12. Nesting of the Goosander on the Shore of Lake Geneva in 1941. (La nidification du Grand Harle sur les bords du Léman en 1941.) J. Burnier. 1942. *Nos Oiseaux*, 161: 137-144. During the summer of 1941 there were at least six nesting pairs of Goosanders, *Merganser merganser merganser* L., on Lake Geneva. This increased number is thought to be the result of the more tranquil conditions on the lake because the gasoline shortage has suspended the use of motor boats. One nest was found; it was in a hollow in a dead poplar tree about eight feet above the ground.

13. The Alta Mira Oriole and its Nest. George Miksch Sutton and Olin Sewall Pettingill, Jr. 1943. *The Condor*, 45: 125-132. The authors observed five nests of this species, *Icterus gularis tamaulipensis* Ridgway, during the spring of 1941 near Gomez Farias, Tamaulipas. The nests were in exposed positions attached to branches 30-80 ft. above the ground. One nest was in a completely dead tree while another was attached to a dead branch of a living tree. The orioles were in no way secretive in nest-building. The authors suggest that there may be some relationship between bright colors of the females of the species and the open exposure of the nests. The time involved in building the nest is not less than eighteen days and may be as long as twenty-six days.

14. An Examination of Incubation in its Wider Aspects Based on Observation in North Cornwall. B. H. Ryves. 1943. *British Birds*, 37: 42-49. The author lists several examples of retardation of egg-laying following nest building, unusual rapidity in egg-laying, and normal intervals between successive clutches. He cites several instances of brooding by females prior to incubation and some examples of delay between the time of completion of the clutch and the beginning of incubation.

15. A study of the Violet-Green Swallow. J. M. Edson. 1943. *The Auk*,

60: 396-403. This paper describes some of the observations made by the author on bird box nesting Violet Green Swallows, *Tachycineta thalassina lepida* Mearns. Of particular interest are the data on the weights of nestlings which demonstrate well the weight plateau which is reached at about 14-16 days with the subsequent decrease in weight beginning at about twenty days and continuing until departure from the nest at 23 or 24 days.

16 Factors in the Incubation Behavior of the Common Tern. Nelson Marshall. 1943. *The Auk*, 60: 574-588. Experiments involving the addition, removal, and replacement by egg-shaped stones of the eggs of the Common Tern, *Sterna hirundo hirundo* L., are described. If at least one egg is allowed to remain in the nest normal attendance by adults continues after reduction or addition to the number of eggs. Considerable variation was observed in egg-rolling. Some birds would roll eggs into their nest even though it already contained a normal complement. The tendency to roll eggs is greatest when the nest has been emptied. "The nest site, rather than the nest itself or the eggs, exerts the initial attraction to the broody Common Tern as it alights in the colony." The adults apparently do not recognize their own eggs; the general appearance of the surroundings apparently is the important factor in nest recognition.

17. Nesting Habits of the Common Redpoll. Lawrence I. Grinnell. 1943. *The Wilson Bulletin*, 55: 155-163. Nine nests of the Common Redpoll, *Acanthis linaria linaria* (L.), were studied during June and July, 1940 at Churchill, Manitoba where this species is abundant. Eggs were laid at intervals of one or two days, usually one day. Incubation period was 10-11 days and the nestling period, 11 to 12 days. Both incubation and brooding were performed by the female only. The nine nests contained 33 eggs; 72% hatched and 39% resulted in fledglings. "According to the stage of nestling development, average intervals between feedings were: 38 minutes (age one to four days); 23 minutes (age five to seven days); and 19 minutes (age eight to ten days)."

18. Canada Goose Nests and Eggs. Cecil S. Williams and Marcus C. Nelson. 1943. *The Auk*, 60: 341-345. The authors have obtained measurements from 100 nests and 174 eggs. The mean egg length was 87.7 mm. (standard deviation = 3.0 mm.) and the mean egg width was 59.1 mm. (standard deviation = 1.2 mm.).

19. Nest-site Selection by Birds. Caroline and Desmond Nethersole-Thompson. 1943. *British Birds*, 37: 70-74. This is the first part of a systematic recording of notes on nest-site selection by various species of British birds. Nine species are included in this section. Because of the condensed nature of the notes it is not possible to represent adequately here the information they contain. It is heartily recommended that readers interested in this subject consult these notes.

20. Nest-site Selection by Birds. Caroline and Desmond Nethersole-Thompson. 1943. *British Birds*, 37: 88-94. Notes on 81 additional species.

PHYSIOLOGY

21. Some Physiological Variations in the Black-capped Chickadee. Eugene P. Odum. 1943. *The Wilson Bulletin*, 55: 178-191. This paper not only contains some fundamental empirical data on heart and respiratory physiology of the Black-capped Chickadee, *Penthestes atricapillus* (L.), but also demonstrates some fundamental principles of avian physiology. Heart rate, breathing

rate, and muscle tremors were recorded with the cardio-vibrometer while the subjects were at basal conditions in a specially constructed temperature chamber. Sixteen determinations (January to June) at $90 \pm 1.5^\circ \text{F}$. gave heart rates of 346 (standard deviation, 18.2) to 547 (S. D., 25.4) beats per minute and breathing rates from 76.0 (S. D., 2.0) to 108.3 (S. D., 6.9) movements per minute; at $43 \pm 2^\circ \text{F}$. (12 determinations, February to April) heart rate varied from 538 (S. D., 28.3) to 655 (S. D., 41.0) and breathing rates, 56.5 (S. D., 2.0) to 73.3 (S. D., 6.8); at $70 \pm 2^\circ \text{F}$. (six determinations, March to June) heart rates varied from 539 (S. D., 31.2) to 555 (S. D., 23.7) and breathing rates, 50.6 (S. D., 5.8) to 76.4 (S. D., 3.6). Heart rate is subjected to two types of inherent, more or less rhythmic variation. One is correlated with breathing; the rate decreases slightly towards the peak of the inflation portion of the cycle and increases between cycles. This is opposite to the situation in mammals. The other variation is less definite and is probably due to a number of causes. "Heart rate probably may be considered a rough index to heat production and breathing rate a rough indicator of heat loss." Breathing rate increased between 70 and 90°F . Heart rate varies inversely with temperature between 43 and 90°F . The increased breathing rate is probably reflexive, being a part of the temperature regulating mechanism. Heart rate was found to be consistently higher in summer than in winter whereas the breathing rate at 90°F . was lower in winter than in summer indicating a seasonal variation in basic physiological rates. The Chickadee nestling, like other passerine nestlings, changes from a cold-blooded to a warm-blooded organism during its nest life. At about 7-9 days the temperature regulating mechanism becomes sufficiently established so that body temperatures with environments at 70°F . and 90°F . became about the same and heart and breathing rates reverse their relation to temperature. The highest heart and breathing rates were recorded at nine days. This is a significant paper.

22. Sex and Age Determination of Waterfowl by Cloacal Examination.

H. Albert Hochbaum. 1942. *Transactions of the Seventh North American Wildlife Conference*, 1942. The penis is a constant criterion of sex in all ducks, geese, and swans. It is also an age criterion. Two stages are recognized: the small unsheathed penis of immature birds and the large adult penis which is enclosed in a conspicuous sheath. It was found that the adult penis developed before the birds were a year old in the Mallard, Gadwall, Baldpate, Green-winged Teal, Blue-winged Teal, Shoveller, Pintail, Redhead, Canvas-back, and Lesser Scaup. The oviduct and bursa of Fabricius also assume adult condition by this time. The occluded left oviduct is a criterion of immaturity in females. The bursa is present only in immature birds of both sexes. Through summer, autumn, and early winter the penis, oviduct, and bursa are reliable criteria in distinguishing adult ducks from birds of the year. However Canada geese with immature cloacal characters may be birds of the year or yearlings. The author describes methods for examination of penis, cloaca, and bursa in both living and dead birds. This work contributes an excellent tool for ecology, life history study, as well as practical management.

23. A Gross Study of the Bursa of Fabricius and Cock Spurs as Age Indicators in the Ring-necked Pheasant.

J. P. Linduska. 1943. *The Auk*, 60: 426-437. The author has studied criteria for age determination on about 2000 individual Ring-necked Pheasants, *Phasianus colchicus torquatus* (Gmelin). The condition of the bursa of Fabricius was found to be a reliable indicator for distinguishing young from adults. A simple method for ascertaining the condition of the bursa in live or dead birds is described. In fall (until September) the bursa was found to persist in all juvenile birds (birds of the year). Its presence and depth can be determined by probing through its opening into

the cloaca. At this time of the year the bursa is absent in all adult birds although the opening into the cloaca may persist in a few. In these the depth is 3 mm. or less whereas the young at this time of the year usually have a bursa depth of 16 mm., never less than 10 mm. "Monthly examinations of captive birds indicated that the bursa opening was still present in all juveniles in February. However the length of the duct had been reduced to less than 5 mm. in a few cocks by January and a few hens by February." Hence after January age determinations on this basis alone would be unreliable. The use of spur length, shape, texture, and color as criteria for age determination is also discussed and statistics are given. The use of spur length should be accompanied with some caution. "It is our experience in Michigan that, as late as January, age recognition is possible for fully three-fourths of the cock birds by noting spur characters alone. The presumed ages of doubtful specimens may be easily verified by reference to the bursa, which can be probed through its opening into the cloaca. Aging of all hens was found possible into January, the juveniles being characterized by a bursa depth greater than 5 mm." It would have been interesting had the author amplified and supported his statement concerning the endocrine function of the bursa of Fabricius. This is an important piece of research.

24. The Molts of Young Wild and Domestic Turkeys. A. Starker Leopold. 1943. *The Condor*, 45: 133-145. This is the first single complete account of molting in turkeys. The young pass through three molts before acquiring the winter plumage. (1) The *postnatal molt* actually begins before hatching with the beginning of development of the juvenile remiges since the first project from their sheaths at the time of hatching. The postnatal molt of the head is not completed until the 10th or 11th week by which time the postjuvinal is more than half completed on the body and wings. The postnatal molt is a complete molt. (2) Actually the *postjuvinal molt* begins in the 4th week with the replacement of the central pair of rectrices. The first primary drops at the beginning of the 6th week and the body plumage molts in the 7th week. The postjuvinal molt of the head is delayed until about the 14th week. The postjuvinal molt, except for the retention of one or two distal primaries in each wing, is complete. (3) The first winter molt is incomplete and begins at about the 15th week. Eventually the body plumage, lesser and middle wing coverts, parts of the tail, and sometimes the upper secondary coverts are replaced. As a result there is a mixed winter plumage consisting of juvenal, postjuvinal, and winter elements. Adult turkeys undergo two molts per year, a complete molt in summer and a partial prenuptial molt late in winter. The molts in young domestic turkeys is similar to that in *Meleagris gallopavo silvestris* Vieillot although more extensive in at least three feather tracts. Hybrids are intermediate.

25. The Wing Molts of Adult Loons: A Review of the Evidence. George Miksch Sutton. 1943. *The Wilson Bulletin*, 55: 145-150. On the basis of some observations at Southampton Island, Hudson Bay, in 1929 and on a survey of some English and American literature the author points out that our knowledge on the molts of loons is incomplete. It is not apparent whether the remiges are molted once or twice a year. Information is also lacking on the occurrence of the flightless period.

FLIGHT

26. Notes on the Chimney Swift. C. Brooke Worth. 1943. *The Auk*, 60: 559-564. This paper records the unusual adaptation of flight by Chimney Swifts, *Chaetura pelagica* (L.), which were roosting in chimneys which were closed at the top so that entry could be made only through "windows" in the four sides

of the chimney. The peculiar adaptation of flight is best described in the words of the author. "The swifts flew several hundred yards from the building and then turning, dashed rapidly toward it at a height only a few feet from the ground. At a suitable distance away, they almost ceased beating their wings but turned them upward so as to glide forward and upward in an arc whose convexity was toward the wall of the building. Of course their speed diminished rapidly both forward and upward but they gauged their progress so that at the peak of the rise (when, of course, all upward motion was lost) there was still a remnant of forward movement. At this point they turned sideways and oscillated in the customary manner, so that by 'lateral translation' they were carried almost horizontally into the chimney window. This maneuver was apparently more difficult to accomplish than that required for the open-top approach, and on windy evenings it was attended by many failures. Three or four attempts were sometimes made before some of the birds succeeded in arriving properly at the windows."

27. Flight-speeds of Hawks and Crows. Maurice Broun and Ben V. Goodwin. 1943. *The Auk*, 60: 487-492. Experiments were conducted on the flight-speeds of hawks and crows at Hawk Mountain Sanctuary, Pennsylvania, using telephonic communication over a measured course. Numerically significant results were obtained for five species: Sharp-shinned Hawk (*Accipiter velox* Wilson), 37 records, range of speed 16-60 miles per hour, average speed 30.0 m.p.h., median speed, 26 m.p.h.; Cooper's Hawk (*Accipiter cooperi* Bonaparte), 12 records, range of speed 21-55 m.p.h., average speed 29.3 m.p.h., median speed 26 m.p.h.; Eastern Red-tailed Hawk (*Buteo borealis borealis* Gmelin), 54 records, range of speed 20-40 m.p.h., average speed 29.0 m.p.h., median speed 28 m.p.h.; Osprey (*Pandion haliaetus carolinensis* Gmelin), 16 records, range of speed 20-80 m.p.h., average speed 41.5 m.p.h., median speed 38 m.p.h.; Eastern Crow (*Corvus brachyrhynchos brachyrhynchos* Brehm), 15 records, range of speed 17-35, average speed 26.0 m.p.h., median speed 27 m.p.h. The bibliography does not contain the excellent monograph of Stolpe and Zimmer (*Vogelflug*, 1939, Leipzig) which has compiled much information on bird flight.

BEHAVIOR

28. The Song of the Wood Pewee *Myiochanes virens* Linnaeus: a Study of Bird Music. Wallace Craig. 1943. *N. Y. State Mus. Bull.* No. 334: 1-186. Dr. Craig, ornithologist, psychologist and musician, has done pioneer work on bird behavior, much of it with special emphasis on vocalization. In the present impressive undertaking he has studied the beautiful twilight song of the Wood Pewee with particular attention to psychological and esthetic implications. With the help of twenty observers from Maine to Oklahoma, 144 examples of the morning twilight song were collected, containing more than 93,000 phrases; these records were "analyzed statistically to determine the order of succession of the phrases and thus the musical structure of the song." During the daytime the Wood Pewee sings in leisurely style two "gliding" phrases (Phrases 1 and 2), but his twilight song contains about 50 per cent of a "rhythmic" phrase (Phrase 3); the most common "sentence" is 3132.

Figures 16-18 give the times of the first waking phrase, and of the beginning and ending of the morning twilight song, from June through August, plotted against the seasonal curves of nautical and civil twilight and sunrise. (Nautical twilight means "the exact minute when the sun is 12° below the horizon," civil twilight when it is 6° below.) The average time of the first waking phrase came when the sun was about 9° 36' below the horizon; the twilight song usually starts

well before civil twilight in June and July, but around civil twilight in August. Throughout the season "the song ends, on the average, when the sun is about 3° below the horizon," p. 109. If cloudy and clear weather had been noted by the observers, the results might have been more clear cut. The twilight song does not begin for some time after the bird's arrival in spring, but no one has yet ascertained its relation to the nesting cycle.

As to the psychology of the song, we are told that while the bird "is singing one phrase, he anticipates the next one," p. 176. The author concludes that the "wood pewee's memory span may in some cases extend over three phrases," p. 139. In the matter of esthetics, "the concept of music is used in a broad sense." The student is advised to familiarize himself with the "music of poetry. Such a study will help him to see how even the songs of the worst singers, such as the chebec and some of the other flycatchers, are in a broad sense musical," p. 161. "Our entire study leads to the conclusion that bird songs are true music, they are esthetic art," p. 169.

The book is furnished with an index and a bibliography of five pages which includes many titles on esthetics. The twilight songs of the Tyrannidae offer a fascinating subject. Let us hope that this careful study on the finest musician of them all will inspire observers to similar work on other species.—M. M. NICE.

29. Notes on the Behavior of Certain Captive Young Fringillids. George Miksch Sutton. 1943. No. 474, *Occasional Papers of the Museum of Zoology, University of Michigan Press*. Observations on twelve individuals of four species: Vesper Sparrows (*Poocetes gramineus*) backed, reaching heads forward in begging; they preferred living on the ground, but Cardinals (*Richmondia cardinalis*) and Indigo Buntings (*Passerina cyanea*) chose high places for feeding, roosting, and resting. The Vesper Sparrows were never found with heads tucked in feathers at night. Indigo Buntings were the last to settle at night. The Indigo Buntings became dominant, being the most pugnacious of the four species. Dust baths were taken by Vesper and Field Sparrows (*Spizella pusilla*). Regrettably, ages are not given when most of the birds began to bathe, drink, peck food, sing or twitter. A delightful whisper song by the oldest Vesper Sparrow was given when apparently about fifteen days old but it is not described. We know that many species, including Cardinal, Towhee, Field and Song Sparrows sing baby songs, different from adult singing, and one wishes Dr. Sutton had added data from his birds.

Alarm over some "suspicion-arousing object" was expressed by every bird by becoming slim, crouching, opening eyes wide, and becoming motionless. "The first sign of return to normal activity was the change in the shape of the eye." Puzzling "panics" occurred when, for no obvious reason, all the birds became very wild, heedlessly flying into objects. Neither persons nor a stationary broom provoked this behavior but sweeping with the broom caused frantic excitement. Excerpts from a communication of Dr. Konrad Lorenz are given, discussing "fright spasms." He says hand-raised birds of most species have no "inlet" for reactions of fleeing—that is, they are deprived of the parental warnings and signals of danger as well as the example of when to fly and from what to fly. These birds are not afraid of anything in particular, therefore they "get off" these pent up fleeing reactions at some quite irrelevant object (the sweeping broom in this case, a vacuum cleaner in the case of one of my Mockingbirds) or for no apparent reason. Lorenz says birds with innate stimuli for fleeing reactions (as the Magpie) never show these *ex vacuo* panics, except perhaps when confined alone.

A carefully handled group of birds raised in captivity in as nearly normal conditions as possible, like Dr. Sutton's group, affords almost unlimited opportunity for study of development and observations that could not be obtained in the wild, supplementing those in the field. Mrs. M. M. Nice's "Behavior of the

Song Sparrow and Other Passerines" (1943) is an outstanding example.—A. R. LASKEY.

SYSTEMATIC ORNITHOLOGY

30. A Revision of the Subfamily Estrildinae of the Family Ploceidae. J. Delacour. 1943. *Zoologica*, 38, Part 2: 69–86. The most important characters, apart from "primordial anatomical particularities," are the characteristic mouth markings in nestlings, specialized, diversified color pattern of plumage with no eclipse phase, and life habits. Young birds are able to breed within a year of their birth, "while it takes two years for young Viduinae and Ploceinae to mature," p. 72. "The nearest relations of the Estrildinae would seem to be the Viduinae, their specific parasites," p. 73. Interesting life history notes are given on these different Weaver-finches—Waxbills (Estrildae), Grassfinches (Erythrurae), Mannikins (Amadinae) and others.—M. M. NIČE.

31 List of Hummingbirds in the Collection of the Carnegie Museum. W. E. Clyde Todd. 1943. *Annals of the Carnegie Museum*, 29: 271–370. This carefully prepared and annotated list will be invaluable to students of the distribution of the Trochilidae. The Carnegie collection is most abundant in specimens from Colombia, Venezuela, Bolivia, French Guiana, Amazon Valley, Rio Tapajóz, Rio Purús, Costa Rica, British Honduras, Puerto Rico, Isle of Pines, and the Bahama Islands. The list contains notes on 5,004 specimens belonging to 324 species and subspecies.

32. Bird Weights as an Aid in Taxonomy. Dean Amadon. 1943. *The Wilson Bulletin*, 55: 164–177. The author shows that when adequate weight measurements have been made for a species the variability is less than is ordinarily supposed. Because weight is directly proportional to volume which in turn is a function of the cube of linear measurements it is logical that the cube root of weight measurements be used in comparing weight variability with the variability of linear measurements. It is suggested that weight be used as a measurement for general size as well as for a standard of comparison for measurements of appendages.

33. An Aspect of Collector's Technique. T. T. McCabe. 1943. *The Auk*, 60: 550–557. Suggestions concerning incidental observations to be made in preparing bird skins, especially in relation to the reproductive systems.

HEREDITY, VARIATION, AND EVOLUTION

34. Corollary and Commentary for "Climate and Evolution." Karl P. Schmidt. 1943. *The American Midland Naturalist*, 30: 241–253. This paper is an able and interesting discussion of the relation of climate to evolution. Although the author draws most of the examples from the distribution of various reptiles and amphibians the principles illustrated may well apply to birds. The author in reviewing the pertinent literature shows how the evidence indicates overwhelmingly that the major evolutionary changes have occurred in Holarctica and are correlated with "pulsations of climatic change" and with large scale radiating dispersal of animals. In this radiating dispersal the primitive forms are crowded to the periphery whereas the newly evolved successful forms remain in the center until displaced by the evolution of still more successful forms. However, the picture is complicated admittedly by secondary centers of evolution among the peripheral relict forms with accompanying secondary radiating dispersals. This excellent critical discussion is recommended to all ornithologists interested

in evolution and zoogeography.

35. Geographic Variation of the Genus *Columba*. Russell W. Cumley, 1943. *The Auk*, 60: 408-425. On the bases of wing, total length, culmen, and tarsus measurements of the species of *Columba* of the world the author considers the possibility of the extension of Bergmann's and Allen's Rules to the genus as a whole rather than to the individual species. He believes that Bergmann's Rule "or more likely a modification thereof" is applicable to the members of the Genus *Columba*. A generic application of Allen's Rule is not supported by the data.

GEOGRAPHIC DISTRIBUTION

36. Major Changes in the Bird Life of Southern Louisiana during Sixty Years. E. A. McIlhenny. 1943. *The Auk*, 60: 541-549. Prior to 1885 the Roseate Spoonbill, *Ajaia ajaja* (L.), was an abundant breeder; there is now a single small breeding colony in Calcasieu Parish. The Whistling Swan, *Cygnus columbianus* (Ord), and the Trumpeter Swan, *Cygnus buccinator* (Richardson), were regular winter residents before farming began; now the Trumpeter is gone and the Whistler is a rare winter visitor. Since 1905 the Mottled Duck, *Anas fulvigula maculosa* (Sennett), has increased in numbers as a nesting species; this is correlated with the decrease in the numbers of mink, raccoons, and alligators. The Swallow-tail Kite, *Elanoides forficatus forficatus* (L.), once a common nesting species, has disappeared and the Mississippi Kite, *Ictinia mississippiensis* (Wilson), has become very rare. The Eastern Red-tailed Hawk, *Buteo borealis borealis* (Gmelin), has recently become a breeding species. The Florida Red-Shouldered Hawk, *Buteo lineatus alleni* (Ridgway), always a breeder, was "never plentiful until about ten years ago." Attwater's Prairie Chicken, *Tympanuchus cupido attwateri* (Bendire), is now reduced to a single small flock. The Whooping Crane, *Grus americana* (L.), and the Sandhill Crane, *Grus canadensis tabida* (Peters), have become rare. The Upland Plover, *Bartamia longicauda* (Bechstein), was abundant when the prairies were grazed but occurs now only in small numbers. The Pectoral Sandpiper, *Pisobia melanotos* (Vieillot), has disappeared with the disappearance of cattle pastures bordering the bayous; the Long-billed Dowitcher, *Limnodromus griseus scolopaceus* (Say), has become rare because of unscrupulous hunting. The fall migration of Franklin's Gull, *Larus pipixcan* (Wagler), is about one one-hundredth of that of 1900. Passenger Pigeons, *Ectopistes migratorius* (L.), were abundant as late as 1882; the author's last record for southern Louisiana is 1896. His last record for the Louisiana Paroquet, *Conuropsis carolinensis ludovicianus* (Gmelin), is 1881; his last observation of the Ivory-billed Woodpecker, *Campyphilus principalis* (L.), was in 1923. The Brown Creeper, *Certhia familiaris americana* (Bonaparte), was a regular winter visitor up to about 1910 but has now disappeared completely; the Blue-gray Gnatcatcher, *Polioptila caerulea caerulea* (L.), has also disappeared. The Southern Robin, *Turdus migratorius achrusterus* (Batchelder), was first observed to nest in coastal Louisiana about ten years ago. The Wood Thrush, *Hylocichla mustelina* (Gmelin), has gradually increased as a breeding species. Bluebirds, *Sialia sialis sialis* (L.), have not been observed to nest in the last twenty-five years. Starlings, *Sturnus vulgaris vulgaris* (L.), first appeared in 1924; the first Great-tailed Grackle, *Cassidix mexicanus mexicanus* (Gmelin), was recorded in 1917.

37. Notes on the Birds of Southampton Island, Baffin Island and Melville Peninsula. Reynold Bray. 1943. *The Auk*, 60: 504-536. The author was drowned on September 14, 1938 during his fourth visit to the Arctic. The notes published in this paper are those made by the author while a member of the British Canadian Arctic Expedition (May, 1936-September, 1937). Additions

are by T. H. Manning on the basis of his observations made during four years at Frozen Strait, Seahorse Point, and Taverner Bay. This paper will prove to be a valuable source of ornithological information for the eastern Canadian Arctic.

38. Birds of the Mackenzie Delta. A. E. Porsild. 1943. *The Canadian Field-Naturalist*, 57: 21-35. An annotated list of observations and specimens collected by the author in this area during the periods, April, 1927 to February, 1928 and October, 1931 to October, 1935. Because little was known of this area prior to the author's work this list with its excellent notes will be an important source of information for the Mackenzie Delta area.

39. Bird Notes from Southwestern Saskatchewan. L. B. Potter. 1943. *The Canadian Field Naturalist*, 57:69-72. These notes are the results of observation made during a residence of forty years near Eastend in southwestern Saskatchewan. Although based entirely on sight records the observations constitute a valuable contribution to the knowledge of the changes in avifauna in this region. Only a few of the interesting observations can be included in this review. The Lewis Woodpecker, *Asyndesmus lewis* (Gray), is described as an uncommon straggler from the west. There is an interesting account of the disappearance of the Magpie, *Pica pica hudsonia* (Sabine), from 1904 to 1910. The Yellow-breasted Chat, *Icteria virens* (L.), is listed as a newcomer of "twenty years ago;" several nesting records are given. The American Dipper, *Cinclus mexicanus unicolor* (Bp.), is recorded as a winter species on the southern slopes of the Cypress Hills where there are swift streams. Two other unusual records are the Clarke Nutcracker, *Nucifraga columbiana* (Wilson), and the Pinyon Jay, *Cyanocephalus cyanocephalus* (Wied). The latter is a sight record however Nutcracker was collected.

40. On Some British Columbia Birds. A. L. Rand. 1943. *The Canadian Field-Naturalist*, 57: 60-63. Notes on some birds observed and collected by field parties from the National Museum of Canada on the Central British Columbia coast. Additional notes from other sources are included.

41. Notes on the Birds of the Peat Bog at La Rogivue. (A la tourbiere de la Rogivue. Notes sur un marais de la Haute-Broye.) O. Paccaud. 1943. *Nos Oiseaux*, 167: 233-236. This paper contains notes on the nesting, visitant, and migrant species of a peatbog near the village of La Rogivue in the Canton of Fribourg, Switzerland, which lies on the main migratory route through this country. The paper is of particular value because the bog has recently been drained and the trees removed.

42. Summer Birds of Northwestern Wisconsin. Hartley H. T. Jackson. 1941-1943. *Passenger Pigeon*, Vol. 3, Nos. 10, 11 and 12; Vol. 4, Nos. 2, 4, 5, 6, 10, 11 and 12; Vol. 5, No. 2. 36 pp. This paper contains many important observations and accounts of collecting records by Harry H. Sheldon, Arthur J. Poole, Dr. A. I. Ortenburger, Professor George Wagner, and the author during the summers of 1918, 1919, and 1920. It is of particular importance because of the paucity of records from northwestern Wisconsin. The annotations contain observations on the stomach contents of some of the species as well as other information. This paper will be an important source of information for northwestern Wisconsin.

BOOKS AND MONOGRAPHS

43. Waterfowl in Iowa. Jack W. Musgrove and Mary R. Musgrove. 1943. State Conservation Commission, Des Moines, Iowa. 122 pp. \$1.00. This concise little book will provide sportsmen, amateur ornithologists, and laymen

with an authoritative, yet inexpensive and usable treatise on the 35 species of Iowa waterfowl. Eight color plates by Maynard F. Reece, with special attention to eclipse plumages, greatly enhance its usefulness. For each species there is a description of all plumages, and a paragraph on useful field marks in addition to information on calls, breeding range, migration, winter range, food, and status in Iowa. The chapter on plumage variations should prove helpful to those unfamiliar with the subject. There are also brief discussions on migration fly ways, enemies, parasites and lead poisoning. The keys with accompanying notes and diagrams should be useful. Its obvious merit and its remarkable price should make this publication very popular.

44. The Wild Turkey in Virginia: Its Status, Life History and Management. Henry S. Mosby and Charles O. Handley. 1943. Pittman-Robertson Projects, Division of Game Commission of Game and Inland Fisheries, Richmond, Virginia. 281 pp. This commendable book contains much more than the title implies. The first three chapters deal with the original and present status and range of the subspecies of *Meleagris gallopavo* (L.), in North America with a more detailed discussion of the history and present status of *M. g. silvestris* (Vieillot) in Virginia.

Originally the Wild Turkey was found throughout Virginia. According to the calculations of the authors it now occurs in 69 of the 100 counties. There is an occupied range of about 13,700 square miles, about 34% of the total area of the State. There are about 6.56 square miles of occupied range per flock of native wild turkeys. In 1937 there were 2,097 flocks with 23,237 birds; in 1938, 2,020 flocks with 22,575 birds. The authors estimate that the turkey can be reestablished in about 2,200 square miles of unoccupied range thereby increasing the total occupied range by 16%. The average annual kill (1927-1939, inclusive) is about 6800. Hence 1,293 acres of occupied range are required for each turkey legally killed.

There are interesting chapters dealing with the ecology and life history of the wild turkey in Virginia as well as an account of diseases and pathological conditions. There is an elaborate treatment of food habits based on stomach analysis (524 birds). Plant food comprises 95% of the contents in adult birds; the five percent animal food is largely insects. Unfortunately there are no data on the food of poults during the period of high protein intake.

The authors present evidence to indicate that the constant danger of domestication in the rearing of the Wild Turkey in captivity can best be prevented by the mating of captive females with wild gobblers enticed into the breeding pens. Although there are some favorable data, much more evidence is required to establish the adequate survival of game farm birds and the actual feasibility of reestablishing turkeys in the unoccupied range in this manner. Of further importance would be a comparison of the survival of pure wild populations with the survival of liberated game farm birds.

This important book will be an interesting and valuable source of information to conservationists, wild-life ecologists, game managers, and ornithologists.

45. The Biotic Provinces of North America. Lee R. Dice. 1943. University of Michigan Press, Ann Arbor. 78 pp. \$1.75. The author introduces the system described in this book as "an experiment in classifying the major ecologic divisions of the continent." Because of the lack of sufficient data on the distribution of associations of animals and plants together much of the system is actually based on the distribution of plants. On the basis of his extensive field experience and a critical survey of the literature the author divides North America into 29 biotic provinces of which only the northernmost, the Eskimoan, is trans-continental. "Each biotic province, according to my definition, covers a considera-

ble and continuous geographic area and is characterized by the occurrence of one or more important ecologic associations that differ, at least in proportional area covered, from the associations of adjacent provinces. In general, biotic provinces are characterized also by peculiarities of vegetation type, ecological climax, flora, fauna, climate, physiography, and soil." It appears likely that the system may encounter difficulty in the mountainous provinces such as the Oregonian and Californian where considerable variations may occur within the province in temperature, rainfall, soil, flora, fauna, and climax associations. This is recognized and is at least partially remedied by the introduction of the *life belt*, "a vertical subdivision of a biotic province." "Frequently its distribution is not continuous, and thus a life belt may, for example, recur, under proper conditions of altitude and slope exposure, on widely separated mountains within one biotic province." It is stated that each life belt is restricted to a single province although "similar kinds of life belts" often occupy corresponding positions in adjacent provinces. Whether or not the importance of maintaining geographically continuous provinces is sufficient to relegate these altitudinal variations to the secondary order of "life belts" will become apparent as the system is subjected to application by other investigators. In reference to the classification of Clements and Shelford, "The concept of the biotic province differs from that of the biome, for a biome, if I understand its definition correctly, is coincident with its climaxes. Every area having the same climax, however far detached from the main area of that climax, seems, in the usage of Clements and Shelford, to belong to the same biome. A biotic province, on the contrary, is never discontinuous (except for marine islands), though ecologic communities somewhat similar to those characteristic of a particular province may exist far beyond its boundaries." There is a description of each of the 29 biotic provinces. A map shows the proposed limits of each of these provinces. In general the distribution of birds is not considered and ornithologists will doubtlessly be interested in testing the system from this point of view. This is an interesting book and is recommended to all who are interested in the ecology of birds. Doubtlessly the system will be modified as more information becomes available. Nevertheless it does establish a foundation for thinking along these lines.

46. Minnesota Wildfowl. Gustav Swanson. 1943. Conservation Bulletin No. 1. The Minnesota Department of Conservation, Bureau of Information, State Office Building, St. Paul 1, Minnesota. 31 pp. This bulletin is intended to present the layman with a non-technical introduction to the waterfowl of Minnesota. There are discussions of species, ranges, nesting habits, feeding habits, populations, management, and conservation. There are suggestions for the study of waterfowl by amateurs.

47. The Place of Winter Feeding in Practical Wildlife Management. Richard Gerstell. 1942. Research Bulletin No. 3. Pennsylvania Game Commission, Harrisburg, Pa. 121 pp. The author's conclusions on the role of winter feeding are based on a critical examination of the literature as well as some extensive experiments with several game species. Experiments with the Ring-necked Pheasant, *Phasianus colchicus torquatus* (Gmelin), in which birds were subjected to fasting at low temperatures showed that this species can go without food for two weeks or more during severe winter weather. Similar tests with the Ruffed Grouse, *Bonasa umbellus* (L.), although the number of experimental birds was small, indicate that this species is sufficiently hardy to withstand severe cold and lack of food for periods of several days. The Wild Turkey, *Meleagris gallopavo silvestris* (Vieillot), can endure one week of cold weather with no food; Hungarian and Chukar Partridges can endure similar conditions for four or five days. On the other hand the Bob-white Quail, *Colinus virginianus virginianus* (L.), is very

susceptible to severe cold and the lack of food. Resistance to cold and lack of food increases with the size of the covey. Semi-domesticated mallards can withstand simultaneous cold weather and fasting for a week or ten days. In all species the period of resistance to cold and fasting was substantially reduced when wind was introduced as a third factor. Attention is also given to the problem of fecundity after winter fasting periods. Preliminary experiments with pheasants in which the breeding birds were fasted for eight days in March and six days in April, showed that this amount of fasting which resulted in substantial losses in weight affected neither the numbers of eggs produced nor their fertility. On the other hand winter food shortages seem to have a distinct effect on the reproductive capacity of the Bob-white Quail. Lack of drinking water in liquid form is not an important factor in the survival of any of these species. The author's experiments confirm earlier observations that gallinaceous birds can retain grit in the gizzard for several weeks and are able to subsist two months or more in the absence of available grit without ill effect. With the exception of the Bob-white Quail these experiments and observations indicate that winter feeding is of no practical value in the management of gallinaceous game birds.

48. Studies in the Life History of the Song Sparrow II. The Behavior of the Song Sparrow and Other Passerines. Margaret Morse Nice. 1943. Transactions of the Linnaean Society of New York, VI. viii + 329 pp. \$2.00. (Address: c/o American Museum of Natural History, New York 24, N. Y.) Volume I of these studies (1937. Trans. Linn. Soc. N. Y. IV) concerns "A Population Study of the Song Sparrow," dealing "with vital statistics of a group of Song Sparrows at Columbus, Ohio: their weights, migrations, territories, nesting success and failure, and the survival of adults and young. Comparisons are made with other species, but the work is chiefly concerned with a sample population of *Melospiza melodia*." (p. 1.) Volume II treats of the behavior of the same group of wild Song Sparrows with the addition of detailed work on a number of hand-reared birds of this species and other Passerines. Comparisons are made with many other works, not alone on bird behavior but on animal psychology in general (the bibliography contains 730 titles) and there is much discussion of theories of behavior and psychology. Each chapter contains the original findings of the author correlated with those of others and discussed in the light of the important theories on the subject of the chapter. When it concerns young birds, material is presented both as to the behavior of the hand-raised birds and observation of wild ones. As in Volume I of these studies, the reader is greatly helped in the assimilation of the wealth of information and ideas contained in the book by compressed summaries at the end of each chapter. To give the gist of the work a reviewer could find no better method than to reproduce sections of these summaries.

"The point of view is fundamentally that of Lorenz, Heinroth and Tinbergen," the author states (p. 4); but other opinions are presented and discussed. "Birds 'have kept instinct as the mainstay of their behavior'; they are 'emotional animals', yet learning plays an appreciable role." "Instinctive action is defined as an inherited type of coordinated movement," while "learning 'can decide the question, whether and with what intensity in an individual case a certain instinctive act will be released'." (Lorenz).

There are five stages in the development of the young Song Sparrow from hatching to independence: (1) rapid growth and start of feather development, days 1-4; (2) establishment of temperature control, days 5-6; (3) rapid development of motor coordination, days 7-9; (4) leaving the nest, acquisition of flight, days 10-16; (5) from attainment of flight to independence, days 17-29. "Precocial birds might be considered as passing stages 1, 2 and 3 in the egg; at hatching a Bob-white is comparable in many respects to a Song Sparrow that has recently

left the nest." "The regularity in the order of appearance of most of the activities in healthy young Song Sparrows is striking. Much the same order of appearance of activities was found in representatives of 5 passerine families." Innate and learned modes of behavior of the young bird are presented and it is pointed out that "learning is largely concerned with the object of the instinctive actions." For instance, "flying is instinctive and is not learned, but expertness in landing has to be acquired by many birds."

"There are four chief ways in which a Song Sparrow may respond to other birds of its own and other species: ignore them, be attracted to them, drive them, or retire before them. These responses differ according to the season of the year." The development from "supersedence" to "peck-right" in the case of the hand-reared birds is shown and, as regards the sociality of the species the author concludes that "although the Song Sparrow is only slightly gregarious, yet it shows the basic mechanisms for social integration."

Chapter VIII deals with awakening and roosting which leads naturally to "one of the most unusual characteristics of the Song Sparrow which is its individuality in song. Each male has a number of different songs—6 to 24—that with a few exceptions belong to him alone. Despite this remarkable variety they are almost always recognizable as coming from this species." (p. 115). Females "occasionally sing early in the season before nest-building begins." Generalizing on the subject of female singers the author suggests that song might be innate in both sexes, in the course of evolution having developed in two lines; in one the "male developed the more elaborate song, in the other the female." The young male has a beautiful sort of *ad lib* warbling song, (uttered as early as on the 14th day. Young of 16 species have been reported as starting to sing at 13 to 24 days.) which becomes fixed and stereotyped in the definite repertory of the adult. Some songs may be sung by more than one individual but the author could find no proof of relationship correlated with this. Experiments on the inheritance of singing in Passerines show that whereas the song pattern of a species is innate the quality of an individual singer's song may be formed by imitation.

"Territory is of fundamental importance to the Song Sparrow, the basis of its individual and social life for more than half the year. This species may be considered a typically territorial bird, following closely the pattern of the Reed Bunting as described by Howard (1920, 1929)." (p. 151.) "Territory requirements are not rigid for the Song Sparrow; so long as he has cover and singing posts, a large variety of habitats will be accepted." This adaptability of the species has "permitted pioneering of somewhat diverse situations," the author quotes from Miller (1942). It has led to the breaking up of the species into about 28 races in North America, whereas the Lincoln Sparrow, of the same genus, adheres to "certain type of fresh-water marsh," thus thwarting intraspecific geographic variation (p. 152). The male Song Sparrow sings his advertising song from his territory as a distance threat to other males and an invitation to females. Trespassers are pursued; boundaries are defended by "ballooning" (also used by females); a male attempting to regain usurped territory goes into "puff-sing-wave display." Both males and females "show a high degree of faithfulness to their nesting territories." Both sexes drive other species from their domains, even those more than twice their own weight. "Nevertheless several of these species nested freely among the Song Sparrows."

Mrs. Nice uses the definition of territory as "any defended area." "The territorial incentive is predominant in both sexes in much of the defense against males and other species, but some of the fighting is certainly sexual." "The chief functions claimed for territory have been: food value, limitation of the numbers of a species in an area, protection against interference in the nesting cycle, assistance to pair-formation. All of these are true in some cases but not in all. They are certainly true for the Song Sparrow."

"The male Song Sparrow's 'courtship display' consists in 'pouncing,' *i.e.* he flies down, hits the female and leaves with a loud song. This occurs during the early stages of the nesting cycle, but ceases with the start of egg laying." "There is a definite bond between the pair; the birds are attached to each other during the nesting season, so long as they are closely associated." But "the male pounces on his neighbors' mates when they are temporarily unprotected. The female normally responds (in such a case), by fighting. This habit of the male is the occasion for many fights. It also opens the way for bigamy when an incubating female loses her mate." "Females are hostile toward neighboring females, using the threat-posture, threat-note and fighting."

"The problem of pair formation is primarily that of recognition. . . specific and sexual," the author states in considering the problem in general (p. 192). "With some birds the recognition of possible mates is an inherited matter (*e.g.* Cowbirds), with others the mating preference is acquired." Pair formation cannot be discussed without touching upon "dominance" and this author goes into this matter most clearly and comprehensively. "Social dominance is something that can be observed and measured; sexual dominance is a postulate that might well be discarded until thoroughly studied. If the male drives or pecks or pounces on the female, these activities are his signals that he is ready for pair formation or copulation. The female signals by posturing, trilling, etc. We do not have to say that one set of actions expresses dominance and the other submission. After all, in nature the female is free to come or go. If she really feared the male, she would stay away from him" (p. 199). The reviewer feels that this clears up a good deal of misinterpretation on this subject. "Many birds (including the Song Sparrow) respond differentially to the sexes, hence may be said to discriminate the sexes." This discrimination may come about through sex dimorphism or through behavior, as with the Song Sparrow, even though in some cases upon *first* encounter a male may not treat an approaching female as such.

The concluding chapters concern the nest, the eggs, care and defense of the young. Under enemy recognition Mrs. Nice concludes that "Owls are recognized by Song Sparrows largely through an inborn pattern, Hawks through their rapid movements, and cats and cowbirds through conditioning." In the final chapter the author says: "There are beginnings of primitive culture among birds and infra-human mammals, experience being handed down non-genetically from generation to generation, particularly in matters regarding protection from enemies."

One may feel confident that this extremely important and stimulating work more than fulfills the author's hope that it will "serve as a guide to the study of bird behavior, showing, as it does, the general pattern of development and broad outlines to be expected, and giving a viewpoint and technique which should help others to intensive observation and study" (p. 3). Rather one believes it to be a standard for all future students to strive for. Probably wartime conditions are responsible for the more than usual crop of typographical errors that mar the book's pages.—LAILAW WILLIAMS.