they were again roosting together.—Ralph W. Dexter, Dept. of Biology, Kent State University, Kent, Ohio, and Gordon L. Hight, Jr., P.O. Box 1626, Rome, Georgia.

Purple Finch Heeds Call. — On June 2, 1954, Miss Louise Payson, 83 Carroll Street, Portland, Maine, brought to me a Purple Finch (*Carpodacus purpureus*) suffering from a bill injury which caused him to hold the bill partially open. Examination revealed a crack across the lower mandible on the outside, about half way between the tip and the base; and one side was slightly bent inward. Careful manipulation straightened the curve somewhat, at least temporarily. It seemed to be an old injury, as the portion of the bill from crack to the tip had darkened considerably. He was unable to crack sunflower seeds but could take small bits offered, scooping them up with the point of his bill and working them around with his tongue. He was a most co-operative patient, taking food from my fingers and drinking from a spoon.

It was decided that he would be able to find enough food he could eat to sustain life, as his body was in good condition. So we banded him (No. 52-60529) and released him on June 3rd, at about 2 P.M. Miss Payson requested that we release him in our banding station instead of bringing him back to Portland, as she felt he would have greater protection in our fenced-in feeding area and freedom in adjoining woods. There would be company of his kind for Purple Finches are numerous at the feeders now.

I saw him at intervals during the afternoon and at 4 P.M. he was eating ground peanut hearts at the window feeder. Miss Payson called to report that at 6 P.M. that night he was eating bits of food from his accustomed place at her feeder, and his mate was with him. He was brought to me in a covered cage by auto from Portland, a distance of five miles. Banded and released the next day, he found his way back to home and mate in less than two hours! — Irma A. Werner, 100 Tolman Street, Cumberland Mills, Maine.

Redstart Five Years Old. — As not much seems to have been published on ages of warblers, this recent recovery of a female Redstart (*Setophaga ruticilla*) may be of interest.

The bird was trapped by me on July 28, 1949, recorded as probably an immature, and tagged with band 46-22566. On June 3, 1954, it was brought dead to a house about three quarters of a mile as the crow flies from my station, by a cat. Its age therefore was approximately five years.

Although never handled by me in the intervening years, it is a fair guess that this bird has nested in this vicinity, though not close to the station, during that period. — William P. Wharton, Groton, Mass.

RECENT LITERATURE

BANDING

(See also Numbers 10, 71)

1. Bird Banding in Finland in 1948 and 1949. (Die Vogelberingung in Finnland in den Jahren 1948 und 1949.) Ilmari Välikangas and Helena Huuskonen. 1951. *Memoranda Societatis pro Fauna et Flora Fennica,* **27**: 54-60. The banding program sponsored by the Zoological Museum of Helsinki University resulted in the banding in 1948 and 1949 of 1787 birds of 85 species. The list of recoveries includes 37 records for 22 species. An Osprey (*Pandion haliaetus*) banded near the Gulf of Bothnia at the end of October was recovered the following summer in Italy. A Woodcock (*Scolopax rusticola*) banded in western Finland on 4 August 1937 was recovered in Turkey 3 February 1942.—D. S. Farner.

2. Bird Banding in Finland in 1950 and 1951. (Die Vogelberingung in Finnland in den Jahren 1950 und 1951.) Ilmari Välikangas and Göran Nordström. 1953. *Memoranda Societatis pro Fauna et Flora Fennica,* **28**: 79-98. During these years the banding activities sponsored by the Zoological Museum of Helsinki University increased substantially. The total banded was 7,545 of 123 species. The list of recoveries contains 134 records for 42 species, including 15 foreign recoveries of *Turdus pilaris,* mostly from France. A Wryneck (*Jynx*

torquilla) banded in mid-July in southern Finland was recovered the following September in northern Italy. Also included is the first recovery of a Finnish Turnstone *(Arenaria interpres)* in Africa—banded on the southern coast of Finland 2 July 1951 and recovered in Morocco on 30 September 1951.—D. S. Farner.

3. Banding Sponsored by the Stavanger Museum in 1950. (Stavanger Museums Ringmerkingsarbeid 1950.) Holger Holgerson. 1951. *Stavanger Museum Årbok* 1950: 77-85. During 1950 the total individuals banded was 6,803. Among the interesting recoveries are those of the first Norwegian Curlew *(Numenius arquatus)* in northern Ireland, the first two recoveries of Norwegian Song Thrushes *(Turdus ericetorum philomelos)* in France and Spain, and a Golden Eagle *(Aquila chrysaëtos)* banded as young and recovered 145 km. southwest the following October.—D. S. Farner.

4. Banding Results from Revtangen in 1950. (Ringmerkingsresultater fra Revtangen på jaeren i 1950. Meddelelse Nr. 3 fra Ornithologisk Stasjon.) *Stavanger Museum Årbok* 1950: 87-92. During 1950, 3,039 individuals were banded; 60 recoveries, mostly of shore birds, are reported. A Little Stint *(Calidris minuta)* banded on 24 August 1948 was recovered 7 September 1948 in Italy. A Knot *(Calidris canutus)* banded the morning of 26 August 1950 was shot the next afternoon in Denmark; another banded 4 September 1950 was shot two days later in Denmark; a third banded 1 October 1950 was recovered on 7 October 1950 in Spain.—D. S. Farner.

5. Bird Banding Activities of the Stavanger Museum in 1951. (Stavanger Museums Ringmerkningsarbeid 1951.) Holger Holgerson. 1951. *Stavanger Museums Årbok* 1951. 11 pp. (reprint pagination.) The total individuals banded during 1951 was 12,756, about 7,500 of which were nestlings. There are records of 266 previously unrecorded recoveries. Among these is the record for a *Motacilla alba* banded in June 1951 at Rindal and recovered in Lebanon the following October.—D. S. Farner.

6. The Activities of the Ottenby Ornithological Station in 1951. (Verksamheten vid Ottenby fågelstation 1951. Meddelande nr 13 från Ottenby fågelstation.) Gunnar Svärdson. *Vår Fågelvärld,* **11**(4): 153-176. During the year 9,849 individuals of 151 species were banded. Among the 166 new recoveries are two important records of *Anthus cervinus:* The first was banded 22 September 1949 and found dead in Vittangi, Norbotten, 1350 kilometers NNE of Ottenby, 31 August 1951; the second was banded on 15 September 1951 and recovered in Vicenza, Italy, 19 October 1951. Further evidence of the southeasterly migratory route of *Sylvia curruca* was obtained in two recoveries from Lebanon. Also included in this report are the records of observations of migrants passing through Ottenby. Of particular interest are the data on several species of shore birds. A resume for 1941-1951 shows a marked increase in the numbers of *Motacilla alba* recorded.—D. S. Farner.

7. The Activities of the Ornithological Station at Ottenby in 1953. (Ottenby Bird Station Report No. 17.) (Verksamheten vid Ottenby fågelstation 1953.) Wolf Jenning. 1954. *Vår Fågelvärld,* **13**(2): 53-76. (English summary.) The Ottenby Station banded 13,988 birds of 112 species in 1953, a noteworthy increase over 1952 (see *Bird-Banding* **25**:114). Again the number of waders handled, 6,407 of 25 species, is outstanding, and the returns and recoveries from them most rewarding. Between 8 July and 11 August they banded 3,508 Dunlins *(Calidris alpina)* alone, and took 53 more previously banded, five of which had carried their bands 5 years.—O. L. Austin, Jr.

8. Results of the ringing investigation of migration instituted by the Royal Museum of Natural History, Leiden, 39 (1952), 1. (Resultaten van het ringonderzoek betreffende de vogeltrek, ingesteld door het Rijksmuseum van Natuurlijke Historie te Leiden, XXXIX, (1952), 1.) G. C. A. Junge and J. Taapken, 1953. *Limosa,* **26**(3-4): 80-100. Lists the raw data for some 450 returns and recoveries received in 1952 for 36 species of herons, ducks, hawks, rails, waders, and gulls banded in Holland under the Royal Museum's ringing program. The largest numbers of records are for the Mallard (124), Green-winged Teal (105), Lapwing (58), and Golden Plover (43). A large percentage of the recoveries are

from abroad, from the British Isles and Scandinavia to the north, and from almost all the other European countries to the south; there are several from northern Africa. It is gratifying to note a number of waterfowl and waders reported from within the U.S.S.R., the farthest east being an *Anas crecca* banded in October 1950 and reported from the Riazan district, southeast of Moscow, in August 1952. Of interest for their longevity are a 14-year *Platalea leucorodia*, one 16- and one 17-year *Haematopus ostralegus*, and two 23-year *Larus argentatus*.—O. L. Austin, Jr.

9. Recoveries of birds banded abroad, 26. (Terugvondsten van in het buitenland geringde vogels, 26.) C. G. B. Ten Kate and J. Taapken. 1953. *Limosa*, **26**(3-4) : 123-133. Lists mainly from the records of the Leyden Museum and the senior author, with a few from published foreign sources, the foreign-banded birds recovered in Holland during the last few years. Raw data are given for some 325 recoveries of 50 species, most of them banded in nearby England, Belgium, and Helgoland, a significant number from the Scandinavian countries, and a few from Finland and the U.S.S.R.—O. L. Austin, Jr.

MIGRATION

(See also Numbers 6, 16)

10. Migration of Norwegian Alcidae. (Hvor kommer alkena fra.) Holger Holgerson. 1951. *Stavanger Museums Årbok*, 1951. 12 pp. (reprint pagination). An analysis of 124 recoveries of Razorbilled Auks *(Alca torda)* banded in breeding areas in northern Norway shows that relatively few remain in northern waters in fall and winter; most migrate south to southern Norway, some to Sweden and elsewhere along the Baltic. The south coast of Norway is visited in winter also by Razorbills from Great Britain, Murman, and the Baltic. Analysis of 458 recoveries of Murres *(Uria aalge)* shows very little movement away from the breeding area in northern Norway; on the other hand the southern coast of Norway in winter has migrant Murres from Murman, the Baltic, Britain, and the Faroes. Of 105 recoveries of Puffins *(Fratercula arctica)*, most of them banded as breeding adults, 102 are recaptures at the breeding site.—D. S. Farner.

11. Arrival Times in Reference to Migratory Routes. (Ankomsttider og traekdelere.) Børge Palm. 1952. *Dansk Ornithologisk Forenings Tidsskrift*, **46** (1) : 32-52. In this interesting paper the author attempts to obtain information concerning the migratory routes of certain passerine species by comparing arrival times in spring in 1943 and 1950 bearing in mind the differences in meteorologic conditions between these two seasons. The arrivals of *Muscicapa hypoleuca*, *Phoenicurus phoenicurus*, and *Saxicola rubetra* were late in 1950 whereas the arrival of *Sylvia curruca* was not. It is consequently suggested that the routes of the former three pass through an area subjected to the cold spell which covered Great Britain, France, and West Germany during the first week of April 1950. Presumably, then, *Sylvia curruca* did not arrive late in the spring of 1950 because its migratory route lies to the east of the area subjected to the cold spell. There is considerable discussion of the general usefulness of this type of analysis and an extension of it to several other species.—D. S. Farner.

12. Site-tenacity among German Marine Birds. (Ueber die Heimattreue deutscher Seevögel.) Rudolf Drost. 1953. *Journal für Ornithologie*, **94**(1/2) : 181-193. Analysis of recoveries of *Larus argentatus argentatus*, *Larus canus canus*, *Sterna sandvicensis sandvicensis*, *Sterna hirundo hirundo*, *Sterna macrura*, *Sterna albifrons albifrons*, *Haematopus ostralegus ostralegus*, and *Charadrius alexandrinus alexandrinus* banded along the coast of Germany indicates that all have a tendency to return to the birthplace to breed although the selection of another breeding site is not uncommon. A considerable amount of change of breeding locality is to be noted among *Larus argentatus*, *Sterna hirundo*, *Sterna macrura*, *Sterna albifrons*, and *Charadrius alexandrinus*. An interesting case is recorded for a Little Tern: This bird was banded in June 1946 at Minsener Oldeoog and captured at the same locality in June 1950; it was then taken again in July 1950 as a breeding bird at Wilhelmshaven, and finally in 1951 as a breeding bird at the original banding site. —D. S. Farner.

13. Observations on Migration in Southwestern France. (Observations sur la Migration dans le Sud-ouest de la France.) D. F. Owen and J. F. Burton. 1953. *Alauda,* **21**(4): 223-239. From Sept. 30 to Oct. 13, 1953 these two English naturalists made observations in France on the migration of birds and insects. From the English summary we learn: "The movements of birds at the coast were always more or less to the south; inland many birds flew west or south. The peak movements always occurred during the 3 hours after first light. . . . Birds which breed near or among trees . . . usually migrated over the edge of the forest, whereas species which breed in open country, . . . tended to migrate over the dunes." —M. M. Nice.

14. Notes on Autumnal Trans-Gulf Migration of Birds. J. B. Siebenaler. 1954. *The Condor,* **56**(1): 43-48. Observations on the movements of birds over the Gulf of Mexico were made during September and October of 1952 from the U. S. Fish and Wildlife Service exploratory fishing vessel, "M/V *Oregon*". The *Oregon* worked waters off the coast of Alabama, Mississippi, and Louisiana (September 17-20), moved across the Gulf toward the Yucatan Peninsula as far as Alacran Reef (October 1-4), and from the vicinity of Arcas Reef along the Gulf coast of Mexico to Port Brownsville, Texas (October 6-14). During daylight hours many thousands of land birds (predominantly small passerines) were seen flying in a southerly direction. The largest numbers were seen on October 3 and 4 while the *Oregon* was 160 to 80 miles north of Yucatan. Birds of more than 20 species were collected for positive identification. These observations contribute substantially toward an evaluation of the importance and the nature of trans-gulf migration. —L. R. Mewaldt.

LONGEVITY AND MORTALITY

(See Numbers 7, 8)

POPULATION DYNAMICS

(See also Numbers 12, 36, 37, 39 through 49, 52, 72)

15. The Final Communication on the Starling Population in Rossitten. (Schlussbericht (1944) über die Starsiedlung in Rossitten.) Ernst Schüz. 1953. *Journal für Ornithologie,* **94**(1/2): 31-35. The author emphasizes the importance of comparative biologic studies of populations of geographically widespread species. This paper represents the final observations in this respect for the Starling population at Rossitten.—D. S. Farner.

16. Biology of the Dipper, *Cinclus cinclus aquaticus.* Part I. Population Movements. (Zur Lebensweise der Wasseramsel. Erster Teil: Der Ortswechsel.) Helmut Richter. 1953. *Journal für Ornithologie,* **94**(1/2): 68-82. For the period 1948-1952 the author color-banded Dippers in a 10 km. study area along the Wilden Weisseritz in the vicinity of Tharandt, Germany. Seventy-three individuals were marked; 64 of these were within the study area. The sex ratios obtained are of considerable interest: for adults, 20 males, 17 females; nestlings, 16, 3; flying young, 12, 5. In each breeding season there was a surplus of males approximately equivalent to the number of breeding males. The surplus males were mostly first-year birds. The author concludes that most Dippers become permanently attached to a territory after the initial pairing, although some individuals leave the territory in autumn and return in February-March. These are regarded as migratory. Young birds were found to wander rather extensively prior to pairing; most of the movements for a given individual were less than 10 kilometers in total magnitude. The author's data suggest that there is in July and August, among the young birds, a *Zwischenzug* period in which there is extensive shuffling; September appears to be a period of relative stability followed by additional movements *(Herbstzug)* in October. During the *Zwischenzug* period of the young, the adults are in molt and are relatively sedentary. In short flights the Dippers were found usually to fly at 0.5-1 meters height whereas in longer flights the height was usually 2-3 meters.—D. S. Farner.

17. Population Studies on Hawks. Results of Breeding in 1940-1951. Investigations on Seven Species. (Populationsstudien an Raubvögeln. II. Bruterfolg 1940-1951, untersucht bein 7 Arten.) Victor Wendland. 1953. *Journal für Ornithologie,* **94**(1/2): 103-113. The author presents data on seven additional

species (See *Journal für Ornithologie*, **93**(2) : 144-153; *Bird-Banding*, **25**(1) : 21.) of breeding hawks for a 12-year period in a 137-square kilometer tract of forest about 25 kilometers north of Berlin. The following is a summary of data obtained from the nests observed by the author during this period.

Species	Pairs Observed	Nests Destroyed %	Successful Nests	Young fledged per successful pair	Young fledged per pair
Black Kite, *Milvus migrans*	39	38.4	24	2	1.23
Red Kite, *Milvus milvus*	8	37.5	5	2	1.1
Honey Buzzard, *Pernis apivorus*	16	37.5	10	1.6	1
Goshawk, *Accipiter gentilis*	14	28.0	10	2.3	1.64
Duck Hawk, *Falco peregrinus*	17	76.4	4	2	0.47
Kestrel, *Falco tinnunculus*	35	37.1	22	3.04	1.91
Hobby, *Falco subbuteo*	32	46.8	17	2.05	1.1

It is the author's impression that population densities of most of these species remained constant for the most part during this period. However, there was a reduction of Duck Hawks which he is inclined to associate with the reduction of domestic pigeons. The destruction of Goshawk and Duck Hawk nests is almost exclusively human. With Black Kites and Hobbies the principal agent is egg predation by crows.—D. S. Farner.

18. Storks in Schleswig-Holstein in 1948 and 1951. (Von den schleswig-holsteinischen Störchen.) Walther Emeis. 1953. *Journal für Ornithologie*, **94** (1/2) : 114-116. Although the total number of pairs in 1951 (814) was lower than in 1948 (1,002), the number of pairs with young was approximately the same — 609 in 1951, 605 in 1948. The number of young produced in 1951 was 1,901 (3.1 per pair) compared to 1,524 (2.3 per pair) in 1948.—D. S. Farner.

19. The Index of Heron Population, 1953. W. B. Alexander. 1954. *British Birds*, **47**(4) : 108-111. Again after a mild winter, the sample heronries of *Ardea cinerea* in the British Isles showed a slight increase, 3 percent, over the figures for 1952.—M. M. Nice.

20. The Stability of the Heron Population. David Lack. 1954. *British Birds*, **47**(4) : 111-121. A discussion of possible factors whereby the population of Herons stays fairly constant "apart from a marked decrease after each hard winter and a rapid recovery back to the previous level." Dr. Lack suggests that the food supply would seem to be the controlling factor, but "How do newcomers determine when a colony has reached the limit?" The editor, E. M. Nicholson, suggests that there may be a higher proportion of overlooked nests in peak years and adds: "If, for example, recent injunctions succeed in greatly mitigating pollution, carrying capacity for Heron breeding population could be increased and a new and higher level of stability might be reached after an unsettled period."—M. M. Nice.

NIDIFICATION AND REPRODUCTION
(See also Numbers 17, 18, 30, 31, 34, 56, 63, 72)

21. Observation of feeding, brooding, and bathing habits in a pair of Kingfishers. (Observationer rörande ett par kungsfiskares *(Alcedo atthis)* matning och ruvning av ungarna, badningsteknik.) P. O. Swanberg. 1952. *Vår Fågelvärld*, **11**(2) : 49-66. Nest-building began on 21 May 1951; young were hatched on 27 June. At first the male and female shared in feeding the young. On 7 July courtship display was observed and the female disappeared for about 10 days. The male then alternated in feeding the young of the first brood with incubation in a second nest about 5,500 meters away. The first egg in the second nest was probably laid about 6 July when the first brood was 9 days old. The first brood left the nest about 24 July and the second clutch was hatched on 1 August. The male and female then shared brooding and feeding equally for 5 or 6 days, the female spending the night on the nest. Some data are given on rates of brooding and feeding; the young were fed only fish. The manner of bathing is well illustrated with elec-

tronic-flash photographs. Splashing into the water after emerging from a dirty tunnel is suggested to be a well-developed instinct. Selection of food is suggested to be a combination of instinct and learning since a young bird was observed several times diving and fetching a small twig.—D. S. Farner.

22. Observations on the Reproductive Biology of the Starling. (Beobachtungen zur Brutbiologie des Stares *(Sturnus v. vulgaris* L.).) Hans G. Wallraff. 1953. *Journal für Ornithologie,* **94**(1/2): 36-67. This paper is a valuable contribution to the comparative biology of Starling populations. The data, which can only be summarized in a fragmentary manner in a brief review, were obtained from observations of six nest boxes in Nürnberg in 1948-1951. Until the time of egg laying both members of the pair were found to spend the night in the nest box; after the beginning of egg-laying only the female was found in the nest box at night. After an initial period of exploration males were found to establish possession of a nest box and then to attempt to extend control over adjacent nesting sites. Frequently a male succeeded in extending control over more than one territory; however, actual combat between males rarely occurred. A few days after the establishment of the males, females began seeking nesting places; they appeared shy in examining nest holes in a manner similar to that of males examining a strange nest hole. Pair formation was found to involve a gradual familiarization of the female with a particular site probably becoming complete, with some readjustment, a few weeks before egg laying. The observations of the author include one of simultaneous bigamy. Copulation was found to occur, for the greater part, before and during egg laying (latter half of April) but sometimes as late as the time of hatching. Both sexes were found to participate in nest building. A gradual transition from an initial nest-box clearing activity to nest building was observed. Egg-laying was found to occur during the morning hours (before 10 A.M.) and at 1-day intervals. A marked change in behavior was noted 1 or 2 days before the beginning of egg-laying; there was less nest-building activity, more singing, a restless tendency to fly in and out of the box, and above all a tendency for the female to remain in the box for longer periods. Egg dimensions and weights were found to differ rather extensively among various females; differences within a clutch appear to be unrelated to the order of laying. Incubation began immediately after completion of the clutch. Both sexes were found to incubate although the part played by the female is more extensive; all nocturnal incubation was performed by the female. Incubation period is about 12 days. Eggs did not hatch necessarily in the order of laying. Both sexes fed the young, the male usually less than the female. As the young became older the interval between feeding trips by the adults to the nest was observed to decrease from 11.5-13.8 minutes immediately after hatching to 3.3-4.4 minutes at 14 days. Departure from the nest was at 19-21 days after hatching. The laying of the second clutch began about 1-2 weeks after the fledging of the first brood. Two observations of post-molt interest in nest boxes are recorded. —D. S. Farner.

23. Reproductive Biology of the Ruff. (Zur Fortpflanzungsbiologie des Kampfläufers *(Philomachus pugnax* L.) Heinz Mildenberger. 1953. *Journal für Ornithologie,* **94**(1/2): 128-143. Observations were made during the spring of 1950 on five individually identifiable males, seven females, and seven nests on Entensee near Wilhelmshaven. The locations of the breeding territories were fixed by the courtship sites as selected by the males. The females established nest sites and nest territories in close relationship to the courtship sites. There was a recognizable order of dominance among the males. This was manifested primarily in the contention for some courtship sites and in the overlapping into the areas of neighboring weaker males. Within this small population polygyny, polyandry, and monogamy were observed. A rational relationship of all males to females and nests was unmistakable although variations in the strength of the relationships were likewise obvious. Nest construction, incubation, and care of the young were effected exclusively by the females. The interval between laying successive eggs was 24-40 hours. Incubation period was 22-23 days.—D. S. Farner.

24. Notes on the Ecology of the Petrels of Adelie Land. (Notes sur l'écologie des Pétrels de Terre Adélie. *Expéditions Polaires Françaises.* (Missions Paul E. Victor). *Expeditions Antarctiques en Terre Adelie* 1949-1953. Note Ornithologique No. 11.) Jean Prévost. 1953. *Alauda,* **21**(4): 205-22. Interesting

observations, particularly on three species. In the spring Snow Petrels *(Pagodroma nivea)* are active in the daytime, but in summer only at night. The male spends the week before the egg is laid at the nest and his constant presence helps to melt the ice. The Cape Pigeon's *(Daption capensis)* egg averages 67.3 grams; incubation lasts 44 to 47 days. The Giant Fulmar's *(Macronestes giganteus)* egg is laid about 25 to 30 days after the first copulations; it averages 333.8 grams and incubation lasts about 60 days. The young hatch about the first of January, are well fed by their parents through March, but only irregularly in April, by which time they have acquired the juvenile plumage. A number die upon leaving their nests. As to the adults, certain individuals remaining on their nests during blizzards, get their heads completely covered with ice. If the hood does not promptly melt, the bird. blundering about among the rocks, may break a wing and soon starve to death. Giant Fulmars are important enemies of the young Emperor Penguins *(Aptenodytes forsteri)*; in preference to dead or starving chicks, they choose the well-fed ones for their victims.—M. M. Nice.

25. Cowbird Parasitizing Eastern Bluebird. Robert S. Ellarson. 1953. *Passenger Pigeon*, **15**(4): 163-164. On June 7 a *Sialia sialis* nest contained four eggs of the host and a just hatched *Molothrus ater*. On June 18 the latter fledged and was never seen again; the young Bluebirds did not leave until after June 22. It would have been of much interest to have ascertained whether the adult Bluebirds did care for the Cowbird outside the nest, when their own young still had about 6 more days to spend in the nest.—M. M. Nice.

26. Apparatus for the Study of Incubated Bird Eggs. Harold C. Hanson. 1954. *Journal of Wildlife Management*, **18**(2): 191-198. The egg volumeter described here is a titration burette with a stopcock welded to its upper end and a ground-glass joint fused to the lower end, the inserted portion of which is sealed off to form a plug. Attached to the inner end of the ground-glass plug is a spring-tension holder for the egg. The apparatus shows egg volumes quickly and accurately by measuring the amount of water displaced. The author also describes and illustrates a portable field egg candler designed to ascertain the viability and age of embryos, and an effective technique of photographing incubated eggs using a dark box with a flash gun as a light source. This paper is a worthwhile contribution in instrumentation and techniques.—Helmut K. Buechner.

27. Experience with artificial swallow nests. (Erfahrung mit künstlichen Schwalbennestern). H. Lohrl. 1954. *Ornithologische Mitteilungen* **6**(1): 5-6. This brief note describes the use of artificial swallow nests made of sawdust-cement mixture to restore the population of Swallows *(Hirundo rustica)* and House Martins *(Delichon urbica)* to a village. The need for cleansing these nests of parasites is discussed.—R. O. Bender.

LIFE HISTORY
(See Numbers 16, 22, 24, 64, 72)

BEHAVIOR
(See also Numbers 16, 21, 22, 23, 24, 64, 65, 72)

28. The Diurnal and Annual Rhythm of the Tawny Owl. (Natuglens (*Strix a. aluco* L.) døgn- og årsrytme.) Lindhard Hansen. 1952. *Dansk Ornithologisk Forenings Tidsskrift*, **46**(4): 158-172. In this interesting paper the author has obtained information on diurnal and annual rhythms by an analysis of rates and temporal distribution of calls. The study area on Lolland was under observation for the period August 1949-August 1951 during which time five pairs were usually present. It was found that the "ee-calls" and "oo-calls" are not sex restricted as previously thought, nor is the "oo-call" a "mating call." It is interesting to note that none of the five pairs produced young in the spring of 1950 which followed a severe mid-winter reduction in mouse populations. Call notes reached a maximum from mid-February to early May, a minimum in June-July, and another maximum in August-October. The mean time elapsed between sunset and the first call of the evening varied from 9 minutes in August-September to a maximum of 34-46 minutes in December-January. The mean time elapsed between the last call to sunrise varied from 26-27 minutes in August-September to 56-66

minutes for December-January. The rate of calling was found to be in inverse relation to wind velocity. Cold weather and rain also have a depressing effect. Light intensity appears to have little, if any, effect on rate of calling. Wind and cold, operating simultaneously, have a particularly strong depressing effect.—D. S. Farner.

29. Calls and Annual Cycles of Calls of Tengmalm's Owl. (Lautäusserungen und jahreszeitliche Gesangstätigkeit des Rauhfusskauzes, *Aegolius funereus* (L.).) Rudolf Kuhk. 1953. *Journal für Ornithologie,* **94**(1/2): 83-93. The author describes about 12 calls, "songs," etc., together with their variations, and with comments concerning their probable functions. Most of the data were obtained in the Lüneburger Heide in northwestern Germany. "Nuptial song" may begin as early as November or as late as the latter part of January; it increases markedly in late February and March. By June the frequency falls off markedly; none was heard in July. A brief period of "autumn song" occurs in September-October and has a duration of about 10 days.—D. S. Farner.

30. Observations on the Blue-cheeked Bee-eater in the Wild and in Captivity with Comparisons with the European Bee-eater. (Beobachtungen am afrikanischen Blauwangenspint *(Merops superciliosus chrysocercus)* in freier Wildbahn und Gefangenschaft, mit Vergleichen zum Bienenfresser *(Merops apiaster* L.). Lilli Koenig. 1953. *Zeitschrift für Tierpsychologie,* **10**(2): 180-204. The detailed observations on *Merops apiaster* were reviewed in this journal in July 1952, p. 121. The present study covers field experience in Algiers and observations on six young taken at the age of 6 to 16 days and hand-reared in Vienna. Incubating parents relieve each other at intervals of about 75 minutes. The burrows serve as refuges during sand storms. Young are fledged at 30 days, at which age they first leave the burrow. "The instinctive movement of killing insects by beating them on the perch was observed as 'vacuum-activity', not only in captivity but also in the field. It was also seen as a displacement activity before copulation." Sun-bathing was often seen in captivity, but never in the great heat of Africa. "The maturation of many instinctive activities takes place a long time before they are used." A European Bee-eater, raised from the egg, showed first intimations of instinctive activities from the third day on (p. 189). Both species are sexually ambivalent. One Blue-cheeked Bee-eater courted Frau Koenig, but also courted its nest-mates. This excellent paper is illustrated with many fine photographs and concludes with a good summary in English.—M. M. Nice.

31. Behavior and Biology of the Caspian Tern. (Verhalten und Biologie der Raubseeschwalbe *(Hydroprogne tschegrava).*) Göran Bergman. 1953. *Acta Zoologica Fennica,* **77**: 1-47. A good study of the behavior of *Hydroprogne caspia* with comparisons with other terns and with gulls. Caspian Terns have increased of late years on the Finnish coast. In 1949 five adult males and four adult females were color-banded; the following spring all the males and three of the females returned to the former breeding place (p. 16). Two to three eggs are laid. There may be a 5- to 6-day difference in the age of the young, yet all do well. In 1949 and 1950 only 15 to 20 percent of the young were lost, but in years with cold, rainy weather and high tides, nearly all the young may perish. The young snap at the end of their parents' beaks as soon as they leave the nest, at the same time giving the hunger cry. Small young can swallow fish as long as 15 cm. (6 inches), but parents may bring fish as long as 25 cm. (10 inches); during the first days half the fish are too large. When a fish has fallen to the sand, the parent takes it to the shore and washes it while swimming. One parent washed a 20 cm. herring 5 times, each time offering it to a newly hatched chick. Chicks of 8 to 10 days can swallow the large fish and washing is seldom seen.

Two series of experiments were made with colored paper models of bills; the strongest reaction of the 5 hour to 2 day chicks was to red or black with a different colored tip — corresponding to the fish. They also pecked at yellow, white and reddish flowers waving in the wind and at the yellow bills of their brothers and sisters, but not at green paper, nor green vegetation.

At 4 days the chicks can swim without becoming wet; the parents try to lure them back to the shore with "fish-calls" and "fish-displays." (p. 40). At 7 days the chicks may start to fight, taking part in their parents' quarrels with neighbors. They learn the voices of their parents; when very hungry they may beg from

strangers, but these pay no attention to them. At 46 to 48 days young may accompany their parents on fishing flights. There are 15 photographs of different displays and a three page bibliography, but no summary.—M. M. Nice.

32. Social Feeding Behavior of Birds. Austin L. Rand. 1954. *Fieldiana: Zoology*, **36**(1): 5-71. An interesting and comprehensive review paper, dealing with 18 categories under three divisions: individuals of one species in relation to food; birds of one species associating with a non-prey animal in feeding; many species of birds feeding together. Striking examples are given of beating for food and other types of cooperation in securing food, as in cormorants and pelicans. Possible stages are discussed through which the more complex patterns might have evolved.—M. M. Nice.

33. The Hovering of the Wheatear. J. P. Conder. 1954. *British Birds*, **47**(3): 76-79. Different explanations have been offered for the function of the "hovering" of *Oenanthe oenanthe;* as a result of his extended experience with this species the author concludes that the Wheatear hovers primarily for the purpose of observing actual and potential predators, although it may occasionally hover in order to procure food.—M. M. Nice.

34. Juvenile Mistle Thrushes Showing Reproductive Behaviour-Patterns. Derek Goodwin. 1954. *British Birds*, **47**(3): 81-83. Of four hand-reared *Turdus viscivorus* kept in an aviary for 3 weeks after they could feed themselves, the male attempted copulation with one of the other birds; all three of these went through nest-building movements, including nest-molding.—M. M. Nice.

35. Territory and Pair-Formation in the Blackbird. R. D. Jackson. 1954. *British Birds*, **47**(4): 123-131. A very interesting study over several years on color-banded *Turdus merula* on 5½ acres in a suburban district. Each pair held a territory of about one acre. "Once a pair is formed and settled in a territory, it remains in that territory, or some part of it, until the death or disappearance of one or both members." "From January the male follows and guards the female." In autumn and December members of a pair usually ignore each other. Immature birds set up sub-territories within the territories of the adults; these immatures are ignored by the resident pair and usually disappear in March. Both members of a pair defend the territory; if the male is defeated, his mate "generally engages the victorious rival in battle or display. In encounters of this type it is found that the female is generally more direct in her attack and does not indulge in the elaborate threat display of the male." Hence, "an aggressive female is a great asset to the territorial ambitions of the pair."—M. M. Nice.

ECOLOGY

(See also Number 51)

36. Ecological Analysis of the Bird and Mammalian Population of a Primeval Forest on the Pol'ana-mountain (Slovakia). František J. Turček. 1952. *Bulletin international de l'Académie tchèque des Sciences*, **53**(3): 1-25. This primeval forest of 1,000 hectares consists of 60 percent beech-fir-maple and 40 percent beech-spruce; most of the trees are from 120 to 200 years old. It is a sanctuary for rare mammals, but game girds are hunted. Red deer browse the fir and maple and prevent their regeneration. Owing to man's activity — hunting, utilization of wood, grass and seeds, and protection of some animals, the complex virgin forest is degrading into a "more simple cultivated forest." The Jay, *Garrulus glandarius* and Brambling, *Fringilla montifringilla*, are important agents in reforestation of the beech. Sixty-three species of birds were found on the 100 hectare quadrat. As to the amount eaten by the birds and mammals, "if we assume that in birds the daily consumption rate is about 25 percent of the population biomass, this would be about 29 kg. daily per 100 hectares; and if the daily consumption rate of mammals is about 20 percent from the entire population biomass, this would be about 122 kg. daily per 100 ha on a dry basis," (p. 21).

"If the population biomass would be evenly distributed throughout the area studied, the 'biomass pressure' [i.e., the total weight of the animals] on one hectare of the area in consideration would be in birds: herbivores 734 g., insectivores 227 g., omnivores 142 g., carnivores 63 g., total 1,166 g. per hectare; in mam-

mals: herbivores 5,033 g., insectivores 141 g., omnivores 1,254 g., carnivores 176 g., total 6,604 g. per hectare." If the biomass of the birds and mammals is totalled. we find 1 gram of carnivores to 31 grams of other food groups, "therefore the pressure of carnivores on the population is in this case very slight." (p. 22).

There is a bibliography of 41 titles, many from English and American sources. Unfortunately the tables giving names, numbers, and weights of the birds and mammals are published only in the Czechoslovakian version and are lacking in the present paper, a serious omission in this original and valuable study.—M. M. Nice.

37. Territory and the Regulation of Density in Titmice. H. N. Kluyver and L. Tinbergen. 1953. *Archives Néerlandaises de Zoologie*, **10**(3): 265-289. The authors approach the role of territory in controlling density by an analysis of the densities of *Parus major, Parus coeruleus,* and *Parus ater* in areas with both mixed and pine forest. The former is preferred by breeding tits. Assuming that the excess tits respond to crowding by taking up territories in the pine forests, the authors then treat the densities in the pine forests as functions of the densities in the mixed forests. In general the functional relationships are quite convincing and support the hypothesis that there is an irreducible minimum size for territories beyond which there is no room for more birds. Possibly better stated—there is a maximum density above which a tit is averse to remaining. Quite obviously this minimum size territory—or maximum tolerable density—itself varies with different habitats. It appears that as the difference in attractiveness between mixed forest and pine forest becomes greater, this buffer mechanism (limitation of density by minimum territory size) becomes more effective.—D. S. Farner.

38. The Distribution of the Ortolan Bunting and the Blue Tit in Sweden. Kjell Engström. 1952. Vår Fågelvärld, **11**(1): 16-23. It appears that the distribution of the Ortolan Bunting, *Emberiza hortulana,* may be governed directly or indirectly by humidity, its occurrence being limited primarily to areas of less than 600 mm. annual precipitation. This explains the absence of the species from the humid parts of the west coast and the humid highlands of Southern Sweden. However, it does not explain its absence from the dry islands of Oland and Gotland. Information derived from the literature indicates that the Ortolan Bunting once bred commonly in the southwestern provinces; the author suggests that its reduction or disappearance here is to be associated with the gradual maritimization of the climate. The Blue Tit, *Parus caeruleus,* appears to have its distribution, as a common breeding species, delimited by the distribution of dense forest with its northern limit fixed by the northward limit of oaks.—D. S. Farner.

WILDLIFE MANAGEMENT

39. A Symposium on Cycles in Animal Populations. Oliver H. Hewitt, Editor. 1954. *Journal of Wildlife Management,* **18**(1): 1. Editor Hewitt organized the following symposium of 10 papers after examining Professor LaMont Cole's 1954 manuscript, "Some Features of Random Population Cycles" (part of the symposium). Reprints of the entire series of ten articles may be obtained for $1.00 per bound set from Dr. Daniel L. Leedy, Executive Secretary of the Wildlife Society, Branch of Wildlife Research, U. S. Fish and Wildlife Service, Washington 25, D. C.—Helmut K. Buechner.

40. Some Features of Random Population Cycles. LaMont C. Cole. 1954. *Journal of Wildlife Management,* **18**(1): 2-24. Cole's hypothesis is that animal population fluctuations or "cycles" result from random oscillations of population levels which may be influenced by environmental factors that are also varying at random. He feels that the only objective way to designate a "peak" year in population levels is to define it as any year in which the population exceeds those of both the preceding and following year. Considering first complete independence of random numbers, Cole shows mathematically that the fundamental cycle in a long series is 3 "years". The length of the series influences the length of the cycle. Over a period of 20 years the predicted mean cycle length is 4 years; in a 35-year series it would be 3.5 years; in a 50-year series it would be 3.33; and in 100 years it would be 3.15. The "longer" cycle between "dominant" peaks is predicted at 13.6 years when $N = 20$; 10.8 years when $N = 100$; and 9.8 years

when N = 200. Most field data fall into the short series. On the basis of probability equations, carefully derived in the paper, Cole next shows the influence of ignoring minor peaks and selecting peaks of three successively higher levels designated as "high," "conspicuous," and "prominent" peaks. The effect of overlooking any of the peaks is to increase the cycle length. The effect of neglecting low peaks is much less drastic than that produced by counting only peaks that are conspicuous or prominent. The subjective influence of selecting peaks can result in cycle lengths of any magnitude above 3 years, depending upon the criteria employed in the selection. Taking into consideration the two extremes of complete independence between random numbers (between populations in successive years) and equal importance of successive numbers (years), Cole has also shown that higher annual carry-overs in the influence of one population on a succeeding population result in: (1) A rapid decrease in the number of 2-year cycles, (2) a slight drop in the number of 3-year cycles, and (3) considerable increase in the number of 4-year and 5-year cycles. The fact that natural populations are nearly always influenced by the preceding populations results in a preponderance of 3-year and 4-year cycles over the 2-year cycles. In addition to the influence of one population on another, random fluctuations in environmental conditions also influence population changes. Apparently oscillations in animal numbers result from the great variety of forces operating at random on the population. In a reanalysis of data on Muskrat populations published in 1942 by Elton and Nicholson, Cole demonstrates that by counting all peaks, the cycles average slightly less than 5 years rather than 10 years, the longer cycle resulting from neglecting minor peaks. As with his earlier paper, Cole has again made a notable contribution to the interpretation of cycles in focusing attention on the fact that some cycles may represent nothing more than random oscillations ". . . initiated by purely random fluctuations in environmental conditions." His paper serves at least to warn against subjective prejudice in the search for the causalities of cycles.—Helmut K. Buechner.

41. Cyclic Mortality. David Lack. 1954. *Journal of Wildlife Management,* **18**(1): 25-37. Lack compliments Palmgren and Cole for questioning the acceptance of population cycles as proved fact and demonstrating that random fluctuations may produce "not dissimilar" effects. He suggests the comparison of cyclic and noncyclic species to determine wherein the difference lies. Lack is concerned in his paper with the biological problem of mortality factors responsible for the periodic declines, a problem that remains whether or not cycles are shown to be simple random fluctuations. The 4-year and 10-year cycles are known to involve only three groups—rodents, their predators, and native gallinaceous birds. Lack gives evidence showing that fluctuations in predatory birds and mammals closely follow those of their prey and that periodic declines are due to food shortages. Rodent fluctuations are believed by one group to result from extrinsic cause, usually climatic, but lack of simultaneity in different parts of the range appears to rule out any widely acting climatic factor. Lemming peaks may be up to 2 years out of step and Varying Hare peaks up to 5 years out of step. Lack rules out predators, internal parasites, and disease as the basic causes of cycles, and for rodents favors an intrinsic, density-dependent cause related to food shortages, a possibility dismissed by most workers. He shows that (1) a decline continues for several generations after crowding has ceased, (2) plant cover is depleted at least in some Lemming and Vole plagues, as well as during peaks of Varying Hare populations, and (3) rodents emigrating during declines exhibit a searching behavior that sometimes results in establishing new ranges. He suggests that the regularity of rodent cycles implies a simple cause, presumably a simple interaction between population density and food supply. The greater simplicity of food-chains and the less-irregular climate of the far north may account for the more well-defined cycles there. He rules out food shortage, disease, and climate in cycles in gallinaceous birds, and suggests predation as the most likely cause of mortality during periodic declines in their populations. Apparently the Ruffed Grouse *(Bonasa umbellus)* and Spruce Grouse *(Canachites canadensis)* cycles, and probably the cycles of other gallinaceous birds, are affected by the same 10-year cycle as the Varying Hare. The Willow Grouse *(Lagopus lagopus)* follows a 4-year cycle correlated with Lemmings in Norway, but a 10-year cycle in the zone of the Varying Hare on the North shore of the Gulf of St. Lawrence. Although predators are too scarce to constitute the main mortality factor in cyclic rodents, they are plentiful enough to affect populations of gallinaceous birds. Lack believes that predators of cyclic

rodents turn toward grouse or ptarmigan when the rodents decline. Wisconsin records strongly suggest that Ruffed Grouse, Prairie Chicken *(Tympanucus cupido)*, and Sharptail Grouse *(Pedioecetes phasianellus)* declined at least one year after the Varying Hare, as would be expected if the predators were diverting their attentions from one prey to another. The small number of juveniles during declines results from predation rather than failure to breed, if Lack's predation hypothesis is correct. Emigration of predators is suggested as the force that brings Ruffed Grouse populations back into step between regions where divergence of peaks has occurred. In setting forth his intriguing ideas Lack points out that they must be tested further in the field.—Helmut K. Buechner.

42. Some Essential Features of Short-Term Population Fluctuation. Lauri Siivonen. 1954. *Journal of Wildlife Management*, **18**(1): 38-45. Siivonen probably deserves most of the credit for touching off the lively discussion on animal cycles within the past 5 years. After studying much of the available data Siivonen became convinced that the basic cycle is a 3- to 4-year cycle and that 10-year cycles are composed of three short cycles. Although impressed by the synchronism of fluctuations in species of varying size, life-span, reproduction, and ecology, as well as in different regions, and by the return to synchronism after divergence, Siivonen shows later the impossibility of forecasting the progress of even the most regular fluctuations until the reproduction data of the summer preceding the fall population in question is available. Cole's interpretation of animal fluctuations as random oscillations fits the irregular fluctuations in southern Finland, but does not explain the regularity between unrelated species of different size, life-span, and reproduction, nor the immediate return of "strayed peaks" to the 3- to 4-year basic fluctuation. It is interesting to note that Lack believes Siivonen's figures do not bear out his claim that the basic cycle averages 3.3 years and that the 4-year and 10-year cycles are really one. In my opinion Siivonen's contribution in this article is his focussing attention on the difficulty of explaining synchronism between species and between areas purely on the basis of random fluctuations as proposed by Cole.—Helmut K. Buechner.

43. Effects of Compensatory Mortality Upon Population Abundance. W. E. Ricker. 1954. *Journal of Wildlife Management*, **18**(1): 45-51. Ricker points out that the general level about which an animal population fluctuates is determined only by the factors of mortality, whose effectiveness varies with population density, and that the young members of a population (from eggs to juveniles) bear the brunt of the mortality factors in operation. A series of eight theoretical reproduction curves for fish populations (number of eggs produced by parent stock plotted against number of eggs produced by progeny of that year) is presented to demonstrate that in populations where two or more age-groups contribute to the annual reproductive increment, when reproduction reaches a maximum before the point of equilibrium and then declines, the stage is set for periodic changes in abundance. Permanent cycles of abundance result when the steepness of the descending limb of the reproduction curve is greater than —1. Any desired combination of cyclic period and amplitude can be obtained by selecting appropriate combinations of reproduction curve and breeding age distribution. Among the six general characteristics of cycles obtained in this manner are: (1) The amplitude of oscillation decreases with increase in the number of ages comprising the spawning stock, and (2) the amplitude of oscillation increases rapidly with increase in the number of years between parental egg and the first production of filial eggs. While these characteristics are reflected in fish populations, they seem at variance with characteristics of cyclic populations of terrestrial vertebrates, many of which have few reproducing age classes and begin reproducing strongly in the first breeding period. This suggests that more than one cause for periodicity of population abundance may be operating.—Helmut K. Buechner.

44. Reflections on the Biology of Animal Cycles. William Rowan. 1954. *Journal of Wildlife Management*, **18**(1): 52-60. Rowan focuses attention on the biological reality of the 10-year cycle by presenting evidence for the abundance of Sharp-tailed Grouse *(Pedioecetes phasianellus)*, Ruffed Grouse *(Bonasa umbellus)*, Hungarian Partridge *(Perdix perdix)*, and Snowshoe Rabbit *(Lepus americanus)* in the Province of Alberta. A graph showing the percentage of nearly 100 observers scattered through Alberta who received increases in these

species over a period of 11 years shows a striking synchronism between species with a low in 1944-1945 and a high in 1949-1951. Evidence supporting some underlying meteorological or other environmental factor as a cause for animal cycles includes: (1) Synchronism between widely different species, (2) agreement in time across the width of Canada and into northern Europe, (3) failure of the animals to influence or change their environment except during the peak of a cycle or under certain semiartificial conditions, (4) persistence of a 10-year interval, (5) confinement of cycles to a belt around the northern hemisphere running from about 50° N. to 30° N., (6) failure of the same species to show cyclic behavior at more southern latitudes, and (7) absence of cyclic behavior among migratory species of birds. The article is a forceful rebuttal to Cole's mathematical hypothesis of random fluctuations. Rowan believes that animal cycles are anything but random and that they are ". . . definitely due to environmental factors to which some species are susceptible and others immune."—Helmut K. Buechner.

45. The Logic of the Mathematical Theory of Animal Populations. P. A. P. Moran. 1954. *Journal of Wildlife Management*, **18**(1): 60-66. "Oscillatory" behavior is exhibited ". . . if the fact that at any given time the population is not at its mean value implies that there will be a tendency for the series to 'overshoot' the mean value." The wandering behavior of random numbers—moving from one side of a mean to the other—lacks the intrinsic oscillatory property of a tendency to overshoot the mean. By establishing a mathematical model in which (1) age and sex structure, (2) influences of weather, (3) the physiological state of the population, and (4) the effect of other animals are absent, Moran shows that oscillations cannot occur without invoking other factors than the size of the population alone. The most obvious of these factors is an oscillatory change in the environment, but so far no positive evidence supporting environmental causalities has been brought forth. Another obvious factor is age distribution; if the birth and death rates at the various ages do not depend on population size, oscillations can result, but they dampen out as time increases. A third factor, the past history of the animals concerned, can produce oscillations in a number of different ways. Moran considers Cole's definition of a cycle obscure and inadequate, and prefers to regard cyclic behavior as occurring when a divergence of the population from its mean value exhibits a tendency to overshoot the mean value at some future date. To determine whether this is happening requires a serial correlational analysis of the series to see if any of the serial correlations found are significantly negative. Cole's random series contain only non-negative serial correlations.—Helmut K. Buechner.

46. On the Hazards of Overemphasizing Numerical Fluctuations in Studies of "Cyclic" Phenomena in Muskrat Populations. Paul L. Errington. 1954. *Journal of Wildlife Management*, **18**(1): 66-90. In reaching the conclusion that Muskrat *(Ondatra zibethicus)* populations exhibit cyclic fluctuations synchronous with the 10-year cycle of Ruffed Grouse *(Bonasa umbellus)* and Varying Hare *(Lepus americanus)* farther north, Errington employs four distinct kinds of evidence: (1) Breeding-season and year-to-year gains in population, (2) synchronies in reproduction, (3) synchronies in behavior, and (4) synchronies in disease syndromes. These criteria supported the existence of cyclic behavior in Muskrat populations despite the fact that fluctuations in population numbers provided no indication of synchronized, rhythmic oscillations. Over a 25-mile-square area considered as a single unit, depressed rates of gain correlated closely with the cyclic lows of the Ruffed Grouse. The number of young per litter also correlated with the Ruffed Grouse cycle, being 6.6 to 6.8 young per litter during cyclic lows and 8.1 to 8.8 at cyclic highs. Muskrat populations tolerated breeding densities about three times as great (5-6 compared to 2-3 pairs per acre) during the high phases of the hare and grouse fluctuations. Abandonment of breeding territories or home ranges after the breeding months was characterized by footloose and hazardous wandering during cyclic lows, and by orderly, seemingly intelligent action during cyclic highs. Resistance to disease correlated well with reproductive and behavior changes, being highest during cyclic highs. The author concludes from synchronies in population phenomena, not necessarily related to gross fluctuations in population numbers, that cyclic fluctuations in Muskrat populations are a reality and that some extramundane factor is affecting the life processes of many species on at least a regional scale.—Helmut K. Buechner.

47. Mean Intervals in Indices of Wildlife Populations. Joseph J. Hickey. 1954. *Journal of Wildlife Management,* **18**(1): 90-106. By counting all peaks and applying Cole's mean-interval test, the author finds that the Hudson's Bay Company statistics indicate continental 10-year Lynx *(Lynx canadensis)* cycles that cannot be explained on the basis of random fluctuations of environmental factors, but that cycles in the Varying Hare *(Lepus americanus)* and Muskrat *(Ondatra zibethica)* statistics could have resulted from random variations. In re-examining McLulich's data on Varying Hare, in which a 10-year cycle was obtained by plotting the last years of great abundance prior to decreases, selection of "dominant peaks" should have resulted in much longer cyclic intervals, and Hickey suggests that the hare cycles may be more than the result of random phenomena. Continental 10-year cycles also seem probable for the Colored Fox *(Vulpes fulva)* and possibly the Mink *(Mustela vison)*. Comparison of actual and calculated (using Cole's equation) mean cyclic intervals in four Hudson's Bay Company regions showed that the Lynx cycle is roughly twice as long as expected in a random serial correlation of 2-point moving averages, the evidence indicating an "ecological" rather than an "arithmetical" cycle. Analysis of hare data on a Canadian regional basis showed that, except for Saskatchewan and Alberta which leaned toward the 10-year cycle, the populations fluctuated in a purely random manner. Despite reports of marked fluctuations in the northern United States, Hickey feels that statistical evidence for an ecological cycle in Varying Hare is lacking for statewide populations. With respect to fluctuations in population size, Hickey found no hint of ecological cycles in statewide Muskrat populations. The unanimity of synchronization of conspicuous peaks in Ruffed Grouse *(Bonasa umbellus)* populations for the central portion of the continent suggests the presence of an ecological 10-year cycle rather than one produced by random variation. Although Ruffed Grouse show ecological cycles at regional and local levels, Hickey fails to emphasize these data.—Helmut K. Buechner.

48. Theoretical Notes on Oscillatory Populations. G. E. Hutchinson. 1954. *Journal of Wildlife Management,* **18**(1): 107-109. In the differential equation for the growth of a population in a constant uniform limited environment, Hutchinson allowed for a time lag in the negative feed-back term by which the actual rate of increase is adjusted to the size of the restricted environment. Such an equation permits the population to increase above the saturation level where natality and mortality exactly balance, and to decline after a given lag of time. Although these considerations lead to the expectation of oscillatory changes even under relatively stable environmental conditions, they do not explain the dramatic cycles of Canada Lynx *(Lynx canadensis)* and Snowshoe Rabbit *(Lepus americanus)* populations. Such extraordinary oscillations are potentially dangerous to the continued existence of the species. Epidemics can spread through high populations, food and cover can be irreversibly destroyed, and the final crash may bring the species below the safe minimum density level. Seemingly, natural selection is operating to reduce the value of the time lag and this is best done by making natality less dependent on density, so that the burden of regulation is placed on mortality.—Helmut K. Buechner.

49. Ruffed Grouse and Snowshoe Hare Populations on the Cloquet Experimental Forest, Minnesota. William H. Marshall. 1954. *Journal of Wildlife Management,* **18**(1): 109-112. This paper brings up to date the Ruffed Grouse *(Bonasa umbellus)* population study on the Cloquet Experimental Forest in northeastern Minnesota, pioneered by Professor Ralph T. King from 1927 to 1936. The data on estimated spring populations obtained through the King census method show a steady rise in population from 1927 to 1933, a stable population in 1933 and 1934 followed by a sharp drop, a steady rise to 1942 at a level of one-third the 1933-1934 peak, a drop to a very low point in 1946, and another steady increase to a plateau in 1950 and 1951. The absence of minor peaks is perhaps an outstanding feature of the data. Peaks as defined by Cole occurred at 9-year intervals. In data gathered on the numbers of grouse seen during deer drives the estimated high in Ruffed Grouse came in 1949 rather than 1950. Snowshoe Hare *(Lepus americanus)* in the deer-drive statistics reached a peak in 1950. This plus verbal reports of Snowshoe Hare highs in 1929, 1935, and 1943 show snowshoe highs on the Cloquet at intervals of 6, 8, and 7 years. These intervals were 2 years later, 1 year later, and 1 year earlier respectively than the grouse peaks.—Helmut K. Buechner.

50. The Value of Waterfowl Refuges in Illinois. Frank C. Bellrose. 1954. *Journal of Wildlife Management,* **18**(2): 160-169. The author's data show that migrating waterfowl are attracted to refuge areas closed to shooting in numbers increasing as the degree of security increases. Band returns from hunters indicate that ducks fan out from refuges to feed within a radius of about 25 miles. Duck harvests are significantly higher on lands within a 25-mile radius of the major waterfowl refuges than elsewhere in Illinois. In general, the larger refuges (1,000 acres or more) support higher populations than smaller refuges, but much depends upon the amount of open water and the degree of disturbance on surrounding lands. Small refuges can be effective if their border lands are protected adequately. Where waterfowl habitat is continuous, refuges should not be more than 50 miles apart to provide adequate sanctuary and to insure the best usage of the food available. The food resources on migratory areas allow waterfowl to be less dependent upon the wintering ground resources, which at times may be inadequate. The author concludes that migratory refuges are important to both waterfowl and hunters, and that this management practice should be continued rather than abandoned as suggested by some hunters and game administrators.—Helmut K. Buechner.

51. Pheasant Winter Roosting Cover Preference in North-Central Colorado. L. Jack Lyon. 1954. *Journal of Wildlife Management,* **18**(2): 179-184. Of 14 different types of winter roosting cover for Ring-necked Pheasant *(Phasianus colchicus),* weed patches (ragweed, Canada thistle, *Kochia,* and yellow sweetclover) and cattail sloughs were preferred in two winters (1950-1951 and 1951-1952). Use of the weed type was usually high during periods of deep snow or cold weather. Roosting in the cattail slough remained relatively constant. Four other roosting sites—riverbottom, south-facing exposures of ditch banks, willow thickets, and grain stubble—were used during mild weather, but pheasants invariably moved in on heavy weed patches, cattail sloughs, and unpastured riverbottoms where shelter was more effective, during periods of low temperature and deep snow. Ungrazed, unburned riverbottoms surpassed all other types in variety of food and cover, although the study plots do not show it, apparently because of grazing and other disturbances on the plots. Vegetation selected for winter roosting was always more than 15 inches high, the height being more important than density or availability of food.—Helmut K. Buechner.

52. An Analysis of Woodcock Singing Ground Counts, 1948-1952. E. L. Kozicky, T. A. Bancroft, and P. G. Homeyer. 1954. *Journal of Wildlife Management,* **18**(2): 259-266. To determine whether a significant trend occurred in American Woodcock *(Philohela minor)* in northeastern United States and New Brunswick, Canada, over the 5-year period, 1948-1952, a study was made of the linear regressions fitted to the yearly means (singing grounds per stop) for the 44 individual routes along which singing grounds were counted. The slopes of these regressions differ significantly, indicating a heterogeneity sufficiently large that no trend is apparent for the whole population within the geographic area under consideration. Using log-transformed data, the number of routes required to show population trends was calculated for different sampling conditions. For example, to measure a significant trend between consecutive years, assuming that the same routes are visited each year, a mean difference of 21 percent can be detected at the 5-percent-probability level from the present 44 routes. The excellent and pertinent philosophical discussions will be helpful in planning future studies. —Helmut K. Buechner.

CONSERVATION
(See also Number 50)

53. Nature Preservation in the Caribbean. A Review of Literature on the Destruction and Preservation of Flora and Fauna in the Caribbean Area. J. H. Westermann. 1953. *Publications of the Foundation for Scientific Research in Surinam and the Netherlands Antilles, Utrecht.* No. 9. A sad story of the destruction of unique and wonderful fauna and flora by man and his introduced plants and beasts—rats, cats, dogs, goats, monkeys, opossums, and mongoose. Three chapters deal with extinct and endangered mammals, reptiles and amphibians, and birds. In the past three centuries 11 species and 10 subspecies of birds have

become extinct, among them 10 species of parrots. "In no other part of the world, with the exception, perhaps of the Hawaiian Islands, are so many birds in danger of extinction as in the West Indies" (Bond, 1936). The indifference of most of the people to nature, and the ever-increasing overpopulation make the problems of conservation exceedingly difficult. The only hope lies in education and in setting aside nature preserves, if possible, before it is too late. This informative bulletin contains 25 sketches of endangered and extinct species, a map, information on legislation and proposed nature preserves in each island or country, and a selected bibliography.—M. M. Nice.

PARASITES AND DISEASES

54. Age as a Factor in Acquisition of Parasites by Canada Geese. Everett E. Wehr and Carlton M. Herman. 1954. *Journal of Wildlife Management*, **18**(2): 239-247. From an examination of 46 wild-trapped Canada Goose *(Branta canadensis)* goslings, the authors found 14 species of parasites, including 5 Protozoa, 4 Nematoda, 2 Cestoda, and 3 Trematoda. They comment pertinently and interestingly on most of the species. The incidence of parasites in eight goslings that died or were sacrificed prior to an age of 56 days indicated that goslings acquired most of the parasites during the first week of life. Twenty-nine goslings from the Seney National Wildlife Refuge in Michigan were infected by 14 species of parasites, while in 17 goslings from Bear River National Wildlife Refuge, only 5 species were found. This interesting paper supports the hypothesis that younger birds are more susceptible to parasitemia than older ones.—Helmut K. Buechner.

PHYSIOLOGY

(See also Numbers 73, 74)

55. An Investigation of Variations in Weight of Great Tits during Winter. (En Undersøkelse over vekt-variasjoner i vinterhålvaret hos Kjøttmeis.) Svein Haftorn. 1951. *Fauna, Norsk Zoologisk Forenings Tidsskrift*, 1951(2): 83-91. (English summary.) The author presents data on 441 individuals of which 167 were known to be males, and 177 were known to be females. These birds were obtained through the course of five winters at Oslo. From October through February the mean weight for males was found to be in the order of one gram greater than that of females. Maximum weights in both sexes were attained in December. In comparing different years there is some evidence that body weight is an inverse function of mean environmental temperature early in the winter whereas later in the winter body weight tends to be a direct function of mean environmental temperature. It is possible that this latter relationship develops because of limitations on available food. It would be of interest to examine this possibility experimentally. Qualitative observations of subcutaneous and visceral fat prompt the author to suggest that the fluctuations in body weight are caused primarily by fluctuations in fat deposits.—D. S. Farner.

56. Notes on body weight and time of breeding in the Great Tit, *Parus major major* L. H. N. Kluyver. 1952. *Ardea*, **40**(3/4): 123-141. This paper is the result of further analysis of the extensive series of data obtained by the author in his investigations at Oranje Nassau's Oord near Wageningen, Holland. A series of body weights, 170 male and 160 female, obtained in 1937-1938 indicates that throughout the winter males are heavier than females, the difference being substantially greater than 1 gram. About the first of April the weights of the sexes are similar and thereafter until mid-June the females tend to be slightly heavier. The females were found to show an increase in weight of nearly 2 grams between mid-March and mid-April whereas the males were simultaneously declining in weight. It was found on the basis of 26 Great Tits held overnight at —10°C. that overnight loss in weight may be quite extensive—the mean loss in this case being 1.7 grams. The author's data suggest that the rate of development of the gonads in spring may be modified by environmental temperature; this reflects in the time of laying. There is an obvious inverse relationship between the "warmth sum" for 16 March-20 April, an index of the warmth of the spring, and the date of beginning of laying. The author's data suggest additionally that a warm winter, pro-

vided that it is not followed by a cold spring, also tends to cause an earlier laying. It is also argued, with some merit, that the increase in daylength beyond mid-March probably has no role in establishing the time of beginning of laying. He presents data strongly suggesting that a high relative humidity during a short period before the determinant laying date has a stimulating effect on laying. In summary, then it would appear that gonadal development is dependent initially on the vernal increase in day length; the development can be accelerated by high environmental temperatures in winter. Of greater importance in modifying the rate of development, however, are environmental temperatures in spring. Factors affecting the actual date of laying, beyond those affecting the rate of gonadal development, include the relative warmth of the spring from mid-March on, relative humidity and environmental temperature in the period up to four days before the laying date, as well as individual differences among the females. Type of habitat appears to have no appreciable influence on laying date.—D. S. Farner.

57. Contributions to the Knowledge of the Body Temperature of Birds. Miklos D. F. Udvardy. 1953. *Zoologiska Bidrag Fran Uppsala*, **30**: 25-42. A careful investigation on 541 individuals of 67 species. The majority of the temperatures were taken from the proventriculus, a method the author found less irritating to most of his subjects than readings from the rectum. The initial temperature reflects the excitement of the bird, hence great pains were taken to keep the birds as quiet as possible; "standard" temperature was considered to be the minimum temperature reached after a period of 20 or 25 minutes. Rectal temperature is somewhat lower than that of the proventriculus. Baldwin and Kendeigh (1932) found the average temperature of 29 passerine species to be 40.4° C.; Dr. Udvardy found the standard temperature was 40.6° C. for 311 passerines and 40.09° C. for 90 Charadriiformes.—M. M. Nice.

58. A Study of the Lipids in Arctic Migratory Birds. X. J. Musacchia. 1953. *The Condor*, **55**(6): 305-312. A study of the lipids of the liver and kidney of four species of arctic migratory birds was made on specimens collected from July 20 to September 1 of 1948 near Point Barrow, Alaska. Findings are based on 12 Old-squaw *(Clangula hyemalis)*, 12 Red Phalaropes *(Phalaropus fulicarius)*, 10 Golden Plovers *(Pluvialis dominica)*, and 10 Red-backed Sandpipers *(Erolia alpina)*. The data reveal a high level of fat turnover in all four species. The author suggests that the apparently high levels of intermediary metabolism of fat are related to early stages of molt and to the phenomenon of fat storage associated with migration. Although the levels of fat turnover may well be related to molting or to a premigratory state, supporting data from his own specimens (e.g. stage or even presence of molt) are almost entirely wanting. Ordinal differences in lipid patterns (e.g. cholesterol/fatty acid ratio and cholesterol/lipid phosphorus ratio) are likewise of doubtful value because the dates of collection are so variable.—L. R. Mewaldt.

59. The Occurrence and Maintenance of the Refractory Period in Crowned Sparrows. Alden H. Miller. 1954. *The Condor*, **56**(1): 13-20. In this most recent of his investigations on the autumnal refractoriness of the pituitary-gonad mechanism, Doctor Miller used 16 male Golden-crowned Sparrows *(Zonotrichia coronata)* and 28 male White-crowned Sparrows of three subspecies *(Zonotrichia leucophrys gambelii, Z. l. nuttalli,* and *Z. l. pugetensis)*. Responses of these four groups to the experimental procedures employed were very similar. Birds of both species started on 15 ½-hour days on October 24 were refractory and continued refractory when their daily photoperiod was increased to 21 hours on January 10. None of these 21-hour birds (six) showed testicular responses or significant fat deposits when autopsied on March 25. Experimental prolongation of refractoriness was extended to 203 days in *Z. l. pugetensis* and *Z. l. nuttalli*, and to 310 days in *Z. coronata*. Compared to adults, the first year birds displayed no differences in schedule nor in susceptibility to prolongation or refractoriness. While the refractory period of *Z. coronata* terminates naturally about November 5, that of *Z. l. pugetensis* and *Z. l. gambelii* apparently terminates in the last week of October. Leydig cells were found present in the testes of nearly all birds in a refractory condition. Doctor Miller discusses briefly the refractoriness of the pituitary-gonad mechanism in view of some of the recent findings.—L. R. Mewaldt.

FAUNISTICS

60. The Avifauna of Western Siberia. Part II. (Die Vogelfauna Westsibiriens. II. Teil, 1. Fortsetzung.) Hans Johansen. 1952. *Journal für Ornithologie,* **92**(3/4): 146-204 (1944). This section is concerned with the Motacillidae, Certhiidae, Sittidae, Paridae, Regulidae, Paradoxornithidae, Laniidae, and Bombycillidae. Following the previously established pattern, there is for each species a discussion of systematics, ecology, distribution, and habits.—D. S. Farner.

61. Eastern birds which have extended their ranges into Scandinavia during the last 100 years. Carl-Fredrik Lundevall. 1953. Part 1 in *Fair Isle Bird Observatory Bulletin* (mimeographed), No. 9, pp. 5-12; Part 2, *ibid.*, No. 10, pp. 11-18. The British bird observatories have a definite interest in this subject, since (to quote Kenneth Williamson, Director of the Fair Isle Bird Observatory) ". . . the Scandinavian colonists of to-day are our vagrants and drift-migrants of to-morrow." The author lists some 60 species which have shown a marked increase as residents. Many of the increases appear to be due to climatic changes of the sort recently described by several authors, *e.g.* by Olavi Kalela in *Bird-Banding*, 20: 77-103, April, 1949.—E. Alexander Bergstrom.

SYSTEMATICS

62. The Distributional History of the Nuthatch, *Sitta europaea* L. K. H. Voous and J. G. Van Marle. 1953. *Ardea,* **4,** extra number: 1-68, 3 figs.—The authors, in the Zoological Museum of Amsterdam, attempt to delineate the zoogeography and evolution of the Eurasian nuthatch, *Sitta europaea,* from a study of about 1,060 skins of the species. The senior author has made comparable studies of jays *(Garrulus),* woodpeckers *(Dendrocopos),* and bullfinches *(Pyrrhula).* In all these studies, including the one under review, the role of Pleistocene glaciation in effecting isolation and consequent raciation is given special attention. For each of these forest birds similar conclusions are reached.

Sitta europaea, as conceived by Voous and Van Marle, has an extensive range including Europe, Britain, Asia Minor, Persia, Siberia, Manchuria, the Orient, and most of India. Preferred biotopes include deciduous, mixed, evergreen broadleaf, and conifer forests; these range from sea level to about 3,000 meters. The species comprises 40-odd races divisible into four major groups: (1) European brown-breasted nuthatches: undersurface brownish- or reddish-buff, cheeks and ear-coverts white or whitish; (2) Asiatic white-breasted nuthatches: undersurface entirely white, or white with buffy or brownish confined to flanks and belly; (3) Chinese and Indo-Chinese nuthatches: similar to group 1, but smaller, cheeks and ear coverts concolor with rest of undersurface; (4) South-Asiatic, or Mahogany, nuthatches: undersurface rich cinnamon to mahogany brown, with different hue or shade in female (sexual dimorphism pronounced in most subgroups), chin and ear-coverts white or whitish.

The areas of intergradation of the predominantly Russo-Siberian group 2 with group 1 in Europe and with group 3 in northeast China appear to be secondary. The first two groups were separated by Pleistocene glaciers, each group having survived in forest refugia to the south, and each having moved northward, with favored forest vegetation, as the ice receded. Areas postulated as refugia for the brown-breasted birds are the Mediterranean region, northern Africa, Asia Minor, and Persia; for the white-breasted birds, the southwest Ural Mountains, central-southern Siberia, Manchuria, Kamchatka, and Japan. Refugees from southeastern Europe made a "pincers-move" around the Alps, establishing a cline on either side. Estimates of the time required for race formation in group 1 range from 10,000 years or less to about 50,000 years. Relict races in the Atlas Mountains and in western Persia are still older, apparently having been isolated before the climax phase of the third glaciation.

The authors are so preoccupied with glaciation as a factor in the evolution of groups 1 and 2 that they all but omit mention of other influences. The terms "mutation" and "selection" are wanting in the discussions; the term "adaptation" is employed solely in connection with foot size. The "ecologic rules" (of Bergmann, Allen, Gloger) are nowhere considered in analyses or discussions of variation.

Pleistocene glaciation phenomena apparently had little effect on groups 3 and 4, their ranges interdigitating in the Indo-Burma region with no evidence of hy-

bridization. The authors' decision to treat the Mahogany nuthatches as conspecific with the others is therefore dubious. Groups 3 and 4 have ranges contacting, to a degree, that of the closely allied *Sitta himalayensis*, but the specific distinctness of the latter is not seriously questioned. The authors seem inconsistent in their taxonomic appraisal of these two cases.

Two other nuthatches, *Sitta leucopsis* and *S. canadensis*, are thought to be close to the ancestral stocks that produced *S. himalayensis*, *S. europaea*, *S. tephronota-neumayr* (rock nuthatches), and other Old World species, as well as to stems that crossed Bering Strait and evolved in North and Middle America into *Sitta carolinensis*, *S. canadensis* (nominate race), *S. pygmaea*, and *S. pusilla*. Speciation of the early nuthatches is believed to have centered in southeastern Asia, where great orogenic activity during the Tertiary appeared to favor both the splitting of ranges and the development of a variety of biotopes.—Robert A. Norris.

FOOD HABITS

(See also Numbers 21, 32)

63. Some Observations on Gyrfalcons at Dovre, Norway. (Jaktfalken *(Falco rusticolus* L.) fra Dovre i Norge.) Yngvar Hagen and Edvard K. Barth. 1952. *Vår Fågelvärld*, **11**(3): 116-123. During the period 1945-1952 the site was used by Gyrfalcons in 1945, 1948, and 1949. Young departed from the site during the first week of July in each of the three seasons. Analysis of pellets indicates an almost complete dependence on avian, mostly *Lagopus*, sources of food. Peculiarly, despite this dependence on birds for food, the breeding and non-breeding years correlate with the fluctuations in populations of small rodents.—D. S. Farner.

64. The Food of the Cormorant in the Netherlands. W. H. van Dobben. 1952. *Ardea*, **40**(1/2): 1-63. This extensive paper contains information on most aspects of food procurement and food relationships of *Phalacrocorax carbo sinensis*. Included are descriptions of methods of procuring food, frequency of fishing, digestion, regurgitation, pellets, feeding of young, daily rations for young and adults, composition of food, parasites of the digestive system, and relation of Cormorant predation to fish populations. The data were obtained principally from a rookery near the village of Wanneperveen near the Ijsselmeer. Most of the fishing is done within 25 kilometers of the colony and entirely during the day. Social fishing is rare. Incubating birds fish once per day; birds with nestlings, once or twice. In rookeries located nearer the fishing areas the birds appear to fish more frequently. The maximum capacity of the stomach is about 750 grams. By exciting birds to regurgitate food early in the morning it was possible to establish that the daily ration of fish is about 300 grams. A large young cormorant requires about 300 grams of fish per day for development; 400 grams produces a better appearance. The principal food fishes include the eel, *Anguilla anguilla;* pike-perch, *Stizostedium lucioperca;* ruffe, *Acerima cernua;* roach, *Leuciscus rutilus;* bream, *Abramis abrama, Blicca björkna;* perch, *Perca fluviatilis;* tench, *Tinca tinca;* pike, *Esox lucius;* smelt, *Osmerus eperlanus* (L.); stickleback, *Gasterosteus aculeatus;* bleak, *Alburnus alburnus;* and gudgeon, *Gobio gobio*. Of these the roach is the most consistently used species. It is estimated that the Cormorants take about 10% of the yield of pike-perch and eel. It is of interest that 30% of the roaches taken by Cormorants are infected with *Ligula* whereas the rate for the population is only 6.5%.—D. S. Farner.

65. Contribution to the food biology of the Lesser Gray Shrike. (Beitrag Zur Ernährungsbiologie des Schwarzstirnwurgers Lanius minor [Gm.]). W. Lierath. 1954. *Ornithologische Mitteilungen*, **6**(1): 1-3. This brief note comments on the insect content of pellets from the Lesser Gray Shrike during low temperatures at the end of May. Two beetles, *Carabus auratus* and *Siepha atrata*, comprised the major part of the pellets. With a cold period in early June mice began to occur in the pellets. The scarcity of normal insect food explains the behavior of a female which was seen to carry off and decapitate one of the five young she was brooding. A check on the nest disclosed that the young were all gone, presumably eaten by the female. With the onset of warmer weather the percentage of insects in the pellets again increased.—R. O. Bender.

66. Observations on Food Habits of the Goshawk, Sparrow Hawk and Peregrine. (Ernährungskontrollen bei Habicht, Sperber und Wanderfalke.) Volkard Kramer. 1954. *Der Falke*, **1**(1): 5-12. Records of prey of *Accipiter gentilis, A. nisus,* and *Falco peregrinus* from examination of plucking stations for 10 years, with comparisons with Uttendörfer's exhaustive studies (1939, 1952). Although all three species do some damage by human standards, the two Accipiters compensate for these depredations, the Goshawk by its destruction of Jays, Crows, Magpies and Squirrels, the Sparrowhawk by the great numbers of House Sparrows it eats, and voles during mouse plagues—both serious enemies of the farmers' crops. The Peregrine is protected by law because of its rarity.—M. M. Nice.

67. Wild Fruits in the Diet of British Thrushes. A Study in the Ecology of Closely Allied Species. P. H. T. Hartley. 1954. *British Birds*, **47**(4): 97-107. In response to a request that records be made for a year or longer "of the occasions when any species of bird was seen to eat any kind of wild fruit or seed," reports were sent in by 20 people on the five common thrushes. These with the author's own observations give an illuminating picture of food preferences. Four tables and eight graphs show records of fruit taken by species, localities and season. "The thesis implicit in Darwin's [Origin of Species] generalization that there must be ecological differences between two or more closely allied species which are able to maintain themselves in one area, is, in general, well supported by the differences in the wild fruit diets of the thrushes. . . . The ecological differences between the thrushes are differences in selection from, or utilization of, the constituents of a common stock. Competition between the species will depend, therefore, on three varying factors—the sizes of the wild fruit crops, the population levels of the birds, and the extent to which other foods may be available." A fine example of cooperative observation on common species.—M. M. Nice.

68. Observations on the storing of food also in the Siberian Tit. Observasjoner over hamstring av naering ogsá hos lappmeis (Parus c. cinctus Bodd.) Svein Haftorn. 1953. *Det Kongelige Norske Videnskabers Selskaps Forhandlinger.* **26**:18:76-82. (English summary.) Four of Norway's seven species of Titmice, the Coal Tit *(Parus ater)*, the Crested Tit *(P. cristatus)*, the Willow Tit *(P. atricapillus)*, and the Marsh Tit *(P. palustris)*, are known to store food, especially during the spring and autumn when the supply is plentiful. This investigation showed that the Siberian Tit *(Parus cinctus)* also resorts to this activity. All these inhabit the coniferous forest biomes. The two other species, the Great Tit *(Parus major)* and the Blue Tit *(Parus caeruleus)*, which live in the deciduous woods, do not store food so far as is known, even if it is abundant. While the food stored appears to be mostly vegetable, larvae are also hidden away after their heads have been picked off. Aphids are stored in clusters, but larvae and fruits singly, one object to a storage place.—Louise de Kiriline Lawrence.

SONG

(See also Numbers 28, 29)

69. Bird Songs of Dooryard, Field and Forest, No. 2. Recorded by Jerry and Norma Stillwell; manufactured by Columbia Records, Inc.; published by Ficker Recording Service, Old Greenwich, Conn. 1954. 33⅓ r.p.m. Running time, 42 minutes. $7.95. The first Stillwell disc, Bird Songs of Dooryard, Field and Forest, was reviewed in *Bird-Banding*, **24**: 85-86, April, 1953. The second disc is similar in plan and quality. It includes 140 songs and calls of 58 species of birds; those of 11 species have been repeated from the first disc for comparison with similar songs of different species or with songs of related species. Of the 58 species represented 52 occur regularly as far northeast as southern Connecticut, reflecting a long recording trip to the northeast by the Stillwells in 1953.

The Stillwell records continue to excel in the variety of songs and calls presented for each species, and in the grouping of species for comparison. For example, the group of five thrushes includes Gray-cheeked as well as Olive-backed. The device of including half-speed or quarter-speed versions (as well as normal speed) for a number of birds is particularly felicitous for the Gray-cheeked Thrush's complex, high-pitched song. The Lincoln Sparrow and Winter Wren are examples of species whose songs were not available on previous records. This, like the first Stillwell

disc, should be in the collection of every serious field birder in the area covered (the eastern half of the continent) and is also well worth owning from an esthetic viewpoint.—E. Alexander Bergstrom.

70. Songbirds of America in Color, Sound and Story. Arthur A. Allen and Peter P. Kellogg. Introduction by Roger Tory Peterson. 1954. Book-Records, Inc. in cooperation with the Cornell University Press. 30 pp. plus record (choice of 33⅓ or 45 r.p.m.). $4.95. This colorful volume combines color photographs of 24 common species of birds of eastern United States (taken from Dr. Allen's recent *Stalking Birds with Color Camera*—see *Bird-Banding*, **23**: 98-99, April, 1952) with recordings (about 24 minutes) similar to those in the various Cornell releases. The brief text deals with each species separately (where found, size, habits, song) and with such general topics as the color of birds' feathers, their migration, how to attract or photograph them, and how the recordings were made. There is an adequate one-page bibliography (errata noted—the address of the editor of *Bird-Banding* is 37 Old Brook Road, West Hartford, Conn., not 87; the A.O.U. was founded in 1883 not 1885).

The work is very well suited to the general public, as an attractive and competent introduction to birds. Those who have passed the stage of beginners in the study of birds will find it desirable to go directly to Dr. Allen's book of color plates and to the longer recordings in the Cornell or the Stillwell series. (See No. **69** above.) Compared to them, the present record is of similar quality but with shorter selections, with little opportunity to compare similar species, and with too much commentary for the length of the selections themselves.—E. Alexander Bergstrom.

BOOKS

71. A Thousand Geese. Peter Scott and James Fisher. 1953. 8vo., 240 pp., ill. Collins, London. Price 21 shillings. Until the Severn Wildfowl Trust Expedition went there in search of the main breeding ground of the Pink-footed Goose in 1951, the tundras of the interior desert of Iceland had not been visited by men for nearly three centuries. Some time before then the coastal Icelanders evidently journeyed inland regularly every summer to harvest the flightless young and molting adult geese for food. They developed a simple, primitive, but most effective method of driving the birds into pens, the rediscovery of which was one of the expedition's high points.

The expedition accomplished all its objectives, and more. It discovered the sought-for main breeding grounds of the Pink-footed Goose. It affixed to geese all the thousand rings it carried (hence the title), double its most optimistic hopes, and could have banded several times as many (for shame, oh ye of little faith!). In developing the method of driving the flightless geese into corrals of netting for banding, it found the remains of ancient stone pens, just the right size and shape for holding geese, and in just the right locations on the hilltops where the geese can be driven into them most easily. The only reference to these ancient goose-folds in literature is a little known and hitherto overlooked account written in 1638, shortly before the Icelanders unaccountably abandoned the practice and forgot about the birds so easily gathered inland.

The main part of this fascinating and well-written book is the narrative account of the expedition, told with typical British restraint and understatement, alternately from the diaries of Scott and Fisher. The scientific results of the trip are given in six appendices which contain pertinent data on the Pink-foot populations in Spitsbergen and Greenland, an estimate of the Iceland Pink-foot population, notes on the other birds and plants observed and collected by the expedition, and a selected bibliography.

In addition to its ornithological value and interest to banders, the book is unique in being the only account of a bird-banding expedition to end with a romantic note. The expedition's leader, Peter Scott, and its capable female member, Philippa Talbot-Ponsonby, were married at the British legation just before leaving Iceland. Once again these leading bird-ringers found themselves far afield with no ring, this time however fortunately remediable.

Still to be told in detail is how Peter Scott returned to Iceland in 1953 to drive, pen, and band 9,005 geese, perhaps one-fifth of the world's Pink-foot population. We await its telling, and meanwhile hope both the Pink-feet and the Scotts will live happily ever after.—O. L. Austin, Jr.

72. The Redstart. John Buxton. One color photograph and many of the 19 black and white photographs by Eric Hosking. 1950. Collins. St. James Place, London. Distributed in the U. S. by John de Graff, Inc., 64 West 23rd. Street, New York. 180 pp. 20 maps and diagrams. $2.50.

As a German prisoner of war for 5 years the author made a thorough preliminary study, then enlisted the cooperation of other prisoners to spend 850 hours watching the behavior of four pairs of Redstarts in Bavaria during April, May, and June, 1943. The exhaustive and authoritative treatise developed from this initial work reflects intensive research in the literature on this and related species. The three pages of acknowledgments and the "select" bibliography of only 181 names out of over 800 authors indicate the painstaking care and attention to minute detail so evident throughout the book. Further, the author purposely omits (as a supplemental reference list) practically all the bibliography in M. Boubier's (1925) monograph on the Redstart, those references concerned only with distribution, and banding data for which, however, he does supply key references.

Commencing with the arrival of Redstarts in their breeding area the author describes song and territory, display and pair formation, nest building, eggs and incubation, care and growth of the fledglings, life expectancy, and migration. He examines the historical material from the time of Aristotle, and the scientific treatment of the genera of Redstarts and closely related species. Brief tabulations list the scientific nomenclature of both birds and insects mentioned in the text. Appendices contain maps showing banding recoveries (with pertinent data) and the geographical distribution of this species and its close relatives.

The male chooses the nesting site and sings vigorously until mated, then remains quiet temporarily during the period of nest construction. Inexplicably he mimics species not known to be in the immediate neighborhood. The nest is customarily in a hole in a tree fairly near the ground. The food factor appears to be the dominant factor in establishing territorial area. Intruders are attacked from beneath. The normal clutch is six eggs but larger clutches are not uncommon. During the 11 to 17 days of incubation the male sings at his best. Only rarely is there a second clutch, unless the first is destroyed. Probably the male does not brood. He does feed the young and it is his particular duty to remove feces.

The young spend 15 or 16 days in the nest, becoming vocal on the 5th day. They are independent when a month old, and molt into adult plumage at 6 weeks of age. The adults molt at the same time unless having a second brood.

While the female feeds on or close to the ground the male remains high and feeds to some extent in flycatcher fashion. There is no proof that the species ever drinks. The false preening so frequently observed seems to be a nervous habit. The European Sparrow Hawk is a major enemy. The author thinks the up and down quivering of the tail is for purposes of sociability and recognition.

Rather startling is the short life-span of the species. Owing probably to lack of food, some 79 percent of the fledglings die in their first year. Of birds over a year old, 62 percent die annually. Mathematically the fledgling success has to be 91 percent of the 6.48 average birds to a clutch-hatch. Nevertheless population fluctuations seem to be purely local in nature.

The species migrates more by night than by day. Distributed throughout much of Europe, Central Asia, and India, the various members of the Redstart group winter to some slight extent in southern Europe, but principally in Africa, Iraq, Abyssinia, and India.

The author questions critically the taxonomy of this small, compact, readily distinguishable group, contained within the great family of the Turdidae. A number of closely related genera possess the habit of quivering a reddish tail. All forms except the subject one and the European Black Redstart are exclusively mountainous in their choice of breeding habitat. In particular, the author would restore to full specific rank Ehrenberg's White-winged Redstart, an Asiatic mountain bird now regarded as a subspecies of the Common Redstart.

The book establishes a high standard of life history investigation, well and interestingly written. We all may profit by the spirit of humility the author shows throughout the book, exemplified by his opening remark: "I have known a few redstarts too well to think I can forecast what others of their kind will do."—Wendell Taber.

73. The Structure and Development of the Avian Pituitary from a Comparative and Functional Viewpoint. Karl Georg Wingstrand. 1951. C.

W. K. Gleerup, Lund. 366 pp. 160 figs. 18 kroner. This important monograph is based on the author's investigations of the pituitary glands of 69 species of birds belonging to 18 orders. Its importance lies not only in its enormous quantity of original, excellently illustrated contributions, but also in its analysis of the extensively scattered literature and in its clarification of much of the confusion with respect to terminology. There are chapters on general anatomy and terminology, the adult adenohypophysis, embryology of the adenohypophysis, morphologic and histologic comparisons with the adenohypophyses of mammals and reptiles, exceptional structures in the avian pituitary, embryonic development of the avian neurohypophysis, adult structure of the neurohypophysis, innervation of the hypophysis, comparison of the innervation of avian, reptilian, and mammalian hypophyses, functional aspects of the avian neurohypophysis, vascularization of the avian pituitary, and notes on structures in the vicinity of the pituitary. Research progress in the histophysiology and cytophysiology of the avian pituitary has lagged substantially behind similar investigations in mammals. To a considerable extent this certainly has been the result of a deficiency in our knowledge of the microanatomy, vascularization, and innervation of the avian pituitary. This monograph should prove to be most important in rectifying this difficulty.—D. S. Farner.

74. Avian Physiology. Paul D. Sturkie. 1954. Comstock Publishing Associates, Ithaca, New York. xv + 423 pp., 67 figs., 44 tables. $6. A proper evaluation of this book requires initially a recognition of the types of investigations which have contributed to avian physiology as well as some understanding of the nature of the literature as it now exists. With rather gross generalization, four general types of investigations may be recognized: (1) Intensive studies on the biology of individual species of birds. Physiologic information from such sources is usually fragmentary and non-experimental. (2) Investigation of physiologic phenomena in which birds are selected as suitable experimental animals. (3) Investigations directed primarily towards the enhancement of some aspect of avian physiology. (4) Investigations designed, or at least so justified, primarily to provide information for improving practices in the husbandry of domestic birds. The first and third of these categories have probably contributed the least. With these observations in mind it is not surprising that the available information on avian physiology is fragmentary, badly scattered, and quite unintegrated. Monographs and review papers are very uncommon. These conditions have contributed to a general feeling that the body of avian physiology is considerably smaller than it actually is; they also make the task of preparing a book on avian physiology more difficult than many may realize.

The introduction to *Avian Physiology* states that this is the first book in any language dealing with the specialized physiology of birds, but this contention requires some clarification. Certainly the three volumes of Groebbel's (1932-) "Der Vogel. Bau, und Funktion, Lebenserscheinung, Einpassung" contain much physiology; unfortunately most copies of the third volume were destroyed before distribution. Also there is much avian physiology in Volume XV, "Oiseaux" (1950), of "Traité de Zoologie" (edited by Pierre-P. Grassé) although, admittedly from a physiologic aspect, the balance is not good. It should be noted that Professor Sturkie has drawn frequently from these treatises in the preparation of *Avian Physiology*.

As the author has noted in the introduction, *Avian Physiology* is restricted very largely to a consideration of the physiology of domesticated species. Although regrettable, the practical necessities of such a restriction are recognizable. The 21 chapters include 5 on blood and circulation, 2 on respiration, 2 on digestion, 2 on metabolism, 2 on reproduction, 5 on reproduction, and 1 each on thermoregulation, excretion, and sense organs. There are no separate considerations of the nervous system and neurophysiology, myophysiology, molt, protein and fat metabolism, or nutritional requirements. Approximately 40 percent of the text pages are concerned with reproduction and endocrinology. Although this represents an undesirable imbalance, it does indicate which aspects of avian physiology have received the greatest attention from investigators. The chapters on reproduction and endocrinology are the most effective parts of the book.

It should be emphasized to the prospective reader that, in the preparation of this book, the author has enjoyed the advantage of a very broad experience in research on the physiology of the domestic fowl; his published experiences ramify into no less than 9 of the 21 fields represented by chapters in the book.

Each chapter concludes with a useful list of references. Although, as the author indicates, these lists are selective and by no means exhaustive, they constitute collectively one of the most valuable parts of the book. The reviewer would be remiss, however, were he not to point out that these lists do omit titles of a number of publications which certainly could have been helpful in preparing the book, and which certainly would be of interest to the reader who wishes to go beyond the presentation in the book. Among these are Sandreuter's treatise of hematopoeisis in the starling and the domestic fowl (1951), Wingstrand's fine monograph on the avian pituitary (1951), Clavert's very useful review of the physiology of the formation of egg shell (1948), and Zeuthen's paper on the ventilation of the respiratory tract of birds (1942).

Throughout the book there are references to and comparisons with mammalian physiology. These are useful in showing many distinctive physiologic differences, for there has been too great a tendency towards the assumption that birds, being also homoiothermal, must be essentially similar physiologically to mammals. Also these comparisons are useful in emphasizing the numerous annoying gaps in avian physiology. Some of the references to mammalian physiology, however, are quite superfluous. For example, it seems quite unnecessary to note (p. 235) that myopia and hypermetropia in humans are correctable with glasses.

It is indeed unfortunate that the very substantial intrinsic value of this book is impaired in places by a somewhat inferior rhetoric. The reader's reaction to this will vary from minor annoyance at poorly constructed sentences to cases of perplexity as to what the author is actually attempting to communicate. The several editorial and typographical errors are not excessive quantitatively for a first edition.

Turning from these criticisms, the reviewer wishes to re-emphasize that the scattered and fragmentary nature of the literature on avian physiology has made the preparation of such a book a challenging task of substantial magnitude and complexity. The author is certainly to be commended for accepting the challenge. Recognizing the limitations imposed with respect to *aspects of physiology covered* and *species of birds included*, the reviewer finds this book very useful; he feels certain that others interested in avian physiology will share in this opinion.—D. S. Farner.

75. Birds of France. (Oiseaux de France.) 1953. Vol. 3. No. 2. 16 pp. Association pour l'Etude dans la Nature des Oiseaux de France et leur Protection. 129 Blvd. St. Germain, Paris 6, France. 100 francs. The Bulletin continues to maintain a high standard in publishing scientific ornithological information in a manner easily understood by and interesting to youthful beginners. Following a brief report on the Annual Meeting of the Association and pertinent matters, and a suggestion that correspondents overcome their timidity in submitting reports in connection with previously mentioned studies on Rooks, Magpies, Bustards, and certain alcids, there is brief mention of a Crossbill invasion with reference to a following article containing first-hand information on feeding behavior. The excellent study of Alsace, elaborating on the various geographical parts from the plains and the valley of the Rhine at the one extreme to the tops of the mountains at the other, and the characteristic bird life of each area, will, it may be hoped, be followed by similar studies on other parts of France.

The studies on the Rook *(Corvus frugilegus)* have been productive. Of 120 young birds examined in May, 1952, eight were found to show a dull white on the upper part of at least one front claw. The normal color is a brilliant black. One of the eight birds had three such claws on the left tarsus and one on the right tarsus. The other seven birds showed only one white claw, each, always the middle one on the right tarsus. Similar proportions were obtained in the May, 1953, examination. Another peculiarity was the presence of small white feathers under the chin on some of the young birds, instead of the usual black ones. Again, some birds had one or both mandibles, but usually the lower one, a dull white in part or entirety. There was no relationship between the white claws and the white mandibles. Adult birds were observed to show a swollen, projecting lower throat when coming to feed the young.

Illustrated sections give data for the field identification of diving ducks, and perhaps rather advanced technical statistics for the Willow Warbler and other Phyloscopi. Other items include a brief study showing the ecological relationship of habitat to birds, a lesson on banding procedure, a plea to make the Bois de Boulogne in Paris a bird refuge and stop the killing of "vermin" by the armed

guards, and general comments from Des Dombes (Ain) accenting in particular the decrease in various heronries.

The procedure followed by this Bulletin might well be taken as a prototype for popular organizations in this country desirous of raising interest in birds above a purely popular level.—Wendell Taber.