juveniles were banded with nos. 39-311618 and 39-311619. They flew from the roof on June 30. One perished soon afterwards.

3. Nighthawks returned on May 15, 1950. Mating was observed May 24 on the roof of McGilvrey Hall. One egg was found on the morning of June 4; the second one at 9 p.m. that evening. The female was captured and banded with no. 42-232611. The first egg hatched June 22 followed by the second one the next day. The female kept the nestlings in shade as much as possible and brooded them most of the time. They were banded with nos. 42-232610 and 42-232614. On July 15 one juvenile left the roof for the first time. The next day all of the birds were gone. No. 42-232610 soon returned to the roof and died July 21 from a digestive disorder.
4. The Nighthawks returned again on May 16, 1951. The same female parent, 42-232611, with two nestlings which were banded with nos. 42-232618 and 42-232619 were found on the roof of Rockwell Library on June 21.

LITERATURE CITED

Sutton, George Miksch and Haven H. Spencer. 1949. Observations at a Nighthawk's Nest. *Bird-Banding* 20(3): 141-149.

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GENERAL NOTE

Depigmentation of a Robin.—For several years a Robin, *Turdus migratorius* Linnaeus, with head largely white has been observed in the vicinity of our banding station. In April, 1951, it became apparent that there were two individuals with somewhat similar plumage, one of which was already banded. Not until June 7, 1951, was it possible to trap this bird, number 48-219681, which proved to have been banded at the same location on April 14, 1949, at which time it had been recorded as an adult male with nothing at all remarkable about its plumage. When retaken, most of the head feathers were white with the exception of some around the eye, but the throat and nape were clear white; there was a small white spot in the center of the breast; the undertailcoverts and the lowest part of the belly were white; and there was a sizeable white area on the primaries.

Dr. C. H. Blake has kindly given me his comments on this case. Most of the white plumages of birds are of genetic origin, such as true albinism. While at least six kinds of genetic whiteness are known in birds, this Robin does not appear to represent any genetic cause unless perhaps an age depigmentation, but if so, no similar effect seems to be known for domestic birds. It appears more likely that in this case the depigmentation was physiological in origin, involving a relatively limited area; if so, it appears to be one of the first authenticated instances, though the possibility has been recognized for many years.—Frank P. Frazier, 424 Highland Ave., Upper Montclair, N. J.

RECENT LITERATURE

BANDING

1. Trapping and Marking of Adult Nesting Doves. Wendell G. Swank. 1952. *Journal of Wildlife Management*, 16(1): 87-90. The construction and operation of an efficient trap are described and illustrated. Only 12 out of 106 attempts to trap Western Mourning Doves, *Zenaidura macroura marginella*, were unsuccessful. Birds were marked across the wings and tail in white and yellow with Testors Model Airplane Dope.—Helmut K. Buechner.

2. Mechanical Aids for Bird Banding. Miller, A. W., and Henry, Russell. 1952. Calif. Fish & Game, 38: 43-51, 7 figs. Describes several types of band-opening pliers for size 3 and larger bands.—C. H. Blake.

MIGRATION

(See also numbers 13, 48, and 62.)

3. The Migration of Swedish Ospreys. (Fiskgjusens, *Pandion haliaëtus* (L.), flyttning.) Sten Osterlöf. 1951. *Vår Fågelvärld,* 10(1): 1-15. Up to 1 January 1950, 1800-1810 Ospreys have been banded by the systems of the Naturhistoriska Riksmuseet i Stockholm and the Naturhistoriska Museet i Göteborg. From these there have been 236 recoveries. This paper is of real importance since most of the European Ospreys breed in Sweden and northern Finland. There is a rather peculiar distribution of recoveries with respect to age. No less than 130 were made during the first southward migration; thereafter the number of recoveries for the 1st, 2nd, 3rd, etc., years of life were 5, 22, 28, 17, 12, 3, 5, 1, 1, 1, 0, 1 (for the 12th year), respectively. Although this series would be altered some by a correction allowing for the number of years available to obtain recoveries of each age group, it would still show a rather odd distribution.

In general the Ospreys migrate on a broad front and in a southeasterly direction. There is a notable absence of winter recoveries probably because the wintering areas are sparsely inhabited by man. The small numbers of one year birds in the series is perhaps to be explained by the failure of the first year birds to leave the wintering area during their first summer. The two-year-old birds are found in more northern latitudes and quite randomly distributed throughout western Europe; they do not breed although a few reach the breeding area. All recoveries of third-year birds were in the breeding area and two-thirds of them were within 100 kilometers of the banding locality. It appears possible that the older birds migrate to Africa by crossing the Mediterranean whereas the young take the land route via the Iberian Peninsula.

The author estimates that the minimum mean life expectancy for Ospreys which reach breeding age is 1.6-1.7 years. The exact mean age for the 226 recoveries is 1.8 years. This figure, however, is not very significant since there is quite likely bias in recovery with respect to age and no correction has been made for the time available for recovery of each age group. This is a very interesting and important paper.—D. S. Farner.

4. The High Migration of Chaffinches over the North Sea in Relation to the Wind Direction. (Ultrahoge trek van Vinken, *Fringilla coelebs* L., over de Noordzee in verband met de windrichting.) D. A. Vleugel. 1951. *Ardea,* 39(4): 341-355. The author takes rather vigorous exception to the interpretation of other Dutch ornithologists relative to the conditions which are conducive to migration across the North Sea. Previously Deelder (*Ardea,* 37(1): 1-88) had concluded that with E and NE winds a broad-front migration passed out immediately over the Sea at great elevation; on the other hand, with SSW to SE winds the birds in the broad-front flight are shunted first southward along the coast at relatively low elevations before crossings occurred. The author develops an argument that it is not the direction of the wind that is of prime importance but rather the general weather conditions. He suggests that birds tend to wait for anticyclonic conditions before crossing the Sea. Since good weather comes most frequently with NE to E winds, these winds are the ones used most frequently by migrating Chaffinches. However, the author cites instances in which Chaffinches were noted in migration across the sea with SSE to W winds in good weather. Further he cites evidence that the picture is similar in spring migration, *i.e.* anticyclonic conditions being desirable. In an appendix, L. Tinbergen points to certain confusions in terminology between this paper and those which its author criticizes. Tinbergen suggests that the flights described by Vleugel with SSE to West winds are probably of the first type described by Deelder. However, he indicates the importance of further study on this point. Particularly is this true in those flights with weak SW to S winds in which the birds do not deviate on reaching the coast.—D. S. Farner.

5. Visible Migration at Land's End. David and Elizabeth Lack. 1952. *British Birds*, 45(3): 81-96. From Oct. 8 to Nov. 1, 1951, the authors watched the morning migration of Sky Larks, *Alauda arvensis*, Chaffinches, *Fringilla coelebs* and Starlings, *Sturnus vulgaris*. Five maps show the movements of the birds. The first two followed the coast west, then south, then east; they "coasted" mainly against the wind. Both "took off over the sea south in the direction of Spain and W.N.W. in the direction of Ireland." "Sky-Larks chiefly took off over the sea in fair weather and often with a following wind." Starlings mainly took off W.N.W. towards Ireland. "Migration was seen most commonly in sunny weather with a light wind and least in fog, heavy rain, or strong wind. It was commonest in the first two hours after dawn, the peak time varying somewhat with the species." Details are given as to behavior when starting off and crossing the sea. It is a fine thing to have these careful, intensive observations on migration instead of mere speculation.—M. M. Nice.

FOOD HABITS

(See also Numbers 32, 33, and 51.)

6. Observations on the Food Habits of the European Sparrow Hawk in Southern Oberlausitz. (Ernährungsbiologische Beobachtungen an den Horsten des Sperbers (Accipiter n. nisus L.) in der südlichen Oberlausitz von 1944-1948.) Volkhard Kramer. 1950. *Die Vogelwelt*, 71(6): 183-187. The data on which this paper is based come from the study of 84 nests. The tabulation of prey shows 7,042 birds of 78 species and 223 mammals of six species. The vast majority of birds were common passerine species.—D. S. Farner.

7. Identifying Pondweed Seeds Eaten By Ducks. Alexander C. Martin. 1951. *Journal of Wildlife Management*, 15(3): 253-258. Pondweeds (Potamogeton), probably the most valuable genus of duck foods in the United States, averaged 11 percent in the stomach contents of 7,998 ducks, nearly twice as much as the next highest item, bulrush (Scirpus). Most of the 35-40 pondweeds can be identified to species. The fruits of twenty-one species of pondweeds are illustrated in three pages of drawings, accompanied by descriptive comments. This paper provides an important tool in waterfowl food-habits studies.—Helmut K. Buechner.

8. Asparagus as Emergency Pheasant Food. Carl V. Swanson. 1952. *Journal of Wildlife Management*, 16(1): 50-53. *Asparagus officinalis* furnishes an excellent winter emergency food for Ringneck Pheasants, *Phasianus colchicus*, even in areas where the rainfall may be as low as 20 inches per year. When placed on a diet of asparagus fruits only, Pheasants lost an average of 3.4 grams per day over a 35-day period. Asparagus is superior to *Rosa multiflora*, *Crataegus* sp., *Robinia pseudoacacia*, *Symphoricarpos* sp., *Dipsacus sylvestris*, *Arctium minus*, and *Prunus* sp. It is of particular value because it stands above the snow and is not utilized except in time of emergency. Unlike cultivated grains, it furnishes a crop of both cover and food *after* a commercial crop has been harvested by the farmer.—Helmut K. Buechner.

9. Food of the Chick of *Notornis hochstetteri*. L. Gurr. 1951. *Notornis*, 4(5): 114. Food for the chick is obtained by the parents by scraping in sphagnum and tussock. Examinations of fecal pellets indicate that the young received dipterous larvae, pupae, and eggs; arachnids; and oligochaete worms. Although centipedes were found to be present in the feeding area, they were apparently not fed to the young.—D. S. Farner.

PHYSIOLOGY

(See also Number 23)

10. Body Insulation of Some Arctic and Tropical Mammals and Birds. P. F. Scholander, Vladimir Walters, Raymond Hock, and Laurence Irving. 1950. *The Biological Bulletin*, 99(2): 225-236. Two principal adjustments can be made to low temperatures: (1) Lowering heat loss through increasing insulation and (2) increasing the heat production through raising the metabolism. In this paper, the first of a series of three, the insulating values of the fur or feather covering of 17 arctic and 16 tropical animals are presented. Since the useful maximum of fur

thickness is reached, arctic mammals the size of the fox and larger show no correlation between thickness of insulation and body size. Below the size of the fox the fur must be lighter to permit the animal to move about. Habits such as burrowing, colonial nesting, and insulating nests protect the smaller mammals from cold. Among the tropical mammals the sloths are the best insulated, which seems to be necessary for their low rate of metabolism. Seal blubber proved to be only five percent less efficient in ice water than in air, showing its effectiveness as an insulator in water. Heat loss through polar-bear skin increases 20-25 times when submerged in quiet ice water; 45-50 times when water is agitated. The insulation is readily restored when the bear emerges because the fur sheds water easily upon shaking. The beaver has an extraordinarily dense and fine fur which retains a layer of air several millimeters thick next to the skin when the animal is submerged. —Helmut K. Buechner.

11. Heat Regulation in Some Arctic and Tropical Mammals and Birds. P. F. Scholander, Raymond Hock, Vladimir Walters, Fred Johnson, and Laurence Irving. 1950. *The Biological Bulletin* 99(2): 237-258. Heat production was determined by submitting the animals to gradually lowered air temperatures in a respiration chamber. There was no correlation between critical temperatures (lowest temperature at which an animal can maintain body temperature without increasing metabolism) and body size, as supposed by some investigators. Arctic and temperate animals have a well-defined zone of thermoneutrality that extends in some down to —30°. Most of the tropical animals have the zone of thermoneutrality so limited and transitory that it becomes more of an abstraction than a reality; that is, their critical temperatures are very close to their body temperatures. This explains the extreme temperature sensitivity of tropical animals. The cold-hardiest animals, the fox and Eskimo dog, can be expected to tolerate the coldest temperatures on earth merely by increasing their metabolism 30-40 percent, whereas the same increase in metabolism in a tropical animal will help only by a few degrees. The critical gradient (maximum gradient between body temperature and ambient temperature that can be maintained without increasing metabolism) in arctic animals may be 70°; in tropical animals (including man) only 10°.—Helmut K. Buechner.

12. Adaptation to Cold in Arctic and Tropical Mammals and Birds in Relation to Body Temperature, Insulation, and Basal Metabolic Rate. P. F. Scholander, Raymond Hock, Vladimir Walters, and Laurence Irving. 1950. *The Biological Bulletin* 99(2): 259-271. Since the critical gradient is proportional to the product of the over-all insulation and the basal metabolic rate, there are three possible adaptations to cold: (1) the body-to-air-gradient (2) the insulation, and (3) the basal metabolic rate. The differences in body temperature among animals from the arctic to the tropics are insufficient to explain cold adaptation; the narrow band of temperature on which both birds and mammals operate is apparently a fundamental, nonadaptive constant in their biochemical organization. Only peripheral parts of the body may show considerable temperature adaptation. Mammalian body insulation is highly adaptive to climate; there is no climate so cold that the larger mammals cannot adapt to it. Metabolic rates of experimental animals were compared with the standard mouse-to-elephant curve of Benedict. Only the arctic weasel and the sloths did not conform to the curve. The conclusion reached was that the basal metabolic rate is determined by a size relation according to the formula, Cal/day = 70 $kg^{\frac{3}{4}}$, and that it is phylogenetically nonadaptive to external temperature.—Helmut K. Buechner.

13. Relation of Lipid Metabolism to Migration in Birds. Seasonal Variation in Body Lipids of the Migratory White-throated Sparrow. Eugene P. Odum and Jesse D. Perkinson, Jr. 1951. *Physiological Zoology*, 24(3): 216-229. The authors extracted the lipids from 86 *Zonotrichia albicollis* collected during the post migratory season in fall, midwinter, spring molting period, and premigratory period in spring. The percentages of total body lipids with respect to total body weight were found to be as follows: postmigration, 6.9; midwinter, 12.1; molt, 6.3; and premigration, 16.7. The skin, together with the subcutaneous depots, proved to be an accurate index of total lipids since it varied directly with

total lipids. Premigratory fat differed from winter fat in having a much greater portion of it concentrated in the viscera. Males became fatter sooner and more uniformly than females during the premigratory season. In males the massive premigratory deposition occurred immediately on completion of the spring molt and within a period of about 10 days. While the changes in body lipids account for most of the changes in weight it is pointed out that there is some evidence of changes in the water content of the adipose tissue and also some changes in other constituents of the body. Thus changes in weight are not completely reflections of changes in the amount of lipid deposited. "It is tentatively concluded that lipid deposition is a necessary prerequisite for migration and that an individual bird will begin migration only when this is completed, other conditions being favorable." (p. 230.)—D. S. Farner.

14. A Comparison of the Ontogeny of Haematopoiesis in the Domestic Fowl and the Starling. (Vergleichende Untersuchungen über die Blutbildung in der Ontogenese von Haushuhn (*Gallus gallus* L.) und Star (*Sturnus v. vulgaris* L.). Adelheid Sandreuter. 1951. *Acta Anatomica,* 11(Supplementum 1): 1-72. This interesting paper has a wealth of interesting comparisons between precocious and altricial birds as well as much useful information on avian haematology in general. The crystaloid granular avian leucocytes are thought to correspond in their origin with the neutrophilic granulocytes of mammals whereas the amorphous granular avian leucocytes correspond with the eosinophylic granulocytes. A very notable difference between the two species is the much greater importance of the liver and spleen in the Starling with respect to the production of red blood cells immediately before and immediately after hatching. Of considerable interest is the increase in erythrocyte count and hemoglobin content which coincides with the development of the ability to fly. Arguments are presented to indicate that passerine birds have a more efficient type of erythrocyte than do galliform species. —D. S. Farner.

15. The Frontal Shield of the American Coot. Gordon W. Gullion. 1951. *The Wilson Bulletin,* 63(3): 157-166. The frontal shield, a fleshy protuberance extending onto the forehead from the upper mandible of the American Coot, *Fulica americana,* is present on both males and females. Immature birds and unpaired adults have small flat shields during the fall and winter. All breeding birds were found to have large shields. A marked increase in shield size was noted in the case of wintering birds prior to their departure to their breeding grounds. Permanently paired birds defending territory, whether resident or migrant, retained enlarged shields. Although enlarged frontal shields of males were directly correlated with increased numbers of testicular interstitial cells, no correlation could be detected between follicle size or "general ovarian activity" (?) and the size of the shield of the several females examined. Testosterone implants resulted in rapid growth of the frontal shield of both sexes. Estrogen implants did not produce consistent results. The author suggests (p. 164) ". . . that a pituitary hormone, perhaps a gonadotropin, maintains an overall control upon shield-size, territorial behavior, gonad activity and migration, since all these functions may operate simultaneously."—L. R. Mewaldt.

16. Spermatogenesis in the Mallard. (La spermatogénèse d'*Anas platyrhyncha.* Odette Tuzet and Clément Besslère). 1951. *Alauda,* 19(3): 129-136. Because of the smallness of avian chromosomes, investigations of the details of spermatogenesis in birds are somewhat infrequent. In this study it was found that all stages of spermatogenesis could be observed in a single seminiferous tubule. The primary spermatocyte is about 10 micra in diameter. It shows the characteristic stages of the first mitotic division of maturation. The spireme fragments into rather long flexed chromosomes which form loops and orient themselves towards the nucleolus; they then shorten and tetrads are formed. At this time the centrosome doubles and assumes positions at the ends of the spindle. The nucleolus remains intact. The chromosomes have the appearance of being massive and few in number; however this is quite likely due to the effects of the fixatives. The secondary spermatocytes, produced from this division, are considerably smaller. There is a characteristically different spindle. Details of the conversion of the

spermatids to spermatozoa are given. The authors found occasional large spermatozoa among the normal cells. These appear to be the result of the failure of the cytoplasm to divide in the course of the last gonial division. There is then an abnormal mitotic division in the primary spermatocyte in which two distinct spindles with common centrosomes are formed. Subsequently the chromosomes of the two sets intermingle.—D. S. Farner.

NIDIFICATION

(See also Numbers 16, 24, 25, 26, 27, 38, 39, 45, 46, and 49.)

17. The Reproductive Biology of the Jackdaw. (Zur Brutbiologie der Dohle, *Coloeus monedula* (L.).) Diethelm Zimmermann. 1951. *Der Ornithologischer Beobachter*, 48(3): 73-111. This important study is the result of many visits to about 40 nests on the towers of the Grossmünster in Zürich in 1949 and 1950. Both sexes participate in nest construction, apparently with no division of labor. Nest construction continues to the time of fledging. Clutch size varies from one to six; the interval between eggs is usually one day but may be as great as three days. Incubation was never observed to begin with the laying of the first egg although it was observed to begin with the laying of the fourth from the last, third from the last, next to the last, or last egg. Incubation period is normally 17-18 days. Males were never observed to incubate. In 1949 nestling mortality was 65 percent whereas it was only 9.4 percent in 1950. Food reaction (Sperreaktion) is elicited only by sudden increase in temperature or by touch until 9-10 days, after which the food call of the adults becomes an important stimulus. The male was never observed to warm the young. During the first few days the young were fed only by the female with food brought to the nest by the male. After the tenth day only the male fed the young. Feces and dead young were carefully removed from the nest. Departure from the nest was between 30 and 35 days after hatching. It is infrequent that all young leave the nest simultaneously; frequently intervals of several days are involved. The family remains in the vicinity of the colony as long as there are young in the nest or as long as there are young which are unable to fly well. Thereafter the family leaves the colony. Thus the colony becomes entirely dissipated. By the end of July or the beginning of August the first Jackdaws return. Initially they spend only a few hours in the morning; by late autumn they occupy the nesting sites throughout the day.—D. S. Farner.

18. Clutch-size and Egg Mortality of Kent Island Eiders. Raymond J. Paynter, Jr. 1951. *Ecology*, 32(3): 497-507. The author has obtained a very interesting series of data from one of the most extensive breeding concentrations of *Somateria mollisima dresseri*. These data have been subjected to a careful statistical analysis which led the author to the following conclusions: the mean clutch size for 1947 and 1948 was 3.53 ± .09. There is no difference between the mean clutch-sizes of nests which produce young and those which do not, nor is there any significant correlation between time of completion of the clutch and clutch-size. Young were produced in 29 percent of the nests with an average of 3.15 birds per productive nest. Human influences may have contributed to a high nest mortality rate. Clutch-size appears not to be related to survival rates, at least after incubation has begun. There is a geographical trend in clutch-size, *i.e.* an increase from south to north. It is logically suggested that this may be correlated with the increase in daylight time available for predation and hence the tendency for greater survival of the higher producing lines because of their greater ability to compensate for higher losses. For this species the author does not favor the suggestion of Lack, that the selective mechanism may operate through the greater amount of daylight available for food gathering.—D. S. Farner.

19. Ten Consecutive Nests of a Song Sparrow. Andrew J. Berger. 1951. *The Wilson Bulletin*, 63(3): 186-188. The author presents data on ten consecutive nests of a color-banded female Song Sparrow, *Melopiza melodia*, at Ann Arbor, Michigan: one in 1948, five in 1949, and four in 1950. Her mate was the same color-banded male for the first five nests. Three of the ten nests were successful. The interval between destruction of a nest and the laying of the first egg in the next varied from five to seven days. It is probable that some host eggs were

removed by female Cowbirds, *Molothrus ater.* In the ten nests 27 host eggs and 18 Cowbird eggs were known to be deposited. Only six Song Sparrow young and one Cowbird young were fledged.—L. R. Mewaldt.

20. The Decrease in the Lapwing Population in the Netherlands with Observations on the Laying Mechanism and Egg-production Ability. (Over de achteruitgang van de Kievit, *Vanellus vanellus* (L.), in Nederland en gegevens over het legmechanisme en het eiproductie-vermogen.) H. Klomp. 1951. *Ardea,* 39(1/3): 143-182. This interesting paper is a thoughtful approach to certain aspects of the problem of the decline of the Dutch population of the Lapwing during the last 25 years. It has been assumed frequently that this decline has been the result of the taking of eggs which is legal until April 20. The author has performed experiments on the removal of eggs which indicate that Lapwings which continually lose their eggs until April 20 still come into incubation after this date. "After the removal of all the eggs during laying the reaction of the Lapwing varies and is dependent on the number of eggs taken. When the first egg is taken when laid the bird produces another four in succession in a new nest (the 2nd, 3rd and 4th egg plus 1 additional.) When the first 2 eggs are taken when laid, the bird produces 3 or 4 eggs in succession in a new nest (the 3rd and 4th egg plus 1 or 2 additional), or in exceptional cases the bird waits after having laid the 3rd and 4th egg in a new nest and after 5-7 days produces 2 or 3 more in the same nest. Sometimes the bird deserts the 3rd and 4th egg when laid and lays another clutch of 4 eggs in a new nest after a week. When 3 eggs are taken when laid, the 4th egg is laid in a new nest and normally deserted. After a week a new clutch of 4 eggs is produced. . . . To summarize these experiments, the Lapwing is only capable of producing more than 4 eggs in succession when she recommences laying in a new nest. Suppressing of eggs occurs possibly after 5-7 days when the bird adds some eggs of a new clutch to the remnant of a clutch that has been partly taken." (p. 176.) However, the later clutches resulting from egg-taking mean that incubation will be three to four weeks later and that the Lapwings will be subjected to mowing operations. The author's investigations show that 10 percent of the clutches are lost because of mowing. However, 40 percent of these losses are nullified by the laying of new clutches. It would therefore seem unlikely that the decline in the population is attributable to the taking of eggs. A very interesting paper.—D. S. Farner.

21. Incubation and Development of the Chick of the Adelie Penguin. (Incubation et développement du poussin chez le Manchot Adélie *Pygoscelis adeliae.*) J. Sapin-Jaloustre and F. Bourlière. 1951. *Alauda,* 19(2): 65-83. This interesting paper is a production of the *Expéditions polaires françaises* (*Missions* P. E. Victor), *Expédition antarctique en Terre Adélie* 1949-1951. On 13 November at the colony at Port-aux-Phoques among 600 nests, 20 had one egg each and one nest had two. The authors regard it as probable that the first eggs were laid on the tenth of November. Nests with two eggs were not common until the latter part of November. Incubation was found to last 33-37 days. As noted previously by Levick, it was found that neither of the members of the pair leaves the nest to feed until the second egg is laid, the first egg being incubated alternately or simultaneously by the two members of the pair. After the laying of the second egg there is a gradual decrease in the number of birds in the colony until in late November more than 96 percent of the nests had a single adult. The prolonged fasting which accompanies the reproductive period can reduce the weight of the adult by more than 25 percent. There are some observations on behavior which, unfortunately, have not been compared with the extensive observations of Richdale on other species of penguins in New Zealand. There is an important series of observations on the development of thermoregulation which is quite well established by the 15th day. The *crêche* develops at about the time of the attainment of thermoregulation and loss of territory-defending tendency by the adults. The *crêche* is "guarded" by parents of its members. The growth rate of young is highly variable. The combined chick and egg mortality rate is about 70 percent.—D. S. Farner.

22. The Nesting Season of Notornis. R. A. Falla. 1951. *Notornis,* 4(5): 97-100. Because of the recent "rediscovery" of the Takahe, formerly believed

to be extinct and still nevertheless perhaps well along towards extinction, the series of short papers in the July, 1951 number of *Notornis* is of considerable importance and interest. This particular paper is a summary of observations made during the breeding season of 1949-1950. The territories of eight, and possibly nine, pairs of birds were found. It appears that no more than two eggs are laid and that families may be limited to a single chick. Nesting activity begins at least as early as October.—D. S. Farner.

23. Studies of the Reproductive Cycle of the Bobwhite Quail. James T. Baldini, Roy E. Roberts, and Charles M. Kirkpatrick. 1952. *Journal of Wildlife Management*, 16(1): 91-93. Subjecting Bobwhite Quail, *Colinus virginianus*, to continuous light starting November 16, 1949 in one experiment with three pairs of birds, and October 7, 1950 with twelve pairs, revealed that the first eggs were laid 38-41 days after light stimulation, production over a 79-day period in the second experiment varied from 3 to 40 eggs per bird with an average of 28 per bird, and that sexual maturity may be attained at the age of 139 days. Polygamous mating was demonstrated by the average production of 42 eggs per bird when three females were placed with one male in a single pen. This study suggests that Bobwhite may be made available at any age for research purposes at all times of the year.—Helmut K. Buechner.

LIFE HISTORY

(See also Numbers 17, 21, 38, 39, 50, 53, 60, and 61.)

24. Report on the Action System of the Bee-eater. (Beiträge zu einem Aktionssystem des Bienenfressers *(Merops apiaster L.)* Lilli Koenig. 1951. *Zeitschrift für Tierpsychologie*, 8(2): 169-210. Careful, detailed observations on Bee-eaters raised in captivity, illustrated with photographs and excellent sketches showing positions in stretching, sun-bathing, rain-bathing, sleeping, courtship, threat and fighting, etc. These beautiful birds are persecuted because of their supposed harmfulness to bees. Yet a bee-hive kept for a year in the aviary with six adult bee-eaters flourished. These birds, even the nestlings, are immune to bee stings, as is the hedgehog. Occasionally on hot days bees stung the birds. Experiments with differently colored pieces of paper showed that the bee-eaters preferred bumble bees to honey bees.

These highly socialized birds have a great variety of vocalizations; the chief ones are described and their significance noted. The birds greeted Frau Koenig as a social companion. They are so sexually ambivalent that it was impossible to distinguish the sexes except in the case of the pair that nested in a hole excavated in the clay bank. Sexual behavior is not influenced by dominance. The male drove others of the flock from the vicinity of his mate, but the pair did not defend the nest hole. When incubating the mates changed places every 15-30 minutes. Incubation lasted 22 days, fledging 30. The previous year when fledglings were brought into the aviary, year-old birds that had never bred began to fly about with food and offered it to the young, but when the latter tried to accept it, refused to give it up and ate it themselves. This is but a small sample of the wealth of illuminating information in this very fine study.—M. M. Nice.

25. Life of the Crowned Hornbill (Part IV), *Lophoceros suahelicus australis*. Gordon Ranger. 1951. *The Ostrich*, 22(2): 77-93. This is the concluding section of a life history study in which bird behavior is stressed. The author describes the changes in family relationships, sexual activity, and territorial defense prior to the female's immurement in the nest tree. During this period the female gradually becomes dependent on the male for food. As this increasing dependence takes place after sexual union in a species which is paired for life, Ranger believes it is "an adaptive process" which has no relation to courtship but which is preparatory to the enforced dependence of the imprisoned female. She plasters up the nest opening from the inside with a plaster consisting of "hornbill dung and the finer soil composing the floor of the nest," leaving the nest for extended periods as long as the opening is large enough to permit her passage. Photographs and a sketch show the nest opening in various stages of closure.—Hustace H. Poor.

26. Some Notes on the Cape Gannet, *Morus capensis*. G. J. Broekhuysen and G. Rudebeck. 1951. *The Ostrich*, 22(3): 132-138. Each year 450 tons of guano are harvested from the Malagas Island colony comprising 130,000 of this little known species. The main breeding season is in September and October, although many individuals are still incubating in February. Nest density averages 2½ nests per square meter; one hundred eggs averaged 76.13 x 48.22 mm. The incubating adult keeps the single egg under its webbed feet, and hatches out the nestling in 42 days. Immature birds do not return to the breeding colony until adult. Their plumages and various phases of the courtship of the adults are summarized.—Hustace H. Poor.

27. The Yellow-nosed Albatross, *Diomedea chlororhynchos* Gmelin, at Its Breeding Grounds in the Tristan da Cunha Group. M. K. Rowan. 1951. *The Ostrich*, 22(3): 139-155. An excellent paper based on two years at Tristan da Cunha, one of the three known breeding stations of this species. In September the birds return to the islands after a five-months absence, most of them apparently already mated. Old nests are often repaired and used, but many new ones are built. They are mounds of mud and vegetation about a foot high, and are usually solitary, but may be crowded into rookeries under some circumstances. There are behavior patterns which permit determination of the morphologically similar sexes. Mrs. Rowan describes the courtship in detail. Egg laying dates differ among the three islands of the Tristan da Cunha group. Incubation of the single egg starts immediately and lasts between two and three months. Feeding habits of the dependent young, immature plumages, and rehearsing for the first flight are described. The albatross feeds chiefly on cephalopods, and has a potential life span of at least 13 years. Skuas *(Stercorarius antarcticus)* take unguarded eggs and chicks, and rob and occasionally attack the young albatross. Adults first and then young leave the islands in late April and March. Islanders have taken the eggs and young birds for food extensively for years, and the species was fast dwindling at these breeding grounds until protective measures were instituted during World War II. The conservation regulations have proved so effective that the colonies are now thriving while providing the islanders with a regular food crop.—Hustace H. Poor.

28. Cuckoo Studies on a South African Farm (Part I). G. J. Skead. 1951. *The Ostrich*, 22(3): 163-175. Life history notes on various species of cuckoos compiled from observations during several years on a large veld tract. The Black Cuckoo, *Cuculus clamosus*, Red-chested Cuckoo, *C. solitarius*, Black-crested and Black-and-Grey Cuckoos (considered inseparable), *Clamator jacobinus serratus*, and Great Spotted Cuckoo, *C. glandarius*, are treated in this part of the paper. Host species, arrival and departure dates, calls, parasitic habits, incubation periods, development of the young, and food are discussed.—Hustace H. Poor.

29. Winter Observation on Notornis in 1949. E. G. Turbott. 1951. *Notornis*, 4(5): 107-113. There is some reason to believe that there may be a certain amount of dispersal movements during the winter. This seems to be supported by the observation that the apparent sources of food may be covered by snow for as much as two weeks at a time.—D. S. Farner.

30. Notornis in February, 1950. C. A. Flemming. 1951. *Notornis*, 4(5): 101-106. These are observations on the same pairs as noted in the paper reviewed above. There are notes on family behavior, immature plumage, and molt. The family grazes as a group with the adults separated by 20-50 yards. Several interesting philosophic observations are made. The author points out that this species is large and herbivorous, characteristics frequently noted in forms on the verge of extinction. There is an excellent series of photographs following this article. General habitat, nests, eggs, feeding, winter conditions, etc., are depicted.—D. S. Farner.

31. Life History of Longuemare's Hermit Hummingbird. Alexander F. Skutch. 1951. *The Ibis*, 93(2): 180-195. *Phaethornis longuemareus* is a small species even among hummingbirds. Its length is less than four inches, over half of this being bill and tail, and its weight is about three grams. The observations

on which this paper is based were made in Guatemala, Honduras, and Costa Rica and hence apply to the subspecies *saturatus*. Males congregate in courtship assemblies usually in dense second growth. Singing is interrupted only by the dry season in February and at the height of the wet season in September and October. Courtship consists of a complex aerial dance performed above the perching female. The downy nest is constructed largely by the female beneath the tapering tip of a palm-frond, or other leaf, three to six feet above the ground. Cobweb binds the nest to the leaf. The normal clutch size is two. Occupied nests were found in every month except February, March, September, and October. Only the female incubates. Incubation period is 15-16 days; nestling period is 20-21 days. The young are fed by female as she hovers over them. On the day after hatching the blind nestlings orient themselves toward the leaf and maintain this orientation until they are ready to fly. At ten days the eyes open, the skin becomes darker, and the feathers begin to unsheath.—D. S. Farner.

32. A Study of the Hadedah Ibis, *Hagedashia h. hagedash*. C. J. Skead. 1951. *The Ibis*, 93(3): 360-382. This paper is based on observations at the author's farm, "Gameston," in the Kariega River Valley near Highlands, Albany district, Cape Province. The principal breeding season is October-November, with occasional double broods. The species is not strongly territorial. Communal roosts are used throughout the year except during the nesting season. However, pairs "which appear to be mated throughout the year" roost apart from the main flock. Incubation is performed by both sexes. The incubation period is about 25 days and the nestling period is about 33 days. Both parents feed the young by regurgitation. Normal clutch size is three although four is not uncommon. There is a high mortality among juvenals due to falling from the nests. The favorite feeding grounds are the open stretches of short grassveld especially where it is damp. The food consists of insects, millipedes and earthworms.—D. S. Farner.

33. Fall and Winter Habits of Prairie Chickens in Southwest Nebraska. Levi L. Mohler. 1952. *Journal of Wildlife Management*, 16(1): 9-23. This study of the Greater Prairie Chicken, *Tympanucus cupido americanus*, was centered around two flocks, each numbering about fifty birds, from September 1940 to January 1941. Each flock occupied a definite home range of about 2,000 acres which included large areas of ungrazed or lightly grazed pasture, cultivated fields, and a farmstead. Feeding was observed 37 times in cornfields, 21 times in sorghum shocks, and 4 times each in rye stubble and Sudan-grass shocks. Dense native grass was preferred for roosting; heavily grazed areas lacked good ground cover and were avoided. Considerable early morning displaying on a booming ground was noted on several mornings in October and November, particularly on November 29, which was a clear, frosty, spring-like morning. No booming was heard, but one local farmer reported booming on October 27, 1940. Although April is the most important month for booming, the first booming was heard on February 10 in 1941. General fall and winter habits, with particular emphasis on feeding and roosting, are presented in this paper providing a useful though minor contribution to our knowledge of the Prairie Chicken.—Helmut K. Buechner.

BEHAVIOR

(See also Numbers 5, 17, 24, 25, 58, 59, 60, and 61.)

34. Flapping Flight. R. H. J. Brown. 1951. *The Ibis*, 93(3): 333-359. Initially the author summarizes the anatomical adaptations for flight specifically with respect to skeleton, musculature, and feathers. There is a critical discussion of various ideas of the functions of the strokes of the wing. It is the author's opinion that much of the disagreement stems from studying different situations in different species and that generalizations must be extremely broad in order to maintain any validity. "It may be convenient to sum up this consideration of the flapping cycle in these terms:—1. The down-stroke is always lifting in function. 2. In the smaller species in the slow flight there is lift and propulsion from the reversed primary feathers on the up-stroke and probably little or no propulsion from the down-stroke. 3. As the forward speed increases this may pass into the type of flight characteristic of large birds, where the tip is not reversed, and no forward force is developed during the up-stroke. Species employing only this

type show inability to take off from the ground in calm weather without a run." (p. 346.) There is a very interesting discussion of the role of wing shape. Whereas the general picture in soaring flight is quite clear, there are many difficulties with respect to flapping flight. "The required aerodynamic shape of a wing in a fast-flapping bird with large difference in airflow velocity between root and tip has not been examined quantitatively. It is fairly obvious that during the down-stroke such a wing behaves more like an airscrew of high pitch than a fixed wing. Also little is known of the properties of structure of the size of a sparrow's wing." (p. 349.) In general the wings of small species are very similar in shape and have very low aspect-ratios and little emargination. Exceptions are birds whose habitats are primarily aerial, such as swifts. As size increases, differences in wing shape become more divergent. There is a correlation between length and open habitat. There is an extensive discussion of the role of emargination. Deep emargination doubtless allows gliding without extensive wing twist. Further, ". . . one can say simply that a bird with deeply emarginate feathers does not need much active or inherent twist in the wing, since the individual feathers can flex so as to limit their angle of attack in the down-stroke and, therefore, remain efficient and also produce forward force." (p. 351.) The older suggestion that the prime function of emargination is the reduction of resistance in the up-stroke is rejected. The author agrees that the function of the alula is similar to a Handley-Page slot and is hence an anti-stalling device.—D. S. Farner.

35. Observations on a Newly-formed Colony of Herring Gulls. (Beobachtungen an einer neugebildeten Brutkolonie der Silbermöwe (*Larus a. argentatus* Pontopp.).) Rudolf H. Fritsch. 1951. *Zeitschrift fur Tierpsychologie*, 8(2): 252-273. A study of space-time relations, flight distance, defense behavior, response to human beings, and behavior of the young in the three-year-old colony at Spiekeroog. Comparisons are made with the older colony at Memmert (Goethe 1937); the gulls there flew together to and from the feeding grounds while in the newer colony they flew more independently. Egg destruction and killing and eating of the young were daily occurrences at Memmert, but almost unknown in the less-crowded colony at Spiekeroog.—M. M. Nice.

36. Behavior of Normal Birds towards Aberrant Ones. (Comportement d'Oiseaux normaux envers des mutants.) H. Heim de Balsac. 1951. *Alauda*, 19(4): 225-226. A young Barn Swallow, *Hirundo rustica*, an almost complete albino, was watched from August 15 to departure in early September. When perched the bird was ignored by its fellows, and none sat near it. When it flew and tried to join others of its kind, these uttered cries of alarm and several pursued it until it left the vicinity. In a farmyard a hen that had curly, frizzled feathers was so persecuted by the other fowls that it hid during the day, venturing out only in the evening to get food.—M. M. Nice.

37. The Action System of the Bearded Tit. (Das Aktionssystem der Bartmeise (*Panurus biarmicus* L.).) H. Otto Koenig. 1951. *Oesterreichische Zoologische Zeitschrift*, 3(3/4): 247-325. The Bearded Tit is a highly specialized and highly socialized bird. It lives in large stretches of reed beds. It walks on the ground and scratches with both feet at once; it hops and climbs through the reeds. During the breeding season it is insectivorous; during the rest of the year it lives on seeds. As a social bird it possesses a great number of calls that serve as signals and these are described from the author's wide experience with the birds both in the wild and hand-raised. Two chief types of notes have developed from the calls of the nestling. Calls without "r" are location, contact and alarm notes; those with "schr" signify that one bird wants another to approach, as a fledgling calling for its parent, a male inviting his mate to nest-site inspection, etc. Threat notes—a loud hissing—appear to be of ancient origin, as they occur in reptiles, birds and mammals and are universally understood. Since the birds are not territorial and since they choose mates before the juvenile molt (see *Bird-Banding*, 23: 38), the short, three-syllabled song is seldom heard except from a male that has lost his mate.

Display, body care, enemies and dangers, plasticity and learning ability are discussed in the final section. Fifteen photographs illustrate stretching, preening, locomotion through the reeds, etc. An admirable study.—M. M. Nice.

38. Head Flagging in the Black-Headed Gull: its Function and Origin. N. Tinbergen and M. Moynhan. 1952. *British Birds*, 45(1): 19-22. Pair-formation in *Larus ridibundus* takes place on "pre-territories" where a single male stands and gives a long call *kreeooo* to any approaching bird. Only females respond by alighting. At first both birds go into the "Forward Display" attitude (Kirkman); which indicates threat. Then both usually go into a very different attitude: "They stretch the neck vertically upward, and, with a sudden movement, jerk the head to the side, pointing the bill away from the partner when they do so." Photographs show both movements. "The threat function of the Forward Display, undoubtedly based originally on the aiming of the bill, is enhanced by the brown face." . . . Head Flagging seems to have "evolved as a friendly gesture because it is the opposite, or negative, of the threat movement." Threat and appeasing movements of other species are also discussed.—M. M. Nice.

39. The Distraction Displays of the Little Ringed Plover and Territorial Competition with the Ringed Plover. Edward A. Armstrong. 1952. *British Birds*, 45(1): 55-59. A pair of *Charadrius dubius* with small chicks was watched in East Anglia; the principal display patterns are described as the crouch-run, the squat and injury-simulation. The first is considered a form of distraction display, the second perhaps a threat. There was continual territorial friction with a male Ringed Plover, *Charadrius hiaticula*.—M. M. Nice.

40. The Memory of the Hen. (Beiträge zum Gedächtnis des Huhnes.) Carlheinrich Englemann. 1951. *Zeitschrift zur Tierpsychologie*, 8(1): 110-121. Experiments on domestic fowls showed that adult hens remembered companions for 30 days, their hen-house for 60 days, plants that they liked and disliked for 14 to 100 days, and grains for 35 to 200 days. Memory is poor in young chickens, but improves with age and experience. Performance was better when hens were tested singly than in groups.—M. M. Nice.

41. American Bird Songs, Vol. II. Recorded by P. P. Kellogg and A. A. Allen for the Albert R. Brand Bird Song Foundation, Laboratory of Ornithology, Cornell University, Ithaca, N. Y. This is a set of five large disks of phonograph records of the songs or calls of 51 species of wild birds, entitled respectively "Birds of Garden and Shade Trees," "Birds of the Roadside," "Birds of the Lakes and Marshes," "More Birds of the Marshes," and "North American Warblers." The voice of Prof. Allen explains the songs or calls before each species and at other appropriate intervals.

When we consider the great amount of patient field work necessary to produce these records, the wide range of our country from which they have come, and the work of preparing them with as much perfection as possible, we feel that those who continued the work Albert Brand initiated some 20 years ago deserve the highest praise from all bird lovers. If some of the records are not quite as perfect as they might be, it indicates that the difficulties of recording such sounds are not completely overcome. Continued improvement is evident as the work goes on.

The calls of birds are practically alike in all individuals of each species, though there are sometimes differences in the sexes, but the songs usually differ. In fact in passerine birds, except the flycatchers, titmice, and nuthatches, variation in songs between individuals is the rule. Those who use the records should keep this in mind and not expect the live birds they hear to sing identically. Yet the similarity is there, and one can soon learn to recognize each species in spite of the variations. An example is the glorious song of the Western Meadowlark, one of the finest singers among American birds. A second recording of this bird, singing in the background of the Clay-colored Sparrow, is quite different in detail, yet both are good examples of the species' song. When compared with 89 records of this species of my own making, none of which are duplicates, they are not exactly like any one of them.

Those who make the recordings in the field cannot always pick and choose, but must record whatever particular song the opportunity affords. Sometimes the songs on the records are not as typical as they might be. The record of the Canada Warbler is of five, sometimes six notes. My own 50 records of this song vary from 5 to 16 notes, averaging about 10. Similarly my records show that four out of five Chestnut-sided Warblers sing the next to the last note highest and

strongly accented. On the record this note is neither the highest in pitch nor as strongly accented as most birds sing it. The Screech Owl record is the long, low call we hear most often in spring. Probably people are more familiar with the late summer call which has a more definite downward slur at its end.

Another difficulty in the making of these records is that of producing the subtle character of sound we call quality or timbre. In the water and marsh birds and in the larger species of song birds this comes out well, but in the smaller species, particularly the warblers that sing on very high pitches, something is lacking. The songs are correct in pitch, time, and general form, but the peculiar husky-nasal quality of the Black-throated Blue Warbler, and the sweet, creamy character of the Black-throated Green are not apparent. I presume this is a matter of overtones which probably do not reproduce well in the high-pitched sounds.

In addition to the 51 bird songs listed in these records, a number of others are heard in the backgrounds. Prof. Allen mentions some of these in his announcements, but one may enjoy discovering and identifying still others. In several places I hear distant songs of the Robin and the Wood Thrush, and in at least one place the Cardinal. Redwings are heard in most of the marsh records. Unless I am greatly mistaken, the last three calls in the Coot recording, two of them loud and one at a distance, are actually calls of the Florida Gallinule.

These records are useful not only to those who wish to learn bird songs, but also to those who already know them well. One may close his eyes and let the sounds take him back to former experiences, and imagine he sees the flocks of Whistling Swans and Canada Geese flying by. One may picture the marsh from whence come the pumping sounds of the Bittern, the songs of Redwings and Marsh Wrens, the grunts of the Virginia Rail, and the sweet whinny of the Sora. The wails of the Limpkins bring back the marshy borders of a Florida lake. The song of the Willet renews to me the experiences of only a few months ago when, on a North Dakota roadside, I both heard this song and watched the bird perform from its perch on top of a fence post.—Aretas A. Saunders.

WILDLIFE MANAGEMENT

(See also Numbers 7, 8, 20, 23, 33, and 55.)

42. A Two-Year Study of Pheasant Restocking in the Gallatin Valley, Montana. Edwin F. Roby. 1951. *Journal of Wildlife Management*, 15(3): 299-307. On four release sites 471 Ringneck Pheasants, *Phasianus colchicus torquatus*, were liberated over the two-year period, 1948-1949. On August 29 of the second year 217 were liberated by a violent-release method directly from crates and 158 by a gentle-release method after two-weeks confinement in large pens placed in the field. During the first week after release, observations on marked birds indicated a survival of at least 13.6 percent of the birds released under the violent method and 20.3 percent under the gentle method, an insignificant difference. For the period of study 66 birds were recovered through return of bands, trapping, and locating dead individuals; this was 14.0 (not 14.4) percent of the number released. Only 10.2 percent were killed by hunters. The 11 bands returned in 1948 represented 6 (13.3 percent) of the violently released cocks and 5 (12.2 percent) of the gently released cocks. In 1949 the return from violently released cocks was 13.8 percent and the return from gently released cocks was 9.6 percent. These data indicate no marked difference in the survival rates of cocks released by the two methods. Checking-station data for 1949 indicate that only 21 (4.3 percent) of 493 pheasants killed were banded; the rest were wild birds. Of 48 birds observed for dispersal distances, 20 moved less than 1 mile, 24 moved from 1-3 miles, 1 moved from 4-5 miles, and 3 moved 9-14 miles. This carefully conducted study further corroborates previous studies that indicate the futility of restocking with pen-reared birds.—Helmut K. Buechner.

43. Public Hunting on the Bear River Migratory Bird Refuge, Utah. John B. Van Den Akker and Vanez T. Wilson. 1951. *Journal of Wildlife Management*, 15(4): 367-381. This refuge in northern Utah consists of 64,000 acres, of which 12,000 are open to public hunting under a system through which data on species, sex and age ratios, and hours in the field may be accurately compiled. Records from 1932 to 1948 are reported. The total kill is a function of the number of hunters and can be regulated somewhat by bag limit, length of season, and

number of shells per gun. Total kill and species composition depend upon the population density and species distribution which are influenced by weather conditions, habits of various species, and vulnerability caused by botulism. Although the bag limit was reduced from 12 to 10 to 5 in the years 1933, 1940, and 1948 respectively, together with a shortening of the season from 60 to 40 days in 1948 (the number of hours per hunter-day remained nearly constant at 7 hours throughout the period), the average daily bag per hunter dropped only from three in 1933 and 1940 to two in 1948. This paper is of interest primarily to game managers and administrators for information of the effects of hunting regulations on waterfowl populations.—Helmut K. Buechner.

44. Effects of Toxaphene and Chlordane on Certain Game Birds. George Post. 1951. *Journal of Wildlife Management,* 15(4): 381-386. To control grasshopper infestations on 4,205,708 acres of range land in Wyoming, a bait of one pound of Toxaphene or one-half pound of Chlordane per hundred pounds of bran was distributed by airplane at a rate of five pounds per acre in 1949 and ten pounds per acre in 1950. By rebaiting some areas received as much as 35 pounds per acre. In the summer of 1950, 1,200 acres of baited land and 200 acres of nonbaited land were examined at least twice each week for dead animals. Sage Grouse, *Centrocercus urophasianus,* Sharp-tailed Grouse, *Pedioecetes phasianellus campestris,* Ringneck Pheasant, *Phasianus colchicus torquatus,* Hungarian Partridge, *Perdix perdix perdix,* Chukar Partridge, *Alectoris graeca chukar,* Gambel Quail, *Lophortyx gambeli gambeli,* and ducks were found on one or more of the plots. Many birds of other kinds, mammals, reptiles, and fish were also found; notes are given for a few of these as well as the game birds. The critical dosage of Toxaphene for Pheasant was between 100 and 200 mg/kg; for Chukar Partridge it was approximately 50 mg/kg. The critical dosage of Chlordane for Pheasant was near the 500 mg/kg level; for Chukar Partridge it was between 100 and 200 mg/kg. On the baited plots 127 birds, of which 79 were game birds, were found dead, representing a mortality of 23.4 percent of the average number of game birds seen per day. Insecticide poisoning was suspected in 4.6 percent of the game-bird mortality. Much of the remaining mortality may have been directly or indirectly attributable to toxemia. On the nonbaited plots 10.1 percent of the average number of game birds seen each day was found dead. There are indications in this paper that increased vulnerability to accidents results from the effects of the insecticide poisons.—Helmut K. Buechner.

45. Identification of Waterfowl Nest Predators. Jim D. Rearden. 1951. *Journal of Wildlife Management,* 15(4): 386-395. During waterfowl nesting studies 16 nests of Ring-necked Duck, *Aythya collaris,* and 11 nests of Black Duck, *Anas rubripes,* were found destroyed. In addition, 26 of 34 artificially constructed nests were destroyed by predators. Specific predators were enticed to destroy certain nests. Raccoons paw nests, seldom leave tooth marks on egg shells, leave most of the shell where it is consumed, bite off the end of the egg, do not chew the edges of the shells, and almost invariably leave hair at the nest. Minks ordinarily do not molest the structure of the nest, eat small holes out of the ends of the shell, chew the edges finely, leave tiny tooth marks, and leave hair at the nest. Skunks typically tear nests apart, mix egg shells with nest debris, crush and chew eggs, and leave hair at nest site. Red Foxes pull away the rim of nest on one side, usually eat shells with rest of egg, and leave hair near nest site. Crows, *Corvus brachyrhynchos,* usually leave nests undisturbed and usually leave shell fragments; the egg retains its shape and has a moderate to large opening. American literature pertaining to identification of predator sign at nests of game birds is briefly reviewed and discrepancies and agreements with published works are carefully noted. The paper is a useful, though limited, contribution to identification of predators responsible for destruction of duck nests.—Helmut K. Buechner.

46. The Hawaiian Goose (Nene) Restoration Program. J. Donald Smith. 1952. *Journal of Wildlife Management,* 16(1): 1-9. The wild Nene, *Branta sandvicensis,* population dropped from about 50 in 1944 to an estimated 33 in 1951. Unless proper conservation measures in terms of an intensive ecological study in the wild, propagation on game farms, and acquisition and

restocking of natural habitat are undertaken, the Nene is apparently doomed to extinction. The geese do not lay until two or three years old; the breeding season begins in November; the first eggs are laid during mid-December, the clutch consisting of three to five eggs. Incubation appears to be about twenty-eight days. Both the goose and the gander moult their primaries in March and are vulnerable to ground attacks by dogs, pigs or other enemies until the end of April, a period of at least one month. There are no lakes or marshes on Hawaii that could be used for refuge during the flightless period. A limited ecological survey is now under way by the Territorial Board of Agriculture and Forestry. Twenty-four birds are in captivity in Hawaii and England. Possibly within the next few years some progress may be made toward increasing the Nene in the wild, but the continued existence of the Nene is precariously balanced on the brink of oblivion. —Helmut K. Buechner.

47. Factors Influencing the Distribution and Abundance of the Wild Turkey in West Virginia. Hans G. Uhlig and R. Wayne Bailey. 1952. *Journal of Wildlife Management,* 16(1): 24-32. A survey based on observations of hunters, personnel of the U. S. Forest Service, and employees of the Conservation Commission showed that the Wild Turkey, *Meleagris gallopavo silvestris,* increased about 14 percent over the five-year period, 1945-1950. On the basis of the locations it appears that turkeys have been forced into relatively inaccessible areas irrespective of the type of forest vegetation. Reported harvests show evidence of a three-year cycle. For the years 1940, 1943, 1946, and 1949 the harvest was in excess of 500; during the intervening years it was less than 500, usually less than 400. The lowest harvest, 227 birds, followed a severe winter with heavy snowfalls that persisted for two months; a high kill of 514 followed the coldest January on record, showing that turkeys are hardy and rarely perish from cold alone. The years showing the highest precipitation during May and June were those in which the greater harvests were made. Since higher-than-average temperatures accompanied the heavier rainfall, temperature may be more important than precipitation in influencing fluctuations. As an abundance of many kinds of food is available, it is unlikely that fluctuations in the abundance of acorn and beechnut mast are significantly related to changes in populations of turkeys. Habitat improvement such as clearings on the Monongahela National Forest and state-owned land has not resulted in significant increases in turkeys within the last five years. Increases in populations seem potentially possible since the best densities are only one turkey per 125 acres, whereas Stoddard reports one turkey per twenty-five acres in the better ranges of Georgia.—Helmut K. Buechner.

48. Monthly Distribution of Mallard Hunting Mortality. Joseph J. Hickey. 1952. *Journal of Wildlife Management,* 16(1): 32-38. The percentages of band returns for 1925 through 1946 are presented by months in three separate tables, two for adults and one for juvenile Mallards, *Anas platyrhynchos.* Forty-five percent of the hunting mortality of 610 juveniles occurred in September and October, the earlier part of the hunting season. Proceeding from north to south in comparing Canada, the northern states, and other states, juvenile mortality decreased from 14 to 8 percent in September and increased from 25 to 50 percent in October. The high October mortality for immature birds reflects the temporary lack of wariness to the gun. For 2,883 western adult Mallards the peak (44 percent) of hunting mortality occurred in November. For 3,033 adults shot in the Mississippi Valley, the peak (36 percent) also occurred in November, but a large portion (31 percent) was also shot in October. Monthly mortality correlates fairly consistently with field observations of peak flights. Marked annual variations in monthly mortality may provide data by which the effect of weather on migrations and harvests may be determined.—Helmut K. Buechner.

49. Effect of Simulated Gunshot Injuries on Reproduction of Game Farm Bobwhites. Charles M. Kirkpatrick, Donald E. Stulken, and James T. Baldini. 1952. *Journal of Wildlife Management,* 16(1): 54-58. On November 29, 1949, four No. 8 chilled shot were implanted in each of 62 Bobwhite Quail, *Colinus virginianus* (Linnaeus), and four No. 8 drop shot (4-4.5 percent antimony) in each of another group of 62. As a control to reveal any traumatic effect of punctures, each bird in a third group of 62 was wounded by inserting a canula into

the back and breast but without implanting shot. A fourth group of 57 birds was handled but not treated, and served as an overall control. There were no significant differences between groups in first egg dates, number of eggs laid per pair, fertility (92-95 percent), or hatchability (70-79 percent). It is implied that waterfowl carrying lead shot in their tissues as a result of gunfire maintain average egg production and egg viability.—Helmut K. Buechner.

ECOLOGY

(See also Numbers 10, 11, 12, 29, 30, 33, 35, 46, 47, and 53.)

50. The Effect of Climate on the Distribution and Breeding Success of the Red-backed Shrike. (Om klimatets inverkan på törnskatans (*Lanius collurio* L.) utbredning och levnadsmöjligheter.) S. Durango. 1950. *Fauna och Flora*, 1950(2/3): 49-78. This interesting paper contains a wealth of interesting information and a number of thoughtful suggestions with respect to the distribution of the Red-backed Shrike. This species shows a pronounced preference for sunny, warm, and dry areas, and avoids areas where the climate, especially in June, is cold, cloudy, and rainy. Hence it is totally absent from the true maritime areas of the western coast of Norway, and the western coastal areas of England and Ireland. The author is convinced that the absence of this species in these areas cannot be attributed to the absence of suitable habitats or to competition with other species. There appears to be an increase in clutch size from west to east. Recent decreases in population in Sweden, Denmark, northwestern Germany, northern Germany, Holland, Belgium, and England are thought to be associated with the effects of maritime climates. The male feeds the incubating female and brings food to the entire family while the offspring are still young. Since the food consists mostly of insects and other moving animals, it is obvious that inclement weather can very seriously threaten reproductive success. There is a marked tendency to desert clutches during bad weather.—D. S. Farner.

51. Researches on the Bird Fauna of the Marine Zone in the Åland Archipelago. Sven Nordberg. 1950. *Acta Zoologica Fennica*, 63. 61 pp. This is a varied collection of extremely interesting observations. The area investigated consists of more than 100 small islands lying southwest of Mariehamn. The total land area is 334 hectares. The islands lie in a favorite area for fishing Baltic herring. A variable amount of protection of the wildlife has been in operation since 1927 although enforcement was very poor during the war years, 1939-1945. The number of breeding species during 1945-1946 was 46 of which 26 belonged to the marine zone. During the summer of 1945 the total of nesting pairs was about 1,200; the total population of full-grown birds was about 3,000. Among the very interesting elements of the breeding population were 138 pairs of Common Eiders, *Somateria mollissima;* 20 pairs of Black Guillemot, *Uria grylle;* 36 pairs of Turnstones, *Arenaria interpres;* 23 pairs of Oystercatchers, *Haematopus ostralegus;* large numbers of breeding gulls and terns; five pairs of Parasitic Jaegers, *Stercorarius parasiticus;* and seven pairs of Razorbills, *Alca torda.*

There is an interesting chapter (pp. 24-34) on the ecology of feeding. The Crows, *Corvus cornix*, are primarily egg feeders, the Eiders being the principal victims. The Greater Black-backed Gull, *Larus marinus*, apparently feeds primarily on fish, probably obtained dead, and young birds. The author feels that this species is responsible for much of the mortality among young of the Tufted Duck, *Aythya fuligula;* Velvet Scoter, *Oidemia fusca;* and the Common Eider. An extensive amount of food specialization was observed among Herring Gulls, *Larus argentatus;* some fed on young of other birds, a pair caught live carp consistently, another took roaches in considerable quantities, others obtained human refuse consistently. Lesser Black-backed Gulls, *Larus fuscus*, used human refuse extensively; predation on the young of other birds was quite slight. Among the food items of the Common Gull, *Larus canus*, crowberries are important.

Chapter 3 contains an interesting series of observations on intra- and interspecific social relations. Ringed Plovers, *Charadrius hiaticula*, invariably nested in association with gulls or terns although apparently the larger tern colonies are avoided. A substantial portion of the breeding Mallards and Tufted Ducks were associated with gull or tern colonies. Velvet Scoters appeared to be completely independent of gull and tern colonies and probably the same can be said for the Common Eider

although they were observed associated with them in several instances. Razorbills were found to live only on those skerries which have gull colonies. "When the gulls in 1939 had left most of the kobbs belonging to the group of Gaddarna to move over to Norrgadden, the Razorbills also left their earlier nesting-places and concentrated on the same kobb." (p. 44.) A similar relationship probably holds for the Black Guillemots. It is of interest to note that the Tufted Duck, Razorbill, Herring Gull, and Arctic Tern, have appeared as breeding species only during the last 30 years. The population of Common Eiders gradually increased to a maximum about 1935. During the war years there was a catastrophic decrease, probably because of the failure to enforce hunting restrictions, so that in 1945 the population was lower than the level in 1920. The Crow population, which is dependent on Eider eggs, shows a similar although less pronounced curve. There are many other interesting observations with respect to population trends for the period, 1920-1945.—D. S. Farner.

52. Investigations on the Density of Birds in Agricultural Areas. (Untersuchungen über die Siedlungsdichte der Vögel in der ackerbaulich genutzten Kulturlandschaft.) Heinz Mildenberger. 1950. *Bonner Zoologische Beiträge*, 1(2/4): 221-238. During 1946-1949 the author conducted field studies to ascertain the density of birds in an agricultural area near Cologne. By means of counting singing males the following breeding densities in pairs per hectare were established: woods, 3-4.42; orchard, 3.44-3.84; field with hedges, 1.12-1.68; open fields, 0.4-1.28; farmyards, 20-27. It was found that the greatest number of nest failures were in one way or another the result of human influences. Other causes of loss were predation and unfavorable weather. The rate of nest losses was found to vary from 32 percent in the orchards to 53 percent in the woods.—D. S. Farner.

AVIFAUNAL DYNAMICS

(See also Numbers 3, 18, 19, 46, 48, 51, and 60.)

53. The Population Ecology of the Great Tit, *Parus m. major* L. H. N. Kluijver. 1951. *Ardea*, 39(1/3): 1-135. Beginning in 1912, populations of the Great Tit were studied on an estate near Wageningen, Holland. Included in this area are 129 hectares of woodland. Nest boxes were inspected once a week during the breeding season and, beginning with 1936, the Great Tits which nested and roosted in these boxes were trapped and banded. Many of the initial data were obtained by the late G. Wolda. Comparative data have been obtained from other localities.

The prodigious mass of data and the effective utilization thereof make this a contribution of major importance to avian population dynamics. There are indications of a slight surplus of males over females. This could be explained by the slightly more favorable survival of males. The pair bond is quite strong. When a second brood is raised, the pair remains intact if both members are still living. Changes in mate between one breeding season and the next are more common but there is nevertheless a strong tendency to maintain the pair. The author has recorded two cases of brother-sister matings. After departure from the nest, the young remain dependent on the parents for 6-22 days. Many of the young become established in the vicinity of the birthplace. They tend to settle to a greater extent within 200-1000 meters of their birthplace than at a distance of 1000-2000 meters. Some become established at still greater distances; these may constitute a substantial portion of the young. Of the young hatched in the 129-hectare study area, it is estimated that 36 percent are established therein for life. Many young take up residence during September-December of their first year. Threat display is frequently observed at the boundaries of the territories in autumn as well as in spring. The "domicile" of each individual, *i. e.* the area within which it breeds and sleeps, involves three to four hectares. Frequently there is overlapping of domiciles. The area through which a single individual may range is usually 30-50 hectares although it may be considerably larger in severe winters. There is a fairly pronounced fall migration of Great Tits in Holland. Foreign Tits frequently winter in Holland and young Dutch Tits sometimes wander into Belgium and northern France. Some of the older birds may undertake movements in fall. Perhaps these are primarily birds established

in poor habitats. Abundance of nesting sites and the nature of the vegetation are important factors in the determination of population density. Deciduous woods are preferred to conifers. However, attachment to the original "domicile" may be more powerful than preference for a more favourable habitat. Individual characteristics are apparently more important than environmental influences in establishing the date of the first egg. Older females begin laying earlier than first-year birds. Increasing daylength and increasing temperature regulate the time of breeding in spring. There are considerable variations (16-100 percent) in the proportion of pairs having second broods. Older females tend to have second broods more frequently than first-year females. In several areas there appears to be an inverse relationship between population density and the percentage of second broods. Second broods are slightly less frequent in years in which the first broods were begun late. Clutch size varies from one to 16. The mean clutch in the principal study area was found to decline from 10.3 for the first half of April to 6.0 in July. Many of the marked annual and local differences in clutch size appear to be correlated with changes and differences in population density. "There is an inverse correlation between population density and fecundity. Probably this is due not to competition for food, but to the effects of increased disturbance by fights and mock-fights in consequence of an innate mutual intolerance of the pairs." (p. 130.) The average production rate on the principal study area varied between 3.9 and 14.1 young. "It is density-dependent because fecundity is density-dependent." (p. 131.) Young hatched at the end of the season have a greater tendency to emigrate than those hatched earlier. Many annual fluctuations are synchronous because of the common effects of unfavorable or favorable weather conditions. However others, sometimes large, are not synchronous. The annual fluctuations, with the exception of those associated with severe winters, are not closely correlated with those of other species of tits. "In any one place the breeding population of the Great Tit fluctuates violently from one year to the next. The breeding population consists of . . . older residents, yearlings born in the locality, and immigrants. For the most part these components fluctuate independently of each other. The number of older residents is each year about 50% of the breeding population of the previous year. The number of yearlings which later settle near where they were born shows a positive correlation with the production rate in years with a low breeding population, but not in years with a high breeding population, as the proportion of yearlings which emigrate or die increases as population density rises. The number of immigrants (*i. e.* yearlings born elsewhere which arrive and settle down between October and March) seems largely independent of the population density in the area where they settle. The amount of immigration and emigration each year has a marked influence on population density. The adverse influence of a cold winter is less clear than expected. It seems especially great when the density at the start of the winter is high. Several factors, such as a high breeding population and a high production rate in the previous summer, a big immigration and a small emigration in the autumn, and a mild winter, may sometimes coincide, leading to an extremely high breeding population, while if all these factors work in the opposite direction, an extremely low population results. A high breeding population is often found after a low one in the preceding year. This is because, with a low breeding population, the production rate tends to be high and the amount of emigration low. As a result the population curve from year to year tends to be saw toothed in form, a steep rise being followed by a deep fall." (pp. 131-132.) Although this review only briefly refers to the major contributions of this treatise, it should be obvious that the author has made one of the major contributions to our knowledge of avian population dynamics.—D. S. Farner.

54. Results of the Investigation of Storks in Oldenburg and Nearby Areas in 1949. (Ergebnisse der Storchforschung im Lande Oldenburg 1949 und in den angrenzenden Gebieten.) Richard Tantzen. 1951. *Ornithologische Abhandlungen*, 9: 11-28. Because of its tabulation of data on migration dates, population, and reproductive success for 1928-1949 this paper is an important source of data for studies of avian population dynamics. For this entire period the number of occupied nests (111) in 1949 was the lowest; also the number of pairs (24) with young and the total number of young fledged (67) were the lowest. The maximum reproduction occurred in 1940 when there were 242 pairs

with young and a total of 716 young fledged. The poor reproduction of 1949 may be associated with the slightly lower May temperatures and the excessive rainfall in April and May.—D. S. Farner.

FAUNISTICS

(See also Number 50.)

55. The Mute Swan as a Breeding Species in Denmark. (Knopsvanen (*Cygnus olor* (Gmelin)) som ynglefugl i Danmark.) Poul Jesperson. 1951. *Dansk Ornithologisk Forenings Tidsskrift,* 45(3): 174-190. At the beginning of the century there were probably no more than three or four breeding pairs in Denmark. In 1926 the species became completely protected. Since that time it has gradually increased until there are now more than 300 pairs. The species now occurs in general throughout Denmark although its breeding range was originally restricted to the eastern part of the country.—D. S. Farner.

56. The Expansion of the Range of the Scarlet Grosbeak. (Über den Karmingimpel, *Carpodacus e. erythrinus* (Pall.) und seine Ausbreitung). Georg Scheer. 1951. *Ornithologische Mitteilungen,* 3(2): 25-29. At the beginning of the 19th century the breeding range of this species extended from the east up to the Baltic states, eastern Poland, and perhaps East Prussia. This paper traces briefly its subsequent expansion westward and northward. Within the past two decades it has been known to breed in Finland, central Sweden, southern Norway, as well as northwestern Germany.—D. S. Farner.

57. Annotated List of Birds of Barro Colorado Island, Panama Canal Zone. Eugene Eisenmann. 1952. *Smithsonian Miscellaneous Collections,* 117 (5): 1-62. (Publication 4058.) Barro Colorado probably has been studied by biologists more intensively than any other comparable area of the American tropics. Eisenmann has drawn on all available sources of information to supplement his own field work in preparing this excellent paper. The taxonomic treatment is generally similar to that of Griscom's monograph on Panama ornithology; particular attention has been given to the selection of vernacular names. The status of each species is summarized, breeding dates are given when known, and in many instances brief descriptive and life history notes are added.—Hustace H. Poor.

BOOKS

58. The Study of Instinct. N. Tinbergen. 1951. Oxford University Press, Amen House, London E.C.4. XII + 228 pp. $7.00 (U. S.): $4.50 (Canada), 25/- (England).

Because of the vast collection of material incorporated in this book and the wide field covered, it is difficult to present a condensed review. Its bibliography of 11 pages indicates its wide scope. In general it deals with the latest concepts of instinctive behaviour with special reference to the now familiar school of thought initiated by Heinroth and developed by Lorenz and Tinbergen. While by no means neglecting trans-Atlantic work, the book contains numerous references, many of them of German origin, that will doubtless be unfamiliar to most American readers. In fact the author, who speaks Dutch, German and English with equal ease, points out specifically that his first aim is to "call the attention of Anglo-American workers to research done on the European continent." Secondly, he says (p. V) "this book is an attempt at an organization of ethological (behavioural) problems into a coherent whole." In this connection he frequently reiterates that our knowledge is still fragmentary and that his attempt to synthesize the whole must be considered tentative, a review rather than a completed statement.

While Tinbergen's primary interest lies in the causes of innate behaviour, he points out that various fields of science are involved, including particularly certain aspects of physiology—those dealing with the sense organs, and nervous and muscular systems, while endocrinology is of self-evident significance. Nor can the evolution of behaviour be ignored, with its subordinate interests of taxonomy, ecology and genetics. There remains finally an inevitable attempt at integration of all these fields, still mostly in the hands of specialists studying them independently and with little reference to each other. From all of which it is sufficiently

evident that the author has set himself an immense task. If the present volume, so replete with clarity of thinking and statement, and so liberally illustrated, and which claims to be no more than a pointer, is a promise of things to come, we can look forward with much confidence to valuable future contributions from the author.

Tinbergen's approach is essentially objective. Broader in his outlook than the behaviourists, he believes that psychologists in general fail to realize "that learning and many other higher processes are secondary modifications of innate mechanisms and that therefore a study of learning processes has to be preceded by a study of the innate foundations of behaviour." In this connection his closing paragraphs which deal with human behaviour, although necessarily on the slight side, are of rather special interest. His plea for breadth of outlook is justified many times over by his examples. Bees, for instance, may respond to the external releasing stimulus of light either on the basis of wavelength (colour) or, under other circumstances, of intensity. Two specialists may thus come to different conclusions, the one that bees are colour-blind, the other that they are not. Both happen to be right (in appropriate circumstances) but each, devoting himself to one special aspect, concludes that the other is wrong. Tinbergen points out that there is a tendency with many workers to work some particular method to a standstill—as for instance maze-running in mammals—the investigator's mental attitude being "What can I do with this method?" whereas it should be "What method shall I apply to solve this problem?". Standardization of method is well enough in itself but it often means putting the cart before the horse. Methods should be flexible and variable, based on a knowledge of the behaviour pattern as a whole and applied on that basis.

The author adopts the position that behaviour consists not merely of reaction to external stimuli, but is concurrently "spontaneous," being equally a response to internal or motivational factors. Both of these aspects are amenable to the experimental approach and can be objectively studied as shown with innumerable examples. With the help of these he establishes a further point—that only certain factors of the environment are meaningful to any given species of animal. One of the pitfalls of the investigator is the common attitude that an animal comprehends, or is cognizant of, the entire environment in the sense that we are. To determine these differences is essential to the ethologist.

The theory of "releasers" (or sign stimuli) naturally plays a prominent part in the book. The releaser is a stimulus without which a given response is not forthcoming. For instance, the female stickleback does not elicit the courtship of the male unless she is gravid and swollen with eggs, while her characteristic posturing enhances his response. A male will court the crudest of models, hardly recognizable as the effigy of a fish, provided it suggests the swollen belly and the appropriate "stance." The male, of course, will only respond if he is under the spell of the internal reproductive drive of spring; the best model in the world interests him not at all in the fall. Despite simple cases of this sort, Tinbergen shows that sign stimuli may be much more complex and demand critical and often elaborate analysis. (Ch. IV.)

In Ch. V—"An attempt at a synthesis"—the author shows that responses run from the general to the particular and that the exact final response is pin-pointed only when the preceding steps have been accomplished: the stimuli constitute a continuous series. In the light of all this Tinbergen defines *instinct* (p. 112) as "a hierarchically organized nervous mechanism which is susceptible to certain priming, releasing and directing impulses of internal as well as external origin, and which responds to these impulses by co-ordinated movements that contribute to the maintenance of the individual and the species."

The next two chapters deal with development of behaviour in the individual and certain aspects of learning. Learning is provisionally defined (p. 142) as "a central nervous process causing more or less lasting changes in the innate behavioural mechanisms under the influence of the outer world." As a simple example, the author cites recognition of young and mates by birds. Up to 5 days of age, young Herring Gulls can be interchanged without harm to the young, but subsequently the changelings will be killed by the owners of the nest; the parents have learned to recognize their own young. Mates can identify each other up to 30 yards both by sight and sound, a matter of observation and learning. Yet such ability is curiously restricted. A Herring Gull, for instance, will brood

its empty nest with its eggs in full sight removed to a distance of but one foot. At this distance the bird may occasionally sit on its eggs, but the actual site of the nest is the real stimulus to incubation. If its eggs, no matter how distinctively marked, are removed to greater distances, the bird evidently fails completely to recognize them as its own for it will eat them. Except for a reference to Lorenz's principle of *imprinting*, a special case, Timbergen makes no reference to recognition by animals of objects outside their normal range, such as a dog which patently recognizes its master by sound, smell or sight. This is a very simple form of learning and one could wish that the author had dealt with the topic more fully.

Ch. VIII deals with the evolution of behaviour. As the author points out, we know little enough about evolution itself in its broader sense: this section can therefore be little more than a tentative sketch. Perhaps the most significant point made is that patterns of behaviour appear to be genetically transmitted in the same way as morphological characters. This is the final chapter and is of special interest in that the author draws analogies between animal and human behaviour, and points out many homologies. It is a chapter that psychologists can read with profit, since it establishes a point generally ignored by current thinking in psychology—we are much more dominated by instinctive drives than is generally conceded.

From the ornithologist's point of view the book is replete with interest. Not only are innumerable examples of instinctive behaviour specifically taken from the world of birds (and fully illustrated), but the general viewpoint has not previously been fully summarized nor has the material, hitherto scattered through innumerable journals, been available in book form. It provides difficult reading in spots but repays the effort. One of its most valuable aspects is that, since it deals with animals ranging from insects to mammals, it lends perspective to avian behaviour that cannot help but broaden the general concepts of the abler ornithologist.—William Rowan.

59. Field Book for the Study of Bird Voices. (Exkursionsbuch zum Studium der Vogelstimmen.) Alwin Voigt. 1950. 11th ed. Edited by Erich Hesse. Quelle and Meyer. Heidelberg. 271 pp. DM 7.80. For nearly sixty years this has been a popular field book in Germany. After the author's death Prof. Hesse made additions and changes, bringing the nomenclature up-to-date. Introductory chapters give advice to the beginner, and treat of time of song during the year and during the day. Both symbols and musical notation are used in describing the songs. The bulk of the book is devoted to individual species, the calls and songs being discussed in detail. An interesting key to bird voices concludes this helpful little book.—M. M. Nice.

60. Birds of an Iowa Dooryard. Althea R. Sherman. 1952. Edited by Fred J. Pierce. Christopher, Boston. 270 pp. $3.75. Althea Sherman was one of the two great pioneer students of life histories of birds in America, the other being Francis Herrick. With great ingenuity she planned nesting boxes in her barn and in a permanent blind with peep-holes and hand-holes in them, as well as building an artificial chimney 30 feet high and eight feet square for observation of Chimney Swifts. Her studies were conducted with meticulous care and dogged determination despite tedium and acute discomfort. When other ornithologists were copying ancient guesses as to the length of incubation, she timed individual eggs from the minute they were laid to the minute they hatched.

Her bibliography appended at the end of this book contains 67 items (five of them on mammals) published from 1905 to 1932. Four of these were notable: seven years' experiments in feeding Ruby-throated Hummingbirds, detailed studies of single nestings of Screech Owl and Sparrow Hawk, and a monograph on many nestings of the Yellow-shafted Flicker. At scientific meetings she had read carefully prepared papers on the habits of the Short-billed Marsh Wren and on the nesting of the House Wren and Chimney Swift. Although repeatedly urged by fellow ornithologists to publish her findings on this last species, she preferred to wait until she could publish as full an account as possible of all the species nesting on her grounds in a book illustrated with her own drawings. But time ran out.

In this book Fred Pierce has presented eight chapters which she had prepared

for this project, besides the three papers presented at meetings. The four life history studies are reprinted as well as three shorter papers, one of which—"Down with the House Wren Boxes"—excited much controversy twenty-five years ago, but seems to have made little permanent impression. Mr. Pierce was able to do little with her sixty note books except to reproduce ten pages of excerpts from her nineteen years of observations on Chimney Swifts. One wishes that more of her spirited drawings might have been included, as well as the delightful account of her trip to India and the Mediterranean countries in 1913 (Birds by the Wayside, *Wilson Bulletin*, 1915, 1916).

The eight chapters of new material are written in more popular style than the others, but contain much of scientific value. An index to the book would have proved very helpful. One chapter tells of a nesting of Catbirds, another summarizes twenty-five years of observation on Phoebes. A male Phoebe had two mates at one time, a male Redwing as many as four. A male Barn Swallow tried repeatedly to kill the small young of a female that had lost her mate. The unfortunate effects of too many birds are described in Chapter IV where over-populations of Brown Thrashers, Robins and Flickers brought about nest desertion and starvation of young.

Miss Sherman was a woman of extraordinary vitality and ability to work. Telling of the many hole-nesting birds in India she wished "for a thousand years in order to give a few decades to the study of bird life in India." She gathered such a vast amount of material during the thirty-five years of active observation at her home, and there were so many distractions—housework, sightseers, and her zealous campaigns against human stupidity, that she never had time to write up her studies as they should have been done. Nevertheless, we can be very grateful for this book. Here is a sample of her admirable, exact life history studies on many species, the whole book written in her inimitable vivid style.—M. M. Nice.

61. Crip, Come Home. Ruth Thomas. 1952. Harpers. New York. 175 pp. $2.50. A chronicle of a Brown Thrasher, *Toxostoma rufum*, that lived for ten years in the author's garden in central Arkansas. Through her close and continuous observation of her color-banded birds, Mrs. Thomas was able to follow the pattern of behavior throughout the season and year after year. The male not only sings loudly to warn rivals and proclaim his need of a mate; he sings loudly and softly to try to win a mate after her arrival. He picks up a leaf or twig as a symbol of nesting; when she flutters her wings, she is won. There is a strong personal bond between mates that lasts from one year to the next. If a female returns to find her place pre-empted, she drives off the new-comer. (In such situations, Song Sparrow females went elsewhere, perhaps settling next door, perhaps a half mile away.) Crip was one of the rare Brown Thrashers that imitate other birds' songs; once he repeated for the first time a tune he had heard from a captive mockingbird four years earlier. One of Crip's mates sang softly and musically on the nest, as a signal for him to take his turn on the eggs. Crip was devoted to his young, feeding one brood for 27 days after they had left the nest.

For 16 years Mrs. Thomas has written a weekly nature column for the *Arkansas Gazette;* telling of the daily happenings, she captured the excitement and freshness of the event as it took place. Thus the book gives a wonderful picture of nature on this Arkansas hillside, of the pageant of the seasons, of the charm of many birds in summer and in winter. With her sympathetic understanding and keen powers of interpretation, the author has made an important contribution to the study of bird behavior, and with her skill in writing, a true work of art.—M. M. Nice.

62. Migration of Birds. Frederick C. Lincoln. 1952. Doubleday & Co., Inc., Garden City, N. Y. 102 pp. $1.00. This is a commercial edition of Fish and Wildlife Service Circular 16 (1950), which can still be obtained for 30 cents from the Superintendent of Documents, Washington, D. C. For a review of its subject matter see *Bird-Banding* 22(3): 142-143. A photo-offset copy of the original, the only change other than the addition of a garish hard cover, is the title page where the publisher's imprint is substituted for the government's and acknowledgement is made to the source of the material as "a publication" of the Fish and Wildlife Service. Aimed at the pocket-book trade, the little volume is of course cheaply gotten out. Reduction to pocket size has left the print still

legible, but has robbed the dramatic picto-maps by Bob Hines of much of their clarity and detail. It is a pity that in their zeal to keep down costs the publishers could not have spent a few dollars to correct the typographical errors in the list of scientific names in the appendix. The subject matter, culled from the works of many authors in technical journals and the Fish and Wildlife files (the partial bibliography is included), is presented in popular, readable style, and worthy of far wider distribution than it could possibly receive from government handling. In its present form it should reach and interest in birds and banding a host of readers who would otherwise never "get the word." We hope it has a wide sale. It will certainly be picked up and read by the many people who buy books off store counters, but who would never trouble to write the Superintendent of Documents, even if they knew of the better and cheaper original edition.—O. L. Austin, Jr.

JAMES LEE PETERS

It is with very deep regret that I inform the members of the Association that James Lee Peters died on April 19, 1952, after a short illness. Mr. Peters had been a vice-president of the Northeastern Bird-Banding Association from 1938 to 1952 and was editor of *Bird-Banding* from 1939 to 1950. I found him ever a source of wise counsel, often wittily expressed. Probably few members ever realized how much he contributed in his quiet and self-effacing way to the work of our Association. The gap he leaves cannot really be filled.

Mr. Peters held a banding permit from February 2, 1922. He was a selective rather than a large-scale bander. That he should have banded for many years is but one of many evidences of his interest in the whole bird rather than just the skin in a museum drawer. His wide and detailed knowledge of all sides of bird life was freely at the disposal of serious inquirers.

At the time of his death, Mr. Peters was Curator of Birds at the Museum of Comparative Zoölogy, President of the International Commission on Zoological Nomenclature, President of the Nuttall Ornithological Club, and a permanent member of council of the American Ornithologists' Union. Seven volumes of his *Check-list of the Birds of the World* have been published and will stand as an enduring record of his remarkable knowledge and sound judgment.

The depth of our own sense of loss is the gage of the sincerity of the sympathy we extend to Mrs. Peters.

Charles H. Blake

A SECOND COOPERATIVE STUDY OF NOCTURNAL BIRD MIGRATION

Readers of *Bird-Banding* will recall a review, in the January issue, of George H. Lowery's "A Quantitative Study of Nocturnal Bird Migration" (University of Kansas Publications, Museum of Natural History, vol. 3, no. 2, pp. 361-472). This paper describes the very interesting data obtained by an analysis of counts of birds passing before the disc of the moon. These data compel us to revise some of our time-honored concepts of nocturnal migration. This study was possible because of the cooperation by 200 observers who, in the spring of 1948, watched the moon for varying periods through small telescopes at 30 stations scattered over the North American continent. The progress already achieved is only a modest indication of what may be accomplished with this promising new approach. During the past decade I have carefully examined scores of papers from many countries on many aspects of migration. There can be no question that the methods and techniques developed by Dr. Lowery and his associates represent one of the very significant advances of this period. Although information on individual species cannot be obtained, the method has produced, and will continue to produce, much important information on the basic aspects of nocturnal migration common to many species.

The method, being one that yields results of a statistical nature, requires great quantities of data in order to produce tenable conclusions. In 1948, the mathematical processing of the raw counts was such a time-consuming undertaking that it seriously limited the scope of the entire project and in many important instances, prevented decisive results. Since then, Dr. Lowery informs me, improved techniques have been developed, permitting the handling of data in unlimited quantities.