again recaptured until December 14, 1942. Upon this latter date the two birds were trapped together as simultaneous returns. And an interesting new observation was made, also: 40-99263 had returned in typical female plumage.—G. HAPGOOD PARKS, 99 Warrenton Avenue, Hartford, Connecticut.

An Eight Year Old Song Sparrow.—On April 5, 1943 I took a return Song Sparrow at my Station banded by me on April 27, 1936. Since this bird could not have been hatched later than the summer of 1935, it is now in its eighth year.—KATHARINE C. HARDING, Cohasset, Massachusetts.

RECENT LITERATURE

Reviews by Donald S. Farner

BANDING STUDIES

1. Experiment on Transporting Alpine Swifts, *Micropus melba melba* L., from Solothurn, Switzerland to Lisbon, Portugal. (Verfrachtungsversuch mit Alpenseglern, *Micropus melba melba* L., Solothurn–Lissabon.) A. Schifferli. 1942. *Der Ornithologische Beobachter*, 39: 145–150. Twenty-eight birds were trapped and marked two weeks before the egg-laying time and transported by airplane to Lisbon, Portugal where they were released. Twelve returned to the nesting sites where they were trapped. The first three returned within three days; the others within the next few days. At least twenty of the twenty-eight were more than one year old (banding data). The birds were marked with red ink and by glueing a white chicken feather on the head. Of particular importance is the fact that nine of the twenty-eight birds were trapped on nests. Of these nine, seven returned after being transported to Portugal. It is unfortunate that the war has interrupted this interesting research.

2. Banding Studies on the Alpine Swift, *Micropus melba melba*, L., Age and Returns to Nesting Sites. (Beringungsergebnisse der Alpensegler, *Micropus melba melba* L., Alter und Nistplatztreue.) H. Arn. 1942. *Der Ornithologische Beobachter*, 39: 150–162. During the period, 1925–1940, 2,556 birds were banded. Constant trapping on a church roof in Solothurn yielded many returns; eighty-four were recaptured in at least two different seasons after banding; eighty-four were recaptured once after the year in which they were banded. Seventy birds banded as young were recaptured or recovered dead; the greatest age was fourteen years; mean age was 4.53 years. Banding data establish the fact that young breed when two years old. Sixty-two nesting birds were observed (by trapping) for more than one season; thirty-three used the same nesting site during the seasons in which they were observed; thirteen changed nesting sites; in sixteen cases observations were uncertain. Two birds retained their nesting sites for ten seasons. A very fruitful banding project.

3. Some Age Records for Banded Birds. Amelia R. Laskey. 1943. *The Migrant*, 14: 5–8. This paper summarizes 229 records of Chimney Swifts and twenty-five passerine species in which an age of three and one-half years or more was attained. Eighty-one Chimney Swifts (*Chaetura pelagica* (L.)) were at least four years old; two were at least five; and there were individual records of six, seven, nine and eleven years. Other interesting records are: Tufted Titmouse (*Baelophus bicolor* (L.)), six years; Carolina Wren (*Thryothorus ludovicianus ludovicianus* (Lath.)), five years; Robin (*Turdus migratorius migratorius* L.),

ten years; Yellow Warbler (*Dendroica aestiva aestiva* (Gmelin)), five years; Northern Yellow Throat (*Geothlypis trichas brachydactyla* (Swainson)), six years; Indigo Bunting (*Passerina cyanea* (L.)), six years.

4. Age of Some More British Birds. David Lack. 1943. *British Birds*, 36: 193–197. A total of 4,789 Starlings, (*Sturnus vulgaris* (L.)), were banded as nestlings; 1.8% of these were recovered. Of 4,854 trapped and banded as adults, 3.1% were recovered. The age data obtained from this study show that *the life expectancy of any Starling regardless of age*, providing it has survived to the first of August following hatching, *is* 1.5 *years*. In the case of the Song Thrush, (*Turdus ericetorum ericetorum*) Turton, 1.6% of 13,589 banded nestlings were recovered. The data indicate inconclusively that the mortality during the first year (starting August 1 after hatching) may be higher than in ensuing years. The author's calculations show that a production of 3.2 fledglings per pair per year is necessary to maintain the population at a constant size.

MIGRATION

5. The Occurrence and Migration of the Blackbird. (Nordiske Solsorters (*Turdus m. merula*) Forekomst og Traek.) Chr. Krüger. 1940. *Dansk Ornithologisk Forenings Tidsskrift*, 34: 114–153. A change in the habits of the Blackbird, *Turdus merula merula* (L.), has occurred in that the species has increased its breeding habitats to include parks, villages, etc. This change became apparent in Denmark in 1888–1895, in southern Sweden in 1913–1914, and in Finland in 1924–25. As a result of this expansion in types of breeding habitats there has been an increase in the total population. Banding results and lighthouse records were used in studying the migration of the species. The spring flight passes through Denmark from February to April and is larger than the autumn flight. The direction of the spring flight is from southwest to northeast across the Kattegat. In fall the Swedish population north of Vänern and Vätern as well as the Finnish birds migrate westward to southwestern Norway and then across the North Sea to England. Birds which nest in southern Sweden migrate directly across the North Sea to England or southward over northwestern Europe. Hence the fall flight through Denmark is smaller than the spring flight and passes from east to west. The majority of migratory birds winter in England. Some males, females, and juveniles winter in Denmark; further north only the old males winter. More males than females are killed at lighthouses in spring whereas in fall males and females are killed in equal numbers. The oldest banded bird recovered was six years. Fall migration is accelerated by the cool northeast. east, and southeast winds; spring migration by the warm south and southwest winds. The author has an interesting and ingenious method of presenting lighthouse records.

6. The Waxwing in Switzerland During the Winter of 1941–42. (Le Jaseur boréal en Suisse pendant l'hiver 1941–42.) P. Géroudet. 1942. *Nos Oiseaux*, 164: 185–192. In its normal winter migration the Waxwing (*Bombycilla garrulus garrulus* (L.)) is observed no further south than northeast Germany. In the winters of 1903–04, 1908–09, 1913–14, 1914–15, 1918–19, 1923–24, 1931–32, and 1941–42 "invasions" by this species occurred in Switzerland. These "invasions" are correlated with increases in the population in the breeding range in northern Scandinavia, Finland, Russia, and Siberia. The 1941–42 "invasion" began in Sweden in September; in October the birds appeared in Finland, Norway, and Denmark with maximum numbers observed in November and December. They arrived in East Prussia in the last part of October and in Holland, Belgium, and Scotland in early November. The "invasion" reached South Germany,

Switzerland, and Hungary in December and extended to Croatia and Italy in January. The first record for Switzerland was December 18. There were fourteen records in December, at least sixty-nine in January, nine in February, and one in March.

7. The Snowy Owl Migration of 1941–42, a Report of the Snowy Owl Committee. L. L. Snyder. 1943. *The Wilson Bulletin*, 55: 8–10. "The migration of 1941–42 resulted in concentrations of Snowy Owls (*Nyctea nyctea* (L.)) in the St. Lawrence valley, along the New England coast, and about the shores of the Great Lakes. The source of this flight was probably Baffin Island, Southampton Island, and the region about the Straits and Hudson Bay portion of Ungava." The birds appeared in pronounced flight in western Quebec in early to mid-October, later in eastern Quebec; Maritime Provinces in early October; New England in mid-October; New York in mid-November; Michigan in late November; and Minnesota in late October. Maximum numbers were present in the various sections two or three weeks after the above mentioned time.

ECOLOGY AND POPULATION STUDIES

8. Note Concerning the Decrease in Numbers of the Hoopoe. (Note sur les Causes de la Rarefacation de la Huppe.) Christian Fjerdingstad. 1939. *Alauda*, 11: 50–54. The hoopoe (*Upupa epops* L.) has almost disappeared from northern France, western Germany, the Netherlands, and Scandinavia. During the past century this species was common in France with its greatest abundance along the Mediterranean. The author does not accept the argument that it has disappeared from much of the northern part of its range because of changes in climate or available food. In his opinion the decrease in population is to be attributed to the increase in the starling (*Sturnus vulgaris* L.) population due to systematic destruction of birds of prey and to the protection of starlings in Scandinavia. Starlings and hoopoes compete for nesting holes. However the starlings begin nesting in March whereas the hoopoes do not arrive until the middle of April. Also it is possible that the starlings and hoopoes compete for food. The latter still persist in southeastern Sweden where the forests are coniferous with no arboreal nesting holes. Hoopoes nest in rock holes whereas the starlings will not. The hoopoe has one further advantage in that it is able to defend nesting holes near the ground which starlings are unable to defend. When the ground is dry hoopoes will also nest in rabbit burrows if other holes are not available. This occurs only in the southern part of its range. Because of its slight edge in nesting versatility the author feels that the hoopoe will not be eliminated completely due to competition by the starlings.

9. A Comparative Consideration of the Status of the Hoopoe (*Upupa epops epops* Linn.) in Great Britain and Ireland over a Period of a Hundred Years (1839–1938), with a Review of Breeding Records. William E. Glegg. 1942. *Ibis*, 6: 390–433. The author has made a critical examination of the available literature and has listed 1,328 records. Most of the records are from April and September. Among the spring records 90.5% are from England and Wales, 4.7% from Scotland, and 4.8% from Ireland. Among the autumn records 76.5% are from England and Wales, 17.7% from Scotland, and 5.8% from Ireland. Great Britain and Ireland lie just north of the normal nesting range of the species. The author believes that there was a gradual increase in the number of visitants from 1839–1863 with the peak occurring from 1859–1863 and that during the ensuing seventy-five years there was a gradual decrease which can be correlated with the decrease in the continental breeding population. Examination of the data leaves little doubt of the decrease since 1863. However

it appears possible that the "increase" from 1839–1863 may be only an increase in numbers of observers and the recording of observations.

10. An Index to the Thames Kingfisher Recovery.—L. S. V. Venables and U. M. Wykes. 1943. *British Birds*, 36: 153–155. A superficial though interesting piece of work. A survey of Kingfishers, *Alcedo atthis ispida* L., along sixty-one miles of the Thames during 1934 breeding season gave a density of one pair per 1.8 miles which is assumed to be a normal population density. In 1939–40 there was a severe frost in which the Thames was frozen. In the 1940 breeding season the density was one pair per 30.5 miles; in 1941, one pair per 8.7 miles; 1942, one pair per 4.7 miles.

11. Birds of the University of Wisconsin Arboretum. Harry G. Anderson, William S. Feeney, Theodore M. Sperry, and John Catenhusen. 1942. Transactions of the Wisconsin Academy of Sciences, Arts and Letters, 34: 5–22. The University of Wisconsin Arboretum contains 1,137 acres of diverse habitats including open water, marshland, wet meadows, old fields, woody thickets, and woodland. Perhaps there is no single area in southern Wisconsin which is subjected to as intensive ornithological observation as this area. This paper summarizes records of birds observed in the Arboretum between 1933 and 1941. Twenty-one species are listed as permanent residents, nineteen as winter residents only, eighty-nine as migrants, and eighty-seven as breeding summer residents. Data are given on the density of twenty-five nesting species for 150 acres of census areas for three seasons (1934–36). Densities of nests of all species varied with habitat from 0.45 to 2.80 nests per acre. Spring and fall migration dates are given for 181 species. This paper should prove a reliable source of information for southern Wscionsin.

12. A Hawk Census on Texas Panhandle Highways. Philip F. Allna and Palmer R. Sime. 1943. *The Wilson Bulletin*, 55: 29–39. The broad expanses of the Texas Panhandle make it ideal for this type of work. During a thirty-nine month period (1938–42) fifteen species of a possible eighteen were recorded. Hawks were seen at the rate of 232.5 per 1,000 miles. For the entire period Swainson's Hawk (*Buteo swainsoni* Bonaparte) and the Marsh Hawk (*Circus hudsonius* (L,)) were most numerous, 41.7% and 22.3% respectively. Marsh and Ferruginous Rough-legged Hawks (*Buteo regalis* (Gray)) were most numerous in winter; the Marsh Hawk in spring; Turkey Vulture (*Cathartes aura septentrionalis* Wied), Mississippi Kite (*Ictinia misisippiensis* (Wilson)) and Swainson's Hawk in summer; and Marsh Hawks again in fall.

13. Extinct and Endangered Mammals and Birds of the Upper Great Lakes Region. A. W. Schorger. 1942. Transactions of the Wisconsin Academy of Sciences, Arts, and Letters, 34: 23–44. This paper contains scholarly discussions of the decline and present status of the Canada Spruce Grouse (*Canachites canadensis canace* L.), Prairie Chicken (*Tympanuchus cupido americanus* Reich), and the Sandhill Crane (*Grus canadensis tabida* Peters) as well as the decline and extinction of the Passenger Pigeon (*Ectopistes migratorius* L.) and the Wild Turkey (*Meleagris gallopavo silvestris* Vieillot). This paper is the result of bibliographic work of a most difficult nature.

14. The Nesting of African Birds in Association with Other Living Things. R. E. Moreau. 1942. *Ibis*, April 1942: 240–263. The author has attempted to classify these relationships into four groups of associations: (1) With insects (three types of associations); (2) With spiders; (3) With other species of birds and (4) With human beings. This paper provides an excellent introduction to a very interesting field of bird behavior.

PHYSIOLOGY

15. Regulation of Spring Migration in Juncos. Albert Wolfson. 1942. *The Condor*, 44: 237–263. A series of ingenious experiments has been performed with resident and migrant races of *Junco oreganus* Townsend. In one group of experiments migrants (*thurberi*, *shufeldti*, *montanus*, and *oreganus*) and residents (*pinosus*) were subjected to artificially increased lengths of day. Birds of the migrant races which responded with recrudescence of gonads and laying down of fat migrated northward, when released, two months earlier than the normal time of migration. Birds of the resident race responded with premature song, breaking of flocks, and premature pairing. In another group of experiments birds were withheld for two months after the normal date for spring migration and then released. These migrated immediately in spite of the fact that the gonads were already in breeding condition. In consideration of these and other data the author proposes that length of day is the principal external factor involved in the regulation of spring migration. As days increase in length there is an increase in total general activity accompanied by an increase in duration of activity of the hypothalamus. There is then a resulting "increase in production, or release, or both, of gonadotropic and other hormones from the pituitary." These produce physiological changes in the birds manifested by the recrudescence of the gonads and the laying down of fat. These physiological changes produce a "physiologic state" which provides the internal stimulus for migration.

The author suggests that the gonads may not be an essential part of the "physiologic state." This is supported by the fact that castrated birds have been observed to migrate. He suggests further that migration and breeding are separate entities in the physiology of the bird although both may be stimulated by pituitary activity. "One can postulate that in the phylogeny of a species, migration was imposed on an already existing breeding cycle and 'timed' to it through the action of the environment and natural selection." Comparative studies reveal characteristic differences in the gonadial cycles of resident and migrant races. At the time of departure on spring migration the mean volume of testes of migrant races was found to be four cmm whereas the testes of the resident races had a mean volume of 220 cmm. The author suggests that such differences could be due to differences in threshold of response to length of day rather than to inherent rhythm. It is admirably suggested that because of these differences in the migrant and resident races the "length of day-hypothalamus-pituitary mechanism" must be applied with caution in any general consideration of migration.

This is an outstanding contribution to experimental ornithology. It is hoped that the problem can be exploited further perhaps with the use of anterior pituitary fractions and hormones.

16. Bird Weights and Egg Weights. Dean Amadon. 1943. *The Auks* 60: 221–234. Since there are very few species for which sufficient data on egg weights are available to insure statistically reliable conclusions the author has examined methods for computing egg weights from egg measurements. The methods considered were: (1) Schoenwetter's formula, $W = 1/2(LB^2 + w)$ in which W is the weight of the egg, L is the length of the egg, B is the breadth of the egg, and w is the weight of the egg shell. Since in practise the weight of the egg shell in the small passerine species is about 5% the formula reduces to $W = 0.5(LB^2 + 0.05W) = 0.5128LB^2$. (2) Bergtold's formula, $W = 11/21(LB^2)S$ (Same symbols). S is the specific gravity of a fresh egg found to be 1.075 in hens' eggs and 1.043 in fourteen species of native (Colorado) birds. This reduces to $W = 0.5463LB^2$ for the latter. (3) Worth's formula for the volume of an egg, $V = 1/6\ LB^2 - 15\%$ "which reduces to $W = 0.4749LB^2$" (presumably by

the use of a specific gravity value of about 1.067). (4) "The formula, $4/3\pi LB^2$, that of a prolate spheroid, has also been used." The author then logically concluded that for eggs with the same shape the size is equal to LB^2 multiplied by a constant. Since he was not interested in egg weights in themselves but rather in the relation between egg weights and body weights, LB^2, the "egg value" was used directly with the omission of the use of constants which are difficult to compute with accuracy. In the cases of fifteen members of the Subfamily *Emberizinae* and seven forms in the Subfamily *Odontophorinae* it was found that egg size (actually egg value) is a non-linear function of body size. In each of these groups a logarithmic graph of egg values (Y) against body weight (X) is a straight line, i. e. $\log Y = \log b + a \log X$ or $Y = bW^x$ where a and b are constants. Constant a expresses the ratio of the rate at which egg size increases to the rate at which body size increases from species to species. This is shown to be constant among the *Emberizinae* varying from twelve to forty grams in weight. The value of a would be different for different groups of birds. The constant b is a constant of proportion "which in this case reflects the variations in relative egg size" i.e. the relation of egg size to body weight. This is influenced by a number of factors and is very variable although constant among closely related species or in groups in which the factors affecting egg size are similar. Since egg size is a function of body weight it is possible to calculate the latter from the egg size providing the values for a and b are known. The author's calculations for the *Emberizinae* are convincing and are accurate within 95%. This interesting paper opens an extensive field for ornithological research. The statement that the formula of a prolate spheroid is $4/3\pi LB^2$ is obviously an oversight. It should be $4/3\pi L/2 \cdot B^2/4$ or $1/6\pi LB^2$.

17. Color Discrimination in Canaries. H. H. Shoemaker. 1943. *Illinois State Acad. Science Trans.*, 35(2): 217–219. Description and chart of two-choice problem box in which six canaries were trained. "Getting out of the foreign problem box where all visual contact with its fellows was cut off and returning to the home cage to which it was accustomed provided sufficient motivation for rapid learning." Punishment for going towards the wrong color was one minute's imprisonment. Care was taken to avoid the "one side habit." "Canaries learned to discriminate between red and green light as transmitted through Wratten tricolor light filters A and B. No matter how much the intensities were varied with one or the other light source entirely removed the birds continued positive to the color to which they had been trained and negative to the one which they were trained to avoid."—M. M. Nice.

18. Hearing Ranges of Four Species of Birds. Ernest P. Edwards. 1943. *The Auk*, 60: 239–241. Observations were made on one Canvas-back (*Nyroca valisineria* (Wilson)), one Great Horned Owl (*Bubo virginianus* (Gmelin)), three Prairie Horned Larks (*Otocoris alpestris praticola* Henshaw), and one Snow Bunting (*Plectrophenax nivalis* (L.)). The following approximate frequency ranges were found: Canvas-back, 190 to 5,200 cycles per second; Great Horned Owl, 60–7,000 c.p.s.; Horned Lark, 350–7,600 c.p.s.; Snow Bunting, 400–7,200 c.p.s. It is hoped that these experiments will be continued so that sufficient determinations can be made to establish statistically reliable means.

19. Effect of Testosterone Propionate on Territoriality in Flocks of Ring Doves. Mary A. Bennett. 1943. *Illinois State Acad. Science Trans.*, 35(2): 193–194. The author concludes from her experiments that are recorded in detail in *Ecology* 1941 that the injection of this androgen "in low ranking members of ring dove flocks increased territorialism in the flocks and contributed to an increase in the development of a peck-right type of social hierarchy." —M. M. Nice.

REPRODUCTION

20. Breeding Habits of McCown's Longspur. Francis Welton Mickey. 1943. *The Auk*, 60: 181–209. This paper summarizes observations of the breeding habits of McCown's Longspur, *Rhynchophanes mccowni* (Lawrence), in a forty acre field east of Laramie, Wyoming during the summers of 1938, 1939, and 1940. This field had never been plowed and had not been grazed for ten years. A total of forty-five nests was observed. The males arrived early in April and became numerous by the third week in April. "McCown's Longspurs, being gregariously inclined, tended to retain something of a colonial formation even during the breeding season. Within the loosely formed flocks each pair was in possession of its own territory; but as soon as the young were on the wing in fall, territories were abandoned." The male's right to his territory was established primarily by the characteristic flight song. The first males to settle established excessively large territories which were diminished in size by establishment of territories by newcomers. As territories decreased in size they were defended more vigorously. In congested areas males frequently fought in order to maintain territories; in less congested areas the flight song and occasionally chasing an intruder were sufficient. "Territorial defense by male longspurs was directed against intruding male longspurs, who by their song and actions indicated that they were trying to establish themselves on a territory. It was not directed against non-competing males, nor those feeding immature birds, nor against males of other species frequenting the area." After the males had settled on territories they seldom left; they sang from or over their territories at frequent intervals during the day and well into the evening. "With the beginning of each new nesting cycle the male engaged in flight song. Prior to the last brood of the season song was much abbreviated; . . .". A new nest was constructed for each brood; usually some distance from the old but within or close to the boundaries of the territory. Nests were built by females only. "Presumably" eggs were laid in the early morning. Eighteen clutches contained three eggs each; eighteen contained four; and two contained five. Incubation was performed by the female only. The incubation period was twelve days. The female began incubation before laying the last egg or immediately afterwards. During incubation the male guarded the nest from a nearby rock, engaged in flight song, and defended the territory. The fear instinct was evident in the young at nine days. The young usually left the nest on the tenth day after hatching. Young were fed entirely on insects, mostly grasshoppers. Both parents cared for the young and removed excrement from the nest. A total of 153 eggs was laid in forty-five nests during the three years of observation; ninety-two (60%) were hatched; seventy-one birds (46% of eggs laid) were fledged. This is a rate of 1.58 birds per nest. The number of young fledged per pair per year is not given. The author considers crows, ground squirrels, prairie dogs, badger, and weasel to be predators on this species. The author is to be commended for a fine piece of esearch.

21. The Reproductive Cycles of the British and Continental Races of the Starling. W. S. Bullough. 1942. *Phil. Trans. Roy. Soc. London, Ser. B, Biol. Sci.*, 231 (580): 165–246. An admirable study based on color-banding of some individuals and the collecting and microscopic examination of the gonads of 786 specimens of *Sturnus vulgaris* largely taken from communal roosts. Sketches and photomicrographs illustrate the reproductive cycles of both sexes and various ages of Continental and British birds.

"The gonads of the first-year British and Continental starlings begin to grow in February, but the rate of growth in the British bird is greater than that in the Continental. The gonads of the adult British starlings do not regress so far in summer as those of the Continental birds, and they start to grow precociously

in early autumn. The gonads of the adult Continental starlings do not begin to grow until January or February, the time when the gonad growth of the British birds is accelerated. In February and March the gonads of the adult British birds grow much more rapidly than those of the Continental birds," p. 165.

British Starlings wear off the tips of their neck feathers through hole-exploration. Their beaks turn yellow in fall, those of the migratory birds not until late winter. Male Starlings have brownish eyes, females yellowish; males have more pointed throat and breast feathers than females, and when the beak is yellow, the base of the mandibles is grey in the males. Female Starlings breed at one year, males not until two years.

The British Starling is sedentary. In fall all adult females appeared to be paired, "and the surplus of unpaired males also occupied holes and staked out territories," p. 227. Some British Starlings go to roost in holes at about the time Continental Starlings leave for roosts fifteen miles distant; they get less light and exercise than do the foreigners, yet their gonads develop more precociously. Three nights spent near a large roost did not substantiate Rowan's idea that peace reigns in the country.

"It was found that only during half an hour just before dawn on one of the nights was the roost entirely quiet. The conclusion was reached that as a normal thing, although large numbers of birds are always asleep, there are thousands of starlings which, owing to their own inherent restlessness or to such disturbing factors as hunting owls or sudden rainstorms, are wide awake, continually chattering, and frequently flying about even in extreme darkness," p. 231.

Prof. Rowan in a letter to the reviewer points out that collections should be made in February rather than March in order to be comparable with his findings where London Starlings had much larger gonads than those in the country (1937, 1938).

Interesting suggestions are made as to the influence on migration of increase of light and development of the gonads. These two populations of Starlings are divided into subspecies by the author on the basis of their physiological differences. It seems probable that both races may be present in America. A paper well worth careful study and full of suggestions as to research on our own Starlings.—M. M. Nice.

22. *Colletoptera affinis* at the Nest. R. E. Moreau. 1942. *The Ostrich*, 13: 137–147. The author presents a study based on 900 hours of observation of a nesting colony of Indian or Square-tailed Swifts, *Colletoptera affinis* (J. E. Gray) at Tanga on the coast of Tanganyika Territory in eastern Africa. These gregarious birds build nests in clusters on the tops of walls beneath the eaves. Laying began between June 9 and 19. Eggs were laid at irregular intervals averaging 1.5 days. Both parents incubated, relieving each other and occasionally sitting on the nest together. During daylight hours, eggs were incubated about 70% of the time. Incubation time was about twenty-three days and the fledgling period about thirty-eight days. Nearly two-thirds of the periods during which neither of the birds were on the nest were less than ten minutes. The maximum periods of non-incubation were 166 and 173 minutes. "Visits with food (brought by both birds), after brooding had ceased, averaged 1.7, 2.4, and 3.4 per 200 minute period at nests of one, two, and three young respectively equivalent to 1.7, 1.2, and 1.1 per young bird. This shows once again that a solitary young bird tends to get more food than one of a brood." Less than half of the eggs produced fledged young. A nice piece of work.

23. The Breeding Biology of *Micropus caffer streubelii* Hartlaub, the White-rumped Swift. R. E. Moreau. 1942. *Ibis*, 6: 27–49. This paper is based on 1,100 hours of observations by African observers under the supervision of the

author. All nests observed were old nests of *Hirundo abbysinicus* taken over and relined with feathers by the swifts and frequently used year after year. The temperature maxima in Amani where the studies were made vary from 21.3°C. in July and August to 27.3°C. in February; minima vary from 14.4°C. in August to 18.1°C. in March. The difference between the longest and shortest day is thirty-seven minutes. The annual rainfall is eighty inches, forty of which falls during March, April, and May. Although the birds are resident throughout the year nesting occurs only from September to March. There are one, two, or three broods per season. A new clutch may be started within three or four days after the departure of the young. If young or eggs are removed a new clutch is started immediately. Clutches invariably contain two eggs; the second egg is laid two days after the first. "Nesting success" was about 75%. Of ninety-seven eggs observed, eighty-six hatched and seventy-four young survived. Incubation time is 20 ± 1–22 ± 1 days; the mean is twenty-one days. Both parents incubate. Departures from the nest by the incubating parent without relief were more frequent than departures when relieved by the other parent. Thirty-one percent of the unincubated intervals were longer than one hour. One clutch was left for periods of 238, 317, and 325 minutes in addition to numerous shorter periods; both eggs hatched. The actual percentage of daylight time during which eggs were incubated varied from 17–90% for all nests observed. Brooding continued for a week after hatching. Fledgling period was thirty-five to forty-seven days. Young were fed at the rate of 1.5 times per young per 200 minute interval; principal items of food were parasitic Hymenoptera, ants, and flea beetles. A very interesting paper.

24. A Managed Cliff Swallow Colony in Southern Wisconsin. Irven O. Buss. 1942. *The Wilson Bulletin*, 54: 153–161. This is an account of the interesting colony of Cliff Swallows (*Petrochelidon albifrons albifr ns* Rafinesque) on the side of a barn on the farm of Mr. Cory Bodeman at Deerfield, Wisconsin. This colony has grown from one pair in May, 1904 to its present size of more than 4,000 birds. The colony has been aided by maintaining mud pools for nesting material and by destroying all but a few old nests each year. These old nests are heavily parasitized but will be used again by the birds if they are allowed to remain. The few which are allowed to remain are for protection in case of sudden cold in spring. Slats are provided for attaching the nests. English Sparrows are controlled. This colony would provide an excellent opportunity for an extensive study of the species.

25. The Family Life of Central American Woodpeckers. Alexander F. Skutch. 1943. *Scientific Monthly*, April, 1943: 358–364. The author classifies Central American woodpeckers into three groups on the basis of family life: (1) Single pair attending nest; individuals past nestling stage sleep singly; male attends nest at night. Wagler's Woodpecker (*Centurus subelegans* (Bp.)), Hoffmann's Woodpecker (*C. hoffmanni* (Cab.)), Golden-fronted Woodpecker (*C. aurifrons* (Wagl.)), Costa Rican Woodpecker (*Chloronerpes rubiginosus* (Swains.)), Pileated Woodpecker (*Ceophloeus lineatus* (L.)); probably Guatemalan Ivory-billed Woodpecker (*Scapaneus guatemalensis* (Hartl.)), Oleaginous Woodpecker (*Veniliornis oleaginus* (Licht.)), Guatemalan Flicker (*Colaptes mexicanoides* (Lafr.)). (2) Single pair attends nest; mated pairs sleep together throughout the year and both spend the night in the nest while it contains eggs and young; young return to sleep in the nest with parents and may do so until next breeding season approaches. Golden-naped Woodpecker (*Tripsurus chrysauchen* (Salv.)), Northern Piculet (*Picumnus olivaceus* (Lafr.)); possibly Little Black Woodpecker (*T. cruentatus* (Bodd.)), Pucheran's Woodpecker (*T. pucherani* (Malh.)), and Piculet (*Picumnus sp.*). (3) More than two grown birds attend nest. Ant-eating Woodpecker (*Balanosphyra formicivora* (Swains.)).

Interesting observations on some of these species are included. Wagler's Woodpecker like most Central American Woodpeckers remains paired throughout the year; territory is maintained throughout the year. Male and female have separate dormitory holes. It was observed in one pair that the male's dormitory was used for the nest. Both sexes incubated although only the male incubated at night; this is true of all of the species in group 1. Both parents fed and brooded the young. After the departure of the young the male was observed to continue sleeping in the nest hole (originally his dormitory) and the female to continue sleeping in her dormitory. After about one week the young succeeded in finding individual sleeping holes. Among the Golden-naped Woodpeckers both members of the pair sleep together. Most of the work in excavation of the hole is done by the male although the female helps as the time for egg laying approaches. Both parents incubate. The young leave the nest at about thirty-four days and fly well at that time. They are brought back to the nest in the evening by the parents. The entire family lives together until the approach of the next nesting season. The Ant-eating Woodpecker is usually found in small flocks which sleep together at night. As many as five were observed to sleep in one hole. During the nesting season a single nest may be attended by an entire flock. On one occasion four males and a female were observed to be caring for the same nest and sharing in the incubation. Whether this was polyandry or merely an association of a pair assisted by three unmated males is unanswered.

26. Observations on the Nesting of the Killdeer. Walter P. Nickell. 1943. *The Wilson Bulletin*, 55: 23–28. This paper records some interesting observations on eight nests of three pairs of Killdeer, *Oxyechus vociferus vociferus* (L.), during 1942. Seven clutches contained four eggs; one contained five. One female laid four clutches during this season. The incubation periods varied from twenty-four to twenty-six days. When the incubating female of one pair was collected incubation was continued by another bird presumably the male of the pair.

27. Nesting Habits of the Black-billed Cuckoo. O. Ruth Spencer. 1943 *The Wilson Bulletin*, 55: 11–22. Observations on six nests of the Black-billed Cuckoo, *Coccyzus erythrophthalmus* (Wilson) made during the summers of 1939 and 1941 are summarized in this paper. Eggs were layed at intervals of one to three days. Both parents incubated. The incubation period was ten days in one nest and eleven in another. The diet of the young consisted entirely of insects. The young left the nest at six or seven days. "Of the eighteen eggs laid in the two seasons (1939 and 1941), fourteen (87.14%) hatched. Ten of the young (71%) left the nest, giving a total for surviving young of 55% from the six nests."

28. A Study of the Nesting Habits of the Cedar Waxwing. Robert B. Lea. 1942. *The Wilson Bulletin*, 54: 226–236. Twenty-one Cedar Waxwing (*Bombycilla cedrorum* Vieillot) nests were observed in the course of two years in an area of about twenty-five acres. Twelve nests were given careful observation. The time required to build the nest varied from five to six days. The incubation period was from eleven to thirteen days with an average of 11.7 days. The nestling period varied from twelve to eighteen days. Females only performed the incubation and brooding; both parents shared in building the nest and feeding the young. Two of the nests were parasitized by cowbirds. Six of the twelve nests observed fledged young. Forty-four eggs were laid; there were thirty-three nestlings; twenty-five young were fledged. Fledglings remained in the vicinity of the nest for about one month.

BEHAVIOR

29. The Daily Movements of Cormorants on San Francisco Bay. George A. Bartholomew, Jr. 1943. *Condor*, 45: 3–18. An eleven-month study of the roosting habits and daily movements of the Brandt Cormorant, *Phalacrocorax penicillatus* (Brandt) and the Double-crested Cormorant, *Phalacrocorax auritus albociliatus* (Ridgw.). The interesting suggestion is made that the time of departure from the roost in the morning is governed by the size of the flock rather than the time of daybreak, the smaller the flock the earlier the departure. The time of return in the evening is dependent also on the size of the flock (the larger the earlier the return) and the distance of the feeding place from the roost.

30. Reactions of Birds to Aircraft. R. A. Carr-Lewty. 1943. *British Birds*, 36: 151–152. Of interest are the following data on observations of altitude at which birds were seen in flight: Pink-footed Geese, *Anser brachyrhynchus* Baillon, 7,000 feet; Mallard, *Anas platyrhyncha platyrhyncha* L., 6,300 feet; Curlew, *Numenius arquata* (L.), 4,600 feet; "Swan," 3,580 feet; Swift, *Apus apus* (L.), 3,400 feet; Wood-pigeon, *Columba palumbus* (L.), 3,100 feet; Golden Plover, *Pluvialis apricaria* (L.), Starling, *Sturnus vulgaris* (L.), Swallow, *Hirundo rustica* (L.), and Rook, *Corvus frugilegus* (L.), all at 2,000 feet or above.

31. How Birds Spend Their Winter Nights. A symposium by the Tennessee Ornithological Society. 1943. *The Migrant*, 14: 1–5. A rich little compilation of interesting observations on the roosting habits of birds during the winter.

32. Imitations of Other Birds by the Starling. George R. Mayfield. 1942. *The Migrant*, 13: 55–56. The following birds are reported to be imitated by the Starling, *Sturnus vulgaris* L., in Nashville: Meadowlark, Cowbird, Bronzed Grackle, Red-Winged Blackbird, White-Throated Sparrow, Bluebird, Bobwhite, Cardinal, Carolina Chickadee, Flicker, Mockingbird, Wood Pewee, Robin, English Sparrow, Downy Woodpecker, Hairy Woodpecker, Goldfinch, Sparrow Hawk, Bluejay, Junco, Killdeer, Prairie Horned Lark, Night Hawk, Solitary Sandpiper.

LIFE HISTORY

33. Hornemann's Redpoll in Belgium. (Acanthis Flammea Hornemanni (Holboell) en Belgique.) Ch. Dupond. 1939. *Le Gerfaut*, 1939: 185–203. An excellent review of the literature concerning this species (*Acanthis hornemanni hornemanni* (Holboell)) including description, distribution, feeding habits, nesting habits, nomenclature and synonomy, history, and a discussion of the single Belgian record.

TERRITORY

34. Territoriality and Related Problems in North American Hummingbirds. Frank A. Pitelka. 1942. *Condor*, 44: 189–204. Based upon an extensive review of the literature and limited field observations of non-nesting birds, the author emphasizes "the uniformity of general life habits among hummingbirds—a uniformity as extreme as that of any other taxonomic group of similar rank." "Belligerence and intolerance" of others, whether or not of the same sex or species, characterize the trochilids. "In no speces of hummingbird is the male known to participate normally in nesting activities," though the author cites two instances to the contrary.

"Courtship and invitation are not apparent" in hummingbirds (p. 198). "In at least North American species, the independence of individuals is conspicuous,

and except for mating, the sexes bear no relation to each other." He later (p. 200) quotes, however, "the most credible description of copulation" available, which mentions wing-fluttering and posturing by a female Calliope hummingbird. Male hummers are "probably polygamous."

Areas surrounding nests are defended by females alone; they may or may not include a feeding territory. Feeding areas of both sexes are described as mostly transitory, with territorial limits not rigidly oberved. They are protected against both sexes by attack flights and by intimidation "dive, gyration and pendulum" displays occurring "probably at all times of the year" in both migratory and resident species. "One of the chief stimuli for an attack flight," according to the author, "is the buzzing-humming of the wings." He states (pp. 197–198) that "the frequent claims of amorous intent attached to display flights . . . by various observers is largely nonsense," but in the next paragraph adds "that these displays bear a sexual significance cannot be doubted since the peak of such activity coincides with the peak of gonad development." He postulates that display flights possibly once were related to courtship, but now are performed by both sexes solely to intimidate other individuals, functioning like "certain aspects of song in passerine species." His data from the literature indicates a rarity of display performances in females. "Defense is the chief feature of hummingbird territoriality; announcement and competition through song and display occur less frequently." Bibliography of 70 titles.—GEORGE A. PETRIDES.

SYSTEMATIC ORNITHOLOGY

35. Correlation of Bill and Foot Coloring with Age and Season in the Black Duck. Terrence M. Shortt. 1943. *The Wilson Bulletin*, 55: 3–7. The author shows conclusively that the supposed races of the Black Duck, *Anas rubripes rubripes* Brewster and *Anas rubripes tristis* Brewster, are actually nonexistent and that the differences in bill and foot color are a function of age and season. Adult males in winter plumage have bills of Wax Yellow to Lemon Chrome and feet of Coral Red to Scarlet Red. First year males in winter plumage have bills of Light Yellowish Olive to Greenish Yellow and feet of Tawny to Apricot Orange. Differences in the females are not as marked. "All of the bills were spotted and blotched with dusky and exhibited a gradual range from Deep Olive to Ochraceous-Orange. The feet varied from Olive Brown to Jasper Red." Age in the males was determined by examination of the bursa of Fabricius and cloaca (degree of development of penis) and in the females by the presence or absence of the opening of the oviduct into the cloaca. Males in eclipse plumage show reversion in bill and foot color to that of the juvenile male. Attractive color plates by the author accompany the paper. Taxanomic ornithology needs many more investigations of this type.

ANATOMY AND MORPHOLOGY

36. A Systematic Study of the Main Arteries in the Region of the Heart, Aves VI. Trogoniformes, Part. I. Fred H. Glenny. 1943. *The Auk*, 60: 235–239. Eight species of trogons, *Chrysotrogon caligatus* (Gould), *Priotelus temnurus* (Temminck), *Pyrotrogon erythrocephalus* (Gould), *Temnotrogon roseigaster* (Vieillot), *Curucujus* (*Trogon*) *massena* (Gould), *Trogon melanocephalus* (Gould), *Trogon strigilatus* L., and *Trogonurus variegatus* (Gould) were dissected and studied. A common basic pattern was found in all of these species. Of particular note is the fact that in the entire family only the left carotid artery enters the hypapophysial canal. American Ornithology needs more research of this kind. There are unsolved problems without number.

BOOKS

37. Systematics and the Origin of Species. Ernst Mayr. 1942. Columbia University Press, New York, 335 pp., $4.00.

This is one of the most important books that have appeared in recent years, of value alike to systematists and biologists. As Professor Dobzhansky in his introduction says: "a correlation of this sort has been necessary for some time; even in the recent past there existed a notorious lack of mutual comprehension between the systematists on the one hand and the representatives of the experimental biological disciplines on the other." In the main this situation is what Dr. Mayr sets out to correct. It speaks well for the calibre of his biological training and the assiduousness with which he has kept up with the mass of current literature in a wide variety of fields, that in large measure he has succeeded in his task.

One of the disappointing things about museum ornithology is the lack of use to which most specimens are put after they have been collected. Some are interesting in the historical sense, as Audubon's skins for example. Rare types and cotypes of the early naturalists have great intrinsic value. Other specimens are of value as records for faunal lists or for taxonomic revisionary studies. Such work of preservation and revision is naturally important, but much of it is essentially static. The pendulum of opinion about the acceptance or rejection of numbers of genera may well swing back again in thirty years. The tempests of "lumping" and "splitting" will probably continue to boil, to simmer, and to boil again. But this book of Dr. Mayr's serves a double purpose. It points the way for greater utilization by museum people of their collections as statistical evidence in genetic and ecological studies, and it shows laboratory people how to find material in museums which can assist them greatly in their work.

Dr. Mayr has attacked his task with method and logic. In the first chapter he presents a thorough exposition of the historical background and current status of systematics. His section, "the functions of the systematist," is worthy of careful study by all museum men. The next chapters on taxonomic characters and geographic variation give a detailed analysis of the relation between morphological characters as such, and various environmental speciation factors. In these sections, as in fact all through the book, Dr. Mayr's detailed knowledge of Old World tropical islands serves him in good stead. The fauna of tropical islands is a special study in itself, one that has not been written of in American scientific literature as much as it has in English and German. It is one of Dr. Mayr's particular contributions that he makes available to American readers a great many ideas and concepts derived partly from these European schools of study.

The next three chapters are concerned with the problem of the species concept. On p. 120, Dr. Mayr presents his species definition which in its shorter form reads: "species are groups of actually or potentially interbreeding natural populations, which are reproductively isolated from other such groups." These chapters are positive and definite. Such a presentation is stimulating indeed. Some of the definitions seem a bit too didactic, but there is surely a virtue in this. The reader must think in order to criticize. Dr. Mayr has no hesitation in coming out on one side of a question. Nothing could be more advantageous in the writing of a book of this sort.

The last three chapters are concerned with a discussion of speciation. They form a valuable and ordered attempt to indicate that the larger evolutionary processes are a direct outgrowth of that fundamental process which may be observed in microspeciation. To a museum worker these chapters are important for their presentation of the evidence in back of taxonomic categories. For the laboratory worker they are valuable as a serious presentation of a "raison d'etre" for taxonomic categories.

In its planned and intelligent presentation, clear thinking, and wide scope, the book should have a valued place in the evolutionary literature of our time. —DILLON RIPLEY.

38. Life History of the Blue Goose, *Chen caerulescens* (Linnaeus). J. Dewey Soper. 1942. *Proceedings of the Boston Society of Natural History,* 42: 121–225, plates 15–26. Separately bound, $1.00. Because of his discovery of the nesting grounds on Baffin Island in 1929 and his long association with research on the Blue Goose the author is extremely well qualified to critically examine the literature and to compile a life history of this species. Breeding areas are located on the coast of the Foxe Basin on Baffin Island and on the southern coast of Southampton Island. The Baffin Island area is a strip ten miles wide and 150 miles long extending from Bowman Bay to Taverner Bay. This area, "as far as known, is confined to a vast tundra region which is flat, inclined to be wet or actually swampy, and liberally sprinkled with shallow ponds and small lakes." The nesting colony on Southampton is smaller and confined to a fifty mile strip of similar terrain on the southern coast of the island. These nesting areas are in the typical "grass tundra" with a cover of grass with intermingling mosses and lichens. The summer is short and rains are frequent. The mean temperature for the last ten days of May, 1929 was 27° F.; for June, 39° F.; and for July, 47° F. Snow begins to melt in June although there may be fresh snowfalls during this month. In 1929 the first Blue Geese arrived on June 2; the bulk of arrivals came from June 10–15. By June 26 there were many nests with incomplete clutches; incubation was well under way by July 1. It is believed that the incubation period is twenty-four or twenty-five days. The average clutch is three eggs. The first downy young were observed on July 20 with most of the eggs hatching on July 21 and 22.

Normally all geese, adults and young, have departed by the middle of September. The migration leaves Baffin Island in a sector enclosing Andrew Gordon Bay and Chorkbak Inlet passing then to the east shore of Hudson Bay. It is joined south of Cape Wolstenholme by the birds from Southampton Island. There is occasionally a split in the flight at Belchers Islands with one group passing by Cape Henrietta Maria down the west side of James Bay with the remainder passing down the east shore of James Bay. The latter is probably exceptional. Hannah Bay is the focus of an autumn concentration of Blue Geese. The birds arrive in early September and leave in October. The migration then passes directly south-southwest to the lower Mississippi, probably in a single high uninterrupted flight. However Michigan and Ontario records show that this is not always a non-stop passage. An early flight of Blue Geese reaches the wintering grounds during the last week in August. These are probably non-breeding birds which leave the breeding areas early and migrate without the prolonged stop at James Bay. These birds usually fly north again after reaching the wintering grounds in August. A second flight arriving in late September "could be very late departing birds direct from Baffin or Southampton Islands; either that, or some of those which tarried in James Bay for (only) two or three weeks." The bulk of the fall migration reaches the wintering area in late October and November.

There are two distinct wintering areas: "first, the area bordering both sides of the mouth of the Mississippi River and second, from Marsh Island for a distance of eighty-five miles to the mouth of Mermentau River." The birds are never found more than eight miles from the coast, a marked similarity to their distribution in the nesting areas. Blue Geese assemble in two or three bands about the tenth of March at which time the unpaired birds select mates. The flight of Blue Geese together with some Lesser Snow Geese leaves Louisiana in the middle of March and proceeds northward along or parallel to the Mississippi;

thence via the Missouri and Red River Valleys to the interior of Manitoba. The latter part of the journey which passes over eastern North Dakota is probably a high non-stop flight. The birds assemble in the middle of May in a limited sector of 800 square miles west of Manitoba centering at Grant's Lake. During the first part of May most of the birds pass eastward to James Bay probably in a single flight although some continue northward. The geese evacuate the James Bay area about the middle of May and migrate northward along east shore of Hudson Bay retracing the fall migration route. The birds going to Southampton probably split from the main flight near Cape Smith. Both the spring and fall migrations are characterized by their restricted breadth.

The author feels that the total population of this species must be not less than 5,000,000 and probably increasing. "Aside from man, possibly the most acute menace to the species is the exceptionally cold, stormy weather at a critical time in the breeding season." It is apparent that much information on nesting behavior is still lacking. This is an excellent paper. The only possible criticism apparent to the reviewer is its lack of summarizing paragraphs as well as a general summary.

39. The Birds of Britain. James Fisher. 1943. London. William Collins and Sons. 48 pp. An interesting elementary introduction to some phases of the ornithology of the British Isles. Great Britain has 20 million acres of moor land, deer forest, and rough forest; 18 million of rich grass land; 12 million in crops; 3½ million of parks, gardens, and buildings; 3 million of woodland and scrub; and ½ million of inland waters. There are at least 3,500 miles of coast line and "thousands" of islands. About 120 million land birds nest on these 57 million acres and unestimated "millions" of sea birds nest on the shores and islands. Thirty-three of the 133 nesting birds are subspecies peculiar to the British Isles. Because of its geographic position Great Britain is the nesting place of many Atlantic birds and serves in addition as a guide to Scandinavian birds in migration. The Ptarmigan, (*Lagopus mutus millaisi* Hart.), Snow Bunting (*Plectrophenax nivalis* (L.)), and Dotterel (*Charadrius morinellus* L.) are described as relicts of the ice age. The Redwing (*Turdus musicus* L.), Brambling (*Fringilla montifringilla* L.), Black Grouse (*Lagopus tetrix britannicus* With. & Lönn.), and the Lesser Redpoll (*Carduelis linaria cabaret* (P. L. S. Müll.)) are survivors from the post-ice-age birch period. The Capercaillie (*Tetrao urogallus urogallus* L.), Long-earned Owl (*Asio asio otus* (L.)), and Coal Tit (*Parus ater britannicus* Sharpe and Dress.) are representatives of the ancient pine forest fauna. Radical decreases in the populations of the Kite (*Milvus milvus milvus* (L.)), Buzzard (*Buteo buteo buteo* (L).); Hen Harrier (*Circus cyaneus cyaneus* (L.)), Marsh Harrier (*C. aeruginosus aeruginosus* (L.)), Eagle (*Aquila chrysaëtus chrysaëtus* (L.)), and Peregrines (*Falco peregrinus peregrinus* Tunst.) have been caused by interference by man in the last 150–200 years. An excellent summary of the history of British Ornithology is given. There is a complete list of British birds. The sweeping generalizations concerning the composition and origin of the British avifauna are justifiable in consideration of the elementary nature of the book. The complete omission of scientific names impairs the usefulness of the book for one not familiar with the British common names.

40. Vertebrate Photoreceptors. Samuel R. Detweiler. 1943. Experimental Biological Monographs. The Macmillan Company. New York. 184 pp. $4.00. In this monograph the author develops an authoritative picture of the physiology of vertebrate photoreception through a careful and thorough analysis of the retinae of many vertebrate species. In the first chapter there is a brief comparative description of the vertebrate eye with statements concerning the evolutionary trends as well as information concerning its adaptations in nocturnal

and crepuscular species. The remainder of the book is devoted to the structure, physiology, and adaptations of the retina. Although the author has not done extensive research with avian eyes his broad knowledge of the field has enabled him to use effectively the literature on the eyes of birds. Because of the high degree of development of sight in birds this book in its entirety will be of interest to many ornithologists. Of particular interest will be its frequent references to specializations and adaptations in birds.

Birds possess the highest visual acuity of all the vertebrates. This is associated with the specialized degree of macular development in which there is an extreme concentration of visual elements (cones) in the fovea which gives increased resolution and acuity. For example, the fovea of *Buteo* contains about 1,000,000 cones per sq. mm. whereas the human fovea probably has only about 160,000 cones per sq. mm. Most birds possess a single central (nasal) fovea. Hawks and swallows, however, have both a central and a temporal fovea in each retina. The author adopts Casey Wood's classfication of "areas for distinct vision" in birds: (1) *Amacular Fundus.* No central macular region. California Quail. (2) *Nasal Monomacular Fundus.* Most birds. (3) *Temporal Monomacular Fundus.* Exclusively in owls. (4) *Bimacular Fundus.* Two foveae. Swallows, most hawks, kingfishers. (5) *Band-like Area Centralis (infulamacular fundus).* A band or stripe containing a well-defined macula or fovea. Greater Yellow-legs. (6) *Infulabimacular fundus.* Band containing or connecting two macular regions. Old World Flamingo, Sparrow Hawk. The great visual acuity in birds is probably due also to the presence of many association cells in the retina as indicated by the striking development of the internal nuclear layer of the retina. Somewhat disappointing is the omission of discussion concerning the function of the pecten, an outstanding unsolved problem in avian physiology. Ornithologists may be further disappointed in finding non-specific references such as "in the hawk" and "in the owl." Chapter IX contains an interesting discussion on the evolution and significance of the fovea. Readers will be impressed with the compact logical organization of the material and above all the fact that the monograph is very readable and not one of those to be shelved for only occasional reference.

41. Bird Migration. A. Landsborough Thomson. 1942. H. F. & G. Witherby Ltd. London. Revised Edition. 192 pp. 6s. Six years have elapsed since the appearance of the first edition of this brief account of bird migration. In the interest of economy the actual size of the revised edition is smaller although through the use of smaller print it has been possible to introduce recent pertinent research. Among the added materials are recent data on transatlantic flights from banding records, Griscom on the movements of crossbills, Middleton on the length of stops by migrants, and Mrs. Nice on the inheritance of migratory instinct in song sparrows. Five new maps have been added. The author toys with the possible role of the pituitary gland in the physiology of migration. His demonstration of the inadequacy of any "explain-all" theory of bird migration would seem to lead logically to the suggestion that "bird m - gration" is actually a group of superficially similar processes probably with several origins and subjected to common or different selective factors, or both, resulting in a common convergence, periodic mass movement. Although there is need for an extensive authoritative treatise of bird migration this little book will always enjoy a most useful niche.

42. General Zoology. Tracy I. Storer. 1943. McGraw-Hill Book Company, Inc. 798 pp. $3.75. As a textbook of general zoology this book contains an admirable balance and choice of material. It is readily usable in either a "principles" or "systematic survey" type of course. The first part consisting of

eleven chapters deals with the principles of animal biology. The frog is used as a representative animal. Of particular interest to ornithologists are the chapters on evolution, animal ecology, and distribution of animals. The second part, twenty-two chapters, deals systematically with the animal kingdom. There is a thirty-five page chapter on birds in which the domestic fowl is used as a type animal in the study of avian anatomy. Adaptations, distribution, migration, food, enemies, reproduction, domestic birds, fossil birds, and classification of birds are discussed. Each chapter concludes with a brief list of well-chosen references. A thorough familiarity with these references would be ample insurance of an excellent general zoological background. In the chapter on birds the author states that there are two pancreatic ducts in the domestic fowl. This is true for many species of birds and occasionally true for the domestic fowl; however this species usually has three. There are 551 figures and five colored plates. This book is recommended to ornithiologists as a "refresher" in allied zoological fields and to the teacher of zoology for serious consideration as an efficient and practical textbook for students in elementary zoology. It should become a very popular text.

43. Bird Houses, Baths and Feeding Shelters. Edmund J. Sawyer. 1940. Bulletin No. 1, Cranbrook Institute of Science, Bloomfield Hills, Michigan. 40 pp. $0.20. Every ornithologist has among his friends at least one well-meaning novice who builds monstrosities of bird houses and hangs them in ridiculous places. For such cases this inexpensive practical little booklet is ideal. It contains plans and suggestions for bird houses for all species which nest in houses in the United States. The "mechanical bouncer" for unwelcome species appears to be a practical idea.

44. Trail of the Money Bird. Dillon Ripley. 1942. Harper and Brothers. New York. 306 pp. $3.50. This is an interesting account of the author's adventures as the ornithologist with an expedition to New Guinea. In the first five chapters he describes the voyage across the Pacific in the *Chiva*, a sixty-foot schooner. Galapagos, Tahiti, Samoa, Fiji, the Solomons, and New Britain were visited enroute. One enjoys particularly the stories of the major collecting trips into the interior of New Guinea and to some of its adjacent islands during which the author was aided by "Jusup", a major-domo who helped prepare skins, and "Saban", a shooter. A colony of crowned pigeons was observed on Biak. Of greatest interest perhaps is the account of the trip into cannibal country in company with a Dutch official who for the first time was bringing the authority of the Dutch Government to some of the tribes. Despite adverse conditions the party succeeded in observing and taking many birds including cassowaries, Radjah sheldrakes, pittas, vulturine parrots, king birds of paradise ("money bird" in Malay), wagtails, lories, and Cuvier's mound builder. On a visit to Bon Kourangen, a mountain of 5,000 ft., 300 specimens were collected including some which the author himself considers "Birds of Fable." Every ornithologist should read the description of the house and gardens of the bower bird. An amusing oddity was the addition of the author's discarded .410 gauge shotgun shells to the gardens of these birds. Several species of paradise birds were taken and although many dancing places were observed only one male was seen dancing by the author. Three pairs of *Rallicula leucospila* were captured alive by putting into a bag the shelter of leaves into which the pair retires for the night. The final and perhaps the most trying adventure involved carrying eighty-seven live birds in forty-two cages on a forty-nine day voyage around the Cape of Good Hope to Boston. For scientific details the reader is referred to a bibliography of the papers eminating from the expedition. By the injection of numerous interesting experiences such as the observation of Papuan dances, a part of the

church Christmas festival, and participation in a two-day Chinese wedding, the author has created a delightful mixture of travelogue and popular ornithology. —D. C. FARNER.

NUMBER OF BIRDS BANDED DURING THE GOVERNMENT FISCAL YEAR 1942

THE Fish and Wildlife Service has compiled the following list of individuals and cooperative stations that banded over 100 birds during the fiscal year July 1st, 1941 to June 30, 1942.

The following stations on Federal Refuges banded more than 100 birds:

Piedmont National Wildlife Refuge, Round Oak, Ga.	7,084
Raymond J. Fleetwood	
Chautauqua National Wildlife Refuge, Havana, Ill.	5,942
Homer L. Bradley	
Lower Souris National Wildlife Refuge, Upham, N. Dak.	4,005
C. J. Henry	
Malheur National Wildlife Refuge, Burns, Oregon	3,057
Geo. M. Benson	
Bear River Migratory Bird Refuge, Brigham, Utah	2,591
V. T. Wilson	
White River National Wildlife Refuge, St. Charles, Ark.	1,724
H. A. Miller	
Sand Lake National Wildlife Refuge, Columbia, S. Dak.	1,403
Watson E. Beed	
Mud Lake National Wildlife Refuge, Holt, Minn.	1,225
K. G. Kobes	
Cape Romain National Wildlife Refuge, McClellanville, S. C.	1,096
A. H. DuPre, W. L. Hills	
Wichita Mountains Wildlife Refuge, Cache, Okla.	1,036
F. B. McMurray	
Seney National Wildlife Refuge, Germfask, Mich.	977
J. H. Steenis and C. S. Johnson	
Waubay National Wildlife Refuge, Waubay, S. Dak.	933
D. R. Ambrosen	
Upper Souris National Wildlife Refuge, Foxholm, N. Dak.	925
F. S. Dart	
Patuxent Research Refuge, Bowie, Md.	700
Royal Stewart, Leonard Llewellyn, Don R. Coburn	
Tule Lake National Wildlife Refuge, Tulelake, Calif.	696
C. G. Fairchild	
Sabine National Wildlife Refuge, Sulphur, La.	656
J. A. Howard	
La Creek National Wildlife Refuge, Martin, S. Dak.	376
E. W. Crawford	
Blackwater National Wildlife Refuge, Cambridge, Md.	365
David V. Black	