in my hands. Thus was the first Great Grey Owl banded for science. On his release he flew to a nearby tree, and we retreated in the opposite direction.

Not satisfied with one, we decided to try for the second possibility. Day was fast departing and the hopes of even locating the second bird were fast fading, when, huddled close to the trunk of a large poplar I met him face to face. I immediately retreated a few feet to fix the noose, but again on advancing the first couple of steps the bird flushed. This individual was far wilder than the first and at no time did he allow us within range with the noose. After numerous attempts the snare was abandoned, and after getting him to perch in an open tree the rat technique was put into play. At sight of the rat he fluffed up his feathers and advanced along the limb of the tree toward the rat, bobbing and glaring at his quarry. The latter went on for a full half hour when finally he sailed from his perch and landed on the snow beside the caged rat. The rat squealed, and the owl retreated to a nearby lamp post to survey the situation. However, his second strike was made in about ten minutes. He lit again beside the cage, stalked around it, sailed onto the cage top and thence onto our trap topped post. The post fell over as he flew and he was pulled to the ground and was ours.

On arrival home, a letter was dispatched to Washington. Official word was received February 17th from Dr. J. W. Aldrich, of the Fish and Wildlife Service, stating:—"We are able to report that no other owls of this species have ever been banded."

These two owls bring our Toronto owl banding activities for this winter season to a grand total of 30 individuals of five species, namely,—Saw-Whet Owl (*Cryptoglaux acadica* (Gmelin)); Great Horned Owl (*Bubo virginianus* (Gmelin)); Long Eared Owl (*Asio wilsonianus* (Lesson)); Screech Owl (*Otus asio* (Linnaeus)); and Great Grey Owl (*Scotiaptex nebulosa* (Forster)).—GORDON LAMBERT, 202 Heward Ave., Toronto, Ontario, Canada.

RECENT LITERATURE

Reviews by Donald S. Farner and others

BANDING

(See also Numbers 29, 43, and 45.)

1. Report from the Lapwing Banding Station, Reeuwijk, for the Years 1943-1945 and Contributions Concerning the Migration of the Lapwing. (Verslag van het Kievitenringstation "Reeuwijk" over de jaren 1943-1945 en gegevens over de trek van de Kievit.) H. Klomp. 1946. *Limosa*, 19(3/4): 76-117. The data on which this paper is based are those obtained from the station operated by J. and C. van der Starre on a small island in a lake near Reeuwijk, a village in the vicinity of Gouda. Lapwings are trapped in spring and fall migration, banded, measured, weighed, sex and age determined, and released. Banding returns and recoveries show clearly that the Lapwings of northern and northwestern Europe pass through the low countries in large numbers in migration, most of them wintering in France or on the Iberian Peninsula; few winter in the British Isles. There is, in both sexes, a statistically reliable difference in wing length between first-year birds and adults. Also there is a statistically reliable difference in wing length between the sexes. Other age and sex differences are noted. In spring 58 percent of the migrating Lapwings were males; in fall, 59 percent. About 40 percent of the population, spring or fall, consists of first-year birds, indicating an annual mortality rate of about 40 percent. This agrees exactly with the calculations of Kraak, Rinkel, and Hoogerheide (*Ardea*, 29: 151-175, 1940). Four distinct phases in southward migration are noted. Late in May and more particularly in June the Polders around Reeuwijk are populated with birds in (1) *early summer southward migration* (de vroege zomertrek, Frühsommerzug, or Frühweg-

zug); these are birds from the Baltic countries, Russia, Poland, Scandinavia, Germany, and Denmark. From July to December large numbers are present in the Netherlands while molting occurs (July to October). In October after this (2) *molting pause* (ruipauze) the Lapwings move in all directions, alone or in flocks. In November the flocks increase in size with a tendency towards irregular sporadic movements W-WNW designated as (3) *vagrant migration* (zwervende trek). When cold weather and frost come a speedy southwesterly migration, the (4) *rush migration* (rush-trek), begins. Spring migration is much more direct and rapid than fall migration. In autumn there is an increase in weight of one gram per day per Lapwing for a period of about six weeks. There is a corresponding decrease in weight in spring.—D. S. F.

2. Color-Banding California Gulls at Great Salt Lake, Utah. Angus M. Woodbury, William H. Behle, and John W. Sigden. 1946. *Bulletin of the University of Utah*, 37(3): 1-15. (*Biological Series*, vol. 10, no. 2). This is a summary of the four years' banding (including color bands) of California Gulls, *Larus californicus* Lawrence, at Egg Island, Utah. This was a part of the Pacific color-banding project of the Western Bird-Banding Association. During this period, 1939-1942, 4,423 young gulls were banded for which there have been 92 returns (two percent) to date. Of these 71 were from the Pacific Coast states, two from British Columbia, two from Baja California, 13 from Utah, three from Idaho and one from New Mexico. Of the Pacific Coast records, 13 were reported to have reached the coast during July and August following banding. "The lack of any great concentration of young gulls around Great Salt Lake during those months supports the idea that most of them migrate longitudinally toward the coast in late summer." (p. 15.) However, some of the young California Gulls loiter in the home area until others have actually reached the Pacific Coast. Recoveries and records indicate that water courses are probably followed in migration. No particular stimulus seems apparent in determining the departure of the young gulls. "Rather it tends to support the idea that the migration stimulus is inherent in the young gull at a given stage of development . . ." (p. 15.) Migrating young gulls from Utah spread out along the coast from British Columbia to Baja California. In general they do not return inland until after three years when they are sexually mature. Return is not necessarily to the natal colony.—D. S. F.

3. Bird-banding by the Museum of Natural History of Göteborg in 1945. (Götesborgs Naturhistoriska Museum ringmärkinger av flyttfåglar under 1945.) Sune Svärd. 1946. *Götesborgs Naturhistorisk Årstryck*, 1946: 81-102. In 1945 there were 13,047 birds banded in Sweden by 120 cooperators under the auspices of the Göteborg Natural History Museum. Bands were placed on 131 species. Since the beginning of bird-banding under this system 159,549 birds of 210 species have been banded. Among the species banded in greatest numbers in 1945 were the Fieldfare, *Turdus pilaris* Linnaeus, 546; the Black and White Flycatcher, *Muscicapa atricapilla* (Linnaeus), 1,704; the Great Tit, *Parus major* Linnaeus, 1,703; the House Martin, *Chelidonaria urbica* (Linnaeus), 537; the Starling, *Sturnus vulgaris* Linnaeus, 943; the Black-headed Gull, *Larus ridibundus* (Linnaeus), 518; and the Willow Warbler, *Phylloscopus trochilus* (Linnaeus), 411. During 1945 there were 235 recoveries and returns. Since 1911 there have been 4,615 recoveries and returns, a percentage of 2.9. Of interest among the returns in 1945 was the retrapping at the banding locality of six female Black and White Flycatchers which were banded as adults in June 1944. There are nine records of Swifts, banded in July, August, and September and recovered in the same months after intervals of one, two, or three years. Three were recovered in two successive seasons and two in three successive seasons. A Willow Warbler banded at Kärra, Torpa, Halland, 17 June 1944 was recovered in Benin Province, Nigeria, Africa, 11 December 1945.—D. S. F.

4. Results of Bird-Banding Activities under the Auspices of the Rijksmuseum van Natuurlijke Historie te Leiden, XXXII. (Resultaten van het ringonderzoek betreffende den vogeltrek, ingesteld door het Rijksmuseum van Natuurlijke Historie te Leiden, XXXII.) G. C. A. Junge. 1946. *Ardea*, 19(1/2): 23-26. Included in this summary are records of 222 returns and recoveries mostly for 1944 and 1945. A Common Heron, *Ardea cinerea* Linnaeus, banded 5 May 1933 at Hallum, the Netherlands, was shot June 1944 near Leeuewarden. Thirty recoveries of the Lapwing, *Vanellus vanellus* (Linnaeus), are recorded; many of these are winter recoveries from France, Spain, and Portugal. A Lapwing banded in the Netherlands as an adult on 26 October 1942 was shot 29 April 1945 in the Vologda District in Russia. There are 17 recoveries of Herring Gulls, *Larus argentatus* Pontoppidan, and nine recoveries of Black-headed Gulls, *Larus ridibundus* Linnaeus. Among the 18 recoveries of Starlings, *Sturnus vulgaris* Linnaeus, are several winter recoveries from the British Isles. A male Reed Bunting, *Emberiza schoeniclus* (Linnaeus), was banded as an adult at Reeuwijk 8 March 1941 and was retaken 16 March 1941, 22 March 1941, 20 March 1942 and 5 February 1944 at the same place. A female banded at the same place 14 June 1941 was retaken 250 meters from the banding place 26 March 1944. During 1945 the total number of birds banded was 4,977 compared to 6,612 in 1944. Species banded most frequently were the Starling, 1,087; the Lapwing, 410; the Swallow, *Hirundo rustica* Linnaeus, 361; the Chaffinch, *Fringilla coelebs* Linnaeus, 620; the Siskin, *Carduelis spinus* (Linnaeus), 331; and the Greenfinch, *Chloris chloris* (Linnaeus), 426.—D. S. F.

5. Bird-Banding Activities in Belgium in 1945. (Oeuvre du baguage des oiseaux en Belgique.) Ch. Dupond. 1946. *Le Gerfaut*, 36(2): 107-112. This is a summary of 64 recoveries and returns of birds banded in Belgium. A Mistle Thrush, *Turdus viscivorus viscivorus* Linnaeus, was banded 16 January 1943 at Celles, near Tournai and recovered at the same locality 27 January 1945. A European Blackbird, *Turdus merula merula* Linnaeus, banded 28 May 1939 as a nestling at Court-Saint-Etienne was recovered in the same locality 8 November 1944. A Long-eared Owl, *Asio otus otus* (Linnaeus), was banded at Molenbeersel (Linsbourg) 15 May 1938 and was recovered three kilometers away 13 March 1945. A Cormorant, *Phalacrocorax carbo sinensis* (Shaw and Nodder), was banded as a nestling 19 June 1939 at Meetkerke lez-Bruges and recovered at Hengistshire Head, Hampshire, England, in June 1945, a distance of 350 kilometers.—D. S. F.

6. Birds Banded in Foreign Countries and Recovered in Belgium. (Oiseaux bagués à l'étranger et retrouvés en Belgique.) Ch. Dupond. 1945. *Le Gerfaut*, 36(2): 112-115. This is a record of 29 birds banded in foreign countries, mostly Scandinavia and Holland, and recovered in Belgium in 1944 and 1945. A Barn Owl, *Tyto alba guttata* (Brehm), was banded at Heerenbroek, Friesland, in the Netherlands, 14 October 1944 and was recovered 260 kilometers WSW in Belgium, 24 January 1945.—D. S. F.

MIGRATION

(See also Numbers 1, 2, 37, and 45.)

7. The Migration of Swiss Song Thrushes. (Vom Zug der schweizerischen Singdrosseln (*Turdus ericetorum philomelos* Brehm.).) E. Brunner. 1943. *Schweizerisches Archiv für Ornithologie*, 2(2): 85-101. In the period 1924-1941, 1,388 Song Thrushes were banded in Switzerland. There have been 29 recoveries and returns from 28 birds; 23 were recorded outside of Switzerland. These data show that the fall migration is southward beyond the breeding area of the race, fanning out to encompass a considerable area along the Mediterranean Sea including the Mediterranean islands. Fall migration occurs principally in October; spring migration principally in March. The migration of Song Thrushes appears

to be mostly at night. There has been a tendency for Song Thrushes to adapt themselves to civilization, noticed first further north in Germany and Holland. Likewise the first report of such adaptation in Switzerland came from the northern part of the country.—D. S. F.

8. The Spring Migration of some Species of Birds through Mediterranean Areas. (Der Frühjahrsdurchzug einiger Vogelarten durch die Mittelmeerländer.) Erwin Stresemann. 1944. *Ornithologische Monatsberichte,* 52(1/2): 29-44. In this paper the author has tabulated and analyzed the arrival times of various species, in northward migration in spring from Africa, in Morocco, southern Spain, Libyan Desert, Egypt, Crete, Smyrna, southern Greece, Saloniki, Latium (central Italy), and miscellaneous other areas. In general the first wave of migrants within a species reaches the Mediterranean area simultaneously at all points; there are no important differences in spring arrival dates between Morocco and Egypt. An exception is the Spotted Flycatcher, *Muscicapa striata* (Pallas), in which arrival in the eastern Mediterranean regions is ten days earlier than in the west. This is reflected in the later arrival of this species in southern England than in East Prussia. A similar difference exists with the Tree Pipit, *Anthus trivialis* (Linnaeus) although it is less marked. Certain other species such as the White Stork, *Ciconia ciconia* (Linnaeus), arrive earlier on the west end of the Mediterranean but these are in general breeding birds of the region. "As a general rule it is valid, that among the members of a particular species, those which reach the Mediterranean area first in spring have the shortest migration route. The more northern populations fly over the more southern which have in the meantime occupied their breeding area." (p. 43.) However, it is assumed that arrival of breeding birds in central Europe is in about the same order as their nesting areas are encountered from south to north.—D. S. F.

9. The Migration of the Black-Throated Diver. (Vom Schleifenzug des Prachttauchers *(Colymbus arcticus).*) G. Bodenstein and E. Schüz. 1944. *Ornithologische Monatsberichte,* 52(3/4): 98-105. Of 12 Black-throated Divers banded in April or in May in East Prussia and recovered in spring or summer, one recovery was on the Åland Islands, two in Sweden, two in northern Russia, and seven in Siberia. Recoveries during fall migration were made in Sweden, the Baltic Sea, Rumania, the Ukraine, and the Black Sea. An analysis of the recoveries indicates that two populations migrate through East Prussia. One population breeds in northern Russia and northwestern Siberia. In fall this population migrates directly to the Black Sea area. However, the spring migration is over the eastern Baltic Sea so that it is necessary to turn abruptly eastward in order to reach the breeding ground. The second population breeds in Sweden and Finland. This population winters in part in the Baltic Sea; non-breeding birds of this population occur in the Baltic Sea in summer. A portion of this population winters in the maritime areas from Italy to the Black Sea.—D. S. F.

10. The Migration of the Roller. (Die Wanderungen der Blauracke *Coracius garrulus.)* Erwin Stresemann. 1944. *Ornithologische Monatsberichte,* 52(5/6): 142-145. This is an extensive analysis of banding, phenologic, and other data bearing on the migration of *Coracias garrulus* Linnaeus. This is one of those species which has spread into Europe from the East. The breeding area includes northwestern Africa from Tunisia to Morocco, parts of Spain and France, Italy, Sicily, central and eastern Europe as far north as southern Sweden and Esthonia, Cyprus, Palestine, Syria, Iraq, Asia Minor, Transcaucasus, Afghanistan, Iran, Kashmir, and Turkestan. From this entire breeding area the species moves for the winter into the eastern half of Africa, in an area between Kenya-Uganda and the Orange River. This is true even for those from Spain and Morocco. The migratory rate in fall is 1000 kilometers in 14-16 days; in spring 1000 kilometers in 8.5-10 days.—D. S. F.

11. The Migration of Swainson's Hawk in Central America. (Der Durchzug von *Buteo swainsoni* in Centralamerika.) Helmuth Otto Wagner. 1941. *Ornithologische Monatsberichte,* 49(6): 162-166. The migration of Swainson's Hawk in Central America is restricted to a relatively narrow strip between the Pacific coast and the Sierra Madre de Chiapas. The observations described in this paper were made at about 1000 meters near Haixtla, Chiapas. The fall migration lasts from about 15 October to the first part of November. The largest number observed in a single morning was 300-400. There is an interesting description of upward spiral soaring repeated over successive ridges, taking advantage of upward currents.—D. S. F.

PHYSIOLOGY

12. The Ventilation of the Respiratory Tract in Birds. Erik Zeuthen. 1942. *Det Kgl. Danske Videnskabernes Selskab, Biologiske Meddelelser,* Bind XVII, Nr. 1. 51 pp. This is the most comprehensive explanation of the mechanics of external respiration in birds yet to appear in the literature and as such constitutes one of the most important, if not the most important, of the contributions of this decade to avian physiology. The bird lung is a relatively small organ confined to the dorsal part of the thorax and separated ventrally from the remainder of the body cavity by the pulmonary diaphragm. The pulmonary diaphragm, which is actually the ventral surface of the lungs themselves, is a membrane of connective tissue and poorly developed musculature which arches *upwards* into the lungs so that a contraction of the muscles of the pulmonary diaphragm will actually cause the lungs to expand slightly. Through the pulmonary diaphragm pass the connections between the lungs and the paired abdominal and thoracic air sacs. The lungs of the bird are relatively very small. The air sacs of a duck occupy 20 percent of the body volume whereas the lungs occupy only 1-2 percent. In man, for comparison, the lung occupies five percent of the body volume. The bronchial or air-tube system of the bird lung is very complex. The *trachea* or wind-pipe divides into two main *bronchi*, each of which penetrates the lung where it then is known as the *mesobronchus.* Each *mesobronchus* runs the entire length of the lung ending, after a single ramification, in the *abdominal* and *thoracic* air sacs. *Ventrobronchi* (five or six in number) run ventrally from the anterior part of the *mesobronchus* and eight to ten *dorsal bronchi* leave the *mesobronchus* posterior to the *ventral bronchi.* The *dorsobronchi* and *ventrobronchi* are connected by minute *parabronchi* or air pipes to which are connected the *air capillaries* in which the actual exchange of gases with the blood occurs. *Saccobronchi* form an additional connection between the air sacs and the lungs by connecting the anterior air sacs with the *ventrobronchi* and the posterior air sacs with some of the *parabronchi* which in turn open into *ventrobronchi.*

Both the inspiratory and expiratory movements in birds are active. During inspiration the thorax is expanded in all directions and air is drawn *through* the lungs into the air sacs; during expiration the thorax is contracted and air passes from the air sacs through the lungs and trachea to the outside. During *inspiration* (1) part of the air passes directly through mesobronchus to the air sacs, (2) part passes through the *ventrobronchi medial parabronchi* (where oxygen is taken up by the blood and carbon dioxide released) *dorsobronchi,* and thence to the sacs either via the *saccobronchi* or *mesobronchus,* and (3) part passes through the *ventrobronchi, lateral parabronchi* (where likewise oxygen is taken up by the blood and carbon dioxide released) and thence via *saccobronchi* to the air sacs. *Expiration* is precisely the reverse; hence oxygen uptake and carbon dioxide release occur both during inspiration and expiration. In the hen on which the author experimented about 80 percent of the inspired air passed into the *abdominal sacs,* 3-12 percent into the *postthoracic sacs,* 8-15 percent into the *prethoracic sacs,* and 0-1 percent into the *interclavicular sacs.* In the duck the percentages are 49,

23, 3, and 1 respectively. The lungs can hold only four percent of the total inspired air. It is estimated that, during inspiration, 35 percent of the air volume passes through the *parabronchi* and is subjected to oxygen uptake and carbon dioxide release; the figure for expiration is about 65 percent. However it is possible that the inspiratory and expiratory volumes passing through the parabronchi are more nearly equal (40 to 50 percent). In a bird at rest at high temperature it appears that the ventilation of the lungs remains unchanged but that there is increased ventilation of the air sacs, thus cooling the body. "In the flying bird, the thermoregulatory needs may become so high that ventilation of the respiratory tract may be about 3 times as high as to be expected when considering the needs of respiration only." (p. 49.) It is presumed under these conditions that parabronchial flow is restricted so the carbon dioxide in the blood is not reduced below a certain minimum. "Most probably pigeons cannot fly faster than 70 $\pm$ 10 km. per hour, since at that rate heat regulation becomes a limiting factor (air sacs empty completely during each expiration . . .) The anatomy of the avian respiratory tract can only be understood, if we consider respiration as well as heat regulation during flight of a maximum intensity." (p. 49.)—D. S. F.

13. A Possible Avian Analogue of the Scrotum. R. B. Cowles and A. Nordstrom. 1946. *Science*, 104(2712): 586-587. In many vertebrate animals there appears to be a temperature maximum above which spermatogenesis will not occur. In mammals, in general, scrotal temperatures are lower than body temperatures and spermatogenesis will occur when the testes are in the scrotum but not when they are in the body. Likewise in the case of the English Sparrow and Starling, and perhaps other species of birds, spermatogenesis occurs in the early morning hours when body temperatures are the lowest. The authors, on the basis of latex injection of the air-sac system in Brewer's Blackbirds, *Euphagus cyanocephalus* Wagler, in standing position (to avoid abnormal displacement of viscera), report that "the testes move a short but important distance downward and backward, so that during the warm spring months while spermatogenesis is in progress *the testes become enveloped between the two dorsal folds of the abdominal air sacs.*" This presumably provides the lower temperature necessary for spermatogenesis.—D. S. F.

14. A Study of the Sexual Characters of the Chaffinch and Brambling. (Étude sur les caracteres sexuels des pinsons, *Fringilla coelebs* L. et *Fringilla montifringilla* L.) 1946. J. Collard and L. Grevendal. *Le Gerfaut*, 36(2): 89-107. A study of castration (applied to both sexes) and of the effect of sex hormones on secondary sexual characteristics. Experiments were conducted with normal and castrated birds of both sexes using natural and synthetic hormones. It was found that hormones of the opposite sex had antagonistic effects on certain secondary sexual characters. The female hormone injected into castrated males did not produce any notable effects on their external appearance. The male hormone had a very pronounced effect. Weak doses caused changes in the color of the bill, then of the plumage and at the same time in aggressiveness. With strong doses, the bird sang. Song and color of the bill are reversible characters and can be used to determine biological dosages of the male hormone. They reflect the sexual activity of the bird. Once colored, the plumage does not change, even when the bird is not sexually active. Large variations in sensitivity of the organs of different species of birds were found with respect to the same synthetic product. The hormones used were: (1) A natural product (from the bull), (2) Testoviron—Schering Laboratories, (3) Progynon—Schering Laboratories, (4) Androtest—Meurice Laboratories, (5) Folliculine—Meurice Laboratories.

An unsuccessful attempt was made to graft an ovary into the castrated male and another to graft testes into a castrated female. This paper describes the experiments in some detail and should be of interest to American workers in this field.

It is unfortunate that these studies were terminated by the invasion of Belgium in 1940.—R. O. BENDER.

FOOD HABITS

(See Numbers 21, 29, 34, 35, and 41)

COLORATION

15. Review of the Pigments Isolated and Identified from Birds. (Uebersicht der aus Vögeln isolierten und identifizierten Pigmente.) Otto Völker. 1944. *Journal für Ornithologie*, 92(1/2): 133-139. The *melanins*, pigments giving black and brown to feathers, occur in granules or rodlets. Because of their virtual insolubility in all organic solvents little is known of their chemical compositions. The *diffusion pigments*, which show no microscopic structure, are soluble in organic solvents and consequently are more easily studied. Two groups of these are known to occur in birds. The first, the *carotinoid pigments*, contains compounds closely akin to, or identical with, many yellow pigments of plants. The vitamin A molecule has close affinities to this group. The yellow pigment of the egg yolk of the domestic fowl is a mixture, varying in proportions according to the diet, of two isomeric carotinoid pigments, *lutein* and *zeaxanthin* ($C_{40}H_{56}O_2$), both of which are widespread among plants. These pigments are deposited in the yolk without chemical change on the part of the bird. "In principle this conclusion [the procurement and deposition chemically unchanged of plant pigments] holds also for the pigmentation of feathers by carotinoid pigments, although in this case the preparative bases are lacking through lack of material." (p. 134.) *Lutein* has also been demonstrated in the fat and retina of the domestic fowl. The red pigment of the side of the face of the pheasant, *Phasianus colchicus* Linnaeus, is likewise a carotinoid pigment known as *astaxanthin* ($C_{40}H_{52}O_4$). *Fenicotterin* is a red carotinoid pigment of unknown composition occurring in the red fat of flamingoes. A second group of *diffusion pigments* is that containing the *pyrrol* or *porphyrin pigments*. The first of these to be isolated and crystallized was *protoporphyrin (= ooporphyrin)* ($C_{34}H_{34}O_4N_4$) from the egg shells of the Black-headed Gull, *Larus ridibundus* Linnaeus, and the Lapwing, *Vanellus vanellus* Linnaeus. It is responsible for the reddish-brown flecks in the shells of these eggs. It is identical with the iron-free base of haemin, the color component of haemoglobin. *Koproporphyrin* III ($C_{36}H_{38}O_8N_4$) is a pigment isolated from the rose areas in the feathers of the African bustards, *Lophotis ruficrista ruficrista* (A. Smith), *Lophotis ruficrista ginidiana* (Oustalet) and *Lissotis melanogaster* (Rüppel); it is closely related also to haemin. The similar and isomeric Koproporphyrin I ($C_{36}H_{38}O_8N_4$) has been isolated from the domestic-fowl embryo indicating that haemoglobin is not necessarily required for the production of porphyrin pigments. *Turacin* is an interesting porphyrin pigment containing copper ($C_{40}H_{36}O_{16}N_4Cu$) which has been isolated from the feathers of 11 species of Plantain-eaters (Musophagidae). It is a red pigment. *Oocyanin* ($C_{37}H_{40}O_8N_4$), is a blue-green pigment in the eggs of the Black-headed Gull and probably in many other species. It is very closely related to, and perhaps identical with, a green pigment of the placental haemotoma of dogs and is very close to the bile pigment, bilirubin. "Very probably, therefore, protoporphyrin (= ooporphyrin) is an intermediate product on the way from haemoglobin to the bile-pigment derivative, oocyanin." (p. 137.) The eggs of the cassowaries have also a green pyrol pigment of unknown chemical composition.—D. S. F.

16. The Coloration of the Sea-Birds. Edward A. Armstrong. 1946. *Birds of Britain*, Booklet No. 21. 7 pp. Glasgow. The predominance of white in sea birds can be interpreted neither as protective adaptation nor as concealing coloration to aid in capturing food. The author suggests that white plumage has an advantage to sea birds because of its conspicuousness. It is suggested that the primary advantage lies in the fact that a *feeding white bird* is conspicuous and

would attract others. Hence white plumage in *colonial* sea birds has selective value because of its advantage to the colony. It is of interest to note that plumage evolution in gulls has been towards white. It is of further significance that the sea birds which are predominantly white are those whose food supply is sporadic and locally plentiful, hence the value of *the conspicuous feeding bird.* White coloration in gulls, furthermore, has developed with increased sociality. "So frequent is the correlation between white plumage and colonial nesting that it is probable that the advantages of social signalling extend to the breeding ground as well as to the feeding grounds." A very interesting paper.—D. S. F.

NIDIFICATION AND REPRODUCTION

(See also Number 46.)

17. The Clutch-Size of the Yellowhammer. R. Parkhurst and David Lack 1946. *British Birds,* 39(12): 358-364. Based on an intensive study of the nesting of *Emberiza citrinella* Linnaeus near Oxford in 1944 by Parkhurst, and an analysis of observations from other parts of England and the Continent by Lack. "The egg-mortality was greatest early in the season, and least late in the season." "Average clutch-size is highest about the first week of June, and is smaller before and after that period. Rather similar seasonal variations are found in Continental Europe. The average clutch-size is greater in the north than the south of Europe, and greater in Central Europe than further west."—M. M. Nice.

18. Abnormal Nesting Activities of Birds. (Rendellenes madárfészkelések.) Edward Agárdi. 1944. *Aquila,* 1943: 385-389. (German translation, 389-393.) This paper contains a collection of interesting nesting oddities. Included are a record of a Great Tit, *Parus major major* Linnaeus, nesting on the ground beneath asparagus; and a Wren, *Troglodytes troglodytes troglogytes* Linnaeus, which nested in a Swallow nest. There are also several records of two or more species nesting simultaneously in the same tree including a record of simultaneous nesting of a Common Buzzard, *Buteo buteo buteo* L., and the Nuthatch, *Sitta europaea caesia* Wolf in the same tree. There are also records of extraordinarily large clutches and abnormally small and large eggs.—D. S. F.

19. A Nest of the Great Grouse. (Un Nid de Grand Tetras *(Tetrao urogallus urogallus* Linnaeus).) Ch. Vaucher. 1946. *Nos Oiseaux,* 187/188: 201-202. This paper describes a late (June 23) nest of this species in the Vaud Alps at 1400 meters in an exposed situation in a small clearing. The only nearby cover was three plants of the European Hellebore, *Veratrum album* Linnaeus. There were seven eggs in the clutch; one of these was broken. The largest of the remaining eggs measured 60.4 x 42.3 mm. and the smallest 55.1 x 39.6 mm., a wide variation. This nest was abandoned the next day.—R. O. Bender.

BEHAVIOR

(See also Numbers 18, 41, 42, and 45.)

20. Seasonal Fluctuations in the Song of the Sky-Lark. R. B. Clark. 1947. *British Birds,* 40(2): 34-43. Methods of different British authors (bibliography of 17 titles) of recording song output are reviewed. Three *Alauda arvensis* Linnaeus were watched in Middlesex in 1944 and three in 1946; diagrams show the minutes of song per half hour in weekly sample periods from April through July for the first year. "The general level of song output in spring is about three minutes in half an hour"; it may reach seven or eight. [With Song Sparrows in the "highly stimulated phase" song output may reach five to six minutes per half hour.] Contrary to the behavior of many American birds (Song Sparrow and wood

warblers, for instance), the "male birds are relatively quiet while the nest is being built and the eggs incubated, but resume song when the young are being fed," although the male does not assist in the first two processes, only the last; one wonders whether this statement is based only on assumption. (See p. 37.) "Fog is a factor which affects Sky-Lark song very adversely. . . The birds always seem to sing within sight of the ground in mists." "When the breeding cycle is begun adverse weather conditions do not appreciably affect song; they may do so to a greater extent during the autumn song period and the first weeks of the spring period."—M. M. NICE.

21. Food-Washing of Waders. D. D. Harber, N. & B. F. Harvey, O. D. Hunt, R. G. Adams, R. F. Moore, E. K. & S. P. W. Chave, J. S. Ash. 1947. *British Birds,* 40(2): 55-57. Washing of worms or crustacea extracted from mud is reported for Black-tailed Godwit, *Limosa limosa limosa* (Linnaeus); Curlew, *Numenius arquata arquata* (Linnaeus); Dunlin, *Calidris alpina* (Linnaeus); Greenshank, *Tringa nebularia* (Gunnerus); Curlew-Sandpiper, *Calidris testacea* (Pallas); Redshank, *Tringa totanus* (Linnaeus), and Ringed Plover, *Charadrius hiaticula hiaticula* Linnaeus.—M. M. NICE.

22. Territory in the Ringed Plover. A. G. Mason. 1947. *British Birds,* 40(3): 66-70. Large numbers of *Charadrius hiaticula hiaticula* Linnaeus nest in and around the tern colony at Malahide, Co. Dublin; each pair owns a small territory, some 30 by 30 yards, "from which all intruding birds, of any species, are driven off," yet nesting Common Terns, *Sterna h. hirundo* Linnaeus, were tolerated. When the writer walked through the territories, other birds came up from all sides and flew or ran around in a loose flock; if there were no more than four, the owner threatened the outsiders and they left, but if there were as many as eight birds, the owners became part of the flock and ceased to act as territory owners. "There is no direct connection between the territories and food supply, but territorial behaviour does set a limit to the local breeding population."—M. M. NICE.

23. Proximate Orientation by Pied Flycatchers. (Die Orientierung des Trauerfliegenschnaeppers, *Muscicapa h. hypoleuca* (Pall.), zum Nesteingang in einem Nistkasten mit mehreren Oeffnungen.) Lars von Haartman. 1944. *Ornis Fennica,* 21(3): 69-89. These tests were made near Åbo, Finland, from about June 20 to July 9, 1943 on one pair of nesting birds; the clutch was completed about June 12. The nest box had six similar nest holes in front, and was divided by a horizontal partition below the third hole (most direct entrance to the nest). The problem was to discover the cues used for orientation to the correct nest hole. Visual cues were indicated by shifts in the hole chosen by the birds in correspondence to shifts in position of a brown pasteboard or in coloration about particular holes. However, the birds learned the right hole even when brown pasteboard with six corresponding holes covered the front of the nest box as well as the tree behind. When the nest box (with all pasteboard removed) was displaced downward 20 cm., the female showed an increased tendency to choose Hole 2. Haartman believes use of kinaesthetic cues improbable on the basis of his observation that deviations from the customary resting place in a nearby alder while en route to the nest box were not accompanied by an increase in wrong choices. To check possible response to numerical position, Haartman placed a one-hole box on the roof of the six-hole box, and the birds still chose the correct hole regularly. It should be noted that this experiment was not well controlled since Hole 5 was surrounded by blue coloring. At no time is it made clear whether or not the young were calling and so providing an additional clue.—N. E. COLLIAS.

24. The Nature of Bird Activities. G. R. Gannon. 1945. *The Emu,* 45(2): 152-169. This is an interesting paper in which the author weighs the ap-

parent evidences of purposeful and premeditated behavior in birds against the evidence supporting purely instinctive behavior, citing numerous interesting examples, many of his own observation. Included are discussions of the *releaser concept* of Lorenz, its broad applicability in bird behavior, and recent experiments in this field. Concerning nest building the author proposes that, "the most that the releaser concept can suggest is that at a certain stage of the courtship proceedings there is released those 'innate preceptory patterns', characteristic of the species, which result in activities that produce a nest." (p. 159.) "Intelligence in a bird, is so interwoven with instinctive behavior that it is difficult to put a finger on any activity and say—that is an intelligent action." (p. 162.) This paper is an unusually interesting summary of the more modern thinking in respect to bird-behavior, well presented and very readable.—D. S. F.

25. Singing of Juvenile Tree-Pipit. G. E. Took. 1947. *British Birds*, 40(3): 83-84. A pair of *Anthus trivialis trivialis* (Linnaeus) were feeding young about twelve days out of the nest, hence about 24 days old. One of the young gave "almost the complete song of this species, but quietly and in the tone of a subsong." —M. M. NICE.

26. Anting by the Indigo Bunting. Walter and Elizabeth Shakelton. 1947. *Kentucky Warbler*, 23(1): 1-4. Two *Passerina cyanea* (Linnaeus) were watched "swiping" large red ants "through the distended tail feathers and drooping right wing primaries."—M. M. NICE.

27. "Anting" by Blackbird. R. E. Williams. 1947. *British Birds*, 40(3): 84-85. Two male *Turdus merula merula* Linnaeus, as well as Starlings, *Sturnus vulgaris vulgaris* Linnaeus, seen anting. One of the Blackbirds inserted "its bill rapidly through the feathers of its wings, breast, flanks, under-parts and tail, at the same time with jerky movements turning round and round and in so doing almost sitting on its tail."—M. M. NICE.

28. Drumming of the Woodpeckers. (Le tambourinage des Pics.) P. Geroudet. 1946. *Nos Oiseaux*, 184: 145-150. This paper contains a discussion of drumming as related to the biology and ecology of the Woodpeckers. Of particular interest is a key adapted from Thibault de Maisieres, based on drumming characteristics, which can be used to identify the five common Swiss Woodpeckers. This key is based on: (1) The duration of the drumming. (2) The approximate number of taps per drumming. (3) The rhythm—uniform or accelerating. (4) The intensity. It would seem that a similar key for American Woodpeckers would be both practical and useful.—R. O. BENDER.

LIFE HISTORY

(See also Numbers 22 and 41.)

29. The Biology of the Alpine Swift, *Micropus melba melba* (L.). (Zur Biologie des Alpenseglers, *Micropus melba melba* (L.).) Hans Arn. 1945. *Archives suisses d'Ornithologie*, 2(4): 137-181. This is an interesting series of observations made by the author in Solothurn, Switzerland. In this city there are three large breeding colonies. The Jesuit Church (120 nesting birds in 1943) colony was known to exist before 1830. The Bieltor colony (23 nesting birds) and the Rathaus Tower colony are the other two sizable colonies. Small numbers are known to breed in three other places in Solothurn. Elsewhere in Switzerland colonies are known at Baden, Bern, Biel, Fribourg, Langenthal, Luzern, Rohrbach, Schaffhausen, and Zürich. Alpine Swifts arrive in Solothurn between 22 March and 11 April and depart between 14 September and 14 October. The nesting birds were always found at the nesting sites at 5:00 A. M. In good weather the adults

spend the entire day in search of food and with exception of the first days after the hatching of the young spend only a short time at the nest. Birds were observed feeding in vicinity of lamps in the evening. Few swifts are seen over the city during the day because the feeding activities take them beyond the city. In bad weather the flights are short and the birds are restless during the long periods at the nests. Food is taken exclusively on the wing and bound into balls with saliva. Of 609 food items examined, 308 were dipterous insects, 125 plant lice, 100 beetles, 96 wasps, two ants, 21 spiders, 16 cicadas, 15 lace wings and two butterflies. Water is taken by swooping to the water surface. "The greatest enemy of the Alpine Swift is doubtless hunger. . ." (p. 147.) However, an example of rat predation of nesting birds is given. The hippoboscid flies, *Craetaerina melbae* Rondani, and *Crataerina pallida* Latreille, may be important parasites. Among the "nest guests" (non-parasitic species occurring in the nest) of the Alpine Swift are the pseudoscorpion, *Chelifer cancroides* Linnaeus; the meal beetle, *Tenebrio molitor* Linnaeus; the assasin bug, *Reduvius personatus* Linnaeus; and numbers of undetermined mites. The first egg is laid normally in the latter half of May. If three eggs are laid most frequently they are laid on the first, third, and fifth days; for two eggs the most frequent situation is the first and fourth days with some clutches laid on the first and third days. There is a single record of a successful clutch of four. From 1932 to 1943 the number of eggs produced by the Jesuit Church colony varied from 76 (1932) to 300 (1942); the percentage of eggs producing young which left the nest varied from 46 percent (1937) to 82 percent (1935). The number of clutches increased from 31 in 1932 to 72 in 1942. Incubation begins after the laying of the last egg; the incubation period is 17 to 23 days, mean about 20 days. In one nest the young reached adult weight at 28 days and then for the next 26 days were heavier than adults. In a second nest adult weight was attained at 24 days with the next 28 days' weight generally above that of adults. The brain and eyes reach their adult weights at about 33 days; heart at 26 days; lungs, kidneys, intestine, and liver at 15 days. Bill length becomes adult at 32 days, bill breadth at 18, head width at 48, head length at 50, carpal length at 22, forearm length at 22, tarsus length at 30, middle toe at 18, wing length at 54, primary-feather length at 50, secondary-feather length at 38, tail-feather length at 48. Banding data show breeding birds (banded as young) of ages as high as fourteen years. Among birds banded as nestlings the following recoveries as breeding birds were made in the same colony: 1st year after banding 22, second year 24, third year 15, fourth year 12, fifth year 15, sixth year 3, seventh year 11, eighth year 5, ninth year 8, tenth year 4, eleventh year 3, twelfth year 4, thirteenth year 1, fourteenth year 3. The data show a marked tendency of the birds to return to the previous breeding locality and also a tendency to return as breeding birds to the birthplace. Data are presented to show a marked tendency to occupy the same nest in succeeding years. There is also a tendency for pairs to remain intact through successive years. Usually Alpine Swifts breed first during their second year although the author has two examples of breeding in the first year. This is an excellent paper.—D. S. F.

30. Notes on the Masked Weaver ***Hyphantornis velatus mariquensis*** **Burch.)** J. Sneyd Taylor. 1946. *The Ostrich*, 17(3): 145-155. This is an extremely interesting paper based on observations made in the Karroo region of South Africa where the Masked Weaver is common. The nest of this species is "kidney-shaped" and has an opening below; it is constructed of grass, leaves of rushes, and similar material and is lined principally with feathers. Breeding plumage in the males begins to show about 7 August; this is followed, in favorable weather, by the first indications of nesting. First there is an inspection of the old colony, "accompanied by much excitement and chatter," which is followed by the demolition of the old nests. This occurred from 1 September on. "The construction of new nests would commence some twenty days after the old ones

had been demolished, and might continue intermittently until early March." (p. 148.) The same colonies are used year after year. Colonies generally contain no more than twelve nests. Nest construction, with the possible exception of the lining, is accomplished by males. Nesting does not begin until after the rains. "When one nest has been completed, another is usually commenced immediately, and up to eleven completed nests have been thus constructed in our thorn tree, apparently all by the one male." (p. 150.) The males are apparently polygamous having at least two mates. "The male continuously displays, hanging on to the nest, and perching upon neighboring branches and other objects." (p. 155.) The male neither incubates nor feeds the young. A footnote by the editor indicates that the correct subspecific name is *nigrifrons* Cabanis.—D. S. F.

31. Blackbird Rearing Four Broods from the Same Nest. W. Baggaley. 1947. *British Birds*, 40(3): 85-86. A pair of *Turdus merula merula* Linnaeus raised four broods in 1938 in Middlesex, totalling 14 young, in the same nest, a large untidy affair beneath the eaves; material fell off almost daily so the nest was "continuously under repair" and the parents were busy for a period of "nearly five months from March to early in August."—M. M. NICE.

32. Long Period of Pairing in Mexican Flycatchers. (Lange "Verlobungzeit" mexikanischer Tyranniden.) Helmuth Otto Wagner. 1941. *Ornithologische Monatsberichte*, 49(4/5): 137-138. The author records the pairing and constant association of a male and female Black Phoebe, *Sayornis nigricans* (Swainson), for a period of three months before actual nesting activities. Also a pair of Azara's Kingbirds, *Tyrannus melanocholicus* (Vieillot), was observed at tht beginning of May; on 28 May after the first rainy weather they began to gather nesting material. Likewise a pair of Scarlet Flycatchers, *Pyrocephalus rubinus* (Boddaert), was observed in January although the breeding season does not begin until April. "In tropical areas with periodic dry seasons such long periods of pairing may be a rule among many species." The long period of pairing may be an adaptation to the variable time of beginning of the rainy season.—D. S. F.

ECOLOGY

(See also Numbers 35, 42, and 43.)

33. The Biology of the Aquatic and Shore Birds in the Schärenmeer of Southwestern Finland. (Zur Biologie der Wasser- und Ufervögel in Schärenmeer Südwestfinnlands.) Lars von Haartman. 1944. *Acta Zoologica Fennica*, 44. 120 pp. This treatise, although lacking in general integration and a summary, is a most interesting accumulation of ecologic and biologic observations and data on the breeding shore and aquatic birds of the Schärenmeer (area of rocky islands, including coast of adjacent mainland) of southwestern Finland near Åbo (Turku). The area involved in the investigations is 65 square kilometers. Each set of data or observations is discussed in relation to existing information in the literature making the paper a series of units of information. Five zones or biotopes are recognized in the area. (1) *The Lakes.* Most of the lakes in the area are eutrophic (high biologic production) and correspond to the *Nyroca*-type lake of Palmgren. A few are less eutrophic and belong to the *Podiceps*-type of Palmgren. Most abundant species in the lakes are the Mallard, *Anas platyrhynchos* Linnaeus; the Common Pochard, *Aythya ferina* (Linnaeus); the Tufted Duck, *Aythya fuligula* (Linnaeus); the Goldeneye, *Bucephala clangula* (Linnaeus); the Great Crested Grebe, *Colymbus cristatus* (Linnaeus); the Common Curlew, *Numenius arquata* (Linnaeus); and the Coot, *Fulica atra* Linnaeus. (2) *The Bays.* The bays are in general eutrophic and correspond in many ways with the lakes. Most abundant species are the Mallard; the European Widgeon, *Mareca penelope* (Linnaeus); the Shoveller, *Spatula clypeata* (Linnaeus); the Common Pochard; the Tufted

Duck (but only about 15 percent as many as in the lakes); the Goldeneye; the Great Crested Grebe (five times as abundant as on lakes); the Lapwing, *Vanellus vanellus* (Linnaeus); the Redshank, *Tringa totanus* (Linnaeus); the Common Curlew; and the Coot. *The Inner Zone* of rocky islands. This includes islands both with and without forests and which therefore differ somewhat faunistically. Common species are the Mallard; the European Widgeon (on islands with trees only); the Tufted Duck; the Common Eider, *Somateria mollissima* (Linnaeus); the Redshank (treeless islands only); the Common Sandpiper, *Actitis hypoleucos* (Linnaeus) (many times more abundant on islands with trees than on treeless islands); the Common Gull, *Larus canus* (Linnaeus); the Lesser Black-backed Gull, *Larus fuscus* (Linnaeus) (treeless islands only); the Black-headed Gull, *Larus ridibundus* (Linnaeus) (treeless islands only); and the Common Tern, *Sterna hirundo* (Linnaeus). (4) *The Fjärd Zone* (area of sea surrounded by rocky islands). Common species are the Tufted Duck; the Common Eider; the Velvet Scoter, *Melanitta fusca* (Linnaeus); the Turnstone, *Arenaria interpres* (Linnaeus); the Common Gull; the Lesser Black-backed Gull; the Common Tern; the Arctic Tern, *Sterna paradisaea* Pontoppidan; and the Black Guillemot, *Cepphus grylle* (Linnaeus). (5) *The Sea Zone* containing the peripheral islands, all treeless or nearly treeless. Common species are the Common Eider, the Turnstone, the Common Gull, the Lesser Black-backed Gull, the Common Tern, and the Caspian Tern, *Hydroprogne tschegrava* (Lepechin). The zones and biotopes are so closely related that the *Schärengürtel* must be considered in its entirety in order to understand it properly. The waters of the area are estimated to have about 200,000 kilograms of small animals. The total weight of ducks for the area is 366 kg. In the lakes there is a decrease in bird density with increasing lake size. This is associated with the fact that productivity is positively correlated with a high ratio of shoreline to lake surface and a high ratio of shallow water to lake surface. From 1940 to 1943 there was a sharp decrease in the numbers of Coots and Great Crested Grebes. This was possibly caused by killing by frost, during the severe winters of this period, of the *Phragmites*-beds. The distribution of bottom-feeding birds is shown to be dependent primarily on depth of water and food disposition. For example the customary diving range of the Tufted Duck is 0.7 to 4.0 meters. The following data on sex ratios in ducks (number of males to 100 females) were obtained: Scaup, *Aythya marila* (Linnaeus), 140; Goosander, *Mergus merganser* Linnaeus, 132; Goldeneye, 127; Mallard, 111; European Widgeon, 131; Shoveller, 111; Velvet Scoter, 111; and Common Eider, 91. Males arrive first in the area and remain associated with the females and nests until the beginning of incubation. There are interesting data on the Tufted Duck nests with compound clutches: *Inner Zone*, 26 percent with eggs of more than one female; *Fjärd Zone*, 14 percent; "N. Schärenmeer," 21 percent; "Esbo-Kyrkslätt" (three zones combined), 5 percent. For 1937-1940 the following data giving the percentage of nests in which at least one egg was hatched are given: Tufted Duck, 74 percent; Common Eider, 67; Oyster Catcher, *Haematopus ostralegus* L., 81; Black-headed Gull, 21; the Great Black-backed Gull, *Larus marinus* Linnaeus, 87; Caspian Tern, 95; Parasitic Jaeger, *Stercorarius parasiticus* (Linnaeus), 90; Coot, 67. Note is made of egg losses of the Great Crested Grebes to crows and the egg losses of terns due to cold weather and high water. The breeding population of Tufted Ducks in 1939 consisted of 110 pairs plus 39 extra males. The calculated number of eggs laid is 1,100. Of these 79 were lost due to rolling from the nest. Eighteen percent failed to hatch, leaving 620 newly hatched young of which 595 left the nest. Renesting and new clutches contributed 51 more young. Hence 110 pairs produced 646 young (59 percent of all eggs laid); within two weeks this number is calculated to have been reduced to 335 young. After two weeks it was calculated to have been reduced to 295 (27 percent of total eggs laid). There is an interesting relation between the breeding of Tufted Ducks and the Common Tern in that they tend to breed on the same islands. Of 57 rocky islands, suitable

for Tufted Ducks and on which there were Common Terns, 38 had Tufted Ducks; of 59 suitable for Tufted Ducks but without Common Terns, only eight had ducks. Presumably there is an ecologic requirement common to both.—D. S. F.

34. Predation and Vertebrate Populations. Paul L. Errington. 1946. *The Quarterly Review of Biology*, 21(2): 144-177 and 21(3): 221-245. In this general review sixteen pages are devoted to consideration of predation and bird populations. The data are principally those of North American species with the inclusion of some pertinent information from the foreign literature. The relation of predation to populations is one of many complexities and much confusion. Certain generalizations seem, however, to have considerable application. Once minimal requirements are met the population levels maintained by most species do not appear to be limited by gross differences in food and cover although exceptions to this occur under extreme conditions. Species produce surpluses, which are usually forced into marginal areas, and which are removed by one predator or another or by other means. Rate of reduction of a population decreases as the surplus decreases. Predation is an ineffective control of populations. In certain species of mammals and birds territorial requirements are the limiting factors on the population. Gregarious species are more vulnerable to predation. Predation as a factor in natural selection is probably grossly overestimated. This is an excellent and important paper; no less important than the conclusions is the indication of the tremendous amount of research that remains to be done in this field.—D. S. F.

CENSUSES AND POPULATIONS

(See also Numbers 33, 43, and 46.)

35. Bird Population Studies in the Coniferous Forest Biome during a Spruce Budworm Outbreak. S. Charles Kendeigh. 1947. Department of Lands and Forests, Ontario, Canada. 100 pp. This paper presents an abundance of interesting data both on the effect on birds of DDT-control of forest insects and, more fundamentally, on the ecology of birds in the Coniferous Forest Biome. In the Black Sturgeon Lake area, not far from Lake Nipigon on the north side of Lake Superior, it was found in controlled studies that a DDT treatment sufficient to kill 50 to 60 percent of the insects produced no appreciable reduction of the total breeding-bird population or its reproductive success. Of fundamental ecologic interest are the data on density of the various species. The density of all species for all experimental plots in the forest area was 319+ per 100 acres, an extraordinary density probably attributable to an "unusually abundant supply of insect food." The full breeding population was not reached until mid-June. The forest-bird population contained ten species of warblers (Compsothlypidae), seven species of Woodpeckers (Picidae), five species of Fringillidae, and one or two species in each of twelve other families. The population of a cutover area consisted principally of seven species of Fringillidae. The breeding-bird density for the area was 169+ pairs per 100 acres. An extensive table (pp. 26-28) gives the densities for individuals in the four forested plots. Most abundant were the Tennessee Warbler, *Vermivora peregrina* (Wilson) (59 pairs per 100 acres); Bay-breasted Warbler, *Dendroica castanea* (Wilson) (92); and Cape May Warbler, *Dendroica tigrina* (Gmelin) (28). Most numerous non-warbler species was the White-throated Sparrow, *Zonotrichia albicollis* (Gmelin) (18 pairs per 100 acres). In the cutover area the most abundant species were the White-throated Sparrow (60 pairs per 100 acres); Lincoln Sparrow, *Melospiza lincolnii* (Audubon) (12); Slate-colored Junco, *Junco hyemalis* (Linnaeus); Song Sparrow, *Melospiza melodia* (Wilson) (26); Tennessee Warbler (12); and the Alder Flycatcher, *Empidonax traillii* (Audubon) (15). A table summarizes the analyses of stomach contents of birds collected in the Lake Nipigon Region in 1923 and 1924. For the Warblers, the

most abundant group, the most important food sources were moths and butterflies (Lepidoptera), 22 percent; beetles (Coleoptera), 19.5 percent; spiders (Araneida), 15 percent; and leaf hoppers, etc. (Homoptera), 11.5 percent. "There are five principal food coactions involving the following groups: (1) amphibia, large insects, rodents, and small birds preyed upon by hawks and falcons; (2) ground insects, particularly ants, and vegetable parts used by grouse, wrens, thrushes, sparrows, and a few other species; (3) flying insects consumed by flycatchers and some warblers; (4) wood-boring and bark-inhabiting insects hunted by woodpeckers, nuthatches, creepers, and the Canada Jay; and (5) the foliage insects taken by the largest group, especially the warblers, vireos, kinglets, and chickadees. Of the foliage insects, the spruce budworm was exceptionally abundant and constituted the principal food of several species." (pp. 96-97.) Territory sizes for warblers varied from a mean of 0.37 acres for the Bay-breasted Warbler, considered to be super-saturated, to 2.7 acres for the Nashville Warbler. There are 27 maps showing nesting territories of the various species. Distinction is made as to whether or not all niches available to a species are occupied (unsaturation or saturation) or whether there is such over-population that there is a reduction in mean size of territory (supersaturation). Tennessee Warblers, Cape May Warblers, and White-throated Sparrows apparently had reached supersaturation. Losses due to predation were apparently unimportant insofar as the breeding birds were concerned during the period of the study.

"An analysis and interpretation of the dynamic forces at work in the population support the contention that intra-species competition is responsible for limiting the maximum density of species at a level conditioned by the food supply and climate. Inter-species competition may replace intra-species competition to a certain extent where there is over-lapping in niche requirements. This control is not rigid, however, so that temporary over-populations frequently occur. The segregation and limitation of species to particular niches is in large part effected by inter-species competition, although this competition is not very obvious except in times of stress, due to the development of inherited behavior patterns that automatically assign each bird to its proper place in the community." (pp. 97-98.)—D. S. F.

36. Summary of the Information from the Stork Census in Latvia in 1934. (Zusammenfassung der Storchbestandszählung in Lettland 1934). T. Strautzels with appendix by E. Schüz. 1942. *Ornithologische Monatsberichte,* 50(3): 69-79. This census was made under the direction of Dr. N. von Transehe. A total of 8525 nests were recorded, an average of 13.0 per 100 square kilometers (4.5-25.5 per 100 square kilometers) or 22.6 per 100 square kilometers suitable biotop (7.3-38.5 per 100 square kilometers suitable biotop): 90.8 percent were in trees and 9.2 percent on roofs; 6,750 of the nests were occupied. Of the occupied nests 3.0 percent had no young, 3.4 percent had one, 35.6 percent had two, 36.6 percent had three, 20.1 percent had four, 1.3 percent had five. The total progeny was 18,312.—D. S. F.

CONSERVATION

(See Number 43.)

ZOOGEOGRAPHY AND GEOGRAPHIC DISTRIBUTION

(See Numbers 37 and 40.)

SYSTEMATICS

(See also Numbers 40 and 42.)

37. The Atlantic Alcidae, the Seasonal and Geographical Variation of the Auks Inhabiting the Atlantic Ocean and the Adjacent Waters. Finn Salomonsen. 1944. *Meddelanden från Göteborgs Musei Zoologiska* Avdelning,

108. *(Göteborgs Kungl. Vetenskaps- och Vitterhets- Samhälles Handlingar,* Sjätte Följden. Ser. B. Band 3. N:O 5.) 138 pp. This revision of the Atlantic Alcidae is based on the material (about 700 specimens) available to the author from Scandinavian museums under wartime conditions and on an extensive survey of the literature. For each species or subspecies, whenever the data are available, there are measurements of wing length, length and depth of bill; information on molt and distribution. Also of interest are data on migratory movements including banding data when available. Of further interest are the data on "mutant" forms, such as the "bridled" variety or color phase in the murre, *Uria aalge* (Pontoppidan), and their geographic distribution. Measurements and notes on the plumage are given for each of the specimens studied. Although considerable attention is given to geographic variation in the various measurements these data unfortunately have not been subjected to the necessary statistical analyses to ascertain the validity of the differences. The author recognizes three subspecies of *Alca torda* Linnaeus, the Razor-billed Auk, contrary to Peters (Birds of the World, Vol. 1, p. 335) and the A. O. U. Check-list (Fourth Edition, p. 144). The birds of Iceland, the Faroes, British Isles, Channel Islands and the coast of Brittany are placed in the subspecies *islandica* Brehm because of their smaller wing and bill size; wing length does not overlap with the same measurement in the other two subspecies. The breeding birds of Norway, northern Russia, Greenland, and Labrador are placed in subspecies *pica* Linnaeus. This subspecies differs from subspecies *torda* Linnaeus (Baltic Sea) in the number of furrows on the bill distal to the white band. In *pica* 62 percent of the bills have a third furrow more or less developed whereas none of the specimens of *torda* have a third furrow. [The Museum of Natural History, University of Kansas, has a collection of 19 adults from Greenland; 11 of these have the third bill furrow.] Superficially the data appear to indicate that the warm-water population, designated as *islandica,* has unquestionably a shorter wing and smaller bill than the cold-water birds, designated as *torda* and *pica.* Within the cold-water birds there may be a cline from more bill furrows in the west to fewer in the Baltic birds designated as *torda* by the author. Since the basis of the subspecies and subspecific names is one of varying conventionality and not a fundamental biologic unit, it is pointless to debate the legitimacy of applying subspecific names to the ends of this cline or, indeed, even to the warm-water population with the shorter wing and smaller bill. Of prime importance is the demonstration of these variations regardless of nomenclatorial status.—D. S. F.

38. The Wing Length of Young and Adult Greenfinches and Redstarts. (Die Flügellänge junger und mehrjähriger Grünfinken und Gartenrötel.) Ernst Sutter. 1946. *Der Ornithologische Beobachter,* 43(4): 81-85. By means of retrapping banded birds the author was able to study the increase in wing length with increasing age. In the case of *Chloris chloris chloris* (Linnaeus) a single male measured in its first winter had a wing length of 87.5 mm., 88.5 mm. in the second winter, and 89 mm. in the third winter. Thirteen males showed a mean increase of 1.7 mm. in wing length between their first and second winter; seven females showed a mean increase of 1.8 mm. for the same period. Seven males of unknown age showed an increase of 0.9 mm. from one winter to the next; nine females of unknown age showed a similar increase of 0.4 mm. Similar data were not available for the Redstart, *Phoenicurus phoenicurus phoenicurus* (Linnaeus). Comparison of measurements of fall migrants show no differences between adult females (29 with mean 78.7 mm.) and juvenal females (232 with mean 78.6 mm.); 60 adult males had a mean 81.4 mm. whereas 263 juvenal males had 79.9 mm., obviously not a statistically significant difference.—D. S. F.

EVOLUTION

(See Number 42.)

PARASITOLOGY AND DISEASES

(See Numbers 29 and 44.)

BOOKS AND MONOGRAPHS

39. Audubon Bird Guide. Eastern Land Birds. Richard H. Pough, illustrated by Don Eckelberry. 1946. Doubleday and Co., Inc., Garden City, New York. xxxvii + 312 pp. $3.00. This pocket-size field guide, sponsored by the National Audubon Society, is both an aid in identification of the land birds of Eastern North America and a condensed reference on life history. Eastern North America, as used in this book, is the area east of the semi-arid Great Plains. The foreword in addition to explaining the general plan and purpose of the book, also provides material on avian ecology, plumage, and behavior for the layman so that the text will be more useful. *Conservation*, one of the captions in the foreword, is ambiguous, for in the discussion that follows there is no positive statement on the conservation of either game birds or song birds.

The text contains descriptions of the *species* in the last eight orders of the A.O.U. Check-list which occur in eastern North America. Each *species* is treated under the headings of identification, habits, voice, nest and range. *Subspecies* are not considered. This is an important point because of the tendency of many ornithologists to use unwarranted subspecific names in the field identification. Two hundred seventy-five species are thus treated, each with at least one illustration. In many instances immature plumages are also portrayed, one of the outstanding features of the book. The illustrations are bound in the center of the book, mechanically facilitating rapid paging.

If the object of this book were maximum utility, I doubt that the extension of the range beyond the Mississippi River, regardless of ecologic import, is advisable. This extension includes 42 species which occur in only a very small part of the encompassed range. If the illustrations given to these marginal species such as the Gray-breasted Martin, *Progne chalybea* (Gmelin); Botteri's Sparrow, *Aimophila botterii* (Sclater), etc., had been devoted to the eastern Falconiformes, Galliformes, and Columbiformes, which are omitted, the usefulness of the book would have been greatly increased. It is understood, however, that this difficulty is to be overcome by the publication of a companion volume covering the species of the other orders for the same area. Whenever adequate information is available there is a concise adequate treatment for each species. References to certain controversial points would have been desirable. The discussions on habits and nests are excellent, much information being drawn from the author's wealth of field experience. A series of well chosen abbreviations aid in rapid reading of the text. The grouping of bibliographic references under sixteen subject headings adds interest and facility to the bibliography. The simple, practical index comprises thirty pages. Each bird is cross-indexed by one or more common names, by group, by genus and by species. I recommend this field guide as a valuable addition to the library of the seasoned ornithologist and as an excellent silent tutor for any bird student.—ROBERT A. MCCABE.

40. The Birds of North and Middle America. Part X. Commenced by the late Robert Ridgway, continued by Herbert Friedmann. 1946. *U. S. National Museum Bulletin* 51. 484 pp. Part X of this important series treats the galliform birds including the curassows, guans, and chachalacas (Cracidae); the grouse, ptarmigan, etc. (Tetraonidae); the American quail, partridges, and pheasants (Phasianidae); the Guinia fowls (Numididae); and the turkeys (Meleagridae). The total number of species, including introduced species, treated is 45. The total number of named forms treated is 178. It is of interest to note that the North American Ringed-necked Pheasants are referred to *Phasianus colchicus*

torquatus Gmelin, which to be sure they resemble most closely morphologically, despite their mixed origin.—D. S. F.

41. Life Histories of North American Jays, Crows, and Titmice. Arthur Cleveland Bent. 1946. *U. S. National Museum Bulletin* 191. xi + 480 pp. The appearance of this volume of Mr. Bent's important series of life histories marks the end of the war period for American ornithology and contributes another important source book of ornithological information. The manuscript was completed in 1941 but its printing was delayed by the war. In 1945 the manuscript was recalled and important information added. The total number of species treated is 31; the total number of named forms treated is 97. As in the previous volumes in the series, in the case of polytypic species, the race most thoroughly known is treated fully and the others compared to it insofar as possible. Also as in the previous volumes, there are sections on *habits, nesting, eggs, young, plumages, food, behavior, voice, field marks, fall, winter, distribution* including *casual records*, and *egg dates*. This volume, like its companions, serves not only as a source book of valuable information on American species but also as a thorough inventory of our knowledge of the life histories of American birds. As such an inventory it shows a real fundamental need for well-planned and executed life-history investigations on most of our species.—D. S. F.

42. Darwin's Finches. David Lack. 1947. Cambridge University Press. 21s. 208 pp. A scholarly and at the same time absorbingly interesting book on the Geospizinae of the Galapagos Islands, that remarkable group of birds that made such a profound impression on Charles Darwin. The first eleven chapters are devoted to description, the last five to interpretation. "A brief and depressing description is given of the Galapagos Islands, their vegetation and their human history"; then the classification of the four genera and 14 species, ecology, plumage, bill and size differences are discussed. The ancestral Darwin's finch has diverged into a group of species, some ground-inhabiting, some tree-living, one that has taken the habits of a warbler and another that of a woodpecker—*Camarhynchus pallidus* (Sclater and Salvin)—that uses a spine or twig to dislodge insects from the holes it has dug in the bark—"one of the few recorded uses of tools in birds." (p. 59.)

"Most of Darwin's finches are not isolated from each other either in habitat, nesting site or breeding season, and they freely use each others' nests when displaying. The birds have scarcely any natural enemies and are extremely tame.... The display of all the species is the same, and their songs are also very similar." (p. 160.) They "recognize each other primarily by beak differences. The marked beak differences between the subgenera of Darwin's finches are correlated with marked differences in their diets and feeding methods."

Chapters XII to XVI discuss The Origin of the Galapagos Fauna, The Origin of Subspecies, The Origin of Species, The Persistence of Species, and Adaptive Radiation. In the Summary, Mr. Lack says: "Darwin's finches probably arrived before any other land birds, which has permitted their evolution in unfinchlike ecological niches. They have been comparatively free from predators. . . . New species originate when forms differentiated in geographical isolation later meet in the same region and keep distinct. . . . When two related bird species meet in the same region, they tend to compete, and both can persist there only if they are isolated ecologically either by habitat or food. All of Darwin's finches are isolated from each other ecologically." (pp. 161-2.) "Two parallel radiations are known, the finches of Tristan da Cunha being at a much earlier stage, and the sicklebills of Hawaii at a much more advanced stage, than Darwin's finches." (p. 162.)

The book is furnished with a great many tables of measurements, a six-page bibliography, and three indices—of animals and plants, of persons, places and

institutions, and of subject-matter, as well as eight plates (four in color) and 27 text-figures. A notable contribution to biology.—M. M. NICE.

43. Wisconsin Pheasant Populations. Irven O. Buss. 1946. Wisconsin Conservation Department, Madison 2, Wisconsin. 184 pp. With a preface by E. J. Vanderwall and an introduction, "The History and Future of the Pheasant in Wisconsin," by Aldo Leopold and W. F. Grimmer. This excellent treatise, whose publication was delayed for three years by the war, is based on seven years of continuous investigation, principally in Dane, Jefferson, and Dunn counties in Wisconsin. There is a wealth of data well presented with the aid of numerous graphs, tables, and photographs. The first chapter deals with nesting. Hayfields are apparently preferred to non-hayfield nesting cover, although first nestings occur more frequently in non-hayfield cover because hayfields, at the time of the first nesting, do not provide adequate cover. Old hayfields were found to have three times as many nests as newly seeded hayfields. "In an average year 35 out of every 100 southern Wisconsin hens nested in hayfields and had 20 live going nests at the time of hay mowing, all of which fell victim to the mower. The mower is eleven times more destructive than hayfield predators." (p. 130.) Hayfield is sought as cover when the plants reach a height of seven to ten niches. Chapter II is a compilation of data on sex ratio and a discussion thereof. In the southern counties, where shooting is heavy, the ratio is one cock per 2.7 hens; in the northern counties it is 1:5.3. Chapters III and IV are devoted to methods of age determination. The bursa of Fabricius is a valid age indicator, distinguishing birds of the year up to December. Juvenile pheasants, 125 days or older, were found to have molted the first two primary wing feathers.

The chapter on survival derives its most accurate data from the comparison of samples of trapped or shot banded birds on successive years. Survival of released birds from one year to the next (hunting season to hunting season) is four to seven percent for 1936-1940 and one percent to slightly more than four percent (1940-1943). (However, this does not include an apparently high loss between release and the first hunting season.) A corrected survival rate of naturally propagated birds indicates a nine percent survival among naturally propagated birds (1936-1940). The turnover period (period required for the annual increment of young to sink to zero) for a protected area was found to be five years. A partially protected area had a turnover period of four years. The analyses presented in the chapter on pheasant movements indicate that naturally propagated birds seldom move more than a quarter of a mile, whereas artificially reared birds may disperse as much as seven miles. The importance of this paper must not be interpreted alone in terms of its contribution to wildlife management but it must also be regarded in the light of avifaunal dynamics, for the pheasant is a species of recent addition to our avifauna. Perhaps its history, modified as it is by human manipulation, can contribute to our understanding of the expansion and regression of species.—D. S. F.

44. Fleas of Western North America. Clarence Andresen Hubbard. 1947. ix + 533 pp. The Iowa State College Press, Ames, Iowa. $6.00. Fleas are not frequently found on birds but nevertheless are an interesting, although poorly known, group of avian ectoparasites. As the author indicates, they are more often found in bird nests than on the birds themselves. An ornithologist who will take the time to examine nests, particularly those in boxes, in holes in trees, or in burrows, will find his efforts rewarded and may easily make important contributions to science. "Fleas of Western North America" deals with the fleas which occur west of the 100th meridian. It is a self-sufficient book. Part I contains a history of the research and publications concerning the fleas in the area, a chapter on the medical importance of fleas, an important chapter on field and laboratory technique, and a chapter on the anatomy of the flea as it pertains

to taxonomy and identification. The directions given for the mounting of fleas on slides for examination are sufficiently clear and adequately detailed to allow a person with no previous experience to obtain satisfactory results. The systematic part contains 350 pages, including keys for the identification of families, genera, and species. Numerous illustrations accompany the descriptions of genera and species. For each species, in addition to the description and references, there are data on range, host preference, medical importance (if any), host and geographic distribution, and sometimes the disposition of the type material. Certain inconsistencies, which in reality do not detract from the book, are noticeable. For example, the scientific names of the hosts are sometimes given with authorities and sometimes not; disposition of type specimens is sometimes given and sometimes not. The conclusion of the systematic part contains a very useful table of geographic distribution for all of the species known from the area. A synonymic index covers changes in nomenclature since 1938, the synonymy previous to this time having been amply treated by Jellison and Good (Index to the Literature of Siphonaptera of North America, *National Institute of Health Bulletin* No. 178). Part III contains a list of hosts of fleas giving the species reported from each. Fifteen "true bird fleas" have been reported from the area. This is a very usable and interesting book. It should contribute much to stimulate the study of fleas in general as well as the study of the ectoparasites of birds.—D. S. F.

45. The Country Diary of a Cheshire Man. 1946. A. W. Boyd. Collins. 14 St. James Place, London. 12s. 6d. 320 pp. These selections from a weekly nature column published in the *Manchester Guardian* from February, 1933, through September, 1945, tell, in simple, straightforward fashion with frequent touches of humor, of birds, butterflies and flowers, as well as of farmers, their curious beliefs and expressions.

Mr. Boyd is an ardent bander. Of the many hundreds of Tree Sparrows ringed near his home only one was found more than two miles away, and that at 25 miles (p. 253); a hen Chaffinch taken in Holland was the first of this species marked in England to be recovered abroad (p. 48); Greenfinches proved almost entirely sedentary, although one reached France (p. 249). As to Starlings, birds with rings were caught in the winter from Holland, Germany, Sweden and Lithuania; birds he banded in winter were found in Holland, Germany, Denmark and Estonia, and one captured by him in January had been banded on Helgoland the preceding October and was retaken in Schleswig-Holstein the following July (p. 90). Of two marked Starlings caught in a box January 14, 1942, one had been ringed as an adult exactly four years before, while the other "was ringed as a nestling on May 11th, 1933; on May 15th, 1934, it was sitting on eggs about 200 yards away from its original home; on December 31st, 1934, it was roosting in a third box close by; in June, 1937, I caught it in a trap." (p. 249.) "Early in 1930, by careful mapping of the county, we found that from at least five hundred square miles of Cheshire, all, or nearly all, the Starlings came to roost in a fox-covert in the centre of the county" (p. 45). "Birds have many sanctuaries, for which they must thank the hunt and the preservation of foxes." (p. 23.)

There are many interesting notes on bird behavior. Black-headed Gulls parasitize Little Grebes, diving ducks, Oyster-catchers and Redshanks (pp. 100-101), Great-crested Grebes, Goosanders, and even Cormorants (p. 180); a pair incubated for 53 days instead of the normal 26 to 28 (p. 176); during the 1934 drought foxes came into a marsh and drove off a colony of three to four hundred gulls except for two pairs that built their nests in fir trees 12 and 20 feet above the ground—"unprecedented" behavior for this species (p. 59). Blue-Tits have learned to perforate the cardboard tops of milk bottles for the cream (p. 158); "the destructive American grey squirrel seems to be on the increase again in this part of Cheshire." (p. 305); semi-tame Mute Swans are becoming far too plentiful, and usurp the territory and food of other and more interesting fowl." (p. 200.)

In 1933 geese and ducks were very much afraid of airplanes, but by 1942 they "seem hardly to notice what they once took for huge hawks." (p. 265.)

Before the war the Boyds went on vacations, and wonderful reading they make—the Calf of Man, France, southern Spain, Sweden, Morocco. "The Country Diary" has 15 pages of photographs of Cheshire and natural history subjects and an eight-page index. A fascinating book, that well shows the endless resources for happiness of an expert naturalist.—M. M. NICE.

46. New Biological Principles. (Nieuwe Biologische Principes.) G. Wolda. 1946. A. A. M. Stols, 's-Gravenhage. 179 pp. About $2.30. This is a peculiar book in which the author generalizes certain principles from the reproductive cycles of passerine birds and then attempts to show that these are applicable to the dynamics of human populations. Leaving aside the application of such principles to human populations, some of the generalizations about passerine birds are of interest although they may require further examination. In passerine birds the size of clutches is largest slightly in advance of mid-season. The author further propounds a theory of "acclimation" (adaptation to ecologic niche is perhaps a better term) in which he assumes that there is an evolution in habitat-occupation from an original deciduous-tree habitat, through coniferous trees, shrubs, to ground-dwelling habitat. With this there is a progressive change in reproductive dynamics from the single large clutch (as many as eleven young), to smaller and more numerous clutches in coniferous trees, and the even more numerous and smaller clutches of shrub-dwelling and ground-dwelling species. There is also a progressive increase in length of breeding season through these four stages. The author also speaks of the "evolution" of nest building in passerine birds in respect to the above-cited generalization. "This evolution begins with a completely shut-off natural hole which the bird can find in the branches or trunks of foliage trees and which is ready in a few days. It ends with a completely shut-off hole which the bird weaves itself and which it can place in the nearest vicinity of the food sources needed for the young birds. . . . All open nests are a gradual transition between these two extremes." (pp. 166-167.) The author also believes that, in this four-step transition, there is a change in plumage from loose and fluffy to compact and then "back to its original loose structure." He also draws correlations between pigment formation, sexual dimorphism, etc., and the transition from deciduous trees to the ground. There is an unfortunate amount of inductive reasoning based on a very limited, however interesting, group of observations.—D. S. F.