

A Loggerhead Shrike Captures a Field Sparrow While in Mid Air.—The unusualness of the actions of the Loggerhead Shrike (*Lanius l. ludovicianus*) responsible for the capture of Eastern Field Sparrow (*Spizella p. pusilla*) 36-37009, makes the following record of interest. The Sparrow was banded on February 23, 1937, at Summerville, South Carolina, being caught with others in a trap set on the edge of a corn field. As is occasionally the case, the captive Field Sparrows in the trap had attracted the attention of a Loggerhead Shrike and it must have sat on a pine tree close by when the writer approached to band the Sparrows in the trap. The Shrike evidently was an interested onlooker during the time the birds were being removed from the trap to the gathering cage, and while the band was being placed around the leg of a Field Sparrow, for no sooner was the Sparrow released from my hand than the Shrike swooped down from its vantage point in the pine tree and seized the just-released Field Sparrow out of the air.

In the writer's experience it is rare for the Loggerhead Shrike to pursue and capture small birds, its diet usually being confined to insects, but in this case the Shrike not only pursued and captured the sparrow in the air, but used its feet, instead of its bill, to make the initial seizure. This hold was not retained long, however, for the Shrike immediately flew in the direction of some nearby hardwood sprouts. The Field Sparrow up to this point was apparently unharmed, as it fluttered its wings in an effort to escape. In the hope that the Loggerhead might be scared into releasing its prey, the writer yelled loudly and dashed off in the direction of the clump of sprout growth, but in vain. During the time it took to travel from the trap to the sprouts, the Shrike changed its hold while perched on one of them, this time picking up the Field Sparrow with its bill, and with this much firmer grip on its prey, it flew to some tall deciduous trees, where the black and white marauder and its victim were lost sight of.—EDWIN A. MASON, Wharton Bird-Banding Station, Groton, Massachusetts.

Welding Celluloid Bands.—As many bird-banders know, the celluloid bands have many advantages over those made of metal: Light weight, availability of many colors, and ease of attachment without tools are some of these. The chief disadvantage has been that the celluloid bands will frequently come off, and the loss of a percentage of bands is disastrous to many experiments.

To eliminate this loss, the writer experimented with acetone, and finds that the loose end of the band may readily be welded in a tight seal. The method is simple, and requires little time to execute. One simply attaches the band in the usual manner, adjusts it to the correct size, lifts the outside end enough to introduce a drop of C. P. Acetone under it from a pipette, and presses the end firmly against the band ring. A pair of tweezers allows a firm grip and prevents the dissolved celluloid from adhering to the fingers. Another drop of acetone may now be placed along the edge of the band end, and the tweezers shifted to grip over this. After five seconds, the tweezers may be removed, and the end will be found to have welded firmly into the band circle. When very young birds are banded, the band should be adjusted to the size of the adult leg before sealing.—WARNER O. NAGEL, Research Associate, Collaborator, Missouri Wildlife Research Unit.

RECENT LITERATURE

(Reviews by Margaret M. Nice and Thomas T. McCabe)

BIRD BANDING

1. Banding in North America.—1937. *Bird Banding Notes*, 2 (15): 247-268. From July 1936 to July 1937, 300,894 birds were banded in North America, the grand total since 1920 reaching 2,482,044. Those banded in largest numbers were: Chimney Swift (*Chaetura pelagica*) 29,112; Common Tern (*Sterna h. hirundo*) 25,354; Junco (*Junco hyemalis-oreganus* group) 17,966, Herring Gull (*Larus argentatus*) 16,304; Mallard (*Anas platyrhynchos*) 15,753; White-throated Sparrow (*Zonotrichia albicollis*) 15,716; Pintail (*Dafila acuta tzizihoa*) 11,767; Song Sparrow

(*Melospiza melodia*) 7,307; Robin (*Turdus migratorius*) 6,511; Cowbird (*Molothrus ater*) 6,161; and Starling (*Sturnus vulgaris*) 5,602.

Age records are: Field Sparrow (*Spizella pusilla*) at least 7 years, Redhead (*Nyroca americana*) at least 11 years, Blue Jay (*Cyanocitta cristata*) 15 years.

2. Ringing of Birds in Belgium.—(Oeuvre du Bagueage des Oiseaux en Belgique. Exercice 1936.) Ch. Dupond 1937. Musée Royal d'Histoire Naturelle de Belgique. 1-71. Starlings (*Sturnus vulgaris*) banded in autumn in Belgium were later found nesting in Germany, Holland, Latvia and Russia. Birds banded in the nest were found in autumn 120 kilometers northwest and 110 kilometers west, while one was taken four years later in summer in England. Barn Swallows (*Hirundo rustica*) nested five years in succession, one bird in the same nest, while another made a change of 50 meters. A House Sparrow (*Passer domesticus*) carried a ring for five years. A Blue Titmouse (*Parus caeruleus*) and Great Titmouse (*Parus major*) from Germany wintered in Belgium. Sky Larks (*Alauda arvensis*) are typically sedentary, but two banded in the nest were killed in France the following winter.

3. Thirteenth Report of the Swiss Vogelwarte at Sempach for 1936.—(13. Bericht der Schweiz. Vogelwarte Sempach (1936).) A. Schifferli. 1937. *Ornithologische Beobachter*, 34:185-191. This report is merely a summary without the interesting details of the earlier years. In 1936, 25,574 birds were banded of which 12,332 were nestlings. Those banded in largest numbers were: Great Titmouse (*Parus major*) 4,652, Swallow (*Hirundo rustica*) 3,167, Starling 2,902, Green Finch (*Chloris chloris*) 1,717, Blue Titmouse (*Parus caeruleus*) 1,206, Redstarts (*Phoenicurus phoenicurus* and *ochrurus*) 806, Black-headed Gull (*Larus ridibundus*) 797, Pied Flycatcher (*Muscicapa hypoleuca*) 724, Redbreast (*Eri-thacus rubecula*) 627, and Chaffinch (*Fringilla coelebs*) 613.

4. Banding in Sweden.—(Göteborgs Naturhistoriska Museums ringmärkningar av flyttfåglar under 1936.) L. A. Jagerskiöld. 1937. *Göteborgs Musei Arstryck* 1937: 117-141. Sweden has two banding centers, one at Stockholm, the other at the Natural History Museum of Göteborg. This institution reports that 11,680 birds were ringed in 1936, bringing the total since 1911 to 83,045. There have been 2,918 returns and recoveries—2.8 per cent. The birds banded in largest numbers during the 25 years were: Black-headed Gull, Common Gull (*Larus canus*), Starling, Common Tern, Arctic Tern (*Sterna paradisaea*) Sandwich Tern (*Sterna cantiaca-sandvicencis*), Herring Gull, Lapwing (*Vanellus vanellus*), and Lesser Black-backed Gull (*Larus fuscus*).

5. The Polish Station for the Investigation of Bird Migration.—(Die Polnische Station für Vogelzugforschung.) Wladyslaw Rydzewski. 1938. *Der Vogelzug*, 9:14-18. Organized in 1931 with 11 coöperators, the station now has 111 cooperators and a total of 38,777 birds banded with 748 returns and recoveries (1.94 per cent). The most popular species have been Starlings, Barn Swallows, Martins (*Delichon urbica*), Rooks (*Corvus frugilevus*), White Storks (*Ciconia ciconia*), Great Tits, Grey Herons (*Ardea cinerea*), Song Thrushes (*Turdus philomelos*), and Blue Tits. A Stork banded in the nest in 1932 nested in 1936 and 1937 in a nest 75 kilometers from its birthplace. Adult Swallows have returned for five years to the same building, even to the same nest. Adult Great Tits are sedentary, but the young wander; of three banded as nestlings one was killed the following December in France 1,300 kilometers southwest, another was found in February 825 kilometers to the northeast, while a third was found nesting 165 kilometers northeast of its birth place.

6. Skokholm Bird Observatory Report for 1937.—R. M. Lockley. 1937. 22 p. An account of struggles with rabbits, bracken, Little Owls and Gulls. A 10 year census of the breeding birds on the island shows some decrease among Passerines and Oystercatchers (*Haematopus ostralegus*) and Lapwings in the last few years and an increase in most of the sea-birds and the Gulls. Instances of return of

nestlings to the place of birth are given for three species: Little Owl (*Athene noctua*), British Razorbill (*Alca torda britannica*) at the age of 11 months, and Manx Shearwater (*Puffinus p. puffinus*) when nearly two years old. With the Southern Guillemot (*Uria a. albionis*) only 50 per cent raised their (single) chicks to fledging stage

7. Swift Banding at Memphis—Sixth Season.—Ben B. Coffey. 1937. *The Migrant*, 8:70-72. A total of 2,375 Chimney Swifts (*Chaetura pelagica*) were banded at Memphis in the fall of 1937. Immature birds have old primaries of the past summer, while adults have new primaries; the two age classes were marked with rings from separate boxes, and it was found that of 1,464 birds handled from September 19th to October 4th 60 per cent were immature.

8. Harris's Sparrow in its Winter Range.—C. E. Harkins. 1937. *Wilson Bulletin*, 49:286-292. From his experience in banding *Zonotrichia querula* in central Oklahoma from November to April, the author concludes, "Harris's Sparrows, in their migration, follow the same route year after year." However since this locality is in the wintering range of these birds, the individuals trapped two falls in succession, or in both fall and spring, may have spent the winter in the vicinity. Prof. O. A. Stevens of College Station, North Dakota, has trapped large numbers of this species on migration without a single return. It should be pointed out that the visiting of traps only once a day is not in accord with approved banding practice.

MIGRATION STUDIES

9. The Early Southward Migration of the Lapwing and Consideration of Other Limicolae.—(Der Frühwegzug des Kiebitzes (*Vanellus vanellus* L.), unter Berücksichtigung anderen Limicolen.) P. Putzig. 1938. *Journal für Ornithologie*, 86:123-163. Some Lapwings, apparently disturbed in their attempts at nesting, start the southward migration as early as the 9th of May from Rossitten. A long discussion follows on the relations of the gonads and thyroids to migration and incidentally to molt, but no definite conclusions are drawn. There are 44 titles in the bibliography.

10. The Migration of the Crane in Historical Hungary.—(Der Zug des Kranichs im historischen Ungarn.) Jakob Schenk, 1938. *Journal für Ornithologie* 86:54-58. Spring migration of *Megalornis grus* is rapid, culminating in the second half of March; fall migration lasts longer. Spring migration is much less influenced by weather than is fall migration. In fall the chief migration sets in when there is a high pressure area north-west of Hungary, such a condition meaning cold weather in the breeding areas.

HOMING EXPERIMENTS

11. Skokholm Bird Observatory Homing Experiments I, 1936-37. Puffins, Storm-Petrels and Manx Shearwaters.—David Lack and R. M. Lockley. 1938. *British Birds*, 31:242-248. Excellent results were obtained with nesting Manx Shearwaters (*Puffinus p. puffinus*), the birds returning from distances of 125 to 930 miles in a direct line. The greatest distance was from Venice, Italy, from which place the mileage by sea is some 3,700 miles.

12. Results of Homing Experiments with Starlings Raised in Captivity by Wilhelm Schein in Winsen.—(Ergebnis eines Heimfindeversuches mit aufgezogenen Staren von Wilhelm Schein—Winsen L.) Werner Rüppell. 1938. *Der Vogelzug*, 9:18-22. Former experiments have shown that a wild bird removed to a strange place, irrespective of direction and distance, has a "sense-perception" for the position of its home. Forty young Starlings were taken from the nest in June 1936 when nearly fledged; they were fed by hand for 14 days and then let loose in a flight cage 2.50 x 3.50 x 10 meters in size. By spring 15 were strong, well developed birds. They started to carry nest-material February 10th and first eggs were laid March 25th, 28th and 30th, a month earlier than any Starlings in the wild and some six weeks earlier than wild Starlings of like age. All 15 were

given colored bands and were taken to Hannover, 115 kilometers south where they were released under favorable weather conditions March 31st and April 1st. Despite most thorough observations for 10 weeks in Winsen and its surroundings, not one was reported again in the home region. Two were found dead near Hannover. Such a drastic change in conditions may have imposed too great a problem to these inexperienced birds for their homing faculties to have been able to operate.

13. Hawks at Banding Station.—Harold and Josephine Michener. 1938. *News from the Bird-Banders*. 13:7-8. Sparrow Hawks (*Falco sparverius*) have returned to the Micheners' banding station in Pasadena, California, when released at distances of 20 to 40 miles, while one came back in a subsequent winter after a deportation of 70 miles. When Sharp-shinned Hawks (*Accipiter velox*) are "deported only a few miles they rarely return". They prey particularly upon the introduced Chinese Spotted Doves (*Spilopelia chinensis*). Both of these Hawks are fall and winter visitors.

14. "Migration" and "Homing" of Pacific Salmon.—F. A. Davidson. 1937. *Science*, 86:55-56. In refutation of Huntsman's denial of real homing in salmon (*Science*, 85:313), Dr. Davidson asserts that Sockeye and pink salmon mature in the open sea and not within the gradients of their natal streams; they home with marked fidelity, although not with "unerring accuracy."

LONGEVITY

15. Twenty Year Old Ferruginous Rough-legged Hawk.—Hoyes Lloyd. 1937. *Canadian Field-Naturalist*, 51:137. On January 7, 1917 a leather collar with belt and name plate was attached to a *Buteo ferrugineus* near Clayton, New Mexico. The bird was reported to have wintered near Clayton the next two years. In the spring of 1937 it was found dead at Strongfield, Saskatchewan. For four or five years prior to its death it had nested in the same tree.

Other notes on Longevity will be found in Numbers 1, 2 and 5.

LIFE HISTORY

16. Goose Nesting Studies on Bear River Migratory Waterfowl Refuge.—C. S. Williams and Wm. H. Marshall. 1937. *Journal of Wild Life Management*, 1:77-86. In 84 nests of *Branta canadensis* found on 5,000 acres in this refuge in Utah 410 eggs were laid of which 81 per cent hatched; "6 per cent were infertile, 4 per cent were deserted, 4 per cent preyed upon, 2 per cent flooded, and 2 per cent destroyed by other causes." Two to eight eggs were found per nest, the most common number being five. The presence of channels and of muskrat houses had a marked influence on the location of the nests.

17. Survival of Canada Goose Goslings, Bear River Refuge, Utah, 1937.—C. S. Williams and W. H. Marshall. 1938. *Journal of Wild Life Management*, 2:17-19. A total of 2,549 broods were counted; the average number of young was 4.87 in May and 4.73 in June. When goslings reached the age of two months they were difficult to distinguish from their parents. Families often banded together, and large numbers grouped together on the dykes. Mortality was negligible.

18. Nesting of the Western Goshawk in California.—James B. Dixon and Ralph E. Dixon. 1938. *Condor*, 40:1-11. At a nest of *Accipiter atricapillus striatus*, the female attacked intruders even when her eggs were comparatively fresh. The authors studied the nest from a blind six feet from the nest. From 11:30 A.M. to 5 P.M. when the young were 26 days old, only one meal was given them, a ground squirrel brought by the male, but fed them by the female. A week later, from 9 A.M. to 5 P.M. no food was brought, only pieces of bark and pine sprigs, the parent dropping "this on the nest the same as it did the food. The young birds would come over and peck at this material and then would turn away in disgust." The food "supply was entirely of mammals during the period the young were in the nest," although grouse "were particularly abundant in this

same area." Many Passerines were nesting near, yet they feared the Hawks, as "the only way we could tell the old Hawk was approaching the nest was by the alarm notes these various birds sounded."

19. Winter and Spring Studies of the Sharp-tailed Grouse in Utah.—Wm. H. Marshall and Max S. Jensen. 1937. *Journal of Wild Life Management*, 1:87-99. Formerly abundant, now rare, *Pediocetes phasianellus columbianus* is on the protected list, but still disappearing. Approximately 1,500 exist in the state in small groups in 5 northern counties, occurring "only where certain characteristic islands of native vegetation are found." A chart of winter and spring activity is given; in the latter the birds "dance" from 4.30 to 7.30 A.M., feed till 9.30, rest (and dust) till 4.30, feed till 5.30, and dance again till 8.30.

20. Protection of Terns in the Breeding Season Through Biological Methods.—(Schutz der Seeschwalben zur Brutzeit durch biologische Trennung.) H. Wachs. 1937. *Ornithologische Monatsberichte*, 45:199-201. In a great many places Terns are decreasing, while Gulls are increasing. Destroying nests of Gulls nearest the Terns is worse than useless, for the Gulls remain on the territories and rob more than ever. The author put a wire fence around the Tern colonies, 50 to 75 centimeters high, putting a long nail on top of each post to prevent the Gulls from perching there. Since the Terns drop to their nests from directly above, they are not troubled by the wire. The Gulls, on the other hand, rob on foot or by flying low, so they are excluded. If one does come into the colony, the Terns drive it against the wire. The mesh must be too small to allow either adult or young Terns to pass through.

21. Experiments with Terns at Tern Island, Chatham, Massachusetts.—Chas. B. Floyd. 1938. *Bull. Mass. Audubon Society*, 21:2-4. Large numbers of Common, Arctic and Roseate Terns (*Sterna hirundo*, *dougalli*, *paradisea*) nested here in 1934 and 1935—12,498 and 12,789, but in 1936 vegetation had taken so much of the island that only 8,781 were present. Sections of the island were plowed and in 1937 the Terns returned.

22. Feeding Habits of the Black Tern.—Paul W. Hoffmann. 1937. *Inland Bird-Banding Notes*, 9(4):12. The Black Tern (*Chlidonias nigra surinamensis*) and Forster's Tern (*Sterna forsteri*) were found to be congenial on their nesting grounds and on occasion adopted each other's young.

23. Notes on Two Nests of the Eastern Mourning Dove.—M. M. Nice. 1938. *Auk*, 55:95-97. A large amount of detail on nest-building and brooding of *Zenaidura macroura carolinensis*, drawn from a few hours' observation and concentrated into two pages, to supplement the author's paper on the nesting of Mourning Doves in the *Auk*, 39:457-474 and 40:37-58 (1922-1923). In one case the male made eighty-two trips with material in three and a quarter hours, while the female remained on the nest. The male often stepped on her back and "laid his offering before her," but at other times merely placed it on the rim.—T. T. McC.

24. On Nest Building and Sex Differences in the *Agapornis* Species.—(Ueber Nestbau und Geschlechtsunterschiede der *Agapornis*-Arten.) H. Hampe. 1938. *Journal für Ornithologie*, 86:107-112. Only a few species of Parrots take material to their nests. One group of Love-birds (with white eye-rings) collect piece of bark and build them into a roofed nest. *Agapornis personata* takes material in the bill, *roseicollis* in the feathers of back and rump! The other group—*Agapornis pullaria*, *taranta* and *cana*—build no real nest, but fix a foundation for the eggs, carrying into the box small pieces of leaves which they have stuck into all parts of their body feathers. The female does most of the work, her mate accompanying her. Pictures are given of a female *roseicollis* sticking pieces of paper under the feathers of her rump.

25. On the Question of the Structure of the Body Feathers of *Agapornis*.—(Zur Frage der Kleinfiederstruktur von *Agapornis*.) H. Sick. 1938. *Journal für*

Ornithologie, 86:113-122. Body feathers of *Alca* and *Agapornis* are especially adapted with hooklike appendages, the one for protection against the sea, the other for transporting nesting material.

26. The Nest Life of the Nightjar.—(Vom Nestleben der Nachtschwalbe (*Caprimulgus e. europaeus*). K. Stülken and H. Brüll. 1938. *Journal für Ornithologie*, 86:59-73. The male displays his white wing and tail markings in courtship. Three sets of eggs were laid and two broods raised, the male taking care of the first brood when they were 13 days old. The female incubated and brooded during the day and most of the night, the male taking her place in the evening and early morning. An extra male attached himself to the pair for almost a month, but his part was not clear; he seemed to be tolerated by the pair, although once the males were seen threatening each other. Apparently he assisted some with the care of the young; later an extra adult helped feed the nearly grown young. This has been shown to happen with various birds, with Hawks occasionally according to the authors, and with the Chimney Swift according to Miss Althea Sherman.

In the day time the parent Nightjars go through "injury-feigning" on the approach of an enemy, but in the evening they fly around a fox or man with a "warning" cry. Raptores recognize "crippled movement" as characteristic of easy prey; hence "injury-feigning" is adapted to draw the attention of such enemies to the parent and away from the young. The article is illustrated with superb photographs.

27. Observations on the Nesting of the Great and Lesser Spotted Woodpeckers.—(Einige Beobachtungen über das Brutgeschäft des Kleinen und Grossen Buntspechts.) Fr. Haverschmidt. 1938. *Beiträge Fortpflanzungsbiologie der Vögel*, 14:9-13. At a nest of the Lesser Spotted Woodpecker (*Dryobates minor*) both parents brooded the young. During six hours on six different days they were fed from 3 to 11 times an hour, the total number of feedings being 48 of which 28 were brought by the female. At a nest of *Dryobates major*, watched 3 hours on 3 days, the female fed 18 times, the male 10. The female helped feed the young after they left the nest.

28. Observations on the Tree-Creeper.—(Beobachtungen am Waldbaumläufer.) Kurt Bäsecke. 1938. *Beiträge Fortpflanzungsbiologie der Vögel*, 14:31-32. Both male and female of a pair of *Certhia familiaris macrodactyla* built the nest, the female doing most of the lining. The female incubated, the period being 15 days, while fledging took 18 days. Both parents fed the six young. When the latter were 11 days old, the male started building a second nest, and again the female did most of the lining. Two of the eggs of the second set had been laid at the time the first young flew.

29. The Reed-Warbler in Finland.—(Lampikertun, *Acrocephalus s. scirpaceus* (Herm.), esintymisestä Suomessa. Olavi Leivo. 1937. *Ornis Fennica*, 14:81-90. This is the newest arrival among the southern birds that are coming into Finland; it was first recorded in 1926. The author calculated that of 29 males in one locality, only 15 had mates.

30. From the Life of Ringed Starlings in the Breeding Season. II.—(Aus dem Leben beringter Stare zur Fortpflanzungszeit II.) Fritz Freitag. 1937. *Vogelring*, 9:43-49. Another detailed account of individual behavior (see *Bird-Banding* April 1936, p. 91) based on colored bands, two cases of bigamy being described. A male *Sturnus vulgaris* in Wetzlar, Germany, preferred one nest, his mate another. "Ring-Female" cleaned the nest in the roof, defended it, sang at its entrance and slept alone in it, while her mate defended a nearby box in the court, driving away males and courting females. Ring-Female attacked these prospective rivals, but finally, despite her opposition, a bird banded as a nestling two years before, settled in the male's box. The male helped incubate her eggs and helped feed and brood Ring-Female's young; these left June 8th, the other

young June 19th. On October 28th Ring-Female returned and cleaned out the nests. In February she "courted" a young female banded the previous May in a nest 50 meters distant, yet she would not allow the latter to sleep with her. Both females became mates of one male, all three carrying material into the box in the court, yet Ring-Female still "sang" to the young female. Ring-Female started to lay April 17th in a box in a neighbor's yard, and the young bird on April 20th in the box in the court; the male helped care for both broods.

31. The Nile Valley Sunbird (*Nectarinia metallica*), in Egypt.—R. H. Greaves and L. A. Treganza. 1937. *Oologists' Record*, 17:79–83. A brief account of the probable recent extension northward, to winter, and perhaps to breed, near Cairo, with notes on the flowers (largely planted and perhaps responsible for the range extension) which are sought for nectar. The deeper corollas are pierced at the base. Insects are taken in quantity, but usually not from flowers. Not very rich results from "constant watching from September to June at Kena and from December to March in Cairo."—T. T. McC.

32. Additional Hosts of the Parasitic Cowbirds.—Herbert Friedmann. 1938. *Auk*, 55:41–50. A briefly annotated list of a large number of new hosts for nine species of Cowbirds (*Molothrus* and *Tangavius*).—T. T. McC.

BIRD BEHAVIOR

33. Social Behavior of the Black-crowned Night Heron.—G. K. Noble, M. Wurm, and A. Schmidt. 1938. *Auk*, 55:7–40. This is a serious and admirable paper on territorialism, social relations, recognition, dominance, and sexual behavior of twenty-nine captive young *Nycticorax n. hoactli* checked by parallel observation of wild colonies. The interest is enhanced by the amount of work which has been done on closely related forms abroad.

The reviewer finds little to quarrel with in the mass of carefully handled detail, though he feels that there is a certain readiness to base good work on facile or debatable general concepts. For instance, the interpretation of most of the early immature reactions depends on a somewhat ready-made or ill-defined concept of "territory" in a spatially restricted sense and quite apart from the period of reproduction. It is a question how far it is desirable to divorce the concept from the breeding phenomenon, wherein its social and economic significance is so far-reaching, and apply it broadcast to the myriad circumstances under which animals may demand minor degrees of isolation. When the authors show that a certain order of dominance, developed in the nest in competition for food, is masked by a new dominance based on "territory" as soon as the young have spread up through the nest tree, they have traced a change of serious biological import (incidentally, one with a tendency away from survival-value based on individual vigor). But it would be just as easy to say that the succeeding dominance of position was a new defensive mechanism,—little more, perhaps, than the demand for wing space. If the everlasting word "territory" means anything, it means a great deal more than the ability to defend a chosen or enforced position, or the achievement of a certain ascendancy on a familiar perch.

A deep and ever-growing distrust of the value of experimental work under artificial conditions to illuminate the *natural* history of the higher vertebrates (to which the reviewer confesses) has two effects. First, of course, it makes one sceptical lest results be primarily the product of false conditions, and second, lest the experiment which is framed be without bearing on the natural life. There is a great deal of difference between the use of psychological investigation to clarify the evolution and interrelations of bird behavior,—and the use of birds, instead of rats or guinea pigs, to study animal psychology. Thus of late there has been much pointed and philosophically purposeful discussion and experiment on the nature of sex recognition in birds. Now comes elaborate experimental investigation of *duration* of mutual recognition between immatures subjected to separations, complex disguises, and deafening, which has a somewhat remote bearing on the life of the wild bird. This illustrates the second source of concern, over experimentalism tending away from the matter in hand. Against the first, that of re-

liance on distorted reactions, the authors are well guarded by a thoroughly scholarly technique and the use of the wild rookeries. Yet in some cases doubt is permissible. In the many instances of removal and separation of "pairs" of immatures and their replacement after many days in their old crowded cage, they are found to re-"pair" and if possible to occupy their old territory. One wonders whether they would not be forced "into one another's arms" as the only strangers in an established and densely crowded social unit, and whether their old territory would not be most likely to be available, since the rest were established before their removal.

Everyone that ever saw the bird at close range is interested in the plumes of the Night Heron, over which a difference arises between the authors and Lorenz. The latter forced them under the "releasers" concept as signals whose uniqueness gave protection against attack by individuals of the same species. The authors find no such effect, but rather evidence for the old concept of stimulating sexual display. In fact two males whose plumes were damaged were conspicuously unable to secure mates. One almost wishes that the whole set-up might have been devoted for years to the substantiation of just that detail, which seems almost too good to be true!

The whole paper is based on the apparently unescapable existence of dominance and subservience as key factors in all sorts of pairing,—quite capable, in fact, of leading to the most complete and lasting homosexual unions, *under the conditions imposed*.

This is one of the very rare papers which lead us measurably farther toward some shadow of subjective comprehension of the mind of a bird.—T. T. McC.

34. Snakes as Prey of Raptorial Birds.—(Schlangen als Raubvogelbeute.) Georg Steinbacher. 1937. *Ornithologische Monatsberichte*, 45:197-198. A description of the instinctive behavior of a Secretary Bird (*Sagittarius serpentarius*) in the Berlin Zoo in respect to snakes—the cautious approach, the lightning speed of the blow on the snake's head with one foot and the instant spring to a safe distance. This bird "played" at killing inanimate objects. The Short-toed Eagle (*Circaëtus gallicus*) grasps snakes with both claws and bites the head.

35. California Ground Squirrel Robs Nest of Valley Quail.—John T. Emlen, Jr. and Ben Glading, 1938. *Condor*, 40:41-42. Detailed description of the technique of the rodent and the attempts at defence on the part of the birds (*Lophortyx californica vallicola*), particularly of the female, that twice rode about on the squirrel's back.

36. Observations on Bank Swallows.—(Beobachtungen an Uferschwalben (*Riparia riparia*.) A Graf Keiserlingk. 1937. *Ornithologische Monatsberichte*, 45:185-188. On a cold and stormy night in September a flock of Bank Swallows took refuge in a shelter, huddling together in a mass about 40 x 30 centimeters in size. These 100 to 150 birds "formed one body, in which individual swallows did not react to outside stimuli—light, touch, shaking, noise."

A Bank Swallow was brought into the house; it was three hours before it learned to avoid the window pane, although a Barn Swallow (*Hirundo rustica*) learned to do so after one trial. The Bank Swallow could not catch flies flying about the room, because the turns were too short for it; a dead fly had no food meaning for it. The experimenter moved a fly by means of a wire, and also moved his hand on which the bird was perched; at first this was the only way in which the Swallow would take food. Gradually, by moving both hands more and more slowly, the bird came to take motionless food and after 6 hours would even take artificial food from a board. A new Bank Swallow was introduced at this point, the experimental bird at once became wild, but, on the removal of the other Swallow, became tame again.

37. Notes on the Development of Two Young Blue Jays (*Cyanocitta cristata*).—A. L. Rand. 1937. *Proc. Linnaean Society of New York*, 1936, No. 48:27-59. A detailed account of two birds taken from the nest at the age of 14 and

18 days. The description of the psychological development is especially interesting—reaction to first experience with water, the storing of food, play, reactions to live prey. There was no instinctive fear of snakes. The birds never quarrelled together. After one was released, the other became much more attached to people. Time of digestion ranged from 55 to 105 minutes, averaging 76 minutes. A valuable paper.

38. Intimidation Display in the Eastern Meadowlark (*Sturnella magna*).—Wm. Vogt. 1937. *Proc. Linnaean Society of New York*, 1936, No. 48:96. Two males, watched from a blind on the boundary between their territories, approached each other, "stopping every few steps to stretch their beaks skyward." "As they drew nearer, they turned their backs, from time to time, and flashed their white rectrices by flicking them apart and together." "When they were separated by only 15 to 20 feet, they would hop into the air, back to, with rectrices flashing."

39. "Anting" by Birds.—W. L. McAtee. 1938. *Auk*, 55:98-105. A thorough ransacking of the published records of the strange passerine habit of filling or anointing the plumage with ants or their secretions, or, occasionally, with other organisms (snails, amphipods, mealworms), or with strange substances of possible toxic or stimulative virtue (lemon or orange juice, vinegar, beer, cigar stumps). A new and unpublished record by E. R. Kalmbach is included. The majority of the opinions favor an anti-parasitic purpose;—indeed Abbott M. Frazer records seeing the ants seize and carry off parasites on a tame crow which posted itself on an ant mound.—T. T. McC.

POPULATION PROBLEMS

40. The 1937 Census of Gannets on Ailsa Craig, with Notes on their Diurnal Activity. H. G. Ververs, C. H. Hartley, and Alan T. Best. 1937. *Journal of Animal Ecology*, 6:362-365. A continuation of the observations of Ververs and Hartley on *Sula bassana* at this point, as previously reviewed in *Bird-Banding* 8:95. The "alighting method" of counting dense populations stands further test and proves practical. In this case it is also used to gauge varying degrees of activity. Attempts to correlate the variations of activity with variations in temperature and relative humidity produce negative results, as in the case of the Kittiwake activity in Spitzbergen when tested by Hartley and Fisher (review in *Bird-Banding* 8:92) although there seems to be some correlation with wind, and a very distinct diurnal rhythm. Oil-pollution is taking its toll of the Gannets.—T. T. McC.

41. The Population of Partridges (*Perdix perdix*) in Great Britain during 1936.—A. D. Middleton. 1937. *Journal of Animal Ecology*, 6:318-321. This is a fourth paper by A. D. Middleton of the Bureau of Animal Population of Oxford University on the fluctuations of the Partridge population in Great Britain since 1933. The previous paper was reviewed in *Bird-Banding*, 8:94. Again we are thrilled by the lavishness of the figures for size of clutch, survival of young, etc., etc., and again lose interest with the thought that figures for a semi-domestic population which is shot to pieces annually do not mean much to a naturalist, however sound the biometrics.—T. T. McC.

42. The Food of Adult Partridges, *Perdix perdix* and *Alectoris rufa*, in Great Britain.—A. D. Middleton and Helen Chitty. 1937. *Journal of Animal Ecology*, 6:322-339. This contains the results of the examination of a large number of crops, but largely during the shooting season, and from birds on cultivated land. Thus a series of frequency polygons shows a fine annual rhythm, but one which reflects little more than the agricultural cycle. Insect food proved less than previous work had indicated, but was, of course, much commoner in the very young, while first fall birds show no differences from the adults. Captive birds consumed enough to stuff the crop twice daily, and usually went to roost with a full crop. Game managers are advised to feed in winter when least natural food is available. When this advice has been followed the populations of the coverts

will doubtless equal those of the barnyards, and the subject of the paper will cease to have the slightest interest to anyone but the "game manager," or laboratory physiologists.—T. T. McC.

43. Observations on Waterbirds in California.—J. M. Linsdale. 1938. California Fish and Game, 24:2-43. A more accurately suggestive title might have been chosen, as the paper is largely a compendium of published facts as to the character and abundance of actual or potential waterbird habitat in California, and other pertinent matter. Admittedly, however, "observations" may mean *remarks* as well as *inspections*. The author's admirable and now familiar theme is that Waterbirds, like other animals, are functions of the land, and that proper comprehension and use of the land is the intelligent highroad to conservation.

The actual fieldtime employed had been ridiculously inadequate for such an undertaking, and with the preoccupation with habitat goes a determination to minimize or ignore the effects of shooting and duck-disease, in regard to both of which the author's inexperience is painfully manifest. Yet the paper as a whole remains the best handbook for the California wildfowl conservationist.—T. T. McC.

44. What is the Meaning of Predation.—Paul L. Errington. 1937. Smithsonian Report for 1936:243-252. An excellent summary of the logical and illuminating conclusions drawn by the author from his wide experience. He states that predation "seems to be a byproduct of population rather than a broadly dominant influence on population." "Ecological studies indicate that, as concerns many wild species, there is only room in a given tract of environment for an approximately constant number of individuals, particularly of individuals that establish themselves in territories or regular home ranges and resist crowding past certain densities." p. 244. He concludes: "The trimming down by predation of excess populations that must disappear, anyway, is incidental. It should not be regarded as a threat to the permanent nucleus, which, barring drastic change in environment, will continue to occupy all livable quarters and produce the usual annual surplus. The surplus is strictly temporary, and generation after generation is frittered away. Whether taken by predators or otherwise lost, the surplus must disappear; population sooner or later coincides with carrying capacity." p. 252.

45. Fluctuations in the Numbers of the Varying Hare (*Lepus americanus*).—D. A. MacLulich. 1937. Univ. Toronto Studies, Biological Series, No. 43. 136p. Various population theories are discussed, those of Pearl, Volterra, Lotka and Gause. The matter of correlation of cycles with the abundance of sunspots is discussed at some length and the conclusion drawn that "the fluctuations in numbers of neither lynx nor varying hares are correlated with sunspots." p. 126.

46. Disease as a Factor in Game Fluctuation.—J. E. Schillinger. 1937. U. S. Dept. Agr. Bur. Biological Survey, Wildlife Research Leaflet BS-99. 3 p. A brief statement of the case emphasizing the dissemination of fatal diseases among dense populations, stressing the importance of complete protection while numbers are low, and suggesting that "if over population is prevented, the periods of extreme scarcity might be prevented."

ECOLOGY

47. Ecology of Birds in Northern Siberia.—(Les Oiseaux du Sud du Taimir. IV. Les Remarques Ecologiques.) W. N. Scalon. 1937. *Le Gerfaut*, 27:181-195. In this region with nine months of winter, courtship and nesting start despite cold weather; Shorebirds and Ducks leave well before the return of cold, while Geese, Divers, and Gulls remain until frost. The Loons arrive so late in spring that they often do not have time to raise their young. Although many of the birds are protectively colored, this is not true of the Snowy Owl (*Nyctea nyctea*), nor the male Ptarmigan (*Lagopus lagopus koreni*) that molts his head and neck feathers before the melting of the snow but keeps the rest of his white plumage through half the summer. Several instances are given of relations between birds and mammals: The Rough-legged Hawk (*Buteo lagopus pallidus*) follows the Arctic Fox and catches mice scared up by the latter; Ptarmigan associate with caribou in

winter and benefit from the food dug up by them, while Gulls eat larvae of *Edemagena tarandi* that come out of the skins of the Caribou.

A chart is given showing the food relationships of the breeding birds, which are divided into three groups—Passive, Active and Independent. The Passive group are the prey species, consisting of the Ptarmigans, Ducks, Shorebirds and Passerines; they have large broods that develop rapidly and can easily obtain great quantities of food. The Active group or predators, the Hawks, Owls and Gulls, and the Independent Group, the Loons that live on fish, have small broods and slow development of young (except for the Gulls); their food is less easy to obtain. The Raptores and Loons are heavily parasitized by helminths, and also have more Mallophaga than the other birds.

48. Effect Upon Wildlife of Spraying for Control of Gipsy Moths.—Allen Frost. 1938. *Journal of Wildlife Management*, 2:13-16. Numbers of birds were counted on sprayed and unsprayed sides of roads on eight dates in June and July 1937 in New York State; there were eighteen on the sprayed area and one hundred fifty-four on the unsprayed.

49. Poison and Ecology.—Lee R. Dice, 1938. *Bird-Lore*, 40:12-17. An excellent article pointing out the dangers to wild life in the wholesale use of poisoned baits. "The best method of all for the control of undesirable animals is to encourage their natural enemies." "If scientific studies were always made by competent biologists before initiating a control campaign to determine if the campaign is necessary in that region at that time, and if other methods of control of mammal and bird pests not involving the use of poison were used whenever possible, it seems certain that the loss of harmless and beneficial animals from poisoning would be very greatly reduced."

50. Photoperiodicity in Birds.—T. H. Bissonnette. 1937. *Wilson Bulletin*, 39:241-270. This paper is a review of a very interesting and important phase of avian physiology and behavior. It contains an extensive discussion of selected phases of the dependence of many of the activities and functions of birds upon variations in daily and seasonal illumination as factors in their environment. The photoperiodic activities are various and include daily times of waking and beginning of song and bodily activity, daily changes in the periods of sporulation of typical cyclic diseases, seasonal changes of plumage, migrations, periods of sexual activity and quiescence accompanied by changes in breeding behavior and courtship display. Much space is devoted to an analysis of theories of sexual activities and migration based largely on endocrine functions which can be partially explained by variations in the duration of light and dark periods. It is an authoritative summary by an author who is eminent in the field. The bibliography contains 146 references.—C. M. H.

51. The Effect of Temperature on the Sexual Activity of Non-migratory Birds, Stimulated by Artificial Lighting.—Heikki Suomalainen. 1937. *Ornis Fennica*, 14:108-112. Twenty-five Great Titmice (*Parus major*) captured in Helsingfors were tested from January 9th to March 1st; one group was kept without artificial light, some outdoors, others in a warm room, while another group was lighted with electric lights continuously day and night, some subjected to low temperatures, others to high. At the end of the experiment, the gonads of the first group were uniformly small, corresponding to those of wild Titmice at that date, while all those of the second group were much enlarged, irrespective of temperature conditions.

52. Experimental Modification of the Sexual Cycle in Trout by the Control of Light.—E. E. Hoover. 1937. *Science*, 86:425-426. Brook trout in New Hampshire normally spawn from October to December. A group were given extra light, an hour being added each week until 8 hours of additional light were being received, when the amount was gradually cut down to a day of 8 hours at which point (in August) the fish were ready to spawn.

BOOKS

53. Bird Studies at Old Cape May. An Ornithology of Coastal New Jersey.—Witmer Stone. 1937. 2 vols. 941 qto. p. Delaware Valley Ornithological Club at the Academy of Natural Sciences. \$6.50. "The primary object in

the preparation of the present work has been to furnish, for purposes of future comparison, as accurate a picture as possible of the bird life of Cape May during the decade, 1920-1930, with an account of the changes that have taken place in the years that followed. I have been so impressed by the failure of the ornithologists who were active in the half century subsequent to the time of Alexander Wilson—and for some years later—to leave us any adequate sketch of the bird life of the New Jersey coast of their day that it seems to me a duty that we owe to our successors to provide such a picture for our own time."

That Dr. Stone has succeeded admirably in his task will be apparent to the fortunate owners of these fine volumes that constitute a mine of information not only on the birds of the New Jersey coast, but of the whole state, for every form recorded from the state is included. The richness of the bird life in Cape May county is shown by its list of 318 forms, while 56 "additional kinds" have been found "farther north in the state and offshore."

The chapters at the beginning are of much interest and value; seven describe the birds of different ecological niches, while the last are entitled: The Changing Bird Life of the Cape, Bird Migration at the Cape, A Monthly Summary, and Breeding and Winter Ranges of New Jersey Birds. Under each species an account is given of the bird's occurrence at Cape May with dates of arrival and departure for many years, and detailed descriptions of the author's own experiences with the species in question. Many of these are of special interest, those on Herons, Shorebirds, Rails, the Robin, Hermit Thrush, to mention a few. Fascinating sections are devoted to the Laughing Gulls, to the Crow with its spectacular roosts, to the beauty of the Willet and the charm of the Sanderling.

The notorious Hawk shooting at Cape May is described: its relation to wind conditions, the chief species and age classes (predominantly young Sharpshins), and the fact that most of the victims are eaten by the natives and Italians.

In Wilson's time and considerably later the Snowy Egret and Little Blue Heron nested abundantly near Cape May; now the latter is returning to breed in small numbers, and the American Egret has also been found nesting. Shorebirds as a whole have increased since protection has been given them, but the Woodcock is still slaughtered in shocking numbers.

A sad note runs through much of the book; the wholesale ditching and draining operations have destroyed the homes of countless birds from Ducks, Herons, Rails, and Shorebirds down to the Seaside and Sharp-tailed Sparrows. Ornithologists and nature lovers should rouse themselves and demand that a stop be put to this senseless destruction of life and beauty.

The volumes are illustrated with many fine photographs, besides two paintings by Earle Poole and excellent, characteristic sketches of the majority of the birds by the same artist. Dr. Stone writes in simple, dignified English which at times in its beauty and vividness rises to literary distinction. "Bird Studies at Old Cape May" is a notable contribution to the ornithology of eastern North America.

54. The Birds of Porto Rico.—(Los Pájaros de Puerto Rico.) Stuart T. Danforth. 1936. N. Y. Rand McNally. 198 p. \$1.60. This attractive and useful little book is illustrated with photographs of mounted birds and 10 colored plates showing 61 species, their names being given in Spanish, Latin and English. A brief history of the ornithology of the island is presented with a bibliography of nine titles. The protection of birds is stressed, their economic value emphasized and methods of attracting birds described—planting, provision of water, and erection of nest boxes and also of bamboo posts on estates as perches for Kingbirds.

Descriptions of each of the 182 birds listed from the island are given with notes as to status, nest, etc. Two African species that came over with the slaves are established: the Hooded Weaver Finch (*Spermestes c. cucullatus*) and Scarlet-cheeked Weaver Finch (*Estrilda m. melopoda*). The introduced Cuban Quail was exterminated by the introduced mongoose, which also exterminated the Porto Rican Chuck-will's-widow, of which only a single specimen is known. An appendix gives a catalog of the birds with names in the three languages, and there are three indices, one for Spanish names, one for English and one for the scientific names.

55. A Nature Lover in British Columbia.—H. J. Parham. 1937. London. Witherby. 8/6. 292 p. A lively tale of pioneering of an English family on a ranch

in the Okanagan Valley relating their vivid interest in nature—birds and beasts, flowers, fish, their dog and horses. An interesting account is given of five Canada Geese raised from the egg, of their adoption of the author and his brother as partial parent-Kumpans, of the daily swimming parties of all seven: "If one of us dived, they too all dived." One Goose in her second summer mated with a wild gander and nested in the dog's box on the back porch, her mate watching her from the roof of the nearby ice-house.

Canada Geese sometime nest in Osprey nests! Bald Eagles catch many woodchucks and fish. A number of Trumpeter Swans used to winter on the lake, but some died from eating shot and the others were killed. Native game birds were formerly abundant, but are now almost gone—Richardson's Grouse, Ruffed Grouse and Sharp-tailed Grouse. The Pheasant, Hungarian Partridge and California Quail have all been introduced. The book concludes with a strong plea to place rare birds on a strictly protected list.

56. Among Avocets and Terns.—(Unter Säbelschnäblern und Seeschwalben.) Eugen Schuhmacher. 1937. Berlin. Hugo Bermühler. 54 p. A charming account of bird study on a little island in the North Sea illustrated with superb photographs. The author's greatest interest lay in studying the Avocets (*Recurvirostra avosella*); all the nests of this species but one were destroyed by a spring tide, and this was deserted, because of the death of one of the birds, but the eggs were adopted by a pair of Common Terns (*Sterna h. hirundo*) that must have lost their own eggs. The young were hatched and thrived for the two days that the author was able to watch them, although he did not see the Terns feed them with fish, but they "scratched in the grass" and called the young apparently feeding them insects! It is a pity that the author does not give more details of his interesting experiences, so that his book would have been of scientific as well as popular value.

57. Bobwhite History.—M. E. Bogle. 1938. Published by author, 105 Rountt St., San Antonio, Texas. 47 p. \$1.00. An account of *Colinus virginianus* by a dealer in Texas Bobwhite, trapped in the State of Coahuila, Mexico and shipped into the United States. Life history topics are briefly dealt with, and the attitude on predators is sound—cats and dogs being counted important enemies, and the sparing of Owls and all Hawks but the Sharp-shin and Cooper recommended. "Wild trapped Bobwhite normally vary in sex from 45 to 46 hens to every 54 to 55 cocks per hundred birds,"—about what Herbert Stoddard (The Bobwhite Quail 1931) found in south-eastern United States. The author describes the shocking treatment to which many Bobwhite are subjected en route to this country and contrasts his own up-to-date and humane methods. He considers that his birds correspond to those of "medium size" (i.e. weighing 6 oz.) of the United States, and believes they will thrive when introduced here. It is astonishing to read of the vast numbers of Bobwhite brought into this country from Mexico—200,000 between 1910 and 1925, and 110,000 in 1937. Mr. Bogle writes me, "During the past 17 years I have shipped over one half a million of wild trapped Bobwhite for stocking purposes, many of which I band at 5 cents extra per bird."

BIRD DISEASES

(Reviews by Carlton M. Herman)

Two New Schistosomid Trematodes from Water-birds.—J. A. McLeod. 1937. *Jour. Parasit.* 23:456-466. The larval stages of schistosomid worms, or blood flukes, occur usually in fresh water molluscs. When mature the worms escape into the water and penetrate through the skin into their final hosts. In many lake regions certain of these worms cause a skin irritation in man often referred to as "swimmer's itch." Various birds and mammals are the normal hosts.

In this paper the author reports the examination of 91 water birds comprising seventeen species. Most of the birds were collected in the vicinity of Manitoba, Canada. Of thirty Blue-winged Teal examined, eight were infected with one species of the worms (*Pseudobilharziella querquedulae*). Eight Herring Gulls obtained from Nova Scotia were examined and three of them were found to be infected with another species of these parasites (*Ornithobilharzia lari*). The worms were found in the veins of the liver and intestines of these birds.

Reciprocal Immunity in the Avian Malaria.—R. D. Manwell. 1938. *Amer. Jour. Hygiene* 27:196-211. This is an extensive study, using canaries as experimental animals, to determine whether a bird that has once had malaria can be reinfected with the same or other species of avian parasites. Earlier results have shown that an infected bird is usually immune to the same species. These studies now demonstrate that birds once infected with certain species of malaria are less susceptible to some of the other species of the parasites, while infections with some species of *Plasmodium* apparently create no immunity to other malarial parasites.

Culture Methods for Invertebrate Animals.—1937. Comstock Publ. Co., Ithaca, N. Y. 590 p. This book is a compendium prepared coöperatively by American zoölogists. It outlines culture and propagation methods of a wide range of invertebrate animals, both free-living and parasitic. It is of interest here because some of the organisms discussed are parasites of birds, transmitters of avian diseases and nest-inhabitants or they may serve as food. The material is presented briefly but concisely. Among the forms related to birds are included malarial parasites, *Plasmodium* and *Haemoproteus*; intestinal round worms, *Ascaridia*; blood-sucking Hippoboscid flies, *Pseudolynchia*; bird-lice, *Lipeurus*; as well as many species of bugs and insects utilized as food by birds.

Biological-ecological Investigations on the Fauna of Birds Nests.—(Biologisch-ökologische untersuchungen über die Vogelnicolen.) Sven Nordberg. 1936. *Acta Zoölogica Fennica* 21, Helsingfors. 168 p. This treatise is a report of studies on the animals, mostly insects, which spend at least a part of their lives in the nests of birds in Finland. The birds are classified according to type and locality of their nests. A description of the size of the nest, the type and weight of the nest materials and number of days the nests are occupied by the birds is also stated. Various physical and biological factors relative to the ecology of the nest fauna are discussed. Temperatures are recorded of the nest material and the area around the nest of several species, both during incubation and while the parent birds were off the nest. Extensive experiments were performed in the laboratory on a number of the organisms to determine the temperatures best suited to the various nest fauna. Temperature is considered a very important factor. Light and humidity were also investigated. The nest material is of importance partly from the standpoint of food.

A total of 528 invertebrate forms were collected from 422 nests of 56 species of birds during the years 1929 to 1933. So-called "spring-tails" were found quite frequently, *Xerylla maritima* was obtained from the nests of 38 species of birds and three species of *Entomobrya* were secured from the nests of 41 of the avian species. Eleven species of the genus *Atheta* (rove-beetles) were obtained from the nests of 33 species of birds. A beetle-mite, *Oribata geniculatus*, was obtained from the nests of 43 of the 56 species.

The ectoparasites of the birds had an interesting distribution. Mallophaga were comparatively scarce, although *Philopterus subflavescens* was obtained from the nests of thirteen species of birds. Hippoboscid flies were observed in nests of only four species of hosts and the blood-sucking *Protocalliphora* are not even mentioned. The most common and abundant forms were the bird fleas of the genus *Ceratophyllus*. These occurred in the nests of 48 species of birds (85 per cent), often in all the nests of a species of bird that were examined. Of 57 nests of *Colaeus monedula* 100 per cent had *Ceratophyllus vagabunda* and 97 per cent had *C. gallinae*.

The most important factor seems to be the location of the nest, not the species of bird. *Columba palumbus* had only one species of nest fauna with a computed density of twenty individuals per 1 dm.³; nests of *Columba enas*, which are in a more confined location contained 58 species and a density of 6,573 individuals per 1 dm.³. Nests in holes (i.e. swallows woodpeckers etc.) harbor the greatest number and density of nest fauna. These organisms can get into the nests by flying, crawling being carried there with the nest material or as ectoparasites on the birds.

There are many detailed tables and graphs, with an extensive analysis of the data presented. The bibliography contains over 162 references, on nest fauna of reptiles and other vertebrates as well as on the subject of the nest fauna of birds.