Massachusetts and is practically unknown, even as a migrant, on Long Island. Only two records are accepted by Bull (*Birds of the New York Area*, Harper and Row, p. 247, 1964). one in mid-July and the other in October. 2. The Long Island tern colonies have been banded intensively for many years by experienced birders, some of them familiar with the Arctic Tern on its nesting grounds, and nesting Arctic Terns certainly would have been detected. If the species should extend its range southward, it would be expected first in the colonies at the eastern end of Long Island, such as the one on Great Gull Island, and not on the south-central part of the island.

The record, therefore, is considered completely acceptable. The most likely supposition is that the bird joined a flock of Arctic Terns and accompanied them to the Gulf of Guinea which, as Robertson ("Transatlantic Migration of Juvenile Sooty Terns," *Nature*, **222,** p. 632-634, 1969) pointed out, is probably the richest feeding ground in the tropical Atlantic.

I am indebted to Mr. Intes for the information furnished, to Dr. Ralph Palmer for literature references, and to Victoria Kuech and Maynard Smith for translation of correspondence into and from French.—Gilbert S. Raynor, Schultz Road, Manorville, Long Island, New York 11949.

**A Hoop-Net Trap for Passerine Birds - Additional Comments.**—In *Bird-Banding*, **41** (2): 92-96, Mr. Kenneth H. Larsen, U. S. Bureau of Sport Fisheries and Wildlife, Cornelius, Oregon, 97113, describes a trap used primarily for taking House Finches. The wording in the last paragraph preceding his summary indicates that this trap need be serviced "only three times a week."

Although it may be necessary to replenish bait and water only three times a week, all banders working under the auspices of a U. S. Federal Bird Banding Permit are reminded that such permits *do not* authorize them to hold any bird in captivity for any purpose for a period greater than 24 hours. As in the past, our policy stresses careful attendance to any trapping device and the prompt removal of any birds captured.—Earl B. Baysinger, *Chief, Bird Banding Laboratory, Migratory Bird Populations Station, Laurel, Maryland* 20810.

## RECENT LITERATURE

### BANDING AND LONGEVITY

**(See also 48, 59)**

**1. Results of ringing of European Corvidae.** P. Bussé. 1969. *Acta ornithol.* (Warsaw), **11**(8): 263-328. (In English, with Polish and Russian summaries.) 36 maps, 13 tables. Bibliography of 30 titles.—A wealth of factual and theoretical discussion based on analysis of personal observation and summarizing of 60 years of published records of bird-banding in Europe (a total of 5,738 returns) finds the Rook, *Corvus frugilegus*, Carrion Crow, *C. corone*, and Jackdaw, *C. monedula*, to be "typical migrants"; Common Jay, *Garrulus glandarius*, a partial migrant; the Raven, *C. corax*, and the Magpie, *Pica pica*, non-migrant or nomadic. A most remarkable banding result is that each of the migrant species manifests on analysis 5 definite populations, as based on different breeding and wintering ranges: a northern (Great Britain), western (France), subalpine (Italy), Balkan (Balkan Peninsula), and Caucasian (Central Asia) population. In the case of the Rook these subgroups show no subspecific differences morphologically, the French population being determined as 28% migratory and traveling an average of 374 km, while the Russian population is 100% migratory, traveling 1,970 km. In the main the movement of these 3 species is much more east to west than north to south. The author believes that these populations are a historical heritage from the glacial periods; he also favors the "law of biogenesis" (of Haeckel) in special application: that migration routes recapitulate the history of species' dispersal.—Leon Kelso.

## MIGRATION, ORIENTATION AND HOMING

(See also 23, 24)

**2. Caspian Tern, *Hydroprogne caspia* Pall., in Poland - the biology of migration period.** M. Józefik. 1969. *Acta ornithol.* (Warsaw), **11**(11): 381-443. (In English, with Polish and Russian summaries.) Bibliography of 51 titles. 29 graphs, 12 tables.—As the result of this species' increase in range and abundance, particularly in Baltic areas over the past decade, thus becoming a regular migrant across Poland, the author has analyzed his own observations for 1960-1966 and 423 records and notes published 1800-1966. Of the numbered 36 statements of mostly local import in the conclusions the more striking are: the spring movement is much swifter than the fall migration; the main inland route leads along the Vistula (48.7% of the records) and its right tributaries only; the fall migration occurs in 2 waves, the earlier combined with nomadic diversions; only since 1950 have there been summer sojourners in Poland; corresponding to their habitual keeping 80 m. or more from gun-toting humanity, they will not follow rivers migratorily beyond where the flow narrows to 70 m. or less; beyond this they travel overland, feeding and lingering around incidentally-encountered water bodies; the daily activity cycle during migration shows 3 phases: morning—food search and migration, afternoon—exclusively food searching, evening—purely migrational, flying at greater height than during food search; most pairing occurs before start of spring migration; family permanency is maintained throughout migration and evidently onto the winter sites, affording the young the benefit of adult experience in travel security, whereby first-year mortality is low, 36% or less, as compared with some gulls, 70% or more; the author suggests that it is unlikely that even adults with much experience follow the same route yearly, but make new choices influenced by temporary factors.—Leon Kelso.

## POPULATION DYNAMICS

(See also 43, 45, 53)

**3. Studies on the Squacco Heron, *Ardeola ralloides* (Scop.). Part I. History of research.** M. Jozefik. 1969. *Acta ornithol.* (Warsaw.), **11**(6): 103-134. (In English. Resumes in Polish and Russian.) Bibliography of 167 titles.—This species attracted special study because it is a member of a group of four (including *A. (Bubulcus) ibis*, the Cattle Egret, which has invaded parts of America and Australia) which have shown pronounced variations of distribution during recorded history. The results of this investigation comprise many local details on many localities and even a long review would not do justice to this report. Briefly, the literature of the species from Aldrovandus (1599-1603) to 1963 was reviewed and the author's observations and studies over the recent 12 years summarized.

**Part II. Secular changes in numbers and distribution in the Palearctic range.** 1969. *ibid*, **11**(7): 135-262. Bibliography of 470 titles.—On basis of records from 1952-1962, including questionnaires and published data, local changes in abundance and distribution were analyzed. A total of 211 nesting localities, regular and sporadic, were considered. From about 1850 to 1920 the species regressed in range and numbers to the threshold of extermination in its Palearctic range, owing to harvesting for the ornamental feather trade; and suffered more from reduction of habitat 1920 to 1940, the situation becoming stablized thence to 1960. Since the latter date there has been a decided increase in abundance and range, with reoccupation of abandoned nesting localities and initiation of new ones. The greatest concentration or highest density of the species was found at 44-48° north latitude. Fluctuation in species' numbers in one area is felt throughout its range, so the author concludes, and correspondingly a decrease in numbers internally is followed by range retreat; while an increase in inland density is a prelude to range expansion.—Leon Kelso.

## NESTING AND REPRODUCTION

**(See also 11, 13, 26, 61)**

**4. A model for the global variation of clutch size in birds***i* T. Royama. 1969. *Oikos,* **20**(2): 562-567.—What regulates clutch size? Most thoughts on the subject (pro or con) follow from Lack's *The Natural Regulation of Animal Numbers,* which states that the clutch size in nidicolous species is adapted to the largest number of young that the parents can feed adequately. From this it follows, Royama states, that the number of chicks that can be reared depends upon the food requirement of each chick, a point that he feels has been neglected both by workers that are pro and those who are anti-Lack in their views on clutch size.

Royama noted that food requirements per chick of Great Tits (*Parus major*) and Blue Tits (*P. caeruleus*) varied inversely with the number of chicks in the nest. He attributed this situation the result of greater heat loss by chicks in small broods than by one in large broods. Another worker (Mertens) had noted that when the air temperature reached 18°C, this relationship broke down, with each young tit producing essentially the same amount of heat, regardless of the size of the clutch. This apparently represented the chicks' zone of thermal neutrality. Temperatures substantially above this should cause chicks to suffer from hyperthermia.

The geographic variation of clutch size in the European Robin (*Erithacus rubecula*) has been cited widely; briefly, a general tendency exists for the brood number to decrease as one moves from high to low latitudes. Lack attributed this change to the difference in daylength, which by this reasoning would allow northern birds more time to collect food per day. However, others have pointed out that the data for the European Robin demonstrate a declining number of hours available for foraging per chick as one moves from *south* to *north.* Ashmole felt this situation indicated that the food supply improved as one moved from south to north, because of presumably lessened competition.

While Royama feels that Ashmole's hypothesis is possible, he believes that the energy requirement of chicks as considered above is a matter of importance. An inverse relationship also appears between air temperature and clutch size in the latitudinal gradient considered. Royama introduces a series of equations to support his contention. As always, such equations at best can only be as good as the data fitted to them, and Royama acknowledges a number of variables that could modify the results to some extent.

In the clutch size data on the European Robin, there is also a definite increase from west (England) to east (Poland). Lack had earlier assumed that this difference was a reflection of differences in the abundance of food. However, Royama feels that it could again be a reflection of temperature differences, since some of the Polish data were taken in or near mountainous areas.

In summary, Royama subscribes to a model for variation in clutch size that incorporates the energy requirements of chicks, hunting efficiency of parents, and time available for hunting. While the proposal advanced is a logical one, more information is needed to test its generality. Does the physiology of heat regulation in chicks also show a geographical variation? This much is becoming clear, however; theory on clutch size is not as beautifully simple as some workers have made it out to be.—Douglass H. Morse.

**5. Photoperiodic and physiological adaptations regulating avian breeding cycles and their ecological significance.** B. Lofts, and R. K. Murton. 1968. *J. Zool.,* **155:** 327-394.—The comprehensiveness of this article is the best testimony in its favor, rendering it beyond adequate coverage in detail. A sufficient statement of its own is: "The investigation of the ultimate controlling factors has generally been the domain of the ecologists, whilst the proximate control of breeding has been the main prerogative of the physiologists. . . . . There is now a great need for a synthesis of ecological research rather than a multiplicity of photoperiodic manifestations of a few north temperate species." Bibliography of 324 titles.—Leon Kelso.

**6. Incubation conditions for some precocial birds in the subarctic.** (Usloviya inkubatsii nekotorykh vyvodkovykh ptits v subarktike.) O. I. Semenov-Tyan-Shanskii and A. B. Bragin. 1969. *Byull. moskovskogo obshch. isp. prirody, otdel. biol.*, **74**(5): 50-66. (In Russian, with English summary.)—Continuing studies of about 30 years duration, the author by use of remote concealed recording apparatus finds additional facts of their behavior not previously revealed by direct visual observations. Of especial significance are facts obtained by a perpetual day-and-night actograph record begun during egg deposition. The Common Teal, *Anas crecca*, laid eggs at intervals of about 24 hrs., 30 min.; the moment of deposition coming later day by day, as stay on nest lengthened, to 14 hrs. at the last. The Goldeneye, *Bucephala clangula*, behaved similarly, but deposition intervals lengthened to 48 hrs. The teal started incubation the day following completion of laying, the young hatched 24 days later, and on the 25th they left the nest. The ducks spent more time than tetraonids in getting food, wherefore they were absent 1/7th to 1/8th of the total incubation time, as compared with 1/17th to 1/36th for Capercaillie. Egg temperature of Goldeneye, being in a cavity, was lower, ave. 31.3°C, than that of Capercaillie, *Tetrao urogallus*, 36.3°. but egg temperature was lost more slowly in absence of the sitter. A notable point is that while the locale of the nests studied is north of the Arctic Circle, and while the eggs were often exposed to severe cold, near-zero temperatures, this did not prevent normal embryo development and hatching. Prolonged rainy spells with abnormally cold weather causes nest abandonment however, and this is the suggested reason for low or non-reproduction in certain years. All in all a most valuable study methodologically.—Leon Kelso.

**7. Microenvironmental factors influencing the nesting sites of some alpine fringillid birds in Colorado.** N. F. Hadley. 1969. *Arctic and alpine research*, **1**(2): 121-126.—This new quarterly serial put out by INSTAAR (Inst. of Arctic and Alpine Research) a new project at the University of Colorado, proceeds from a locale well situated for such work. In this article modern instruments were employed in measurements of humidity, radiation, wind and exposure around ground or near ground nests, 31 of Gray-headed Junco, 19 of Lincoln's Sparrow, and 16 of White-crowned Sparrow, at altitudes of 9300 to 11,300 ft. Nest temperatures varied 5-22°C warmer than air by day to 3-6 cooler by night, the Junco nests being warmer than the others. Numerous other facts with discussion thereof are presented.—Leon Kelso.

**8. The breeding biology of California Quail in New Zealand.** G. R. Williams. 1967. *Proc. New Zealand Ecol. Soc.*, **14**: 88-99.—The California Quail (*Lophortyx californicus*) is yet another of the many species introduced by man into New Zealand. There it occurs on both the North and South Islands. It has been the subject of a long-term study by Williams, of which this article is a part. This paper concerns itself mainly with variations in the onset of the breeding season and the duration of events during that period, and with annual variation in clutch size, nest success, fertility, and hatchability of eggs. The data revealed few differences in these factors from the situation observed in North America by a number of other workers.—Douglass H. Morse.

**9. The Great Grey Owl and its prey in Sweden.** N. H. Hoglund and E. Lansgren. 1968. *Viltrevy* (Swedish wildlife.), **5**(7): 363-421. (In English with Swedish summary.) 22 figures. Bibliography of 60 titles.—Despite some indisposition toward new serials and their small circulation and less availability, more and more bird articles of consequence are appearing in comparatively non-ornithological journals. Those who have found the owl form particularly entrancing in life or as a motif for objects d'art should find this item of monographic scope to be an owl-lovers delight. So remote lives tl is gray ghost of boreal forests that few if any observers have had a chance to follow its life cycle closely over much of the year. That these authors have at last accomplished this is evidenced by some very attractive habitat and action photographs. Their observations and available literature are summarized under: Introduction; Preparation for breeding and choice of nest; Size of nesting territory; Clutch size; Weight and growth; Food, with survey of prey animals during non-breeding season; Pellet data; Methods of hunting; Feeding at the nest; Behavior at the nest; The young in and

near the nest; Voice; Vagrancy; and Enemies. All in all it amply justifies its separate number under a separate cover.—Leon Kelso

## BEHAVIOR

**(See also 6, 18, 19, 24, 46, 60)**

**10. Body care of animals in the wild and in captivity.** (Zur Korperflege der Tiere in freien Wildbahn und Gefangeschaft.) H. Dathe. 1964. *Milu*, **1**(6): 349-383. (In German.) Bibliography of 247 titles.—Taking his own countryman's advice, as reported in a local paper, that the availability of exotic animals in zoos deserved closer habit studies by their staff, the director of the Berlin zoopark in its comparatively new research serial, has rendered a monographic review of the varied treatments of feathers and fur by birds and mammals, including dust, water, rain, dew, sun, snow, smoke, green leaf and trash, bathing, and the various forms of "anting", with discussion of theories of possible benefits thereof. Curiously, the extensive bibliography does not include certain papers in *The Wilson Bulletin* which seems to be relatively unknown in some ornithological centers abroad.—Leon Kelso.

**11. On the juvenal development and ethology of Pin-tailed Sandgrouse.** (Zur Jugendentwicklung und Ethologie des Spiessflughuhns.) O. v. Frisch. 1969. *Bonner Zool. Beitr.*, **20**(1/3): 130-144. (In German, English summary.)—Several years of observation of *Pterocles alchata*, with rearing of 10 chicks by hand, yielded many details of behavior on the basis of which this author would ally them closer to shorebirds than to pigeons. There was scarcely any evidence of water transportation to young (per Cade and Maclean, *Condor* 69(4): 323-343, 1967; reviewed, *Bird-Banding*, 39(1): 67, 1968, review **20**). There is a bibliography of 14 titles and 7 excellent photographs. (Also see review **39**.)—Leon Kelso.

**12. Laboratory research and field observation on visual acuity and behavior of Old World Vultures.** (Laboruntersuchungen und Freilandbeobachtungen zum Sehvermögen und verhalten von Altweltgeiern.) A. B. Fischer. 1969. *Zool. Jahrb. (Systematik)*, **96**(2): 81-132. (In German, English summary.) Bibliography of 140 titles.—This detailed review and thorough account of experiments with supplemental observations on numerous vulturids of the Old World finds that their visual capacity, particularly relative to great distance, is far beyond that of any other birds examined so far; but moreover, according to preponderant evidence they have no sense of smell and cannot locate food thereby. This constitutes a strong contrast to the New World species, which, per recent research (Stager), do locate food by smell.—Leon Kelso.

**13. On territorial behavior of Chaffinches.** (O territorialnom povedenii zyablikov.) T. I. Oliger. 1970. *Byull. moskovskogo obshch. isp. priorody, otdel. biol.*, **75**(1): 128-132. (In Russian, English summary.)—Summer observations in 1966 and 1967 on two 25-hectare areas found apparent male territory space shrinking to zero as the nesting season progressed. It was concluded that the male guards neither space, food supply, nor nest, but the female only. The author favors the Malchevskii definition: that territorial behavior is a manifestation of male antagonism evoked by competition for females.—Leon Kelso.

## ECOLOGY

**(See also 4, 5, 7, 35, 40, 41, 42, 43, 45, 50, 52, 57, 58, 59, 60, 62)**

**14. Bird species diversity: components of Shannon's formula.** E. J. Tramer. 1969. *Ecology*, **50**(5): 927-929.—Information theory has been put to continually greater use by ecologists as a means of describing species diversity, and more recently, other parameters. This paper attempts to analyze the two components of the equation: species richness and equitability. Species richness

simply refers to the number of species in the sample being counted. Equitability refers to the relative abundance; if all species in a sample have the same density, equitability is at a maximum; if all species but the most abundant are represented by a single individual, equitability is at a minimum.

In breeding bird censuses of homogeneous habitats changes in diversity are closely correlated to variations in species richness. Consequently, breeding bird diversity may be calculated by counting the species richness and disregarding relative abundances. The species richness component differs from the situation found in phytoplankton, where changes in diversity arise primarily from differences in relative abundance rather than species richness. Tramer believes that the difference lies in the fact that phytoplankton are opportunistic; that is, they experience much greater fluctuations in environmental conditions from generation to generation than do breeding birds. He suggests that birds may attain such a condition as they exhibit through the strong development of intra-specific territoriality. The most diverse values appear in marshes, where large numbers of certain species may nest; ones that defend only the immediate area of the nest and feed away from the marsh. Tramer hypothesizes that winter and migratory populations will show a closer correlation to relative abundance than do breeding populations.

It is heartening to see an attempt to analyze data that bear on some of the more important theoretical advances of the past few years. It will be interesting to see if further collections of data will confirm these preliminary findings; that is, whether species in rigorous or unpredictable environments will show strong correlation with the relative abundance factor, while those in less rigorous or more predictable ones retain the strong correlation with the species richness factor. Tramer has promised further tests of this question; we look forward to them eagerly.—Douglass H. Morse.

**15. Habitat selection by birds following a forest fire.** J. T. Emlen. 1970. *Ecology,* **51**(2): 323-345.—Recent opinion suggests that habitat selection by birds is determined largely by the gross visual aspects of vegetational physiognomy. Emlen, however, found that following controlled burning in a slash pine (*Pinus elliotti*) forest in southern Florida essentially the same numbers of the same species remained. In the process the shrub and herb vegetation was almost completely removed, but pines of 20-45 feet height were not damaged. The conclusion about bird distribution was based upon adjacent plots, one burned and one undisturbed.

Emlen's interpretation is that individual attachments to home ranges and foraging areas transcended species-characteristic habitat responses. Such a predisposition for site tenacity could be advantageous where short-term modifications to gross habitat features are of relatively frequent occurrence. While Emlen offers this explanation only as a suggestion, and it is supported only by circumstantial evidence, it is nevertheless an attractive idea that could be expanded by careful studies upon marked individuals in an area before and after modification. These homogeneous southern forests are burned regularly and could be put to good use in developing further this interesting and potentially important series of observations.—Douglass H. Morse.

**16. Colonization of secondary habitats by Peruvian birds.** J. Terborgh and J. S. Weske. 1969. *Ecology,* **50**(5): 765-782.—This is the first of a series of promised papers by Terborgh and his colleagues upon avian ecology in Amazonian Peru. The scene of this study was the Apurímac Valley, an area of lowland between two high mountain ranges. This area was inhabited only by Indians until 1940 and at the time of the study still contained large areas of pristine forest in addition to sizeable areas of agricultural land and second-growth vegetation.

In this study the bird faunas of 6 habitats (2 primary and 4 secondary) were sampled and compared. These included primary forest, matorral (riparian) forest, coffee plantation with a sparse cover of trees from the original forest, coffee plantation with a dense cover of shorter planted trees, cacao plantation with a sparse cover of trees similar to those covering the second coffee plantation, and dense young second growth. In this area Terborgh and Weske find that they can divide the bird fauna into 3 distinct elements: species that inhabit only the

forest, species that inhabit only the matorral (riparian) areas, and species common to both.

Only 10 species out of a total of 221 encountered on the census tracts were not found in primary habitat; the failure to record some of these may have been the result of sampling problems. The major question posed was, "How much will each of these pools contribute to the bird fauna of the newly-created secondary habitats?"

A prediction that species common to both primary habitats (general species) should be the best colonizers, because of their apparent ecological versatility, was verified. However, a second prediction that matorral species would be better colonizers than forest species was not borne out completely. Within the types of second growth habitats studied, matorral understory and forest canopy species were better colonizers than species from other parts of these two forests.

An attempt is made to determine whether any particular adaptive features may be related to an ability to colonize new habitats. Initial results appear equivocal for the most part, though there appears to be a higher degree of habitat specificity for small species than large ones, a finding that is in keeping with many other studies.

Bird species diversities showed a high equitability of abundances in each instance, with truly abundant species being virtually absent, except for the case of the manakin, *Pipra fasciicauda*, which comprised approximately 1/3 of the forest catches in mist nets. Evidence suggests that the higher diversity in tropical forests than in temperate ones is accommodated through a greater vertical separation of foraging domains; correspondingly, tropical species appear to have more extensive horizontal planes than temperate ones.

Bird species diversity in the habitats was greater than would be predicted by MacArthur and his colleagues from their studies on relationships between this measure and foliage height diversity. In his studies MacArthur used limited sample sizes, which based upon their experience Terborgh and Weske believe to result in unrealistically low diversity values.

To account for this discrepancy they propose a "special habitat quality factor". While in some cases undefinable at this time, two possible examples are given. Certain species in the primary forest are associated exclusively with dense tangles of vines in the trees, which were not present in the only secondary habitats studied. Certain species also expended a great deal of effort investigating dead leaves that had hung up in the foliage at low to moderate heights. These leaves are not apt to remain arrested in breezy open areas.

The secondary areas were varying distances from the different primary sources of bird species, and in some cases it appeared that proximity had an effect on the species present. Certain vegetational characteristics modified this factor considerably.

The authors last look at the frequency of congeners in primary and secondary areas, reasoning that the number will be disproportionately low in secondary areas, since congeners must partition their habitats in a particularly discrete manner. If critical vegetational factors are broken up in secondary areas, a low number of congeners should be found. The data suggest that the number of congeners is reduced in secondary areas.

This and Orians' paper (# **40**) present welcomed data upon tropical diversity. The present paper provides critical information for evaluation of MacArthur's ideas on species diversity and suggests that modifications may be in order. We look forward to seeing more of this projected series.—Douglass H. Morse.

**17. Ecological localization of avian migrants in the Gabon equatorial forests.** (Localisation écologique des oiseaux migrateurs dans la forêt équatoriale du Gabon.) A. Brosset. 1968. *Biologia Gabonica*, 4(3): 211-226. (In French, English summary.)—In this new serial, edited by leading French zoologist Grassé, 5 years of observations totaling 1440 hours observation in primary (original, undisturbed) forest, and 540 in secondary (cutover, exploited) forest are reported (3,700 individuals of 295 species were trapped and banded), finding not one migrant sojourning in primary biotopes, and 26 species of palearctic, and 10 of trans-tropical migrants in secondary biotopes; the more forest clearing the more migrants. Reasons: a primary forest is zoologically saturated, all ecological niches occupied; wherever competition arises the migrant intruder faces elimination; also noted is a "psycho-ecological" response, that a wintering migrant seeks

a site familiar in appearance. Thus, while Common Swallow, *Hirundo rustica*, perches in thousands on village telegraph wires, native birds avoid them.—Leon Kelso.

**18. Bird communities in an equatorial forest of Gabon.** (La vie sociale des oiseaux dans une forêt équatoriale du Gabon.) A. Brosset. 1969. *Biologia Gabonica*, **5**(1): 29-69. (In French, English summary.)—Five years of observations on 295 species in different forest strata of N. E. Gabon found assemblages of various species around certain "catalyzers" or leaders consisting of birds (flycatchers & cuckoos), or mammals (5 monkey species, 6 of squirrels, murine rodents, e.g. *Hybomys*) or insects (ants of genus *Anomma*). These leaders in foraging flushed out insects rendering them prey to the mixed flocks of up to 17 species; the preferred time, 8 a.m. to 2 p.m. When the leaders ceased activity the followers dispersed, this and other facts corroborating many other observations in tropics and in other zones. No competition was seen in these mixed flocks; they varied per biotope and leader, the species not related nor widely dispersed geographically. The interpretation here given includes energy expenditure economy; the leaders benefiting in followers' perception and warning of danger; that assemblages are weakest in tundra and desert and strongest in tropics where insect camouflage is most pronounced; complexity of assemblages in comparison to mammalian is charged to less morphological adaptation; that trend to aggregate is not hereditary but transferred generation to generation via family group flocking. There is discussion of most of the other types of aggregation, including owl mobbing. "In the cases studied, the activity of the leader, be it bird, mammal or insect, opens up an ecological niche which does not exist in its absence. Thus, at night the raids of Manans ants are followed by parties of bats which occupy the ecological niche left vacant by the birds." Most avian abservers with boreal and temperate coniferous forest experience may recall that in winter foraging flocks, largely of Paridae, are not rare, and here insect flushing is hardly a factor. There is a bibliography of 39 titles.—Leon Kelso.

## WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

**(See also 62)**

**19. Fighting cock kills its owner.** "Reuters". 1970. *Washington Post*, May 13: A3.—Having armed his gamecocks with 3-inch razor-sharp spurs for a fight to the death he was himself fatally stabbed, 2 jabs in the thigh leaving 8-inch gashes. The affinity to the primitive persistent to the present day in humanity evidenced by exploitation of cockfighting needs little particular comment.—Leon Kelso.

**20. Variations in development of muscles in chickens.** D. B. Halvorson and M. Jacobson. 1970. *Poultry Sci.*, **49**: 132-136.—This is basically an investigation of "meatiness" in leg and pectoral muscles and is a good example of the wrong people having the right idea for the wrong reasons. The development (weight and linear measurements) of six muscles were studied in Leghorn chickens (at 5, 7, and 9 weeks of age). Weights were taken on cooked! ("simmered") muscles (apparently because they were then easier to dissect); the methodology here and with the linear measurements is anything but precise. Not unexpectedly muscle weight increased with growth of the chickens, and gastronomes will be interested to know that the pectoralis muscle shows the greatest increase (although the other muscles exhibited "mathematically significant" weight increases). This *type* of study needs to be undertaken and could provide valuable morphological and evolutionary data. For example, do different kinds of birds grow in the same ways? How do individual muscles grow and what are the functional consequences of this growth (changes in fiber number, length, angle of pinnation, etc.)? When research for "economic" reasons is placed before that for "scientific" reasons, society will frequently suffer. (A parallel can be drawn between this study and the "ecological" work supported by the U. S. Department of Agriculture). The authors would have been just as successful "economically" had they designed their research with more biologically meaningful questions in mind.—Joel Cracraft.

## CONSERVATION AND ENVIRONMENTAL QUALITY

**(See also 53, 54, 55, 58, 62)**

**21. The Prairie Dog and the Black-footed Ferret.** F. McNulty. 1970. *The New Yorker,* June 13, 1970: 40-89.—Giving a very thorough and journalistically able going-over of the wildlife poisoning racket, which affects birds as well as mammals, in the same serial in which Rachel Carson's "Silent Spring" got its start, this may deserve and win attention sufficient to bring it out as a book. Its publishers thought enough of it to advertise its appearance months ahead. The amount of history of wildlife control and number of personalities involved is amazing. Curiously, of two of the eminent doctors engaged in the "Leopold Board", and the subsequent "Leopold Report", one began his career in poisoning work, and the other officiated in development of the efficient "1080" poison, prominent in this account, and both were in positions of almost total power in the wildlife saving-control bureau for over 20 years.—Leon Kelso.

**22. Changes attributable to pesticides in egg breakage frequency and eggshell thickness in some British birds.** D. A. Ratcliffe. 1970. *J. Appl. Ecol.,* 7(1): 67-115 (with statistical appendix by M. D. Mountford).—Recently we have heard much about the plight of our birds of prey, with repeated observations of sterility, thin eggshells, and egg-eating. The present study concerns itself largely with the latter two problems, considering primarily the data upon Peregrine Falcons (*Falco peregrinus*), Sparrowhawks (*Accipiter nisus*), and Golden Eagles (*Aquila chrysaethos*) in the British Isles. This information is compared with less abundant data from a variety of other species of raptors and other species of birds.

In the 1950's ornithologists began to become alarmed by the decreasing success of certain raptors, particularly peregrines and eagles. It was subsequently found that their eggshells had declined markedly in thickness and that this decrease could be traced in egg collections to the 1946-1950 period, immediately after chlorinated hydrocarbons came into common use in agriculture. Scattered observations of egg-eating and clutch depletion prior to this time are reviewed, and Ratcliffe concludes that while some such activity probably has occurred traditionally, its frequency has increased dramatically. In a majority of cases he feels that depletion of eggs from a clutch is attributable to destruction of them by parents. In fact an impressive amount of information (adults seen eating eggs, freshly-broken eggs in nests, fragments of shells in pellets that matched missing pieces of smashed eggs, eggs with beak marks that were tossed out of the nest, etc.) is presented to document this assertion. While it is granted that predation, human disturbance, and intraspecific interactions (in recent years many single peregrines have been noted about established pairs) may account for some breakage, they appear totally inadequate to account for the apparent rapid increase of the phenomenon.

Ratcliffe then considers a host of possible causes (some quite improbable) for the thinning of eggshells during the period mentioned above. It appears that the differences in eggshells is mainly, if not completely, the result of changes in the calcium carbonate fraction of the shell, which in older shells averaged about 90% of this material. This implies changes in the calcium metabolism of the birds being considered. An imperfect diet causes domestic fowl to lay thin-shelled eggs, and the shortage of food in wild species might lead to a similar condition, but no evidence exists for such a decline in food supply. Age and genetic constitution affect eggshell thickness in chickens. However, samples are available for the same peregrine over a period of six years. Since no change in shell thickness occurred during this time, it seems unlikely that the phenomenon could be explained simply by the existence of an old-aged population. A substantial decrease in shell thickness was also noted at three eyries during the critical period, thus ruling out the probability of a changing genetic constitution of the population. Stress may decrease shell thickness, but stress is in itself a response to other external factors, which have already been largely discounted in this paper. Disease may cause thin-shelled eggs in chickens; both infectious bronchitis and Newcastle disease appeared in Britain in 1947, at the time that shells began to decrease in thickness. However, neither had been reported from raptors. Further,

domestic fowl recovering from these diseases lay normal eggs again. No evidence exists to suggest that any other disease has afflicted these raptors from 1947 on. The disease hypothesis is thus discounted. Radioactive fallout is then considered. In Britain, fallout is heaviest in the northern and western parts of the country, the areas where decrease in shell thickness and nesting success has been least marked. Thus this explanation seems unfounded.

By process of elimination, then, we come to the inevitable: persistent synthetic chemicals. These, too, are reviewed in exhaustive detail, with sulfur dioxide and detergents being eliminated as likely subjects. This then leads to the persistent chlorinated hydrocarbon biocides, and it is concluded that a strong *prima facie* case exists for these substances being causally involved in initiating and maintaining the eggshell effect. It is also suggested that polychlorinated biphenyls (PCB's) are contributory agents, though their importance is still little aunerstood. A word of additional warning is passed along: if PCB's were not suspected to be harmful environmental pollutants until 1966, are there other potentially hazardous waste products still unidentified?

Egg-eating is then considered as a possibly adaptive mechanism under natural circumstances. It is known that once an egg is cracked or broken, the parents exhibit a strong tendency to remove it from the nest, which in many cases takes the form of egg-eating. If shells were abnormally thin, then such problems with eggs might consistently arise, and potentially might even result in the development of such seemingly dysgenic behavior. If the body calcium reserves are low, then the predisposition for this behavior might be enhanced. Other characteristics of peregrine populations include the failure of females to lay eggs and irregular appearances of one or both birds at the nest when no eggs have been laid. The latter symptoms point to apparent sterility resulting from changes in hormonal conditions. In addition to problems about the nest, the rapid decline suggests also heavy adult mortality.

This is a most important paper, in that it provides a comprehensive review of the pesticide problem in some species of raptors and also considers and argues about almost any conceivable causative agent. Furthermore, a number of new data appear in the paper. This publication deserves to have a wide audience. It should serve as an excellent source of information and ideas.—Douglass H. Morse.

## PHYSIOLOGY AND PSYCHOLOGY

**(See also 4, 5, 12, 18, 22, 31, 32, 60, 64)**

**23. Flight energy in swallows and swifts.** (Energiya poleta u lastochek i strizhei.) D. S. Lyuleeva. 1970. *Doklady akad. nauk, SSSR.*, **190**(6): 1467-1469. (In Russian.)—Published in their serial for presentation of more significant and urgent research results, in response to lack of bioenergetic data on birds more specialized for flight, this supplies details from a study of the Common Swallow, *Hirundo rustica*, House Martin, *Delichon urbica*, and Swift, *Apus apus*. Several of each species were trapped at the nest, banded, weighed, their bills tied shut to prevent feeding on "aerial plankton", and released 40 to 70 km from home; on return they were reweighed, and their weight loss was calculated with respect to that of control birds, to rate of return travel, and compared to that of other species. In proportion to weight, the apparent energy expenditure of Swifts (ave. weight about 40 gms) was only about half that of the swallows (ave. about 20 gms). On the general theory of "bionics", that living things have had eons of time to solve physical problems, birds should have solved the puzzle of "antigravity" to some extent, if possible, and that might account for gaps between expected and actual flying efficiency, exposed in this and other studies.—Leon Kelso.

**24. Starling dispersal from a winter roost.** W. J. Hamilton III and W. M. Gilbert. 1969. *Ecology*, **50**(5): 886-898.—Though studies of orientation in birds have been extensive in recent years, accompanying problems of energy expenditure of the orienting individuals have received little attention. The work of Hamilton and his associates represents a definite exception. In the Starling (*Sturnus vulgaris*) they have advanced the hypothesis that individuals dispersing

from roosts behave to maximize the efficiency and rate of energy gain; furthermore, ability to orient plays an important role in the energetic considerations. The study was carried out upon birds at roosts in the Central Valley of California. At times these roosts contained as many as two million Starlings. The size of the roost obviously has certain implications for dispersal behavior, due to the high concentrated density of the birds. Similarly, the nature of the surrounding land is of importance. To study dispersion patterns, regular observations were made at the two sides of a 20° arc at 10, 20, 30, 40, and 50 miles from the roost.

As might be expected, as the number of Starlings at a roost increased, some birds moved farther away from the roost than previously. Most individuals moved away from the roost in a linear fashion. Consequently, the farther the birds moved from the roost, the more dispersed they became. Such behavior should reduce intraspecific competition, if food is in limiting supply, though certain observations made in the paper suggest that it is not limiting (nevertheless, the idea of competition plays an important role in Hamilton and Gilbert's hypothesis). The movements of these birds continued to be of a radial nature until late morning, at which time they appeared random. Foraging activity was most intense in the early morning, with the pace becoming more leisurely later.

It is wellknown that overcast conditions may result in disorientation of species, including the Starling, that use the sun for orientation. This paper presents some novel data providing additional information that the lack of sun results in disorientation of individuals. Under such conditions Starlings apparently dispersed in directions other than linearly away from the roost. Flight directions at these times generally showed more variability than on clear mornings, and the passage of birds overhead on overcast mornings usually was more evenly distributed than on clear mornings, when the vast majority of individuals passed over in a relatively short period.

Hamilton and Gilbert explain the adaptiveness of normal flight patterns in the following way. Different individuals should possess different strategies in order to maximize opportunities for all. They assume that the combined strategies result in approximately equivalent net energy transfers for different individuals. Stops in transit may permit birds to monitor continuously the quality of resources relatively near the roost, which could be exploited with less flight energy than distant ones. A longer time is also available during a day for exploiting them. The authors believe that the existance of the group results in more accurate overall assessment of a resource than an individual can provide, thus assuming the presence of a communicative facility among the birds.

As the winter progressed, the birds left the roost later relative to sunrise. These observations run counter to results from a number of other roosts of various species and leads Hamilton and Gilbert to suggest that food supplies were not limiting these populations. In other studies, high ambient temperatures and abundance of food resulted in an early return to the roost; late dispersal times may represent another response to favorable conditions. When extensive flooding occurred on farmlands near the roost an enlarged concentration of Starlings frequented the area, apparently feeding upon the abundant insects and worms forced to the surface. This concentration is consistent with the authors' hypothesis. Similarly, Starlings tended to utilize newly-tilled barley fields heavily.

The wide range of dispersal (up to 50 miles) was not anticipated and may be peculiar to large flocks, which in turn may be responses to a shortage of adequate roosting places. Small flocks in the area did not disperse more than a few miles.

Flocks are larger on overcast mornings than at other times. The authors believe that flocking may increase the accuracy of orientation; hence, at such times a premium for such behavior should exist. On these days fewer birds reach the peripheral areas, resulting in a higher density of individuals near the roost and increasingly intense competition (their term) for resources. Thus, the advantage of a well-developed sense of orientation in a nonmigratory species may be clearly seen. It is clear that Hamilton and Gilbert do not use the term *competition* in its narrowest ecological sense.

This study demonstrates possible advantages for orientation abilities in species that do not possess strong migratory tendencies. One would suspect, however, that at least on clear days, the social tendencies have other functions more important to the Starlings than in potential directional assistance in movements.—Douglass H. Morse.

**25. Preliminary models for growth rates in altricial birds.** R. E. Ricklefs. 1969. *Ecology*, **50**(6): 1031-1039.—Why do baby birds grow at such a prodigious rate? Why do some grow at a rate faster than others? These are types of questions considered in Ricklefs' present paper. Basically, three major energetic considerations will determine the growth rate (increase in body weight) and clutch size; the time, energy, and nutrients available to the species.

There are definite advantages in growing rapidly. If nest predation or parasitism are important factors, selection should occur for an increased rate of growth. However, the limits of increase may be severely limited if resource exploitation is accomplished only at the expense of considerable time and effort. One might then expect it advantageous to reduce the clutch size, so that a small number of young could be pushed to maturity as rapidly as possible.

Ricklefs finds that a number of generalizations are in order. Growth rate is inversely related to body weight in an exponential manner. Further, young of large species generally have lower mortality rates than do small species. However, no clear pattern can be seen between growth rates and nestling mortality, though a high correlation appears between nestling mortality and precocity of development and the length of the nestling period. And in species of the same adult weight, the growth rate is primarily related to whether the species is altricial or precocial, rather than to the mortality rate. The conclusion drawn from these observations is that differences in mortality rates account for little, if any, of the diversity observed in growth rates.

A number of models are then constructed in order to make predictions about what strategies should be followed by young. They predict that selection should act to increase growth rate at the expense of brood size until only one young is raised per brood. Clearly, this is not the usual outcome, and where it does occur, growth is slow, so Ricklefs concludes that the increased rate of energy utilization cannot counter selection favoring more rapid growth. He then hypothesizes a "physiological bottleneck"; that is, there is a limit to the capabilities of tissue metabolism in young birds; hence, additional food could not increase growth. This is essentially saying that the cause remains generally unknown.

This paper does not come to the satisfying conclusions that it appears its author originally sought. The mathematical models presented are admittedly simplified; they may be so simplified as to have limited predictive power. As Ricklefs admits, they disregard balancing factors such as changes in predation rates, postfledging survival, and future competitive success in reproduction, number of young raised, their dispersal, etc. These are essentially unknown in many cases, but it would be premature to discount their potential overriding importance.—Douglass H. Morse.

**26. Weight fluctuation of the large pectoral muscles of thrushes in postembryonic life.** (Izmenenie vesa bolshoi grundnoi myshtsy u drozdov v postembrionalnyi period.) E. S. Lysov. 1970. *Z. zhurn.*, **49**(3): 471,472. (In Russian, English summary.)—Based on analysis of 123 nestlings, fledglings and adults of *Turdus pilaris*, *T. ericetorum*, and *T. musicus*, extraction, weighing, and calculation of per cent of body weight is described; at hatching they were 1.34 to 1.68, at nest departure, 7.41 to 8.07% of body weight, or 26% of same muscles weight ratio in adult; in the latter they were 17-20% of adult body weight. Absolute weight increase over the whole growth period was 250 to 300 times the original.—Leon Kelso.

**27. The changes in egg shell strength during incubation.** J. Vanderstoep and J. P. Richards. 1970. *Poultry Sci.*, **49**: 276-285.—White Leghorn chicken eggs were studied. Under a unit load of 500 grams shell strength (as measured by deformation) decreased through inculation with the greatest deformation taking place between days 14-18. Although the shell membrane loosens during the period of greatest shell strength change, it is not the membrane *per se* that affects the shell strength but rather the amount of moisture present in the shell.—Joel Cracraft.

**28. Electrophysiological features of the avian auditory analyzer.** (Elektrofiziologicheskaya kharakteristika slukhonogo analizatora ptits.) V. D. Ilyichev, S. S. Gurin, and A. N. Tempchin. 1970. *Biol. Nauk* (*Nauchnye doklady*

*vysshei shkoly*), **13**(1): 38-49. (In Russian.)—Here, in the first article of a projected series, from information based on analysis by refined electronic instruments we have a historical account, followed by detailed sections on potentials and projection in diencephalic,and hemispheric nuclei with morphological details, electrophysiological features of acoustic pathways, and microelectronic analyses of acoustic nuclei.

A point made by McLuhan under "clocks" in his "Understanding media" is that the world of sound (acoustic pressure) and the ear is much more pervasive and inclusive than that of light and the eye. This may account for the apparent greater complexity of the mechanism for sound perception over that for sound production or vision, particularly as shown in these studies.

These authors note a recent trend to compare and homologize the avian hearing systems to those of mammals, and are inclined not to follow this since different electronic analysis methods by different researchers have elicited contrary opinions on the acoustic operation of certain brain cells. They propose and await further research. There is a bibliography of 74 titles.—Leon Kelso.

**29. Photorefractoriness in pinealectomized Harris Sparrows.** R. S. Donham and F. E. Wilson. 1970. *Condor*, **72**(1): 101-102.—Here it is again concluded that the pineal gland is not responsive to light, or else photoperiods do not operate via the pineal gland in *Zonotrichia querula*. Likewise not clear is how this mounting evidence squares with the common belief that the plumage is impenetrable or irresponsive to light.—Leon Kelso.

**30. Ineffectiveness of the pineal lesions on the testis cycle of a finch.** W. M. Hamner and R. J. Barfield. 1970. *Condor*, **72**(1): 99-101.—Through experimental lesions effecting destruction of most or all pineal tissue in the House-finch, *Carpodacus mexicanus*, it was determined that: "the pineal gland has no effect on photoperiodically induced testicular growth, regression, or termination of photorefractoriness in a non-domesticated normally cyclic bird."—Leon Kelso.

## MORPHOLOGY AND ANATOMY

**(See also 20, 26, 36, 39, 50, 51, 64)**

**31. Photoreceptoral and secretory structures in the avian pineal organ.** M. B. Bischoff. 1969. *J. ultrastructure research*, **28**(1-2): 16-26. Bibliography of 31 titles. 12 electron micrographs.—"Electron microscopic studies on pineal organ of adult Japanese quail and White Leghorn chicken showed 3 cell types present in the cell cluster: ependymal, secretory, and photoreceptor cells." . . . . .

"Melatonin, a serotonin derivative, has been discovered in exceedingly high concentrations within the pineal organ of both birds and mammals. The enzyme hydroxyindole-o-methyl transferase, exclusively found in the pineal organ is responsible for the conversion of serotonin to melatonin. Melatonin appears to stimulate gonadal development in birds.

"Exposure to light has been shown to increase melatonin synthesis in birds. However the light stimulus appears to effect [?] the pineal organ via the retinal cells. . . . . Thus the role of the photoreceptor cell located in the pineal organ remains unclear." Likewise unclear is how any pineal cells in birds may be identified as photoreceptoral.—Leon Kelso.

**32. Sensory corpuscles in the beak skin of the domestic pigeon.** L. Malinovsky, and R. Zemanek. 1969. *Folia morphologica* (Czechoslovak.), **17**(3): 241-250. (In English.) 7 tables, 12 photomicrographs, bibliography of 31 titles.—There has been considerable attention to analysis of these biological structures, but this penetrative study (and others such) leaves a puzzle in the role these abundant and varied "mechanoreceptors" take in the bird's operation. It has seemed to some writers that birds can "smell' or "feel" their way in homing but whether these micro-bodies enable them to do so needs more attention. Since birds can molt the exterior bill surface as well as feathers, the 16 variants of Herbst bodies reducible to 4 rather similar types as described here may represent

age or growth stages rather than type differences. They were found most numerous and varied in the cere, the least so in the feathered skin at the beak base, which suggests something as to the function of the former area.

A contemporary paper dealing with very similar receptors is: **A possible mechanism of Pacini body excitation.** (Vozmozhnyi mekhanizm vozbuzhdeniyya telets pachini.) V. Chernigovskii. 1970. *Izvestiya akad. nauk, ser. biol.*, **1970**(2): 214-223. (In Russian, English summary.) Bibliography of 45 titles. This suggests a complex of mechanical and electrochemical elements in their operation. —Leon Kelso.

**33. Observations on the ultrastructure of the smooth muscle and its innervation in the avian lung.** R. D. Cook and A. S. King. *J. Anat.*, **106:** 273-283.—The authors studied the lungs of White Leghorn chickens using light and electron microscopy. The smooth muscle cells were similar to those of other vertebrate organs. The primary bronchus is more highly innervated than the tertiary bronchus, and the authors suggest that there may be more precise neural control of the muscles in the former.—Joel Cracraft.

**34. Researches on the development and the morphogenesis of the *Gallus gallus* (Linn.) patella.** T. Renida. 1969. *Arch. It. Anat. Embriol.*, **74:** 253-263. (In Italian. English abstract).—The mesenchymal bud of the patella appears at 6 1/2 - 7 days of incubation, begins to chondrify at 11 days, and remains cartilaginous until 13-14 weeks after hatching. One center of ossification then appears and the patella is completely ossified by the 30th week.—Joel Cracraft.

## PLUMAGES AND MOLTS

**(See also 10, 29, 30, 56, 64)**

**35. Moult in birds of the Australian dry country relative to rainfall and breeding.** A. Keast. 1968. *J. Zool.* (London), **155:** 185-200.—The annual molt of 20 species of west New South Wales is considered and compared to that seen in Africa and So. America. Molt is more regular than breeding; that of migrants is later and shorter than that of residents, and in both is much subject to modification by environmental conditions, with some antagonism apparent between molting and reproductive hormones. Bibliography of 24 titles.—Leon Kelso.

**36. The epidermis and feather follicles of the King Penguin (*Aptenodytes patagonica*) (Aves).** R. I. C. Spearman. 1969. *Z. Morph. Tiere*, **64**(4): 361-372. (English.)—There have been too few comparable studies employing such advanced microphotographic equipment to afford much trenchant comparison; more marked details are: penguin epidermis develops no stratum granulosum, stratum corneum cells are solidly keratinized, without basophilic nuclear remnants. Feather follicles are deeply sunken, opening onto the skin surface through epidermis-lined canals. Cystine disulphide is prominent in the feather as a whole, with cysteine compounds in the keratinous sheaths and inner calamus layer, and phospholipids in the keratinized sheath tissue. The author finds the feather-related structures strangely similar chemically to those of Galliformes. There are 7 excellent microphotographs and a bibliography of 30 titles.—Leon Kelso.

## SYSTEMATICS AND PALEONTOLOGY

**(See also 11, 41, 51, 63)**

**37. Mid-Pleistocene birds from western Nebraska, including a new species of Sheldgoose.** L. L. Short, Jr. 1970. *Condor*, **72:** 147-152.—A small collection of fossils from the Yarmouth Interglacial were studied. All but one were waterfowl, and they suggest a marsh-edge habitat. A new species of Sheldgoose, *Anabernicula robusta*, is described. The author supports the inclusion of *Anabernicula* in the Tadornini. Other species in the fauna include: *Branta*

*canadensis*?, *Anas platyrhynchos*?, *Spatula clypeata*?, *Lophodytes cucullatus*, *Meleagris gallopavo*?, and *Fulica americana*.—Joel Cracraft.

**38. Some taxonomic comments on the genus *Auriparus*.** W. K. Taylor. *Auk*, **87**: 363-366.—This note re-examines the presumed relationship of the genera *Auriparus* and *Remiz*. Taylor summarizes comparative data on morphology (bill structure, plumage), egg color, nest construction, breeding biology, and foraging behavior. *Auriparus* and *Remiz* differ from each other in all of these characters, and Taylor concludes that the two genera should not be placed in the same family. Instead, Taylor believes the biology of *Auriparus* greatly resembles that of *Coereba* and a case is then made for the tentative inclusion of *Auriparus* within the Coerebidae. Hopefully this paper will stimulate detailed comparative work on *Auriparus* and coerebid genera.—Joel Cracraft.

**39. On the systematic position of Pigeons and Sandgrouse.** (Über die systematische stellung der Tauben und Flughuhner.) B. K. Stegmann. 1969. *Zool. Jahrb., Syst.*, **96**(1): 1-51. (In German, English summary.)—Disagreement on the systematic position of the Pteroclididae continues after over 100 years. This very detailed account of their comparative morphology is motivatedly a rebuttal of a stand taken most recently by Maclean (*J. f. Ornith.*, **108**(2): 203-217, 1967; reviewed *Bird-Banding*, **39**(1): 67, 1968, rev. **21**.) which would place them closest to the shorebirds. Any serious consideration of the matter should note in passing at least that this perplexing group has been a chief object of study by the above outstanding vertebrate anatomist of the Slavic world for many years, in a long series of papers, at least one of which is in translation at the Carnegie Museum. The solution rests on whether one should put emphasis on habits and habitat, ethology and ecology, or on anatomy. Dr. Stegmann's emphasis is on anatomy, and the present item presents the gist of his numerous papers, with 29 figures of comparative anatomy of sandgrouse, pigeons and shorebirds, with a bibliography of 39 titles. In morphological details from the plumage inward many resemblances to the pigeons have long been known, yet the extreme precocity of sandgrouse young makes it hard for some observers to reconcile them with the very altricial pigeon family. (see review **11**.) The present author sees a solution to the dilemma in regarding the Pteroclo-Columbae as a group of more remotely antique derivation having subsequently diverged in habits and habitat; the shorebirds, and Galliformes, being of later derivation, developed whatever resemblances they show to sandgrouse by convergence.—Leon Kelso.

## ZOOGEOGRAPHY AND DISTRIBUTION

**(See also 3, 8, 16, 56)**

**40. The number of bird species in some tropical forests.** G. H. Orians. 1969. *Ecology*, **50**(5): 783-801.—The subjects of species diversity in tropical and temperate areas have been prominent ones in the past decade. Though the basis for alleged differences has been a subject of considerable interest, field studies relating to this basic problem have been rather limited. Orians' paper is an attempt to fill that void. It is the result of a year's study of seven different habitats in Costa Rica, differing in altitude and the length of dry season. The habitats were all forests and differed in both vegetational types and vegetational diversity. This paper takes the form of a number of questions, which are then answered one by one.

The number of tree species (i.e., tree species diversity) was not a good predictor of the number of bird species in a tropical forest. Neither was there any sign of any species demonstrating tree specificity in any of the study areas.

There was no relationship between length of dry season and the number of bird species present within the tall, structurally-complex forests that were censused. It is acknowledged that species numbers would have been much reduced in dry deciduous forests. The drier sites censused were the only ones containing migratory breeding species, the Piratic Flycatcher (*Legatus leucophaius*) and Yellow-green Vireo (*Vireo flavoviridis*), species that migrate to South America during their breeding season. Orians feels that their presence may be related to the flush of insects occurring when a new growth of leaves occurs at the end of the dry season. While the sites with long dry seasons contained about the same number of bird species as the wetter sites, they held a much higher proportion of the

total avifauna of the region, suggesting that though within-habitat diversity is about the same in the cases observed, between-habitat diversity may be much greater in the wetter areas.

Primary productivity was apparently lower in montane forests than in lowland ones. Correspondingly, species diversity of birds was only half that found in lowland plots. Total biomass of insects obtained by sweeping is known to decrease with increasing altitude, though the size distribution does not. Consequently, the number of all size classes will be decreased, and it appears that this change may be responsible for the dropping out of species that are dependent upon large insects. This section is the weakest in Orians' paper and is supported by few if any data. He freely acknowledges that such measurements were not taken during the course of this study.

Census sites were chosen that had similar foliage profiles, so the information gathered would not be expected to give insight into whether foliage height profile is a good predictor of bird species present. However, in most of the lowland sites a good correlation existed between the number of species and average number of leaves above a point.

Several conclusions are drawn about whether by their foraging behavior birds respond to the vertical distribution of the leaves of the forest *per se* or whether they respond to other features as well. The number of ground feeders is fairly constant at low elevations, but decreases at high elevations, resulting from a loss of terrestrial antbirds and tinamous. Species that drop to the ground from elevated perches are best represented at the driest sites, where the forest floor is most open and most strongly illuminated. Species with these habits were not found in the high-elevation sites. Few woodpeckers were found at high elevation sites. Numbers of obligate fruit eaters probably decrease in dry areas, while the number of species feeding upon both fruits and insects increases. Numbers of salliers were quite constant in all sites, showing no significant altitudinal gradient. Leaf gleaners (including hoverers) are much more prominent in lowland forests than at higher elevations. Only in forests that had large numbers of epiphytes were there bird species that specialized upon them.

Species of the canopy tend to forage over a wide vertical range, while those of lower zones may be restricted sharply to a narrow vertical band. Species of the canopy may feed on tops of bushes as well, and this occasional great vertical variation represents considerably less foliage difference for the individuals concerned than that faced by a ground-foraging species being found in the top of a bush.

The birds in Orians' study distributed themselves as if there were four layers in the forests studied. However, it appeared that layering did not represent the only (and perhaps not the primary) factor responsible for the large number of species of birds in tropical forests. In tropical forests there are more species of trunk gleaners than in temperate forests, species that do not have fine vertical division of space. (However, horizontal parameters may be most important for this type of forager). There are no ecological equivalents for obligate fruit eaters such as parrots and manakins in temperate areas, a possibility in the tropics because of the nearly constant availability of fruit in some situations. Specialized reptile-eating predators appear to be more varied in tropical forests than in temperate areas, where a maximum of one such species might be anticipated. No equivalent to the ant-following species occur in the temperate zone, though it is unclear how dependent all of these species are upon ants for their persistence. Lastly, there are relatively few temperate-zone forest species that sit quietly and watch for prey. Hoverers are also much more abundant in tropical forests than in temperate ones. This may represent a maximally efficient way of conserving energy, or might be a result of leaf size, which decreases altitudinally and latitudinally. Where leaves are small, perched individuals can reach a large fraction of insects present. Furthermore, if overall insect abundance is higher in the tropical forests, then it may be high enough so that increased specialization is possible.

Orians also includes some comments about oscines and suboscines and their respective ecological adaptations and relative successes. His data suggest that oscines have made only slight inroads into the bird communities of undisturbed wet lowland tropical forests. However, oscines are more conspicuous in drier areas and early successional stages.

Orians' concluding statement indicates that it is dangerous to overgeneralize about the tropics, a feeling that appears to be shared by increasing numbers of

workers, as more field information becomes available from these areas. While this study is of a preliminary nature and barely scratches the surface of many vexing problems, it represents an important contribution to the study of factors determining patterns of micro-and-macrodistribution.—Douglass H. Morse.

## EVOLUTION AND GENETICS

**(See 4, 25, 42, 44, 49, 51, 57)**

## FOOD AND FEEDING

**(See also 9, 55)**

**41. Overlap in foods and foraging of four species of blackbirds in the potholes of central Washington.** G. H. Orians and H. S. Horn. 1969. *Ecology,* **50**(5): 930-938.—Can two ecologically very similar species coexist in the same environment in the face of a shortage of mutually essential resources? This is one of the more hotly-argued topics in ecology. The present paper attempts to provide further insight into this question. It involves four species of blackbird: Brewer's (*Euphagus cyanocephalus*), Red-winged (*Agelaius phoeniceus*), Yellow-headed (*Xanthocephalus xanthocephalus*), and Western Meadowlark (*Sturnella neglecta*). These are all species of about the same size (roughly Robin-sized) that breed in the vicinity of artificial ponds in an arid part of the state of Washington. Major parameters studied were the areas in which the adults foraged and the food that they brought to their young. Food samples were collected by securing lengths of pipe-cleaners about the necks of young, so that they could not swallow the food that they were given by their parents. The technique is somewhat reminiscent of the one used by Chinese fishermen upon their captive fish-capturing cormorants. Orians and Horn apparently assume that the food fed to the young is comparable to that fed upon by the adults themselves, which may or may not be valid.

Of the four species considered, the meadowlark foraged quite differently from the others and hence was considered only briefly. In this locality, which consists of large areas of arid country and many ponds, that species fed almost entirely in the dry areas. It also obtained a large percentage of its food by digging in the earth with its bill, a technique seldom used by the other species.

Considerably greater similarities existed in the foraging of the other three species. Brewer's Blackbirds foraged regularly on the ground in areas with no vegetation or with short sedgy vegetation. Their long legs were advantageous to them there, and they were able to move about more agilely in such conditions than were Yellow-headed and Red-winged blackbirds. The shorter, sturdier legs of the latter two species facilitated their moving about in emergent vegetation by grasping vertical stems.

All three species demonstrated a definite daily periodicity that was closely tied to periods of availability of food. Emerging damselflies, which appeared primarily in late morning, were a major source of food. At this time the three species of blackbirds foraged most similarly to each other; at other times they demonstrated a greater degree of divergence. This observation is in accordance with several other studies indicating that when superabundant food sources are available, their consumers show more similarities in foraging than when food is in more limiting supply.

Indices of overlap were calculated for food choices and the areas in which the species foraged. These values may be helpful, but as Orians and Horn indicate, they are of limited value for interpretation if one does not have an excellent working knowledge of the species he is working with. Red-winged Blackbirds tended to be intermediate to the other two species in habitat utilization, and they displayed sizeable overlaps with them; the overlap between Brewer's and Yellow-headed blackbirds is smaller.

Finally, the data are compared with two theoretical analyses of MacArthur and his colleagues. First, these workers suggested that an organism might be expected to respond to competition by decreasing the number of patches in which it foraged but not to decrease the number of prey types that it caught. The

data available suggest that the blackbirds differed to a greater extent in their foraging habitats than in overall choice of food types. However until the existence of competition can be verified more definitely, such an interpretation appears a bit strained. MacArthur and his coworkers also have derived a criterion for the limiting similarity of coexisting species. The fit of the blackbird data with the maximum limit is very close.

This study makes a solid contribution to the steadily growing volume of data-filled papers upon interspecific ecological interactions. Soon we may hope to be at the point where we will be able to test theory adequately.—Douglass H. Morse.

**42. A quantitative study of the foraging ecology of Downy Woodpeckers.** J. A. Jackson. 1970. *Ecology,* **51**(2): 318-323.—Recently, considerable emphasis has been placed upon sexual differences in foraging behavior in birds, with the woodpeckers being particularly popular subjects for this sort of analysis. In the Downy Woodpecker (*Dendrocopus pubescens*), male and female (at least those in the Kansas study area) show definite differences in foraging; males tend to forage on small limbs, while females concentrate on large limbs and the trunk. Males also tend to feed lower than females. However, such differences are not clearly marked on dead trees, which may provide abundant food sources. In addition to the topics documented above, differences in foraging over the period of a year were also recorded (these were marked in some cases).

Other workers have commented upon the presence or absence of morphological differences between sexes that may be associated with different types of foraging behavior. While this subject is not treated in detail, Jackson states that this species is relatively monomorphic in its mensural characters. We thus can compare this information with that existing for species that show marked dimorphism in such characters as bill shape and length.

The usual discussion of the advantages of such a relationship (lessening of possible food competition between sexes) is included.—Douglass H. Morse.

**43. Ecology of Red-tailed Hawk predation in Alberta.** S. Luttich, D. R. Rusch, E. C. Meslow, and L. B. Keith. 1970. *Ecology,* **51**(2): 190-203.—Though much has been written on the beneficial or detrimental effects of our raptors, with few exceptions relatively little precise quantitative information exists upon the nature of their impact. The Red-tailed Hawk (*Buteo jamaicenais*), while being the most abundant large raptor in many parts of North America, is no exception to this rule. This study, the result of four years of work in central Alberta, attempts to document the effects of prey density and habitat type on the food habits of this species and also to assess its impact upon its principal prey.

Food habits of Red-tailed Hawks were determined by analysing pellets of the young and collecting prey remains about nests. After the young were old enough so that they did not require brooding, they were tethered on the ground for 3-4 weeks, which apparently did not result in changes in the amount of food brought them by adults, but extended the period of observation. When the young began to lose weight (interpreted as a sign of impending desertion by the parents) they were released. The assumption (always open to some question) was that this food was also representative of the adults' diets.

Red-tailed Hawks nested in a wide variety of habitats. These were roughly broken down to open, water, and forest-oriented, depending upon the habitat in the surrounding one and one-half square miles, the average size of a territory. Prey species were also categorized as coming from one of these three habitat types. Extensive concurrent work upon snowshoe hares (*Lepus americanus*), Richardson's ground squirrels (*Citellus richardsonii*), and Ruffed Grouse (*Bonasa umbellus*) was carried out; data obtained from these studies in fact are what distinguish the hawk work from many other less ambitious attempts to learn about them. The total requirements of the Red-tailed Hawk population were calculated in biomass. No direct information was available for the adults or the young after fledging; estimates are made from information available in the literature.

As suggested from the wide variety of habitats occupied, the Red-tailed Hawk is a very adaptable species. Further, pairs nesting in the different habitats tended to take the majority of their prey from that habitat. The wide range of habitats utilized in central Alberta may be the result of the absence of Red-shouldered Hawks (*B. lineatus*) from this geographic area.

Red-tailed Hawks fed largely upon mammals (primarily ground squirrels and snowshoe hares). These two species alone made up about one-half of the biomass of the diet; other mammals made up an additional 17% of the diet. Waterfowl contributed another 18%, while Ruffed Grouse added but about 3%. In the years of the study, fluctuations were noted both in hare and grouse populations; however, the breeding success of Red-tailed Hawks did not increase with high population densities of prey populations. This is in contrast to the well-known correlation of breeding success of arctic raptors with microtine cycles. The authors believe that in the variety of circumstances in which it was studied, the Red-tailed Hawk displayed a marked ability to utilize a variety of available prey items. This capability may be reflected in its less-marked responses to fluctuations in the level of the food supply than those found in arctic raptors. From the prey's point of view, the authors' calculations suggest that Red-tailed Hawks may be a factor of importance in regulating population of ground squirrels, though it is questionable whether they exert an important brake upon other species.—Douglass H. Morse.

**44. On the maintenance of a shell pattern and behavior polymorphism in *Acmaea digitalis*, a limpet.** J. T. Giesel. 1970. *Evolution*, **24**(1): 98-119.—Basically, this is a paper upon limpets, as its title suggests. However, birds are called upon in a pinch. Giesel attempts to account for the existance of polymorphism in a population of limpets on the Oregon coast. A light-colored morph is intimately associated with a white gooseneck barnacle (*Pollicipes polymerus*), while a darker morph is found on rocks. Where population levels are high, individuals rarely are found out of their appropriate places. Experiments on habitat choice demonstrated that they select the appropriate substrate with a high degree of predictability. While the morphs apparently interbreed freely, the intermediate forms in a year class become progressively rarer as they grow older.

Here is where the birds come in. In the presence of interbreeding, in order to maintain a bimodal distribution as observed, some sort of disrupting factor is called for. Studies by European workers on land snails of the genus *Cepaea* suggest that thrushes (*Turdus*) prey selectively upon certain individuals, thus providing such a factor. Giesel hypothesizes that bird predation is the key factor in the limpet situation also, though he provides only anecdotal information here to support this statement. References are cited to indicate that such species as Black Oystercatchers (*Haematopus bachmani*), Surfbirds (*Aphriza virgara*), and gulls prey on *Acmaea* and other inhabitants of *Pollicipes-Mytilus* beds. He further indicates that he has seen oystercatchers walking over the surface of rocks in the study area picking limpets both from the rocks and from the barnacles. High densities of oystercatchers and surfbirds coincided with the period of greatest disruptive selection. In situations where the gooseneck barnacles are less abundant, habitat separation of the two forms of limpets is less marked and the presence of intermediates greater. Such a situation would be predicted if the predators are attracted to the barnacles as searching places for prey, and if they searched out the areas of highest apparent prey density (apparently using the barnacles as cues?). Giesel does not state whether any or all of these species eat the barnacles (probably a question with an obvious answer to a marine invertebrate zoologist, but not to an ornithologist).

To verify the major causative agent acting in limpet predation, it is necessary to look farther; if birds are suspected, then they should be investigated in detail. This may get one far away from the original subject, but here it appears to be a necessity, if the conclusions drawn are to be strong ones. All of the suggestions made in this paper are quite reasonable ones; however, the parts involving avian predation are without strong documentation. One puts down this paper with the nagging feeling that limpet dimorphism has not yet been completely explained.—Douglass H. Morse.

**45. The responses of Redshank (*Tringa totanus* (L.) ) to spatial variations in the density of their prey.** J. D. Goss-Gustard. 1970. *J. Anim. Ecol.*, **39**(1): 91-113.—Though it remains a controversial subject, many agree that the food supply often can limit the size of an animal population. Verification of this generalization, however, often is difficult. It involves careful measurement of

food resources available, rates of exploitation by the species involved, and energetic demands of that species — all difficult values to obtain with a moderate degree of accuracy. In short, it involves a rigorous regime of field work, and with many species it just is not possible within reason to make such observations. Therefore, it behooves one interested in the general subject of food exploitation to pick species that can be studied readily. Goss-Custard chose the Redshank for this reason, since it occurs in large sumbers, can be observed readily on the tidal flats, and exploits a food source that can also be sampled readily.

This study, which spanned four winters, was conducted on the intertidal flats of the Ythan estuary in Scotland. Its primary purpose was to determine whether the density of Redshank and feeding efficiency (ingestion rate and effort expended in gathering food) were positively correlated with prey density. Theory suggested that the birds would aggregate in areas where prey density was greatest, and that feeding rate would increase with increasing prey density up to some ultimate point.

Though Redshanks take several species of food, an amphipod, *Corophium volutator*, was by far the most important species in the diet, comprising over 80% of the total ingested weight of food. The majority of the remainder of the diet was made up of a gastropod (*Hydrobia ulvae*) and a polychaete (*Nereis diversicolor*).

Local density of Redshanks on the flats increased with density and abundance of the amphipod. Since the amphipods were larger where they were more abunddant, it is not possible to state which factor (if either) is the governing one.

Feeding rate was calculated by determining peck rate and feeding success. No correlation occurred between peck rate and prey density. In one of the two transects feeding success increased as prey density increased; however, in the other it did not show such a correlation. Nevertheless, ingestion rate was positively correlated with prey biomass, and effort expended in collecting a given mass of food was greater in areas of high prey density than low.

The evidence thus suggests that Redshanks concentrate in areas in which they feed most efficiently. Goss-Custard then raises the question of why all Redshanks do not feed in such areas. One possible answer is that aggressive behavior among individuals causes the observed spacing. High densities may also cause the amphipod to withdraw into its burrows as a result of disturbance. Lastly, too high a local density might completely exhaust the food supply. The last alternative assumes that the species has a mechanism for monitoring the density of the food supply and regulating their activities accordingly.

This paper thus provides evidence for the hypothesis that Redshanks most often feed in the area in which food can be gathered most efficiently. Given the absence of ecologically similar species, one would predict this outcome; however, hard data for such seemingly obvious phenomena are often difficult to obtain. While the study points out many other ramifications of the general problem that should be investigated, it goes considerably beyond most studies of this sort.—Douglass H. Morse.

## SONG AND VOCALIZATIONS

**46. Vocal imitation and individual recognition of finch calls.** P. C. Mundinger. 1970. *Science*, **168** (3930): 480-482.—Observations on "individual adult European siskins *Carduelis pinus*, American gondfinches *Carduelis tristis*, and pine siskins *Carduelis pinus*", both in the field and in the aviary, showed that mates of these species learn each other's distinctive call notes and thus recognize each other. Experiments with play backs of call notes of these birds and of their neighbors showed that the incubating female responds only to the call note of her mate. Adult mates learn from each other, adopting one version from either repertoire; hence "learning of new flight notes is not limited to a critical period in the first year of life," as has been found in a number of other passerine species,, as the son sparrow *Melospiza melodoia*,chaffinch *Fringilla coelebs*, and others.

This interesting paper is illustrated with reproductions of flight notes of various pairs of these species, some showing similarity between those of mated pairs, others diversity between neighboring pairs.—Margaret M. Nice.

## PHOTOGRAPHY AND RECORDINGS

(See also 9, 64)

**47. Wildlife Portrait Series, No. 1.** U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife. Government Printing Office, Washington, D. C. 20402. $2.00.—This set of 10 beautiful color photographs (17" x 14") would cost a private citizen at least $50 made up from his own transparencies. If said private citizen could take these superb photographs he would spend thousands of dollars reaching the habitats of the subjects. Avocets, big horn sheep, bison, the black-footed ferret, Chachalacas, Pintails, pronghorns, Sandhill Cranes, Trumpeter Swans, and White Ibis with Snowy Egrets cannot be summoned from a model agency.

About four years ago when American publishers were rushing into print with outsized bird books, the Fish and Wildlife Service joined them and in some ways outdid them when it published *Birds in Our Lives*. Now when a double column of classified ads and other scattered ads in *Audubon Magazine* offer all sorts of prints—some good and some not so good—for all sorts of prices, the Fish and Wildlife Service, although it is not offering "signed by the artist limited editions," is offering magnificent photographs, each accompanied by a short informative text. Without any fanfare they may be collectors' items some day and they are the best picture buy of the year. My only criticism is: bands should be put on the legs of the White Ibis and Snowy Egrets.—Elizabeth S. Austin.

## MISCELLANEOUS

**48. George Petrovich Dementiev.** (Georgii Petrovich Dementev.) N. A. Gladkov. 1959. *Ornitologiya*, **2**: 289-294.—His passing 14 April 1969, at age of 71 years, marked the close of a career which to the western ornithological world at least constituted most of the recent history of Russian ornithology. Since his fiftieth anniversary a number of accounts of his scientific life have appeared of which this one by the leader of his many proteges is fully representative. Other accounts will be published so this note here will attempt only an appreciation of his role and his principal works. Offhand it appears that the only phase of ornithology to which he did not contribute in great amount and quality was bird artistry or portraiture, but he supported and encouraged several artists in the latter field. In every phase of serious study, from classical systematics to the most modern advances in bionics, bird-banding and orientation, he made leading contributions, to the number of over 300 papers in addition to books. His career began as recently as 1931, when he was put in charge of the bird division of the Moscow University Zoological Museum. Within a few years he converted it into about the leading ornithological center of the Soviet Union. Operant in this was a remarkable memory, a great facility in languages, with a buildup of worldwide contacts and literature exchange, with even his publications in journals abroad. It was no small sensation to one in the U. S. to send even a small publication to him and receive in acknowledgement a thankful note in English. An enthusiastic following was attracted at home. And in productivity: *Systema avium rossicarum*, Vol. I, 1935; with S. A. Buturlin, *Key to USSR Birds*, Vols. 1-5, 1934-1941; *Handbook of zoology, birds*, 1940: *Key to USSR Birds*, 1948, and 1964, revision; and by his great capacity for leadership, courtesy and tact the collaborative monumental *Birds of the Soviet Union*, Vols. 1, 2, 3, 4, 5, and 6, appearing within a space of 4 years, 1951-1954, often referred to in this country simply as "Dementiev", startling the western ornithological world with the evidence that that of the Slavic world was to be reckoned with. As with Sharpe and Ridgway before him, his original systematic interest was in raptorial birds; his thoroughgoing monograph of the Gyrfalcon, 1951, is a treasurered item. Other outstanding evidences of his organizational efforts are the Banding-Bureau in Moscow, and the All-Russian Conservation Society. Then more recently he figured in the initiation of the significant series *Ornitologiya*. During the recent war his division moved to Ashkhabad, Turkmeniya, where he furthered considerable work and interested students in the ornithology of Russia's southwest. In recent years his main efforts went to the conduct of a "Laboratory of Ornithology", at Moscow University. As if he had visited or received advice from that of Cornell University,

it was organized to serve not only collaborators and students, but outside scientists, game biologists, and amateurs, anyone interested in birds; for them were held weekly colloquia, and "ornithological Saturdays", which became traditional. And in the tradition there that a non-mammalogical ornithologist, or vice-versa, is rare he even produced a number of papers on fur-bearers.—Leon Kelso.

## Special Section on

## CHILDREN'S BOOKS

**49.** ***Birds Do The Strangest Things.*** Leonora and Arthur Hornblow. 1965. Random House, N. Y. 61 pp. Illus. by Michael K. Frith.— "Some owls look wise. Some owls look gentle. But don't be fooled by looks." It is an introduction to the Great Horned Owl and his relatives, but it could be an introduction to life. This book absolutely absorbed my seven-year old, who curls up with it over and over again. From it, he draws a store of information: after seeing some bats he quietly informed his mother that oilbirds also have a sonar system!

The book is a series of portraits about birds that literally do the strangest things: stay under water for long periods (loons), mimic (mocking bird and mynah), find honey (honey guide), hang meat (shrike) and so on. The text is accurate throughout, although the illustrations are sometimes not terribly bird-like. "Could they [the birds] be laughing at us? After all, people are strange and wonderful, too."—Jack P. Hailman.

**50.** ***Penguins: the Birds with Flippers.*** Elizabeth S. Austin. 1968. Random House, N. Y. 82 pp. $1.95. — This has got to be a bargain, containing as it does some magnificent photographs of the world penguins. It is a very authoritative child's book, probably geared to about age ten, although read aloud is appropriate for a much younger set. There is good history about antarctic exploration, and good natural history about penguins. The explanation of Latin names, although a good idea, was treated as a drag by my listeners. And similies such as "They wore a black band across their white throats, like the hat strap under the chin of a guard at Buckingham Palace" might have more effectiveness with British offspring (despite familiarity with the changing of the guards witnessed by Christopher Robin and Alice). Lest there be concern about possible backscratching among staff reviewers, let there be no doubt that if I thought this was a bad book, I would say so; it isn't, so I haven't. Mrs. Austin never gives in to the natural anthropomorphism commonly observed in zoo patrons watching penguins, yet avoids the pedantic over-organization of a didactic text.—Jack P. Hailman.

**51.** ***Birds that Stopped Flying.*** Elizabeth S. Austin. 1969. Random House, N. Y. 82 pp. $2.95. — Lapsing immediately into the vernacular, this book really turned my son on. There is something inherently fascinating about the evolution of birds from reptiles, which story opens this well illustrated book on the world's flightless birds. A seven-year old finds it difficult to grasp the evolutionary process, but one of the main points hits its mark: all of today's flightless birds had ancestors that *could* fly. I think this volume shows more sensitivity to the thought processes of children than the previous one (above): "When we see a bird perched on the limb of a tree, we very naturally think that it got there by flying. In most cases it did. Yet . . .". I never considered flightless birds as a subject about which to build a fascinating exposition of evolutionary adaptation; in fact, I have never seen any book devoted to flightless birds as a whole. Let us hope Mrs. Austin continues to pen books on fascinating birds.—Jack P. Hailman.

**52.** ***Bayou Backwaters.*** Allen W. Eckert. 1968. Doubleday, Garden City, N. Y. 155 pp. $4.95. — This book is "derived" (by some process left unexplained) from a television show entitled "Marlin Perkins' Wild Kingdom." There is a full page frontispiece photograph of Mr. Perkins, and a biography printed in the back. Presumably Eckert wrote the book from materials furnished by Perkins, who penned an introduction.

The book is a series of stories about the animals living in the bayou country

of Louisiana: the Louisiana Heron, armadillo, racoon, water moccasin, Anhinga, spadefoot toad and hognose snake, alligator snapping turtle, dragonfly, spotted skunk and alligator. Some animals that survive reappear in subsequent stories.

This is a children's book, asserted for grades 7 through 9. By empirical investigation, I found that, read aloud, it is a little old for a bright four-year old, and about right for a bright seven-year old (forgive parental vaunting). The stories are well written with occasional spurts of really fine prose. The emphasis is on the food chain of the bayou, and since this eats that continually it is not a book for children reared on the insipid anthropomorphism of Walt Disney animal stories.

The stories are amazingly factual, and give a good portrait of animal morphology, behavior and ecology. The illustrations are generally quite excellent, but there is one bad mistake. On pages 82-83 the painting ostensibly depicts the female spadefoot coming to mate with the calling male of her species, but someone gave the artist the wrong photograph to copy for the male. Instead of being a spadefoot, with a vertical pupil (which the text correctly says characterizes these amphibians from all other American anurans), the male is in fact a *Bufo* toad, complete with horizontal pupils, parotid glands, warty skin and brown coloration!

My only real complaint is the tremendous overemphasis on predator-prey relations in this excellent volume. Emphasis might have been spread among courtship, feeding by herbivores, protection from the elements, reproduction, growing up of the young and such things. On the whole, though, this is a book the likes of which we need more of.—Jack P. Hailman.

## BOOKS AND MONOGRAPHS

**53.** ***Peregrine Falcon Populations: Their Biology and Decline.*** Joseph J. Hickey (editor). 1969. Univ. of Wisc. Press, Madison. 596 pp. $10.00 — Once in a great while some ornithological volume becomes a classic even before we can review it. This book is an example. A conference was organized in mid-1965 to assess the status of *Falco peregrinus*; in a moment the results of that conference. Nearly every corner of the globe once had as either a breeding or winter resident one or another of the forms of the peregrine (the specific status of some forms is still under study). Not only is it world-wide, but also as handsome a bird as one could ask for. It may also be the fastest flier in the world. And now it has become the very symbol of man's destruction of his environment and the beauty it holds.

I remember the first peregrine I ever saw: he was sitting on the now defunct Willard Hotel, two blocks from the White House in Washington, D. C. I suppose he did his share of cropping the pigeons and starlings that so plague the nation's capital. My elder son has seen a peregrine, but the younger one may never. This book documents why.

There are five principal parts, following an introduction by Hickey and Anderson: status and trends of the populations, population trends in other reptors, behavior and ecology of raptors, population ecology, and a roundtable summing up and discussion of the results and problems. Although every effort was made to dissect out the entire complex of causes contributing to the peregrine's decline, the blame clearly rests primarily with biocides.

This book is not just an ecological horror story, albeit it is that in part. It is also one of the finest studies of a species of any kind of living organism It is also a photographic study of beauty, which includes Arthur Allen's famous picture of a peregrine at Taughannock Falls, N. Y. — which perhaps rates as one of the finest photographs ever taken of a bird. And it is a book about basic and applied science. The transcript of discussions demonstrates the inquiring, probing nature of scientific minds interacting in a way that no summary could ever convey.

Hickey opens the volume with several quotes, among them this from Matthew Stevenson (1660): ". . . I confesse them somewhat out of my Road, but I assure you to pleasure you and satisfie myself, I have consulted the most approved Authors and given you here the creame and marrow of their severall experiences in their own expresse characters."—Jack P. Hailman.

**54.** ***A Paddling of Ducks.*** S. Dillon Ripley. 1969. Smithsonian Institution Press, Washington, D. C. 256 pp. $5.95. — We note briefly the reprinting of

the 1957 book published by Harcourt-Brace, in the event that you missed it the first time around. It is a personal account of Ripley's quest to learn about and conserve the world's waterfowl. It includes accounts of his travels and the building of his famous collection of waterfowl in Connecticut. Of special interest to me was the recalling of his development of interest in birds, and participation in the successful effort to restore the Wood Duck as a regular member of the avifauna. The many drawings by Francis Lee Jaques are of the usual excellent quality. The volume was penned well prior to Ripley's becoming Secretary of the Smithsonian Institution, and one hopes that he will upon retirement give us an equally personal and informative account of world conservation efforts from the viewpoint of one in great authority.—Jack P. Hailman.

**55.** ***How to Attract, House & Feed Birds.*** Walter E. Schutz. 1970. Bruce Publishing Co., N. Y. 196 pp. $7.95.— When getting this book first remove and dispose of the dust jacket and then tear out the first 40 pages. What remains is well worth owning. The dust cover is a photograph of a chickadee so washed with red that his cap is maroon. The typography in this book gives the impression of 1940 vintage, which wasn't a particularly good year, and the photographs throughout are nearly uniformly lousy. The first 40 pages are essentially fill-material about bird watching as a hobby. Do not mistake me, I object not to the subject matter, but to the execution. Such matter can be either enchanting or informative (rarely both); here it is neither. A table about the food of birds is credited to the Agriculture Department in the text and to the Interior Department in the title, but in neither place can one get the exact source. Most of the photographs look as if they might have been taken by Matthew Brady, and I'm convinced the one of wild turkeys is a fraud, though I can't *prove* the birds are stuffed. The section on "equipment needed" spends eight lines telling you nothing about binoculars, when it could briefly recommend center focus, coated optics and about seven power as a starter for bird watching. The sketches of species (pp 23-30) add a humerous touch: ever see a peewee with a spike-like upturned bill, or a junco with a tail longer than body plus head?

Not convinced? How about evidence of the hasty paste job? On page 14 the author asserts "In another part of this book I pointed out the difference between Ornithology and Bird Watching" (caps his). That "other part" is page 13 (bottom) and the previous paragraphs on page 14. Or how about the last page of text (p. 194): "To help you in identifying birds by their song, as suggested on page 000, you can . . ."? On page 38 the author talks about leaving town for several weeks and finding the birds were no longer coming to his empty feeder when he returned. (They were probably dead.) And counting seems to be a problem: ". . . use the six-syllable word and name yourself an 'ornithology' society." (p. 39).

So save yourself confusion and agony by beginning on page 41. The first section of meat is plantings that attract birds: trees, shrubs, vines and ground cover. The next is on food and how to prepare it, with many excellent tidbits. Then comes building of bird feeders, and the author is really in his element. The feeders are attractive, and each is explained by a blueprint, photograph, bill of materials and a text. How to provide water follows (including a section on dust for dust bathing!) Lastly comes housing, as clever and clear as the section on feeders. The pictures and text tell you how to take apart an orange crate to use the wood (It's not as easy as some think), how to saw correctly, etc. At the end there are some lists: wildlife conservation organizations (called "agencies" although none is governmental), references (in which only the last name of the senior author plus an abbreviated title is given, which may create problems) and lastly a list of periodicals (yes, *Bird-Banding* is there).

If this book sounds vaguely familiar, it may be because you read the first edition, entitled *How to Build Birdhouses and Feeders* (1955). Or perhaps you saw the second edition, called *Bird Watching, Housing and Feeding* (1963). (The word "and" was spelled out in previous titles.) Any guesses as to the title for the next edition? — Jack P. Hailman.

**56.** ***The Birds of Tikal.*** (*Las Aves de Tikal*). Frank B. Smithe. 1969. Asociacion Tikal, Guatemala City, Guatemala. 376 pp. paperback. $3.00 (In Spanish) — This is a Spanish edition of a 1966 book (not seen). It is a pocket-sized field guide, in the "Peterson-style" with arrows pointing out key identification features on the color plates of birds that live in an area of central Guatemala.

The colored illustrations, by H. Wayne Trimm, are far better than those usually appearing in such guides. There is a short description of each species, giving notes on its size, status, calls, ecology coloration etc. There are some interesting photographs including ruins of temples in the forest sprinkled through the book, and an appendix on hanging nests. The guide may be ordered from the Asociacion Tikal (Avenida de las Americas 6-19, Zona 14, Guatemala City), which is a non-profit organization supporting local interest in conservation and archeology. Since many of the species covered in this guide are widely distributed, any traveler to Central America would do well to have a copy of this fine volume.—Jack P. Hailman.

**57.** ***The evolutionary ecology of animals.*** *(Evolyutsionnaya ekologiya zhivotnykh.)* S. S. Schwartz. 1969. Akademiya Nauk, SSSR, Uralskii filial, Sverdlovsk. 199 pp. 8 figures, 13 tables, bibliography of 765 titles. 1 rouble, 55 lopecks (about $3.50 U. S.) (In Russian).—Taking for example other recent texts this could well be titled "Ecology and the origin of species." In recent sessions of the USSR national academy, the author of this book was the only vertebrate zoologist elected to high rank, and his recent 50th birthday was celebrated in a number of journals. This publication is the *magnum opus* of the author, who heads his own laboratory and school of collaborators. While spatial structure of vertebrate animal populations has received much attention there and abroad, his principal faith is in age structure as a major factor in animal speciation. While the species is the basic level of living matter, the population is the simplest unit in which a species can survive. A rapid rise in numbers, along with resulting age stratification, and perhaps other, e.g. ecological and dispersal factors, results in alteration of the genetic structure, eventual fractionation of the population, and finally, speciation. "Change in numbers is inevitably accompanied by alteration of population quality" (p. 18). "Abrupt change in numbers is the most important factor in population transformation" (p. 171). Thus we have another warning against indefinite increase and concentration of human or any other populations. The conspicuous brahminism, or caste-and-classism of India or even our eastern seaboard, along with human swarming, would but little weaken his argument, to say nothing of the "flower children" and other elements branching off among us. Anyway his purported discovery of the missing link between environment and transformation and transmission of genetic diversity, with eventual production of new species, suggesting means for human control of evolution, supported by much field and laboratory research over 20 years time, all in all finds much favor over there. The author's arguments are very well organized systematically, reinforcing his theories from a variety of approaches, and by frequent citations from American, English and other researches on birds and mammals.

There is an introduction and seven chapters: Genetic fundamentals of population transformation; Ecological evaluation of interpopulation diversity; Population transformation.—Homeostatic alteration of population genetic structure and microevolution; Ecological mechanisms of maintaining genetic diversity of populations; Ecological mechanisms of transforming genetic structure of populations; Speciation; and Ecological essentials of macroevolution, and a very graphically concise chapter of Conclusions. This is evidently a major contribution to evolutionary theory.—Leon Kelso.

**58.** ***Biological Conservation.*** Ehrenfeld, David W. 1970. Holt, Rinehart and Winston, N. Y. 226 pp. — The author opens his preface with the thought that "No academic subject can be said to have come of age until textbooks have been written about it." This is the first, and although it will not be the last, it is a good opener. It is a paperback designed to be used with other paperbacks to form text material for a college course, but it stands on its own two covers as a volume for anyone interested in how basic ecology and practical conservation are related.

The plan is simple: after an introduction there is a discussion of how natural communities are threatened and various species endangered. A chapter is devoted to the case history of the blue whale. Then suggestions are made based on ecological study. The text is punctuated by some really interesting photographs, such as that of John Muir in a redwood forest and Arthur Allen's famous picture of the Ivory-Billed Woodpeckers on the Singer Tract in 1935. In what must rate

as one of the master-strokes in subtle political symbolism, figure 2-6 shows "before" (1949) and "after" (1969) photographs of Biscayne Bay, Florida.

To both my surprize and embarrassment, I learned a great deal from this little book, since it ties in and summarizes so well the problems facing the environment and the creatures that live in it. For anyone who wishes to achieve an authoritative overview of the conservation problems before us, I heartily recommend this volume as a starter.—Jack P. Hailman.

**59.** ***The Lady and the Sharks.*** Eugenie Clark. 1969. Harper and Row, New York. 269 pp. — O. K., so there isn't very much about birds in it: still, it is a fascinating and unusual account of a woman marine biologist and her life as director and scientist of a coastal laboratory in Florida. You'll learn from reading this book about training sharks, hermaphroditic fish, schooling of rays and other subjects that are bound to fascinate those of us who love the birds and other creatures of the sea. The book recounts what must certainly be one of the more unusual recoveries: a banded gull found inside a dissected shark.—Jack P. Hailman.

**60.** ***Field Studies in Natural History.*** 1970. Van Nostrand Reinhold, N. Y. 215 pp. — The American Museum's *Natural History* is a monthly of the *Scientific American* genre, and, like the latter, the former has now collected some of its articles for republication in book form. This paperback includes a number of reprints on birds, all relevant to the natural lives of animals, but not all "field studies" as the title suggests. There is no readily discernable order or grouping to the articles.—Jack P. Hailman.

**61.** ***The Wild Falcon is My Companion.*** (Der wilde Falk ist mein Gesell.) Renz Waller. 1937. 403 pp. J. Newmann, Neudamm, Germany.—I am indebted to Robert Stabler of Colorado College, Colorado Springs, Colorado, for his kindness in correcting the reference that I quoted in my review on p. 57 of the January 1970 issue of *Bird-Banding*. Mr. Stabler wrote me: "I have my copy of this really amazing book before me." So here is the *correct* reference to what appears to be the earliest published record of the breeding of a falcon in captivity.

While we are on the subject of breeding of raptorial birds, Sergej Potstypalsky reports in *Raptor Research News*, 4(1): 3, 1970, that White-tailed Eagles [Gray Sea Eagles (*Haliocetus albicilla*) have bred successfully in the Scheonbrunn Zoo, in Vienna, Austria since 1961. "The adults were obtained in 1955 when still in immature plumage. Patuxent Research Center, which now has over a dozen bald eagles ought to get on the ball and try breeding them. It can be done!".—Margaret M. Nice.

**62.** ***An Extensive Bibliography on Falconry, Eagles, Hawks, Falcons, and Other Diurnal Birds of Prey.*** Richard R. Olendorff and Sharon E. O. Olendorff. 1968. Three volumes, privately printed; limited edition of 1000 copies; Olendorff, Ft. Collins, Colorado. 244 pp total.—With the current emphasis on a last-ditch stand to save the birds at the top of the food chain from environmental poisoning, this very extensive bibliography should prove a great help to researchers. The first volume covers falconry (section 1) and eagles (sec. 2); the second hawks and miscellaneous (sec. 3); and the third falcons (sec. 4) and ospreys (sec. 5), including addenda (sec. 6). The authors make it plain that they have no claim to completeness, although the apology is hardly necessary. We all know how useful lists of this sort can be, so that extensive thanks are always due the unsung heroes who compile the bibliographies and indices for ornithology.—Jack P. Hailman.

**63.** ***Systematic Biology: A Survey of Federal Programs and Needs.*** Panel on Systematics and Taxonomy of the Federal Council for Science and Technology. 1969. Office of Science and Technology, Executive Office of the President. 106 pp. (For sale by the U. S. Gvt. Printing Office, Washington.) $1.25. — Systematics sometimes seems to be at the bottom of the biological peckorder, yet in a sense it is better thought of as being at the core of the biological endeavor. Not only is it absolutely necessary to have a taxonomy for naming and sorting animals, but true systematics summarizes phylogenetic relationships

and evaluates all the morphological, behavioral, physiological and ecological adaptations of organisms. This volume is about the need for systematics and the need for federal support of it.

The practical significance of taxonomy in crop improvement, mineral prospecting, national defense, and quality of the environment is discussed, and an historical perspective of federal support since the 1803-04 expedition of Lewis and Clark is included. Expenditures, in both time and money, are given for major federal agencies, and sketches of federal programs are laid out. The emphasis is on insects, parasitic worms and plants, but those concerned with avian systematics may find this report valuable.—Jack P. Hailman.

**64.** ***Flying Birds.*** David and Katie Urry. 1969. Harper and Row, N. Y. 192 pp. $7.95.— I marvel at those able to produce any work that is successful simultaneously at two or more levels. This is a book explaining clearly and simply that which is understood about bird flight, but it is a so a gallery of unusual and beautiful photographs of birds. It begins with an accurate non-technical account of how birds fly, with simple diagrams of wings and feathers. Then it passes quickly into a wonderful series of generously-captioned photographs of birds in flight. The bulk of the volume is on "summer shores and islands," being studies of alcids, terns and gulls, gannets and other seabirds. A short section on "winter shores and marshes" follows, with photographs of shorebirds, swans and geese. Then "winter in the city" with pigeons, gulls and starlings, concluded by "winter fields and trees" starring geese, starlings, gulls and rooks.

Nearly every photograph is a masterpiece. Some of my favorites are the Puffin landing with at least four fish in its beak (p. 29), the Arctic Terns in "dread" flights (pp. 72-73), the flock of boldly marked Turnstones moving away from the camera (p. 125), a somewhat similar portrait of Oystercatchers (p. 130), the incredible mass of pigeons in Trafalgar Square (p. 153), the pair of gulls (p. 161) and the Rook landing at its nest (p. 186). The short terminal section on "photo technique" will be of interest to every would-be photographer of birds.

Since it is primarily their ability to fly that makes birds so interesting to man, it is about time someone concentrated on this ability photographically. This volume is a magnificent record of flight, birds, photography and artistry. Who could ask for more?—Jack P. Hailman.