RECENT LITERATURE

Edited by Bertram G. Murray, Jr.

BANDING AND LONGEVITY

1. Inequities of early and late broods of the Chaffinch (*Fringilla coelebs*) on the Courish Spit. (Neravnoznachnaya rol rannikh i pozdnikh vyvodkov v podderzhanii populyatsii zyablika na Kurshkoi Kose.) L. Sokolov. 1975. *Z. Zhurn.*, **54** (2): 257-265. (In Russian with English summary.)—Sightings of 147 banded nestlings showed general persistence at the nest site for 2 to 3 weeks after fledging. By the middle of August, at age 40 days or more, most banded young had left the Spit. Of 1,153 other banded juveniles were 100 returns (8.6%). Retrapping of early summer broods was greater (11.8%) than for late broods (5.7%). Of 4,740 banded in this area, local-breeder returns totaled 430 (9.1%). Of these, birds banded from late June to early July also gave higher returns (11.1%) than those banded later. It is suggested that the lower return ratio of late broods is due to higher mortality.—Leon Kelso.

MIGRATION, ORIENTATION, AND HOMING

(See also 18)

2. Recent changes in chronology of spring Snow Goose migration from southern Manitoba. H. Blokpoel. 1974. *Can. Field-Nat.*, **88**: 67-71.—Snow geese have migrated north 4 to 6 days later in recent years than during the period 1923–1937. Temperatures near the migration staging areas close to Winnipeg have declined slightly in recent years, but Blokpoel feels that this factor is not responsible for the later migration dates. Lower temperatures from June to August at Baffin and Southampton Islands have shortened the breeding season at these sites, possibly accounting for the later northward migration.—Edward H. Burtt, Jr.

3. A new method for recording migratory restlessness in caged birds. D. Czeschlik. 1974. *Experientia*, **30**, 1490–1491.—This is an important paper for all who have worked on or will work on Zugunruhe or migratory restlessness in caged birds. Zugunruhe has often been measured in units of locomotor activity or more specifically perch-hopping activity, but Czeschlik emphasizes in this paper the importance of "whirring" by caged migrants as an index of Zugunruhe, suggesting that it might be a more specific expression of migratory drive. He used Garden Warblers (*Sylvia borin*) and Blackcaps (*S. atricapilla*), two species known to show intense whirring during nocturnal migratory restlessness. During whirring the birds trip sideways to and fro on the perch with the axis of the body inclined at an angle of about 45° to the plane, beating vigorously with their wings.

By constructing a switch that responded to air movements Czeschlik compared whirring activity with simultaneously recorded hopping activity. The results show considerable differences in the duration of these two types of nocturnal restlessness under various night-light intensities. With night-light of 5.0 lux, both species exhibited more perch hopping and less whirring than on darker nights. Under very weak night-light intensities of 0.0005 lux, Blackcaps often showed no hopping and only whirred throughout the night. In complete darkness, Garden Warblers showed whirring with very little hopping, and Blackcaps were inactive. The results have an important implication for past and future studies of Zugunruhe, particularly those that have used complete darkness to suppress nocturnal activity as a part of an experiment (see E. Gwinner, *Naturwissenschaften*, **61**: 405, 1974).—Sidney A. Gauthreaux, Jr.

4. Recoveries after displacement in pigeons belonging to an urban population. G. Chelazzi and F. Pineschi, 1974. *Monitore Zool. Ital.* (*N. S.*), **8**: 151-157.—Virtually everyone is familar with racing and homing in pigeons (*Columba livia*) and most are aware that these birds are carefully selected and bred for these traits. This paper gives an answer to a question that has crossed my mind on more than one occasion: How do the homing abilities of "wild" urban pigeons compare with those of pigeons that have been selectively bred for homing for many generations? The answer to this question attests to the validity of artificial selection and breeding as a means of enhancing otherwise weakly developed traits.

At a minimal release distance (an average of 12.5 km), 42 out of 240 pigeons were recovered, the majority (38) of these in the city of origin. At a greater distance (an average of 77.7 km), 59 of 343 pigeons were recovered, for the most part (52) outside the city of origin. In the latter case an analysis of the recovery directions revealed a slight tendency to orient towards home, a direction that could help the birds in their search for known topographic landmarks. The authors hypothesize that the homing performance of these animals is limited above all by the low motivation for immediate return to their place of origin coupled with the birds' inability to undergo long flights.—Sidney A. Gauthreaux, Jr.

5. The importance of optical parameters for homing in pigeons. (Untersuchungen über die Bedeutung optischer Parameter für das Heimkehrverhalten der Brieftaube.) H.-J. Schlichte. 1973. *Z. Tierpsychol.*, **32**: 225-256. (In German with English summary.)—Plastic contact lenses that allowed the entire ultraviolet-visible spectrum, only the longer visible wavelengths, both long wavelength and UV, or UV-blue and some near infrared did not impair homing, nor did lenses with restricted fields of view. Frosted lenses impaired homing, and from training experiments apparently birds can localize the sun's position but would have difficulty recognizing specific topographical sites. Training experiments suggest that the homing pigeon can locate the sun behind scattering material about as well as can the human observer.—Jack P. Hailman.

POPULATION DYNAMICS

(See 19, 47)

NESTING AND REPRODUCTION

(See also 12, 14, 19, 20, 41, 48)

6. Mating behaviour of Brown Kiwi in captivity. B. Rowe. 1974. *Notornis*, **21**(4): 384-385.—Copulatory behavior of *Apteryx australis mantelli* is quite like that of the common domestic fowl. There is no display, either visual or vocal.—Leon Kelso.

7. Morpho-ecologic adaptations in early embryogeny of birds. 1. (Morfo-ekologicheskie adaptatsii v rannem embriogeneze ptits . . .) 1. I. Zusman, A. Bragin, and S. Lyashenko. 1975. *Z. Zhurn.*, **54**:(2) 244-256. (In Russian with English Summary.)—This report covers the years from 1928 to 1973 of the Lapland Reserve collaborators' work on the Goldeneye (*Bucephala clangula*), including observations on 294 nests, with the history of nine nests tape recorded completely. The main point of concern is the role of discontinuous incubation during the early days of egg-laying. At the moment they are laid eggs are at the "discoblastula" stage, i.e., in the middle of the first stage of gastrulation. This and many corroborative details are elaborated and supported by refined micro-histologic techniques. Discontinuous incubation, due to alternate cooling and warming of the egg as the sitter alternately broods and leaves the clutch during egg-laying, insures development of the embryo through the "early germ disc-primitive streak" stages. Continuous incubation begins with deposition of the next to last egg, but rate of development of birds within a clutch is not equal.—Leon Kelso.

8. Breeding and ecology of the Black-tailed Godwit in eastern Siberia. (O gnezdovanii i ekologii bolshovogo veretennika (*Limosa limosa melanuroides*) v vostochnoi sibiri.) V. Tolchin and U. Melnikov. 1974. *Biol.*

nauki, **1974**(11): 27-30. (In Russian.)—Miscellaneous notes are given on 17 nests found in Selegin River delta. Bulk of egg-laying was in late May to early June in dry cattle-trodden meadows near water. Nests were in small colonies or single. Food was chiefly of carnivorous and coprophagous insects taken from cattle excrement.—Leon Kelso.

9. Sapsucker nest holes and their use by other species. A. J. Erskine and W. D. McLaren. 1972. *Can. Field-Nat.,* **86:** 357-361.—The authors suggest that Yellow-bellied Sapsuckers (*Sphyrapicus varius*) utilize aspens (*Populus tremuloides*) in proportion to the availability of these trees and because of the susceptibility of aspens to *Fomes* rot.

Potential competitors for nest-sites are few. Hairy Woodpeckers (*Dendrocopos villosus*) and Three-toed Woodpeckers (*Picoides* spp.) are scarce. Sapsuckers dig through two inches or more of healthy wood to reach rotten heartwood, considerably more digging than is done by Flickers (*Colaptes auritus*), the only other common woodpecker in the area surveyed. Sapsuckers excavate new holes annually and therefore Tree Swallows (*Iridoprocne bicolor*), chickadees (*Parus atricapillus* and *P. gambeli*), and Red-breasted Nuthatches (*Sitta canadensis*) that occupy used holes are not nest-site competitors. In the southern part of the range flying squirrels (*Glaucomys volans*) often occupy abandoned sapsucker holes, but the larger northern flying squirrel (*Glaucomys sabrinus*) is too big to enter sapsucker nest cavities. Starlings (*Sturnus vulgaris*) displace flickers from active nests, but because of the availability of flicker holes, Starling-sapsucker interactions are infrequent.

In addition to a lack of nest-site competitors sapsuckers have few nest predators in the study area. A few nests were robbed by weasels (*Mustela erminea*), but the various species of squirrels present were too large to enter, and raccoons (*Procyon lotor*) were absent. Bears (*Ursus americanus*) tore open a few nests, but the thick-walled nests sometimes withstood these attacks.

Evolution of the sapsucker nest remains an interesting problem. As suggested by the authors, the answer may lie with more southern populations where the selection pressure of predation or competition for nest sites may be more intense. The possibility of wind toppling partially hollowed trees should also be considered a factor in the evolution of thick-sided nest cavities.—Edward H. Burtt, Jr.

10. Biology of the Ilisk Ground Jay. (K biologii Iliiskoi Saksaulnoi Soiki.) V. Arakelyants. 1974. *Byull. mosk. obshch. isp. priorody, biol. div.,* **79**(4): 27-33. (In Russian with English Summary.)—This summarizes several years of field observations of *Podoces panderi ilensis*, a desert dwelling corvid in Kazakhstan. Its nest is distinctive. Built low or on the ground, the nest is compact, spherical, and roofed over, having two lateral openings, used alternately for entrance and exit. The species is non-colonial, nesting sites being 1 to 4 km or more apart.—Leon Kelso.

11. Cactus birds. M. Keasey, III. 1974. *Pacific Discovery,* **27**(6): 10-14.—That apparently defensive and protective structures do not always protect or repel is too familiar an observation to deserve repetition. The Cactus Wren's (*Campylorhynchus brunneicapillus*) accomodation to cactus spines is an example. Other birds similarly adapt, as related here and proven with excellent photographs. A preferred cactus host is "jumping cholla" (*Opuntia fulgida*). Cactus dwellers include Curve-billed Thrasher (*Toxostoma curvirostre*), Bendire's Thrasher (*T. bendirei*), Mourning Dove (*Zenaidura macroura*), White-winged Dove (*Zenaida asiatica*), Inca Dove (*Scardafella inca*), and House Finch (*Carpodacus mexicanus*). Their nest sites, however, are not the safest because they do not secure eggs and young from various species of "racer' and "gopher" snakes.—Leon Kelso.

BEHAVIOR

(See also 5, 6, 10, 17, 27, 28, 41, 45, 46, 47, 48)

12. Colonial nesting and social feeding as strategies for exploiting food resources in the Great Blue Heron (*Ardea herodias*). J. R. Krebs. 1974. *Behaviour,* **51:** 99-131.—The first conclusion is that the distribution of time-intervals between departures of birds leaving the colony to feed has too many short intervals to be random; hence the author suggests that "the birds were not departing independently of one another" (p. 107). Several problems emerge. First, departures depend upon the tidal level and the author's "adjustments" in the data to account for this factor are intuitive and open to question. Second, the distribution utilizes class intervals of departure times, a lumping that could seriously distort the analysis performed. Third, the actual, rather than cumulative, distributions are plotted; the latter would eliminate the need for lumping into classes and provide a much truer picture of where the distribution departs from the exponential decay. Lastly, even if the result holds up under a more sensitive analysis, there are other interpretations of the result (one being pointed out by the author in a footnote).

The second set of conclusions attempts to show that neighboring birds tend to leave the colony together, as judged by whether a close bird is more likely to leave after flight of a given bird than is a bird more distant in the colony. This comparison assumes implicitly that the inter-departure times are everywhere the same, and I doubt this for several reasons. For example, breeding cycle synchrony is greater in proportion to nearness of nests, so that if state of the cycle influences feeding (which has been shown in so many other birds), then the difference found by Krebs may be due to causes other than those to which he attributes them.

A third set of conclusions was derived from experiments in which zero, one, or five heron models were placed in a tidal pool to see if they attracted other herons. Unfortunately, the models were always placed out during the middle of an observation period, not randomly in time, nor were the control data broken down into the "before models" and "after models" periods so that one could be assured of the validity of the control data. The results are that more herons and a greater percentage of those flying over landed when the models were present.

Finally, food intake per unit time and percentage of successful strikes rise for individual birds as the group size increases,u ntil reaching an apparent asymptote at about 20 birds. However, the observations were not taken in a single pool, and it may be simply that when fishing is good more birds come to the good area.

The author tries to build a case for the colony's being an "information center" about feeding, birds cueing upon one another to increase their feeding efficiency. The idea may indeed be correct but no single set of data is convincing, and it becomes the reader's decision as to whether the whole of the evidence in this case is greater than the sum of its parts.—Jack P. Hailman.

13. Development and object fixation of some behaviour patterns of the Barheaded Goose during its first four days of life. (Die Entwicklung der Objectfixierung einiger Verhaltensweisen während der ersten vier Lebenstage bei der Streifengans *Anser indicus* (*Eulabeia indica* Latham). I. Würdinger. 1974. *Z. Tierpsychol.*, **35**: 209-218. (In German with English summary.)—Unfortunately "Objektfixierung" transliterates badly because "object fixation" in vision studies already means one thing and in psychology another. Here the author means the process by which the range of stimulus-objects to which a bird responds narrows during ontogeny (a concept related to my "perceptual sharpening"). Four responses of goslings were investigated over the first three days of life, during which the birds are still in the nest. Goslings "greet" parent-like objects with calls and imprint to them at about 13 hours post-hatch; beginning about 18 hours they learn individual characteristics of objects and by 36 to 40 hours respond differentially to parents and siblings. When exiting the nest at 56 hours they usually, therefore, recognize their own family and are attacked by goslings of another family if they make mistakes. Crawling under the wing and pecking at objects were also studied. This could have been a more exciting study if a stronger curiosity about the factors of ontogenetic changes were manifest and if something other than the "instinct" literature had influenced the observations.—Jack P. Hailman.

14. Extramarital courting in Lesser Black-backed and Herring Gulls. M. H. MacRoberts. 1973. *Z. Tierpsychol.*, **32**: 62-47.—In *Larus fuscus*, and less commonly in *L. argentatus*, a male of one territory will sometimes attempt to copulate with the female of an adjacent territory. Uncommon between 1962-

and 1965, the behavior rose in frequency during 1969 through 1971 when the density of the colony doubled. Females do not cooperate, and no sperm transfer takes place.—Jack P. Hailman.

15. The influence of some experiential and genetic factors, including hormones, on the visible courtship behavior of Budgerigars (*Melopsittacus*). B. F. Brockway. 1974. *Behaviour,* **51**: 1-18.—Various hormonal treatments were given isolated birds to find the effects on several precopulatory behavioral patterns. About the only reasonably clear result was that blood estrogen levels promoted "solicitng for copulation" in females. Other results are extensively discussed.—Jack P. Hailman.

ECOLOGY

(See also 8, 9, 12, 21, 41, 42, 43, 44, 47, 48)

16. Habitat selection of breeding birds in an east Tennessee deciduous forest. S. H. Anderson and H. H. Shughart, Jr. 1974. *Ecology,* **55**: 828-837.—This is the second paper on habitat selection in breeding birds that uses the technique of gathering data on many variables of the structure of the vegetation for many small plots (0.08 acre in this case), considering the presence and absence of a large number of species of birds, and then determining the responses of the species to the vegetation by discriminant functional analysis and principal component analysis (see F. C. James, *Wilson Bull.,* **33**: 215-236). By means of separate univariate analyses of variance, estimates of the relationship between 28 vegetational factors and abundance categories of 28 species of birds were made. These permitted interesting insights into the species-specific responses of the birds to certain characteristics of the understory, subcanopy, and canopy. Next, discriminant function analyses were run for each of 13 species to determine which combination of factors was the best linear predictor of the abundance of species on the plots. Correlations with the originally measured variables are given. Finally, a principal component analysis is used to reduce the 28-dimensional vegetational space to three dimensions, and the species are located within it. I find this approach to the study of the distribution of birds more complex and insightful than studies in which a "community" of species is considered to occupy a single "habitat."

There are a few minor errors. The results of the univariate analyses were not used to eliminate unimportant variables, although this was stated as a goal. The correlations between the abundance of Hooded Warblers and the density of understory vegetation (Table 4) are negative and are misinterpreted in the text. The principal component axes should have been labeled in terms of the contributing vegetational characteristics, and the fact that the birds cluster in the middle of the plot (Fig. 1) is due to the analysis itself, not to any special response of the birds to their habitat.—Frances C. James.

17. Studies of the guild of ant-following birds at Belem, Brazil. Y. Oniki. 1972. *Acta Amazonica,* **2**(1): 59-79.

Studies of ant-following birds north of the eastern Amazon. Y. Oniki and E. Willis. 1972. *Acta Amazonica,* **2**(2): 127-151. —The army ant (*Eciton burchelli*) ranges the neotropics from Mexico to Argentina and is the major arthropod followed by birds. As described here, its swarming masses are not as formidable as stories and movies would have us believe. At Belem 7 species of "professional," or regular, and 37 species of "nonprofessional," or casual, birds occurred in the "guild" of ant-followers. They were mostly woodcreepers (Dendrocolaptidae) and antbirds (Formicariidae). In the eastern Amazon 9 regular and 45 causal species comprised the guild. The regulars were 2 smaller antbirds, 2 medium-sized antbirds, and 5 medium-sized to large woodcreepers. The casual group included 16 antbird, 5 woodcreeper, and 5 manakin species. Antbirds usually take horizontal perches, whereas woodcreepers take vertical perches. Larger birds usually drive off the smaller. The casual species foraged briefly and peripherally, during or slightly after the regular species, and more frequently at forest edges or in second growth.—Leon Kelso.

18. Notes on ecology of the Crimean Chaffinch. (Zametki ob ekologii krymskogo zyablika, *Fringilla coelebs solomkoi.*) G. Noskov, T. Rymkevich, A. Shibkov, and D. Nankinov. 1975. *Vest. Leningr. Univ.*, **1975**(3): 11-16. (In Russian with English summary.)—Although larger overall than the common Chaffinch (*F. c. coelebs*) the prominent feature of the Crimean form is a stouter bill, manifest in the young as early as the seventh day of growth. Incidental to this study, 20 were kept four years in laboratory cages. Many other details are given. Formerly regarded as sedentary in southeastern USSR, it was found to be migratory through Crimea and the Balkans in winter, where it is replaced by the nominate form. The larger bill is seen as correlated to autumnal feeding from apple, pear, and hawthorn fruits, prevalent in local orchards. Applying its cutting edges, the birds dig a hole through the fruits to the core, whence the seeds are readily extracted.—Leon Kelso.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(See **19, 20, 21, 47**)

CONSERVATION AND ENVIRONMENTAL QUALITY

(See also 47)

19. Golden Eagles in 1973. (Suomen Kotkat v. 1973.) E. Kellomaki and P. Sulkava. 1974. *Suomen Luonto*, **1974**(2): 90-93. (In Finnish with English summary.)—The annual census of *Aquila chrysaetos* in Finland recorded 95 eyries, of which 25 were uninhabited. Eggs were laid in 38, and 41 eaglets were fledged from 31 nests. An additional 50 eyries were found but not examined. Losses through forestry activities are now "relatively well controlled." Conservationists' winter feeding of eagles apparently improved nesting success, as indicated by a range expansion southward in 1974. Assiduous efforts by local observers appear to have arrested this species' decline there.—Leon Kelso.

20. White-tailed Eagles in 1973. (Marikotat v. 1973.) J. Koivusaari, 1973. *Suomen Luonto*, **1973**(4): 174-177. (In Finnish with English summary.—Thirty-four *Haliaetus albicilla* eyries fledged only 5 young in this year. This species is rated as one of the most immediately endangered of Finnish wildlife.—Leon Kelso.

21. The anarchy of environmental education. (Ymparistonsuojelun opetuksen anarkia.) R. Oinonen. 1973. *Suomen Luonto*, **1973**(5): 202-204. (In Finnish with English summary.)—Several Finnish universities now give courses in "environment management." The author criticizes them as being haphazard in content and administration. But moreover a danger is foreseen "of training too many experts in environmental matters without suitable jobs for them." It is suggested that a better policy would be to develop semi-popular courses for the general public; "A few experts can do very little if the majority of people are not aware of the problems." With meaningful information for all, the environmental future would be more secure.—Leon Kelso.

PARASITES AND DISEASE

22. Birdlice fauna of Corvidae and Ploceidae of the Donets region. (K faune pukhoedov (Mallophaga) voronovykh i takchikovykh ptits donetskoi oblasti.) N. Kirilova. 1974. *Vestnik Z.*, **1974**(3): 80-81. (In Russian.)—Of 56 Magpies (*Pica pica*) examined, 28 (50%) were infested; of 53 Rooks (*Corvus frugilegus*), 39 (73%). Of 218 Tree Sparrows (*Passer montanus*), 182 (83.5%), and of 117 House Sparrows (*Passer domesticus*), 74 (63%) were infested. Thirteen species of birdlice were recorded.—Leon Kelso.

PHYSIOLOGY

(See also 48)

23. Enzymatic and biochemical characterization of the avian glycogen body. A. S. Fink, P. M. Hefferan, and R. R. Howell. 1975. *Comp. Biochem. Physiol.*, **50A:** 525-530.—The results of an investigation of the activity of some 15 key enzymes involved in the synthesis and degradation of glycogen in the avian glycogen body are presented. The absence of glucose-6-phosphatase activity indicates that the glycogen body cannot provide glucose for the central nervous system. With this one exception, the enzymes present are within the range of that normally seen in mammalian liver samples. This and other observations lead the authors to conclude that the avian glycogen body may be a useful model for the study of Type 1 glycogen storage disease in man, characterized by a deficiency of glucose-6-phosphatase.—James C. Vanden Berge.

24. Choline ester hydrolase activity in the avian nasal gland. B. Ballantyne. 1974. *Cytobios*, **33/34:** 39-53.— It is concluded that the nasal glands of seabirds operate as extra-regulatory organs allowing survival in a salt saturated environment. The glands secrete a watery "hypertonic" solution when sodium concentration rises. Experimentally, 48 ducks (unidentified), ages from 12 to 16 weeks, in 4 groups of 12 each, developed 50 to 95% more nasal gland weight in 1 and 4 day periods, respectively, when fed extra salt (NaCl) solution. The physiology of this is elaborated in a variety of chemical details including "rise in acetylcholinesterase activity." The author suggests that this process affords a convenient model for investigating similar biological patterns.—Leon Kelso.

25. Gastric digestion in some raptors. G. E. Duke, A. A. Jegers, G. Loff, and O. A. Evanson. 1975. *Comp. Biochem. Physiol.*, **50A:** 649-656.—Gastric digestion was studied in Great Horned Owls (*Bubo virginianus*), Snowy Owls (*Nyctea scandiaca*), Red-tailed Hawks (*Buteo jamaicensis*), Swainson's Hawk (*Buteo swainsoni*), Peregrine Falcon (*Falco peregrinus*), Gyrfalcon (*Falco rusticolus*), and Bald Eagle (*Haliaetus leucocephalus*), with samples of 7, 2, 3, 1, 1, 1, and 1 birds, respectively. Gastric juice in the falconiforms contained considerably more hydrogen ion than was the case for the strigiforms, and pellet weights were correspondingly relatively lighter in falcons; this was due mainly to greater corrosion of the bones in the laboratory mice used as the test food.

There was little difference between the species in the time spent in digesting a food item, although the method used to assess this was rather crude. No checks on the energy content of cast pellets were made; it was assumed that the greater bone corrosion in falconiform pellets was entirely mineral loss. The birds used in these experiments had been kept in captivity for periods of from 3 to 12+ months.

It remains a moot point whether the differences reported would still be present in birds fed on their natural diets.—Raymond J. O'Connor.

26. The digestion of bulbils (*Polygonum viviparium* L.) and berries (*Vaccinium myrtillus* L. and *Empetrium* sp.) by captive ptarmigan (*Lagopus mutus*). R. Moss and J. A. Parkinson. 1975. *Br. J. Nutr.*, **33:** 197-206.—Bulbils of *Polygonum viviparum* are a favorite food of Rock Ptarmigan in east Greenland, where they can constitute up to 80% of the diet in summer. In keeping with this Moss and Parkinson show by comparison of the composition of the bulbils with that of the excreta of captive ptarmigan fed on this diet that *Polygonum* provided a good source of metabolizable energy, protein, and phosphorus; the plant was, however, markedly deficient in sodium: in the absence of alternative sources of Na the birds lost weight. In Scotland, berries of *Vaccinium* and *Empetrium* are the main winter food of ptarmigan, with the former the preferred species. This choice matched its greater digestibility and adequate levels of protein, carbohydrate, and phosphorus but again with a deficiency of sodium. *Empetrium*, on the other hand, contained adequate sodium and carbohydrate but inadequate protein and phosphorus. Ptarmigan must therefore take a mixed diet in the wild to maintain both energy and nutrient balance. These results can be extrapolated to wild birds only with caution because the captive birds had much shorter guts than wild birds.—Raymond J. O'Connor.

27. Olfactory thresholds of Pigeons (*Columba livia*), Quail (*Colinus virginianus*) and chickens (*Gallus gallus*). A. J. Stattleman, R. B. Talbot, and D. B. Coulter. 1975. *Comp. Biochem. Physiol.*, **50A:** 807-809.—Operant conditioning techniques were used to assess the ability of the three species to discriminate concentrations of pentane, hexane, and heptane. For all three species the (species-specific) threshold for detection decreased through the sequence pentane, hexane, heptane, but there was no consistent pattern in the absolute levels involved. An interesting result was that birds attempting olfactory discrimination refrained from defecating while doing so, possibly because fecal odors obscure the olfactory cue. One wonders in the light of these results to what extent olfaction could be a significant source of bias in experiments testing the effectiveness of mimicry as an anti-bird response.—Raymond J. O'Connor.

28. Color discrimination in *Sturnus vulgaris* and *Padda orizyvora*. (Das Farbunterscheidungzvermögen bei *Sturnus vulgaris* (Sturnidae) und *Padda orizyvora* (Estrilididae). G. Ducker and I. Schulze. 1973. *Z. Tierpsychol.*, **32:** 496-505. (In German with English summary.)—This is another study using colored papers in discrimination tests, this time with Starlings and Rice Finches. The birds can discriminate all colors. It seems unlikely that the supposed difficulty in distinguishing greens in the central part of the spectrum is due, as the authors suggest, to natural attraction of birds to green vegetation. Colored papers are balanced for human vision, and experiments such as this do not measure color vision accurately enough to yield information about receptor mechanisms, nor can they deliver an unequivocal conclusion that the birds possess color vision. At best they are "consistent" with the latter conclusion, which is hardly unexpected.—Jack P. Hailman.

MORPHOLOGY AND ANATOMY

29. Comparative neuromorphology of the shoulder muscles of certain birds. (Sravnitelnaya morfologiya nervov myshts plechevogo suscava nekotorykh ptits.) V. Such. 1975. *Vest. Zool.*, **1975**(1): 21-27. (In Russian with English summary.)—Here are descriptive notes on the ontogenetic development, nerve patterns, and weights of shoulder muscles of *Apus apus, Delichon urbica, Podiceps cristaus, Corvus frugilegus, Ardea cinerea, Accipiter gentilis, Passer domesticus, Coturnix coturnix, Carduelis carduelis, Pyrrhula pyrrhula, Turdus merula, Oenanthe oenanthe,* and *Phaethornis superciliaris.* The points of origin and termination or distribution of the nerves indicate the history of origin and development of the muscles. The supracoracoid muscle is homologous to the superficialis pectoralis of mammals, and the pectoralis major is homologous to pectoralis profundus of mammals.—Leon Kelso.

30. Elektronenmikroskopische Untersuchungen der Myogenese in der unteren Extremität von Huhnerembryonen. R. Schüssler. 1974. *Acta Anat.*, **88:** 321-347. (In German with English summary.)—Electron microscopic studies on the development of the skeletal musculature in the legs of chick embryos from day 4 to 21 of incubation are described. Special consideration is given to the question of the origin of multinucleate muscle fibers (evidence in support of the fusion theory); the formation, aggregation, and alignment of myofilaments; development of the sarcoplasmic reticulum and transversal tubular system, and the origin and function of the satellite cells (persistent myoblasts, enclosed by a basement membrane, retaining their capacity for replication). —James C. Vanden Berge.

31. Plastic embedding of avian tissues for diagnostic histopathology. O. J. Fletcher. 1975. *Avian Diseases*, **19:** 201-208.—This research report describes the procedure for the use of glycol methacrylate as an embedding medium for avian tissues. A series of 24 photomicrographs illustrates that the techniques described gave superior resolution and less cell shrinkage and tissue distortion than sections prepared by conventional paraffin methods. The disadvantages of plastic embedding include the longer processing time, smaller tissue blocks, and somewhat greater cost ($0.66/block compared with $0.17/block for paraffin). The author is primarily concerned with the cost factor in terms of routine histopathologic investigations, however, whereas the advantages in terms of histological research may indeed outweigh such a disadvantage.—James C. Vanden Berge.

32. **Dermo-epidermal interactions between birds and mammals: differentiation of cutaneous appendages.** D. Dhouailley. 1973. *J. Embryol. Exper. Morphol.*, **30**(3): 587-603.—The dermo-epidermal interactions were studied in a series of experiments to determine the capacity of skin constituents to participate in feather and hair morphogenesis in chick and mouse embryos, respectively. The results are rather interesting. Apparently the dermis is the source of at least two "messages": one, a non-specific triggering factor which may be transmitted, interpreted, and morphologically translated by any epidermis of heterotopic or heterospecific origin; the other, a specific factor that contains determinants for the specific arrangement of epidermal keratinizing cells, but which can only be used and interpreted by an epidermis of the same zoological "class" of vertebrates. In addition, there is some evidence to support the observations of other investigators that the polarity and regional specificity of feathers and scales, i.e., the spatial distribution of the cutaneous appendages, is also strictly governed by the dermis.—James C. Vanden Berge.

33. **The ultrastructural characteristics of the eosinophilic granules in six species of domestic bird.** M. H. Maxwell and W. G. Siller. 1972. *J. Anat.*, **112**: 289-303.

Comparison of heterophil and basophil ultrastructure in six species of domestic birds. M. H. Maxwell. 1973. *J. Anat.*, **115**: 187-202.

An ultrastructural comparison of the mononuclear leucocytes and thrombocytes in six species of domestic birds. M. H. Maxwell. 1974. *J. Anat.*, **117**: 69-80.—These three papers represent good electron microscopic studies of the circulating cells in the peripheral blood of domesticated *Anas platyrhynchos*, *Anser anser*, *Coturnix coturnix japonica*, *Meleagris gallopavo*, *Numida meleagris*, and *Columba livia*.—James C. Vanden Berge.

34. **The middle ear of the skull of birds: the Procellariiformes.** E. I. Saiff. 1974. *Zool. J. Linn. Soc.* (London), **54**: 213-240.—The middle ear is described on the basis of examination of prepared skulls and on the basis of detailed dissection of several representatives of the Procellariiformes, including *Diomedea immutabilis*, *Fulmarus glacialoides*, *Puffinus* spp., *Pterodroma hypoleuca*, *Oceanodroma leucorrhoa*, and *Pelagodroma marina*. Special emphasis is given to selected morphological features including the presphenoid sinus, upper tympanic recess, foramen for the facial nerve, the metotic process, the entrance and distribution of the internal carotid artery, the presence of a rete mirabile (in all but the Pelecanoididae), the eustachian tube, and the quadrate bone. One major criticism would be the lack of illustrations; only two figures and two plates are included. This makes the descriptive material difficult to interpret, particularly since the author did list some 21 terms which he considered to be unfamiliar to some readers. In view of the fact that such dissection would be difficult, more illustrations would have been appreciated. No major taxonomic conclusions are reached.—James C. Vanden Berge.

35. **Stereotaxic topography of the brain of the quail (*Coturnix coturnix japonica*).** J. D. Bayle, F. Ramade, and J. Oliver. 1974. *J. Physiol.* (Paris), **68**: 219-241.—Semi-diagrammatic plates of the brain in stereotaxic coordinates are presented, based on superimposed drawings from sections of 150 birds. Both transverse planes anterior to the interaural axis and sagittal planes from the mid-sagittal section are included. The method of fixation of the skull was directly reproduced from the technique described by Karten and Hodos ("A stereotaxic atlas of the brain of the pigeon, *Columbia livia*;" The Johns Hopkins Press, Baltimore, 1967). The authors claim that the validity and precision of their system of coordinates are substantiated by a series of experimental designs in which more than 300 birds were used. They cite many of their publications from these experiments.—James C. Vanden Berge.

36. Gross and microscopic morphology of the Glandula proctodealis (foam gland) of *Coturnix c. japonica* (Aves). R. D. Klemm, C. E. Knight, and S. Stein. 1973. *J. Morph.*, **141**: 171-184.—The histology of the Glandula proctodealis is well described and excellently illustrated. This paper is said to be the first of a series of publications in which the authors also propose to detail the vascular and nerve supply to the gland and the associated musculature. If these subsequent publications continue in the style of this paper, then we may yet arrive at some understanding of the anatomy and function of this gland which is, apparently, highly developed only in the coturnix quail.—James C. Vanden Berge.

37. The ultrastructure of the lymphoid follicles of the chick Bursa of Fabricius. J. A. Frazier. 1974. *Acta Anat.*, **88**: 385-397.—The cortex of the lymphoid follicle of the cloacal bursa is separated from the medulla by a well-defined basement membrane, on either side of which is a layer of amorphous material. As a result, there are several differences in their respective structures, and there is some evidence that these two components develop to some extent independently of one another. The author describes the presence of many reticular epithelial cells in the medulla, rarely seen in the cortex. Dark reticular cells associated with collagenous fibers, on the other hand, are found in the cortex but not in the medulla. A third striking difference is the absence in the medulla, and presence in the cortex, of blood capillaries. Present in both cortex and medulla are lymphocytes and macrophages (phagocytic mesenchymal reticular cells). Several good EM figures are included.—James C. Vanden Berge.

38. Avian oral pigmentation. C. O. Dummett and G. Barens, 1974. *J. Periodontal.*, **45**(6): 426-433.—This is a very sketchy, gross anatomical and histological characterization of the oral cavity and oral mucosae in the "Lutino" parakeet (a color variant of *Melopsittacus undulatus*), Bee Bee Parrot (*Brotogerus jugularis*), and two species of Amazon parrots (*Amazona aestiva* and *A. ochrocephala*). The 19 figures do not contribute much to the anatomical descriptions, especially a black-and-white photograph (Fig. 7), which bears the legend, "Pale pink, shiny hard palate with anterior transverse ridges," to cite but one example. The authors have described oral pigmentation in various domesticated mammals, but one wonders what is the significance of the comment that "the intensity of appearance of melanin pigmentation in the Amazon parrot recalls that found in the oral tissues of the chow-chow dog" (p. 433).—James C. Vanden Berge.

ZOOGEOGRAPHY AND DISTRIBUTION

(See also 18, 41)

39. Birds of the Cape Henrietta Maria Region, Ontario. G. K. Peck. 1972. *Can. Field-Nat.*, **86**: 333-348.—The land and water within 25 miles of the base of Cape Henrietta Maria at the junction of James and Hudson bays is the area included in this study. The arctic waters of the bays produce a low latitude coastal tundra throughout the census plot. Ninety-four species occur in the cape region: 35 known breeding species, 10 probable breeding species, 30 summer visitors including nonbreeders and accidentals, 18 arctic breeding migrants, and one winter resident. The paper is an excellent review of previous survey work in this tundra region and is beautifully illustrated.—Edward H. Burtt, Jr.

SYSTEMATICS AND PALEONTOLOGY

(See also 48)

40. Godwits, curlews, and tringine sandpipers: New evidence challenges old classifications. J. E. Ahlquist. 1974. *Discovery*, **10**(1): 14-25.—This paper, although by title sounding like a press release, presents data obtained from egg white protein analysis and peptide maps that suggest a similarity between godwits, dowitchers, and snipe and a "tantalizing" (p. 19) similarity between curlews, avocets, and stilts. This writer finds the results not so easily interpreted but I may be looking at the figures incorrectly. Nevertheless, data obtained from the stilts are not presented. Most of this provocative paper is devoted to a review and reinterpretation of skeletal characters, especially of the skull, of shorebirds. This and biochemical information provided the author his basis for the conclusions of the paper: that curlews "may be closer" (p. 25) to avocets and stilts than to tringine sandpipers and that avocets and stilts are (or may be) closely related to sandpipers. The author states that the suggested relationships are not proved beyond doubt and urged further study.—M. Ralph Browning.

41. Occurence, nesting and affinities of the White-throated Grass Wren *Amytornis woodwardi* and White-lined Honeyeater *Meliphaga albilineata*. R. Schodde and I. J. Mason. 1975. *Emu*, **75**(1): 12-18.—The nest and eggs of *A. woodwardi* and nest and juveniles of *M. albilineata* are described. The distribution, habitat, and behavior of these little-known species are discussed, and the systematic positions of both are reviewed. The authors conclude that insufficient information or habitat and behavior of the species of *Amytornis* precludes and understanding of the genus. On morphological grounds *M. albilineata* is said to resemble species in the genus *Pycnopygius*, although based on the juvenile plumages of *albilineata* the authors conclude that this species is more closely related to the Australo-Papuan rainforest group of *Meliphaga* than to the genus *Pycnopygius*. The genus *Meliphaga* includes species with a wide range of morphological characters (plumage, bill shape, etc.) and several of these are similar to *albilineata*.—M. Ralph Browning.

EVOLUTION AND GENETICS

(See 14, 29)

FOOD AND FEEDING

(See also 12, 17, 18, 25, 26, 47, 48)

42. Research on feeding ecology of the Great Black-backed Gull in Helgoland. (Nahrungsokologische Untersuchungen an Mantelmöwen (*Larus marinus*) auf Helgoland. K. Kock. 1974. *Helgolander wiss. Meeresunters*, **26**(1): 88-95. (In German with English summary.)—From field observations and analysis of 54 stomachs of this gull from North Sea, Helgoland, in 1971 and 1972, the author found 73.5% (numerically calculated) of its food was of "human origin" (i.e. of fisheries waste) and 26.5% was natural (Crustacea, Mollusca, and Insecta). Thirty-six (66.7%) stomachs contained fish, mainly Cod (*Gadus morhua*), Whiting (*Merlangius merlangus*), and "poor cod" (*Trisopterus minutus*). The Great Black-backed Gulls and Herring Gulls (*L. argentatus*) raided fishing Guillemots (*Uria aalge*), pirating just-captured prey from them.—Leon Lelso.

43. The Steppe Eagle, *Aquila nipalensis*, and other termite-eating raptors in South West Africa. R. Jensen. 1972. *Madoqua*, **1**(5): 73-76.—Abundant rainfall in January and February, 1971 in the Karibib district resulted in a "Termite Year," with heavy flights of "harvester termite" (*Hodotermes mossambicus*) emerging. Flocks of *Aquila nipalensis orientalis* and miscellaneous other falconids, including Yellow-billed Kites (*Milvus migrans parasiticus*), appeared and remained a month or more. Small numbers of pellets, crops, and stomachs collected contained only head fragments of digested termites. After the February rains the termite swarms declined and the raptor flocks moved away.—Leon Kelso.

44. Exploitation of a food source in a feeding association of whydahs. G. R. Cunningham-van Someren. 1974. *East Africa Nat. Hist. Soc. Bull.*, 35-36.—In the course of describing the feeding behavior of a mixed flock of *Vidua* species, the author draws upon his field experience in East Africa to provide a brief but useful review of the various feeding techniques used by the small seed-eating estrildines and viduines. Species of *Vidua*, *Hypochera*, and *Steganura* obtain seeds by scratching in soil, thereby exploiting a food source unavailable to *Lagonosticta* spp. and *Uraeginthus* spp., which merely pick seeds from the surface. Members of the genera *Estrilda*, *Amandava*, and *Lonchura* obtain seeds mainly or exclusively from seed heads of grasses, sedges, and other plants. *Granatina*, a close relative of *Uraeginthus*, takes seeds either from seed heads or from the surface of the soil. These observations provide at least a partial answer to the question of how so many small granivorous birds can co-exist in the same habitat.—John Farrand, Jr.

SONG AND VOCALIZATIONS

45. Stereotypy of a fixed action pattern during ontogeny in *Coturnix coturnix*. W. M. Schleidt and M. D. Shalter. 1973. *Z. Tierpsychol.*, **33:** 35-37.—The European Quail, subspecific relative of the domesticated Japanese Quail, gives a three-part "wet-my-lip" call, the sonagram of which allows measurements of the frequency at the beginning, middle, and end of each note, the length of each note, and the interval between them. Chicks sometimes give the call when only a few hours old and 1/20th the weight of the adult, and it is higher in pitch but otherwise similar. Wavelength of the sound changes proportionally to the cube-root of body weight, as might be expected, but other measures show changes that are not readily explicable on the basis of size as the chicks develop. Furthermore, the variability in measures remains the same during ontogeny. This is an interesting little study, which hopefully the authors will follow up in greater detail.—Jack P. Hailman.

46. Duet development in hand-reared Barbets. (Duett-Entwicklung bei handaufgezegenen Bartvögeln (*Trachyphonus d'arnaudii emini*).) G. Tyroller. 1974. *Z. Tierpsychol.*, **35:** 102-107. (In German with English summary.)—In males the song always develops the same, but females learn the timing of their part in the duet.—Jack P. Hailman.

BOOKS AND MONOGRAPHS

47. Man and Birds. R. K. Murton. 1972. New York, Taplinger Publishing Company. 364 p. $8.95.—According to the author's preface, the aim of this book "is to deal with the truly economic aspects of man's interrelationship with birds. . . ." One might, therefore, expect a catalog of instances in which birds cause either economic loss or gain to man. As valuable and interesting as such a compilation and analysis of the net economic value of birds might be, it is not within the scope of this volume. The key in the statement of aim seems to be "inter"; if one considers the ways in which man and birds affect each other's economy, economy can be translated "ecology," and the book does deal with avian ecology more than with old-fashioned economic ornithology. Elsewhere in the preface, Murton seems to acknowledge this with the statement, "In discussing avian population dynamics I have singled out . . . species of economic importance."

An early 32-page chapter entitled "Ecological Considerations" sets the stage by relating population dynamics to both control and conservation of birds. Briefly, the thesis is that birds produce more offspring than is necessary to compensate for adult mortality. Density related mortality adjusts this surplus so that a relatively stable population is maintained through time if the habitat remains stable. In the absence of one mortality factor, another will take its place; conversely, mortality factors are not usually additive. Related to control of pest species, this suggests that before artificial killing can result in a long-term reduction of population size the total number of animals killed must exceed the number that would have died from natural causes. Related to preservation of desirable species, it indicates that reducing natural mortality will be ineffective unless adequate habitat is maintained. Thus, this book has something to say both to those who strive to control avian populations and to those who deplore any killing of birds.

The ecology of economic ornithology is more specifically discussed in a series of chapters considering birds in relation to forests, farms, horticulture, and fisheries, the core of the book. At the beginning of the three chapters on "Birds on the Farm," the fact that man and birds each affect the other is clearly noted. "From being a country originally covered with deciduous forest, Britain. . . has reached the stage where woodland occupies only 8 percent of the land surface. . . ." Farmland is now the biggest bird habitat in that nation, a habitat entirely manipulated by man. Murton points out many instances in which man's modification of the environment has led to increased bird populations with the result that a species could conflict with man. The Rook (*Corvus frugilegus*), Starling (*Sturnus vulgaris*), Lapwing (*Vanellus vanellus*), partridges (*Alectoris*), pigeons (*Columba*), anatids, the Bullfinch (*Pyrrhula pyrrhula*), and the Oystercatcher (*Haematopus ostralegus*) are given detailed attention. The analyses of the population dynamics of these and other birds, based on intensive and detailed work carried on by Murton and his colleagues over many years, highlight the complexity of ecological relationships and the involved train of events that may follow agricultural changes. Similar analyses are provided for species where conflicts with man are caused by something other than the birds' feeding habits (fecal fouling, aircraft strikes, etc.).

The depth of analysis in the individual cases is striking, and it is significant to me that the detailed studies on feeding habits and reproductive success over long periods of years and in various ecologic situations are available for analysis. Obviously, the basic research has been directed, at least to some extent, and has not been hurried for the sake of a quick, if ineffective, solution. I believe that the synthesis has given me a deeper appreciation of the value, indeed the necessity, of in-depth "life history" studies (emphasis on "in-depth").

Murton's book concludes with a chapter on wildlife management. He touches briefly on the need for habitat preservation in blocks sufficiently large to permit survival of avian populations and on the need for the existence of habitat where man can have day-to-day contact with wildlife. Most of the chapter is concerned with various control methods.

The book was written for the British layman, and several aspects of its production may annoy professional biologists who read it. The 19 tables that present some of the data discussed are grouped at the end of the book. Text references to sources of the studies discussed are rather sparse. The selected bibliography is arranged by chapter (at the end of the book), and references may not be repeated if already given for an earlier chapter. Scientific names are used sparingly throughout the text, but appear along with the vernacular names in the index, so there is no real excuse for not knowing whether a blackbird discussed, for example, is American or European. The 40 text figures and 32 halftone plates are well done, although the latter are not always placed most appropriately. The book is written in British style, which will offer only a slight handicap to an American reader.

In summary, I believe this book to be a worthwhile addition to libraries of both professionals and amateurs. I benefited from reading it, and doubt that my experience will be unique.—Richard C. Banks.

48. Breeding biology of the Gray Gull, *Larus modestus*. T. R. Howell, B. Araya, and W. R. Millie. 1974. *Univ. Calif. Publ. Zool.*, **104**: 1-57.—Very little was known about this species, which nests on the nitrate deserts of Chile, until about 10 years ago. Now, Howell and his coworkers have provided a quite complete and fascinating life history of this unique gull. They review the history of knowledge about the bird, its behavior on the coast and at the nesting area, descriptions of the colony and nests, incubation, care of the young, and much general information.

Temperature of the substrate at the nesting colony may exceed 50 °C, and many aspects of the gull's behavior and life history appear to be adaptations to such extreme temperatures. For example, birds stand on rocks (which are cooler than sand) so that their feet are in the shade of their bodies. They feed at the coast by day and fly the 30 km inland to feed chicks at night. Eggs are incubated constantly, but change of incubating partners occurs only at night. Sometimes the incubating parent stands during the day to shade the nest, and presumably allows convective cooling to take place. Least convincing of the possible adaptations is the gray plumage, which the authors suggest may absorb radiant energy at the surface of the feathers, and then lose the converted heat by convection. This problem of the relation of insulation-color to heat balance in birds and mammals is under intensive scrutiny by Porter and other biophysical ecologists, and no final answer is yet available because the physics of heat transfer is so complicated. It is not clear how much heat is conducted to and from the body by insulation, but recent research suggests that as much as 50% of heat-loss from insulation may be in the form of radiation rather than nearly all by convection as has been previously assumed. The thesis of Howell et al. also fails to explain why the Gray Gull's head is white and why the body is gray rather than black.

The displays of the Gray Gull are basically similar to those of other gulls studied intensively by Tinbergen, Moyniham, Beer, and others. Howell et al. provide general approximations of how various displays are used in social interactions and conclude that the relatively unspecialized form of the Gray Gull's display patterns is related to its nocturnal habits, which in turn implies that its displays may just as likely be secondarily simplified as primitive. Howell (p. 44-45) likens gull interactions to a chess game and the analogy may provide useful intuition if Howell's admonition not to take it too seriously is kept in mind.

In all, this is a fascinating study of an intriguing species, containing much useful information that space limitations preclude summarizing here. Those of us who are "gullologists" will certainly read it, but the monograph deserves a wider audience as well.—Jack P. Hailman.