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RECENT LITERATURE

Edited by John A. Smallwood

NEW JOURNAL

1. Bird Conservation International. This new journal is the product of the International Council for Bird Preservation (ICBP). The aim of Bird Conservation International is to "publish original papers and reviews dealing with the conservation of birds in the wild and their habitats. It seeks to promote worldwide research and conservation action to ensure the protection of birdlife and fragile environments. Specifically targeted articles and recommendations by leading experts encourage positive conservation steps toward resolving the current global problems of many bird species and their habitats." The first volume will include articles on the problem that rats pose to island conservation, the impact of hunting pressure on guillemots in Greenland, a national conservation strategy for the Yemen Arab Republic, wetland conservation priorities in the Pacific, conservation of birds in the threatened forests of Upper Guinea and the Comoros Islands, and status reports for several threatened avian species.

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BANDING AND LONGEVITY

(see also 4, 6, 25)

2. Life expectancy and age structure of the feral pigeon *Columba livia* forma *domestica*. [Lebenserwartung und Altersstruktur der Strassentaube *Columba livia* forma *domestica*.] D. Haag. 1990. Ornithol. Beob. 87:147-151. (German, English summary.)—Feral pigeons have a much shorter life expectancy than those of domestic populations. The mean life expectancy for a feral population in Basel, Switzerland, was 2.4 years, compared to a mean of 5 years, and maximum of 15 years, for domestic populations. The shorter life expectancy of city pigeons is attributed to the extreme conditions of city life. There were no significant differences between males and females, but the oldest birds were from the outskirts of the city. [Weiherhofstrasse 141, 4054 Basel, Switzerland.]—Robert C. Beason.

MIGRATION, ORIENTATION, AND HOMING

(see 23, 24)

POPULATION DYNAMICS

(see also 2, 18)

3. Osprey productivity on Long Island 1978–1987: a decade of stabilization. M. S. Fishman and M. Scheibel. 1990. Kingbird 40:2-9.—This study focuses on the productivity of a breeding population of Osprey (*Pandion haliaetus*) on Long Island, New York. This population declined severely between 1948 and 1972 due to use of DDT. In 1972, the EPA banned the use of DDT. Following this legislation, the Osprey began to recover steadily and the first population growth was observed in 1977. Data collected from 1978 to 1987 indicate that productivity has stabilized and the population is maintaining itself. [17 Mott Lane, Brookhaven, NY 11719, USA.]—Lori A. W. Duncan.

4. Population dynamics of the Skylark *Alauda arvensis* in intensively cultivated farmland in central Switzerland. [Populationdynamik der Feldlerche *Alauda arvensis* in einer intensiv genutzten Agrarlandschaft des schweizerischen Mittellandes.] M. Jenny. 1990. Ornithol. Beob. 87:153-163. (German, English summary.)—A population of Skylarks was studied during 1983–1987 on a 93-ha study area in the Reuss valley. An average of 62% of color-banded males and 29% of the color-marked females returned in subsequent years.

Only 4.5% of the birds hatched in the study area returned to it. Based on mortality rates of the adults and estimated emigration rates of young birds, the author feels that the population is gradually declining. [Madetswilerstrasse 3, 8332 Russikon, Switzerland.]—Robert C. Beason.

5. Fluctuations and long-term trends in nestbox occupancy by songbirds in the Basel region, and their usefulness. [Schwankungen und langfristige Trends der Nistkasten-Besetzungsanteile von Singvögeln in der Region Basel und ihre Aussagekraft.] M. Blattner and C. T. Speiser. 1990. Ornithol. Beob. 87:223–242. (German, English summary.)—Over 20 years of nestbox data were compared between Nuthatches (*Sitta europaea*), Great Tits (*Parus major*), Pied Flycatchers (*Ficedula hypoleuca*), Redstarts (*Phoenicurus phoenicurus*), and Tree Sparrows (*Passer montanus*) for 11 study areas within 20 km of Basel. There was no correlation of population size for any species across all study areas, although Great Tits and Nuthatches showed similar fluctuations for many sites, indicating that the population dynamics of these species can differ between nearby populations. There was no correlation in population sizes in almost all of the 98 combinations of species and sites, indicating that most species' population sizes fluctuated independently from one another. [Weinbergstrasse 62, CH-4102 Binningen, Switzerland.]—Robert C. Beason.

6. Survival rates and mortality factors of Florida Sandhill Cranes in Georgia. A. J. Bennett and L. A. Bennett. 1990. No. Am. Bird Bander 15:85–88.—The authors studied the nonmigratory Florida Sandhill Crane (*Grus canadensis pratensis*) in the Okefenokee Swamp, Georgia, where the population of 400 birds is not subject to hunting pressure. Forty-four cranes, captured by rocket-netting and tagged with leg band radio transmitters, were located on at least three days per week between March 1986 and March 1988. Of the eight deaths that occurred during this period, five were attributable to predation by bobcats, one to predation by an alligator, one to an undetermined predator, and one to an unknown cause. Most deaths occurred during spring, adult males exhibiting the significantly lowest survival rate (0.80) during that season. No deaths of radio-tagged cranes occurred during winter. Mean annual survival for all cranes was 0.89. The mean time between tagging and death was 252 days. [Coop. Fish and Wildlife Research Unit, School of Forest Resources, Univ. of Georgia, Athens, GA 30602, USA.]—John A. Smallwood.

NESTING AND REPRODUCTION

(see also 3, 13, 14, 15, 16, 17, 18, 19, 20)

7. Using phenology to predict commencement of nesting of female Spruce Grouse (*Dendragapus canadensis*). D. M. Keppie and J. Towers. 1990. Am. Midl. Nat. 124:164–170.—The authors used plant phenological events and dates of snow cover over 15 years in New Brunswick and Ontario, Canada, to predict the date at which female Spruce Grouse begin to lay and hatch eggs. Nesting was not initiated as early as suitable nest substrate became available, but rather at an average of 17.2 days following the date that 50% of the snowpack had melted. Temporary resumption of snow cover above 50% did not delay nest initiation. The dates on which the first flowers of blueberry (*Vaccinium augustifolium* Ait.) and trailing arbutus (*Epigaea repens* L.) appeared also served as a good predictor of median egg-laying dates, as well as median hatch dates. Relative variances of egg-laying and hatch dates among years were similar to the variance of the phenological events forementioned. These data provide circumstantial evidence that the timing of Spruce Grouse nesting is influenced by the timing of plant development. [Dept. of Biology and Forest Resources, Univ. of New Brunswick, Bag Service #44555, Fredericton, NB E3B 6C2, Canada.]—Danny J. Ingold.

8. Egg recognition by Elegant Terns (*Sterna elegans*). F. C. Schaffner. 1990. Colonial Waterbirds 13:25–30.—Egg recognition capabilities generally have been assumed for species of crested terns which nest colonially and have indistinct nests and single-egg clutches. Schaffner reports on egg recognition experiments with Elegant Terns involving acceptance or rejection of a foreign egg. The 1980–1981 study, conducted in San Diego Bay, California, involved adding foreign (donor) eggs to 60 nests after periods of 1–18 days of incubation. Donor eggs were matched for shape, size, weight, color, and pattern to resident eggs. Of 30

eggs donated after 1–5 days of incubation, over half were accepted. All 30 donated after six or more days of incubation were rejected. No resident eggs were rejected. There was no significant difference in hatching success for accepted donor and resident eggs, but the fledging success of donor chicks was significantly less. Schaffner concludes that the experiments clearly demonstrate Elegant Tern egg recognition abilities, although they are not complete until after the fifth day of incubation. He further suggests that a tern's ability to recognize its egg is related to the problem of locating its nest in a dense colonial, synchrous nesting situation with indistinct nest sites, rather than to brood parasitism or egg dumping. The acceptance of some foreign eggs early in incubation supports the hypothesis of egg recognition by learning. [Dept. of Natural Resources, P.O. Box 5887, Puerta de Tierra, San Juan, PR 00906, USA.]—William E. Davis, Jr.

9. Reproductive biology of a finch community in a "Mugetum" on the Rhaetian Alps (Sondrio, Italy). [Biologia riproduttiva di una comunita' di Fringillidi in un Mugeto delle Alpi Retiche (Sondrio).] F. Maestri, L. Voltolini, and F. L. Valvo. 1989. Riv. Ital. Ornitol. 59:159–171. (Italian, English summary, figure and table captions.)—Data on nesting phenology and nest sites are presented for Chaffinch (*Fringilla coelebs,* three nests), Citril Finch (*Serinus citrinella,* 17 nests), Linnet (*Carduelis cannabina,* one nest), Redpoll (*C. flammea,* 16 nests), and Red Crossbill (*Loxia curvirostra,* 10 nests) in a subalpine zone dominated by Swiss mountain pine (*Pinus mugo* and *P. uncinata*). Nest-building began in late February for the crossbills, but not until April for the Citril Finch or Redpoll. Nestlings were found into late June for Citril Finches and crossbills, and through July for Redpolls. Redpoll nests averaged 1.3 m above ground in 2.6-m pines, Citril Finch nests averaged 2.9 m high in 3.6-m pines, and crossbill nests averaged 3.0 m high in 3.7-m pines. Nests of the three dominant species tended to have more southern exposures. Data on nest dimensions, egg sizes, and reproductive success also are presented.—Jerome A. Jackson.

10. Geographic variation in clutch and brood size of the Eagle Owl *Bubo bubo* in the western Palearctic. J. Donazar. 1990. J. Ornithol. 131:439–443.—This synthesis and review of available data includes studies with data for 30+ nests and covering 4+ years, thus minimizing problems due to unusual nests and variable food supplies. No significant variation was found for clutch size. Significant positive correlations were found between brood size and both latitude ($r = 0.704$) and longitude ($r = 0.618$). Nearly significant correlations were found between brood size and distance between Eagle Owl nests ($r = 0.73$), and between brood size and lagomorph frequency in the diet ($r = 0.473$).—Jerome A. Jackson.

11. Within clutch repeatability of egg dimensions in the Black-headed Gull *Larus ridibundus.* J. Banbura and P. Zielinski. 1990. J. Ornithol. 131:305–310.—Egg length and breadth were measured and egg volume calculated for clutches with two or more eggs. One-way analyses of variance were carried out for each egg dimension and repeatability of egg dimensions was calculated as intraclass correlation coefficients. Significant repeatabilities (egg similarity within clutches) were found for all traits and ranged from 0.51 to 0.61. These values generally are less than those found for several other species (*Parus major, Ficedula hypoleuca, Phoenicurus phoenicurus, Sturnus vulgaris*) in which values have ranged from 0.70 to 0.81. However, the values for the Black-headed Gull are considerably higher than those of the House Wren (*Troglodytes aedon*; comparative data available only for egg length and breadth). Egg length for the Common Tern (*Sterna hirundo*) has shown higher (0.72), whereas egg breadth has shown lower repeatability (0.54). Increased variability in the Black-headed Gull is suggested to be a result of smaller third eggs, or possibly smaller last eggs.—Jerome A. Jackson.

12. Clutch size and egg size in four Anatidae species in ne Italy. N. Saino and P. Brichetti. 1989. Riv. Ital. Ornitol. 59:259–264.—Data are provided for 10–11 clutches each of Mallard (*Anas platyrhynchos*), Gadwall (*A. strepera*), Northern Shoveler (*A. clypeata*), and Pochard (*Aythya ferina*) from the Comacchio region of northeast Italy. Mean clutch sizes were 9.5, 9.73, 10.3, and 10.18, respectively. For Mallard, Shoveler, and Pochard, the mean clutch size was greater than or equal to clutches reported from northern or central Europe; for Gadwall it was intermediate. Egg volume averaged about 6% less than in

northern and central Europe for Mallard, Gadwall, and Pochard; 2.7% greater for Shoveler.—Jerome A. Jackson.

BEHAVIOR

(see also 8, 19, 21, 24, 30, 31, 33, 34)

13. Parental effort in the California Gull: tests of parent-offspring conflict theory. B. H. Pugesek. 1990. Behav. Ecol. Sociobiol. 27:211–215.—Parental effort in a banded population of California Gulls (*Larus californicus*) was monitored in pairs with a brood size of two in Albany County, Wyoming. Feeding latency after returning from foraging was significantly longer among younger parents (3–9 years old) compared to older parents (11–17 years old). In addition, the duration of parental care (DPC) was significantly longer among older parents, and the survival among older gulls was significantly lower compared to younger gulls. Results indicated that survival was significantly related to DPC, and that parental age had little effect on the relationship between survivorship and DPC. These data support the major predictions made by Trivers regarding parent-offspring conflict theory, namely that: (1) the amount of time parents withhold food from offspring increases with increasing offspring age, (2) older parents should be less likely to withhold food at any point in the offspring's period of parental care, and (3) older birds, which have less potential for future reproductive success, will care for their young for longer periods of time. [College of Health and Human Development, S-210 Henderson Bldg., State Univ., University Park, PA 16802, USA.]—Danny J. Ingold.

14. Mate choice by female White-crowned Sparrows in a mixed-dialect population. G. Chilton, M. R. Lein, and L. F. Baptista. 1990. Behav. Ecol. Sociobiol. 27:223–227.—From 1984 to 1988 the authors investigated mate choice by female White-crowned Sparrows (*Zonotrichia leucophrys*) in a mixed-dialect population (*Z. l. oriantha* vs. *Z. l. gambelii*) in southwestern Calgary, Alberta. Their objectives were to test whether: (1) an individual female would consistently choose a mate singing the same song type in successive breeding seasons, and (2) an individual female would show a tendency to mate with a male with the same song type as her father. The results indicate that females did not choose mates during consecutive years on the basis of song dialect. In addition, the songs of the father and the mate of each female were no more likely to be the same than expected by chance. These data suggest that within mixed populations of White-crowned Sparrows, mate choice is likely based on characteristics other than song types, and that song differences probably have no social or genetic significance. [Div. of Ecology, Dept. of Biological Sciences, Univ. of Calgary, Calgary, AB T2N 1N4, Canada.]—Danny J. Ingold.

15. Provisioning of nestlings by dunnocks, *Prunella modularis*, in pairs and trios: compensation reactions by males and females. B. J. Hatchwell and N. B. Davies. 1990. Behav. Ecol. Sociobiol. 27:199–209.—Four mating systems (monogamy, polygyny, polyandry, and polygynandry) were examined in a population of dunnocks in order to investigate how an adult's provisioning of nestlings varies with the provisioning efforts of other adults. Provisioning rates were recorded at 105 nests during 1981–1984 and 1988–1989. Broods were attended by lone females, by females with the part-time help of one male, by females with the full-time help of one male (pairs) or by females with the part-time or full-time help of two males (trios). No significant difference was detected in the provisioning rates between males and females in pair-fed broods. In trio-fed broods, alpha males and females fed nestlings at the same rate, and at a significantly higher rate than beta males. Females attained maximum help from males when the ratio of provisioning by alpha and beta males approached 50:50. Females were most likely to achieve this by eluding alpha males for a period of time during mating, and soliciting increased copulations from beta males. Although the feeding rate of females in pairs and trios did not differ significantly, the total feeding rate in trio-fed broods was significantly greater than for pair-fed broods. When males were removed from pairs (either naturally or experimentally), or when paired males reduced their help to part-time, females fed nestlings at a significantly higher rate, but were unable to fully compensate for the loss of help. In contrast, females left in pairs following the removal of one male from a trio, did not compensate by feeding the brood more frequently. Beta males increased their provisioning when alpha males were removed from a trio or

when alpha males reduced their provisioning to part-time. Alpha males may have increased their feeding rates in the absence of beta males, but if such increases occurred, they were insignificant. Nonetheless, the removal of one adult (of either sex) from either a pair or a trio resulted in a significant reduction in the mean weights of chicks. The authors discuss the relevance of these results to maximized fitness of individuals composing pairs and trios of breeding dunnocks. [Dept. of Zoology, Univ. of Cambridge, Downing St., Cambridge CB2 3EJ, United Kingdom.]—Danny J. Ingold.

16. Pair relationships and female-female agression in the occasionally bigamous Japanese Wagtail *Motacilla grandis*. Y. Ohsako and S. Yamagishi. 1989. Jap. J. Ornithol. 37:89–101.—The Japanese Wagtail is normally monogamous, but Ohsako and Yamagishi here analyze behavioral observations of the females of five bigamous relationships among 225 breeding attempts studied during a four-year study. Four of the five bigamous relationships occurred during first nesting efforts of the season. Bigamous females were widowed females from neighboring territories (three cases) or new birds (widowed elsewhere?). Simultaneous observation of bigamous females demonstrated that they generally spaced themselves out within the male's territory. Primary and secondary females tended to maintain their original territories, or the primary female dominated the secondary one. In one case bigamous females were compatible until incubation began, at which point the male's help was needed for incubation and care of young. The females seemed to become aggressive to acquire the male's parental investment, and the secondary female received little help with feeding of her young, resulting in lowered reproductive success, and probably limiting the extent of bigamy in the species. In four instances monogamous males attempted to copulate with neighboring paired females, but were rejected by them.—Jerome A. Jackson.

ECOLOGY

(see also 6, 7, 10, 13, 14, 15, 20, 21, 30, 33, 34, 35)

17. Habitat selection in a population of Marsh Warbler, *Acrocephalus palustris*, in the central Po Plain, province of Brescia (Lombardy, n Italy). [Selezione dell'habitat in una popolazione di cannaiola verdognola, *Acrocephalus palustris*, nella pianura Lombarda.] P. Brichetti, A. Gargioni, and S. Gellini. 1989. Riv. Ital. Ornitol. 59:205–217. (Italian, English summary.)—Breeding population levels of the Marsh Warbler were related to streamside and emergent vegetation characteristics along a 19-km waterway. Herbaceous cover was the primary requisite for higher population levels, and decreasing numbers were found along a gradient of decreasing herbaceous cover and increasing shrubby cover. The presence of trees did not affect presence or absence of the birds.—Jerome A. Jackson.

18. Predation on Yellow-eyed Junco nestlings by twin-spotted rattlesnakes. T. C. Gumbart and K. A. Sullivan. 1990. Southwest. Nat. 35:367–368.—During a long-term study on the behavioral ecology of Yellow-eyed Juncos (*Junco phaeonotus*) in Cochise County, Arizona, three cases of nestling predation by twin-spotted rattlesnakes (*Crotalus pricei*) were observed between June 1986 and June 1988. The nestlings ranged from one to nine days of age. Additionally, another nestling from one of the three nests had been bitten but subsequently recovered, suggesting some degree of resistance to the venom. Snake predation also was the possible cause of the disappearance of numerous clutches. This is the first published account of twin-spotted rattlesnake predation of birds. [Dept. of Biology, Utah State Univ., Logan, UT 84322, USA.]—Robin J. Densmore.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

19. Field tests of predator-deterrent nest box devices for acceptance by cavity-nesting birds. K. L. Berner. 1990. Sialia 12:123–128.—The author monitored a bluebird trail with 52 nest boxes (four groups of 13, each equipped with a different predator-deterrent device) during the 1989 breeding season in Schoharie County, New York. Eastern Bluebirds (*Sialia sialis*), Tree Swallows (*Tachycineta bicolor*), and House Wrens (*Troglodytes aedon*) readily nested in boxes which possessed both a 12.7-cm extended-length roof and 1.9-cm thick wooden guard over the entrance hole. Although sample sizes were small, it appears that all three species nested in boxes with the 1.9-cm wooden guard only, and with the 3.5-

cm wooden guard only, at a rate no less than expected by chance (no statistical test results were reported). Bluebirds and Tree Swallows avoided nest boxes equipped with a commercial plastic predator guard that extended 7.6 cm from the cavity entrance; House Wrens, on the contrary, appeared undeterred by such a device. Based on the nest box acceptance rates by these species, boxes equipped with an extended-length roof and a 1.9 to 3.5-cm thick wooden guard over the entrance cavity should adequately serve to attract these species and deter predators (cf. Sialia 1990 12:83–87). [State Univ. of New York, Cobleskill, NY 12043, USA.]—Danny J. Ingold.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 3, 5, 19)

20. Values of phosphate-mined wetlands for birds: a balanced approach. W. R. Marion. 1989. Pp. 1195–1202 *in* R. R. Sharitz and J. W. Gibbons, eds. Freshwater wetlands and wildlife. DOE Symposium Series No. 61. United States Dept. of Energy, Oak Ridge, Tennessee.—This paper summarizes the values for birds of wetland habitats created by phosphate-mining in Florida. Both positive and negative values are addressed. These created wetlands generally are considered beneficial for wildlife. The author sees this as an over-simplification and presents information to further explain the situation. Four dilemmas are addressed: (1) wetland vs. upland habitat availability; (2) reproductive success of wetland vs. terrestrial birds; (3) high concentration of birds, which has a positive value from a recreational viewpoint but a negative value in terms of increased disease; and (4) long-term maintenance of the created wetlands. [Dept. of Wildlife and Range Sciences, 118 Newins-Ziegler Hall, Univ. of Florida, Gainesville, FL 32611, USA.]—Lori A. W. Duncan.

21. Avian use of fluctuating wetlands. J. Kushlan. 1989. Pp. 593–604 *in* R. R. Sharitz and J. W. Gibbons, eds. Freshwater wetlands and wildlife. DOE Symposium Series No. 61. United States Dept. of Energy, Oak Ridge, Tennessee.—Water level fluctuation plays a significant role in maintaining many wetland habitats for birds. This paper suggests that birds using these areas have behavioral, ecological, and/or morphological adaptations that allow accommodation to the fluctuating water levels. Thus, in order to conserve natural wetland systems and the bird populations they support, water level fluctuations also must be preserved. [Dept. of Biology, Univ. of Mississippi, University, MS 38677, USA.]—Lori A. W. Duncan.

22. Hawaii's endangered waterbirds: a resource management challenge. C. R. Griffin, R. J. Shallenberger, and S. I. Fefer. 1989. Pp. 1165–1175 *in* R. R. Sharitz and J. W. Gibbons, eds. Freshwater wetlands and wildlife. DOE Symposium Series No. 61. United States Dept. of Energy, Oak Ridge, Tennessee.—This paper examines the status and distribution of the endemic waterbirds of the main Hawaiian Islands and some of the possible reasons for their decline. Among the major reasons for their decline are wetland losses, hunting and predation, and hybridization and competition with non-endemic species.

There is some confusion in the wording of the introduction concerning whether the four waterbird species on the main Hawaiian Islands are endemic species or not. The beginning of the paragraph describes "five endemic waterbird species recorded by early naturalists." Later in the paragraph it is stated that "only the Hawaiian duck is classified as an endemic species." I believe what the authors are trying to say is that the Hawaiian duck is the only endemic species and the others are endemic subspecies of waterbirds. [Dept. of Forestry and Wildlife Management, Univ. of Massachusetts, Amherst, MA 01003, USA.]—Lori A. W. Duncan.

PARASITES AND DISEASES

(see 20)

PHYSIOLOGY

23. No evidence for polarization sensitivity in the pigeon. M. A. J. M. Coemans, J. J. Vox Hzn, and J. F. W. Huboer. 1990. Naturwissenschaften 77:138–142.—The objective of these experiments was to investigate the sensitivity and mechanisms of polarized light detection in the Homing Pigeon (*Columba livia*) using psycholophysical and electro-

physiological techniques. The results of this study contradict previous reports that pigeons can detect differences in the plane of polarized light. In key-peck conditioning experiments, four pigeons were unable to distinguish between overhead polarized light patterns with different E-vector orientations. They were able to detect a 10-Hz flickering light and rectangles oriented orthogonally. Electroretinogram (ERG) recordings from 19 pigeons also failed to demonstrate a sensitivity to light flashes that differed in the orientation of their E-vectors. Based on their results, the authors conclude that previously reported sensitivities by pigeons to polarized light are misinterpretations of sensitivities to intensity differences. The ERG recordings showed changes with time, but there were no differences between responses to polarized and unpolarized light. The results of these experiments clearly indicate the care that is needed in conducting experiments involving sensory modalities to which humans are blind. It is important that these results be replicated by an independent group to resolve the inconsistencies between this and previous studies. [Lab. Comparative Physiology, Utrecht Univ., Transitorium III, NL-3584 CH Utrecht, Holland.]—Robert C. Beason.

24. Effects of local anesthesia of the nasal mucosa on other sensory inputs of pigeons (*Columba livia*). [Auswirkungen der Lokalanästhesie der Riechschleimhaut auf Sinnesleistungen bei Brieftauben (*Columba livia*).] W. Schlund. 1990. J. Ornithol. 131:325–332. (German, English summary.)—A local anesthesia (such as Gingicain) frequently is used to test the ability of pigeons to perceive odors in homing and cardiac conditioning experiments. The results of this study reveal that such manipulation also may affect aspects of the bird's behavior not associated with olfaction. There seems to be a general systemic effect of the anesthesia on the nervous system that must be taken into consideration for such experiments, especially those that are sensitive to differences in motivation on the part of the animal. [Univ. Tübigen, Abt. für Verhaltensphysiologie, Beim Kupferhammer 8, D-7400 Tübingen, Germany.]—Robert C. Beason.

MORPHOLOGY AND ANATOMY

(see also 21, 28, 29)

25. Sex and age variation in the Dipper *Cinclus cinclus*. [Variabilite morphometrique du cincle plongeur *Cinclus cinclus* en fonction du sexe et de l'age.] G. Marzolin. 1990. Alauda 58:85–94. (French, English summary and table and figure captions.)—This 8-year study of the biometrics of the Dipper revealed that 99% of the birds in the northeastern France study area could be sexed by wing length alone. Wing length of males continued to increase each year through at least the fourth year. That of females decreased slightly after the fourth year. Other parameters for which data are provided include culmen length, two different tarsal measurements, and weight. Means for females were consistently smaller than those for males in all parameters. Good sample sizes (120+ birds) allow for ready comparisons among most sex and age classes. Weight data are broken down by month (no July or August data) and sex, but not by age. Mean weight for both males (64.4 g) and females (53.4 g) was least in June; heaviest means for males (68.3 g) were in December, and for females (59.7 g) were in April. This is a nice study with an enviable data set!—Jerome A. Jackson.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 22, 28, 37)

26. First Hook-billed Kite specimen from Nuevo Leon, Mexico. F. M. De La Garza and A. J. Contreras-Balderas. 1990. Southwest. Nat. 35:370.—The first Hook-billed Kite (*Chondrohierax uncinatus*) specimen from the state of Nuevo Leon, Mexico, was collected on 16 January 1989. Additionally, the authors observed a nesting pair of Hook-billed Kites near Nuevo Leon in 1975 and another in 1977. [Lab. de Herpetologia y Ornitologia, Univ. Autonoma de Nuevo Leon, Apartado Postal 425, San Nicolas de los Garza, Nuevo Leon 66450, Mexico.]—Robin J. Densmore.

27. A range extension for the Botteri's Sparrow (*Aimophila botterii*) in southern Texas. D. K. Conway and K. L. P. Benson. 1990. Southwest. Nat. 35:348–349.—In 1988

a breeding pair of Botteri's Sparrows were found in the La Copita Research Area in Jim Wells County, Texas. One fledgling was observed. Except for one other record in San Patricio County, Botteri's Sparrows had not previously been known to breed north of the southern tip of Texas. [Dept. of Wildlife and Fisheries Science, Texas A&M Univ., College Station, TX 77843, USA.]—Robin J. Densmore.

SYSTEMATICS AND PALEONTOLOGY

28. A reappraisal of species limits in the Pied Imperial Pigeon *Ducula bicolor* (Scopoli, 1786) superspecies. M. D. Bruce. 1989. Riv. Ital. Ornitol. 59:218–222.—The Pied Imperial Pigeon complex ranges from the islands of the Bay of Bengal and the Philippines to the New Guinea region and northeastern Australia. Bruce suggests recognition of four allospecies: *Ducula bicolor,* with an extensive range throughout the region; *D. luctuosa,* endemic to Sulawesi and adjacent islands and the Sula Islands; *D. subflavescens,* endemic to the Bismarck archipelago and Admiralty Islands, but absent from the islands between New Britain and New Guinea; and *D. constans,* sp. nov., endemic to the Kimberly Division, northwestern Western Australia. Only minimal data are presented: descriptions of plumage and measurements of wing and tail, with very small samples (3–13) and no descriptive statistics other than range of variation. As the author acknowledges, much remains to be learned of this complex.—Jerome A. Jackson.

29. Preliminary systematic notes on some Old World Passerines. S. L. Olson. 1989. Riv. Ital. Ornitol. 59:183–195.—Relationships of several problematic genera are assessed relative to osteological characters of the nostril and syrinx. Rationale for publication of these "preliminary" findings is the "imminent appearance of the passerine volumes of *The Birds of Africa*" (Urban et al., Academic Press, London). Among Olson's recommendations are the following: (1) Leafbirds of the genus *Chloropsis* are members of the Pycnonotidae based on nostril ossification. (2) Based on absence of nostril ossification, *Nicator chloris* is not a member of the Pycnonotidae and should be returned to the Malaconotidae. (3) Lack of nostril ossification (one alcoholic specimen examined) suggests *Neolestes* does not belong in the Pycnonotidae and its affinities are uncertain, but could be near *Prionops.* (4)*Phyllastrephus* spp. represent a mixed assemblage, but no good evidence (lack of narial ossification) exists for including any of them in the Pycnonotidae (Olson suggests that they may represent an unrecognized example of adaptive radiation much like the Vangidae). (5) The distinctive genera *Paramythia, Oreocharis,* and *Malia* lack narial ossification and have humeral characteristics that suggest they are not Pycnonotids. (6) *Tylas* of Madagascar lacks narial ossification and is thus not a Pycnonotid, but its true affinities are questionable. (7) Other birds sometimes included in the Pycnonotidae but which lack narial ossification and are thus excluded from the bulbuls are *Hypergerus atriceps, Apalopteron familiare,* and *Lioptilornis rufocinctus.* (8) The monarch flycatchers are part of the corvine assemblage and properly placed in the family Myiagridae. (9) *Trochocercus cyanomelas* and *T. nitens* belong in the genus *Terpsiphone* which Olson considers to be the only monarch flycatcher genus in Africa; *Erythrocercus* and *Elminia* are of uncertain affinities, but based on osteology are not monarchs nor members of Platysteirinae. (10) The Australian mudnest-builders *Corcorax* and *Struthidea* are closely related, but osteology corroborates that at least *Grallina cyanoleuca* differs in having typical monarchine narial ossification. (11) The ioras of the Asian genus *Aegithina* should be considered monarch flycatchers. The remaining genus of the family Irenidae may have affinities with *Oriolus.* (12) The amphirhinal condition of *Eurocephalus* argues against its placement with *Prionops* and Olson considers it a typical shrike. (13) Based on syringeal structure the following species should be included in the Muscicapidae: *Cercotrichas podobe, Irania gutturalis, Thamnolaea coronata, Pseudocossyphus imerinus sharpei, Cichlerminia lherminieri, Fraseria ocreata, F. cinerascens, Humblotia flavirostris, Nesocichla eremita.* (14) Based on the presence of the "turdine thumb" character of the syrinx, *Myioparus plumbeus* belongs in the Muscicapidae. (15) The Boulder Chat (*Pinarornis plumosus*) seems to have a turdine affinity.—Jerome A. Jackson.

EVOLUTION AND GENETICS

(see 13, 14, 15)

FOOD AND FEEDING

(see also 10, 13, 15, 35)

30. Prey selection by Big Brown Bats (*Eptesicus fuscus*) and Common Nighthawks (*Chordeiles minor*). R. M. Brigham. 1990. Am. Midl. Nat. 124:73–80.—In order to compare the diets of Big Brown Bats and Common Nighthawks, both species were captured in mist nets at dusk from May to August 1986 and 1987 near Okanagan Falls, British Columbia. Insect parts were identified in fecal samples, regurgitated pellets, and stomach contents of individuals that died accidentally. The availability of insect prey at dusk was sampled using a whirligig or rotary trap. Since both species sought prey at the same location with temporally overlapping foraging periods, the author predicted that both species would have similar diets, despite differences in their methods of prey detection and wing morphology. Although nighthawks sometimes selected hymenopterans (carpenter ants) and coleopterans in proportions significantly ($P < 0.05$) greater than expected on the basis of availability, both species fed significantly more often on large trichopterans, ephemeropterans, homopterans, and chironomids. These data refute the suggestion that Big Brown Bats and Common Nighthawks feed opportunistically. However, the data do not elucidate whether these species actively "select" prey or eat what they do because of constraints imposed by detectability. [Dept. of Biology, York Univ., North York, ON M3J 1P3, Canada.]—Danny J. Ingold.

31. A comparison of feeding areas used by individual Common Murres (*Uria aalge*), Razorbills (*Alca torda*) and an Atlantic Puffin (*Fratercula arctica*) during the breeding season. S. Wanless, M. P. Harris, and J. A. Morris. 1990. Colonial Waterbirds 13:16–24.—Radio-tracking methods were used to find the feeding areas of three closely related alcid species. The study was conducted on the Isle of Man near the Firth of Forth, Scotland, in 1986–1987. The sample sizes were small with eight murres, three Razorbills, and one puffin receiving radio transmitters. The authors describe how changes in the radio signals could provide information on whether a bird was on its breeding site, flying, sitting on the sea or underwater, or flying out of range of the receiver (7–10 km), and how direction and flight distances were determined. This would be useful information for anyone planning a radio-tracking study of seabirds. The birds apparently flew directly to and from the feeding areas which ranged from 100 m to more than 10 km. Individual birds used widely separated feeding areas, often on consecutive trips. Razorbills travelled farther from the colony and foraged in shallower inshore water, while murres used a wide range of habitats, and the puffin fed closer to the colony. The authors suggest that Razorbills may be more selective in their choice of foraging habitat than the other species. The complex pattern of feeding areas used by individual birds during the nesting season may be related to the long period of immaturity in these species. The authors acknowledge that their sample sizes were low and their findings preliminary. [Inst. of Terrestrial Ecology, Hill of Brathens, Banchory, Kincardineshire AB3 4BY, Scotland, United Kingdom.]—William E. Davis, Jr.

32. Geographic and seasonal variation in the food habits of the Eagle Owl (*Bubo bubo*) in Navarra. [Variaciones geograficas y estacionales en la alimentacion del buho real (*Bubo bubo*) en Navarra.] J. A. Donazar. 1989. Ardeola 36:25–39. (Spanish, English summary, figure and table captions.)—Pellets were collected from 18 owl pairs in northern Spain between 1980 and 1985. The most common prey were *Oryctolagus cuniculus, Rattus* spp., *Mus* spp., and *Apodemyus sylvaticus*. The rabbits were taken much more frequently in summer, and smaller mammals were most frequently taken in autumn and winter. Among the 2558 prey items identified were approximately 20 species of mammals, 28 species of birds, colubrid snakes (18 individuals, not identified), at least two amphibian species, at least two fish species, and a few invertebrates (mostly Coleoptera and Orthoptera). Predators (Carnivora, Falconiformes, Strigiformes) seem unusually prevalent (3.1% of the prey items). Among avian prey, thrushes (*Turdus* spp.) were most prevalent (126 prey items), and along with doves (*Columba* spp.) were found as prey of 15 of the 18 pairs.—Jerome A. Jackson.

SONGS AND VOCALIZATIONS

(see also 14)

33. Attributes of whistling posts used by Northern Bobwhites (*Colinus virginianus*). D. B. Johnson, F. S. Guthery, and A. H. Kane. 1990. Southwest. Nat. 35:229–231.—The selection of whistling posts by male Northern Bobwhites was studied at two sites in southern Texas from March to June of 1985 and 1986. The first study site was located on the San Vincente ranch in Hidalgo County and was characterized by mixed brush habitat. The second site was located on the McFaddin ranch in Victoria County and was characterized by mixed grasslands with scattered clumps of brush.

Thirty-one whistling posts were observed on the San Vincente area in 1985, and none in 1986. Eighteen posts were observed on the McFaddin area in 1985 and 13 in 1986. Whistling posts were defined as the plant species or object on which the bird perched. Perch sites were defined as the exact location where the bird perched. Variables measured included height of whistling post, diameter of whistling post, brush canopy coverage within 30 m of perch site, vertical screening at perch site, circumference of perch site, and height of perch site. The authors interpreted the differences in variables between study sites as indicative of attributes for which whistling bobwhites have flexibility in post selection. Thus, height and diameter of whistling posts (which were larger in the McFaddin area), and circumference of perch sites (which were larger in the San Vincente area), seemed less significant in post selection. Conversely, the authors interpreted similarities between areas as indicative of attributes which were significant to bobwhites in post selection. Thus, male bobwhites seemed to seek out posts where canopy coverage of brush within 30 m averaged about 20% and where visual screening from 12 to 20 dm aboveground averaged 20–40%. Additionally, male bobwhites seemed to prefer perch sites with overhead cover as well as perches at a height of 1.5–2.5 m aboveground. [Florida Game and Fresh Water Fish Comm., Pembroke Pines, FL 33084, USA.]—Robin J. Densmore.

34. Song matching and the perception of song types in Great Tits, *Parus major*. D. M. Weary, J. B. Falls, and P. K. McGregor. 1990. Behav. Ecol. 1:43–47.—Like many species with repertoires, Great Tits respond to playbacks of their songs by singing the same type of song. They also match songs of other individuals. Researchers have assumed that phrase length is a key feature when classifying bird songs. It is not clear, however, what cues are used by the birds to classify songs.

To determine whether Great Tits use phrase length to classify songs, the authors presented wild, territorial males with a series of their recorded songs. Two song types, which differed in frequency, duration, and phrase length, were played back in edited and unedited forms. In the edited versions, phrase length simulated that of the other song. The subjects nearly always matched the unedited songs with identical songs. Although the birds frequently responded to the edited songs with the alternate song type (of equal phrase length), they responded with the same type of song (with altered phrase length) in more than half of the trials.

If phrase length had been the primary cue in the birds' classification of song types, the subjects should have responded mainly with the song of equal phrase length. Because such matching occurred to a limited extent, it is likely that the birds recognized differences in phrase length. The authors concluded, however, that frequency, rather than phrase length, was the most important feature in the birds' perception of song. They caution that classifications of stimuli must be biologically meaningful to permit accurate inferences about behavior. [Dept. of Psychology, Queen's Univ., Kingston, ON K7L 3N6, Canada.]—Kenneth D. Meyer.

BOOKS AND MONOGRAPHS

35. Food hoarding in animals. S. B. Vander Wall. 1990. The University of Chicago Press, Chicago, Illinois. 445 pp.—I begin this review by recommending Vander Wall's book for any biologist interested in the foraging behavior of animals. The book is an ambitious project. Many monographs have been written on food hoarding in specific taxa, or specific aspects of food hoarding, but this is the first booklength treatment of the subject of food

hoarding as whole. It is a substantial contribution, summarizing an impressive volume of literature in an accessible, even enjoyable format. By my estimate, there are over 1400 citations in the bibliography. The work is not without its shortcomings; there are aspects of content and arrangement that detract from the usefulness of the book. Some of these aspects are discussed below. On the whole, however, *Food Hoarding in Animals* is well worth the money, and more importantly, worth the time to read it.

A review monograph of this sort typically is faced with a trade-off. On the one hand, it is most useful as a reference book if its information is redundantly cross-referenced, with a minimum of interpretation or discussion. The facts then are quickly and easily located. The result is very useful, but not at all inspirational. On the other hand, a writer can strive for an insightful review, noting patterns, suggesting possible explanations, and evaluating and interpreting the papers discussed. Though very thought-provoking, such reviews are of limited use as references, as the sought-after bits of information are hard to find amidst all the insights and interpretation. Vander Wall circumvents this trade-off with a few simple techniques. First, he employs an unusually thorough index (15 pages), which includes taxonomic, phenomenological, and conceptual terms (e.g., dispersal of plants, food envy hypothesis). Second, he includes two appendices at the end of the book; Appendix I, Food-Hoarding Mammals and Birds Mentioned in the Text, and Appendix II, Plants, Plant Parts, Fungi, and Lichens Mentioned in the Text that are Stored by Animals. The appendices do not give page numbers, so the reader must flip back into the index (which is annoying as the index does not include plant parts, such as "bulbs" or "foliage"), but they are useful. Third, each citation in the bibliography is followed by the pages in the text where the work is cited. Together, these devices make the book very serviceable as a reference, and free Vander Wall to note interesting patterns and present his thought-provoking insights in the text.

Food Hoarding in Animals begins with several chapters on specific issues of food-hoarding behavior considered from the view of many different animal species (e.g., The Evolution of Food-Hoarding). Then, there are three taxon-specific chapters: Food-Hoarding Mammals, Food-Hoarding Birds, and Food-Hoarding Arthropods. The final chapter considers how food hoarding may affect community structure. Below, I give a short sketch of the chapters, with particular attention given to the chapter on birds.

After an opening chapter defining food hoarding and differentiating between scatter and larder hoards, Vander Wall devotes a chapter to the question of how animals use stored food. Differences between short-term and long-term storage are discussed. Reproductive benefits of food hoarding are discussed, including its use in courtship and mating rituals, its effects on the timing of breeding and on litter/clutch size, and its effects on nest attentiveness. Chapter 3 considers the evolution of food hoarding, and reviews a number of hypotheses about the selective pressures and mechanisms by which food hoarding evolved. Here, Vander Wall also considers the various specializations animals have evolved for food transport, cache dispersion patterns, and the possible coevolution of plant propagules and food hoarders. Chapter 4 investigates the various processes by which food caches are lost, and some of the behaviors animals have evolved to minimize losses. Factors influencing food-hoarding behavior are reviewed in Chapter 5, with internal state affects (genetics, development, hunger, and gender) considered separately from environmental factors (proximal factors, or cues to hoarding are discussed here, ranging from photoperiod to social facilitation). Cache recovery behaviors are detailed in Chapter 6, with birds, mammals, and hymenoptera treated separately. Although touched on in an earlier section, Vander Wall devotes an entire Chapter (7) to the subject of food hoarders as dispersers of plants.

The first seven chapters are meant to deal with their subjects in a general manner, relevant to all animal hoarders. The insights and hypotheses presented, however, seem mostly to be inspired by vertebrate examples, usually avian. This "bird's eye" view may reflect the author's expertise, but also may reflect the biased distribution of animal taxa in the literature. Birds are diurnal and large enough to be observed easily, whereas mammals usually are nocturnal and/or secretive, or are large enough to threaten the observe with the possibility of being killed and cached. Many arthropods are small and cryptic. Hence, birds may dominate the literature on food hoarding merely by being easy to work with.

The natural history of food hoarding in mammals, birds, and arthropods is presented in chapters 8, 9, and 10, respectively. Each chapter is organized about the taxonomy of the

group. Chapter 9 is comprised of sections on raptors, woodpeckers, and perching birds. The perching birds discussed at some length include corvids, Australian butcherbirds, bowerbirds, parids, nuthatches, thrushes and flycatchers, shrikes, and mynas. The chapter on birds is representative of both the strengths and weaknesses of the book, and is reviewed below.

One of the most thought-provoking aspects of this chapter (and of the book as a whole) is the fascinating patterns Vander Wall points out. For example, food hoarding is very common among true falcons, and among owls, but virtually absent from other raptor groups. What aspects of falcon ecology might promote food hoarding, or discourage it among other raptors? Might history play a role here, if one ancestral falcon adopted the habit and passed it on to descendent species? Every pattern noted suggests many possibilities for scientific inquiry.

One of the weaknesses of this chapter (and of the book) is the absence of statistical analyses. Without them, the reader must struggle to differentiate strong from weak patterns likely to be due to chance. The proposition that food hoarding is over-represented in the Falconinae certainly would survive statistical scrutiny (17 of the 37 species of falcons hoard food, versus two of the 53 accipters, five of 93 buteos, and none among the other subfamilies; table 9.3, p. 286). Other patterns probably would not pass muster. For example, Vander Wall notes that most owls accumulate prey in larder hoards, in contrast to falcons, which store prey in scattered hoards (p. 288). However, table 9.4 lists eight species of owls that hoard in larders (or "stockpiles"), versus six that scatter-hoard. If only one species were classified differently, there might be no pattern for owls. In addition, while table 9.4 lists the type of hoard (scatter or larder) for each species of owl, the analogous table 9.3 for falconiformes does not include a column on type of hoard. This makes it more difficult for the reader to assess the strength of the contrast between falcons and owls. Too often, patterns are described without reference to the sample sizes they came from.

Justifications for observed patterns sometimes are inconsistent. For example, on page 283, Vander Wall posits that vultures do not store food, because they would gain little from storing carrion, and Ospreys may not hoard because fish decomposes so rapidly. Nevertheless, on page 305, he notes that Carrion Crows store carrion, and American, Northwestern, and Fish Crows store fish.

Still, it is a very informative and scholarly work. For each species discussed, we learn what is stored, how and when it is stored and retrieved, and how the stored food is used (to survive the winter, to feed young, etc.). His summaries of papers reveal that he has actually read and assessed them carefully. On page 292, he traces reports of Northern Flickers storing acorns back to the original report, and concludes the author of the original report probably misattributed the work of Acorn Woodpeckers to flickers. This sort of careful evaluation, and the enormous quantity of information summarized, make the book extremely worthwhile.

The paperback production is of moderate quality, and it is priced ($29.95) within the range of most graduate student budgets. Although thin, the paper is alkaline and should last. Similarly, the binding is glued rather than sewn, but it is bound in signatures rather than the flimsy "perfect" binding that seems to fall apart so quickly. The printing and layout are easy on the eyes and accessible. The most interesting aspect of the layout is the wide (5 cm) outer margin. I do not know if it was intended for this purpose, but it makes a convenient space for scribbling in ideas, questions, hypotheses, and outlines of possible experiments inspired by the material in the book. The margins in my book already are well scribbled, which is perhaps the most sincere compliment and recommendation a reviewer could make.—Peter D. Smallwood.

36. The habitat guide to birding. T. P. McElroy. 1987. (Reprint of 1974 edition.) Nick Lyons Books, New York, New York. 275 pp.—In general it is a relatively easily read book for the amateur birder. The anecdotal accounts presented are interesting and the presentation impresses upon the reader that to be a good birder one should learn to be observant. Habitat descriptions, although not very detailed, with only a few indicator plant species listed, are for areas east of the North American Rocky Mountains. Bird species are listed by common name throughout the text; unfortunately, no scientific names are used. Some terms (e.g., "buteo") are used, but not defined in the text until several pages later. Information regarding a number of species could use updating (e.g., current ranges, en-

dangered status). Some anatomical information is questionable, such as the reference to the vertebrae of several species. The author gives some good safety advice in the section on marshes (birders should be aware of tides and undercut embankments, and should not go alone). The bibliography, the list of bird song recordings, and the list of principal ornithological organizations and their journals is very antiquated. The updated information in this printing appears to be a table on page vi concerning the change in common names of some of the birds in the text as listed in the *Check-list of North American Birds* (6th edition, American Ornithologists' Union, Washington, DC, 1983). Both the "name as used in book" and the "corrected name" are published in this table at the beginning of the book, a minor irritation encountered while reading the text.—R. W. Colburn.

37. **An annotated list of the birds of Bolivia.** J. V. Remsen, Jr. and M. A. Traylor, Jr. 1989. Buteo Books, Vermillion, South Dakota. 79 pp. $15, softcover.—With at least 1274 species, Bolivia has one of the richest avifaunas in the world. This is in spite of being completely landlocked, thus lacking marine, littoral, and pelagic birds! Why? The answer lies in Bolivia's tremendous topographic and habitat diversity within tropical latitudes.

This slender volume introduces the reader to both the habitat and avian diversity and provides a guide to where species occur. The only illustration other than the beautiful Red-fronted Macaw (by J. P. O'Neill) is a map identifying departments and habitats within Bolivia. The main body of the book is a list of species which indicates the department and life zones from which they are known. Fifty-one footnotes explain taxonomic decisions that had to be made in compiling the list. An annotated list of hypothetical species, a 163-entry literature cited, and indices to English names, genera, and families complete the book. It is unfortunate that the indices do not include species mentioned outside of the main list.

This book is a fine foundation for future workers and one that visitors to Bolivia will want to have—in company with a South American field guide.—Jerome A. Jackson.