J. Field Ornithol., 58(1):81–97

RECENT LITERATURE

Edited by Jerome A. Jackson

BANDING AND LONGEVITY

(see also 3, 15, 20)

1. Massachusetts-hacked Bald Eagle on the Mississippi coast. J. A. Jackson and J. E. Swedberg. 1986. Miss. Kite 16:24–25.—A Bald Eagle (*Haliaeetus leucocephalus*), originally hacked in Massachusetts in August 1983, was observed on the Mississippi coast from 15–24 October 1983.—Malcolm F. Hodges, Jr.

MIGRATION, ORIENTATION, AND HOMING

(see also 1, 6, 10, 31)

2. Distribution and migration of smaller petrels of the genus *Pterodroma* in the northwest Pacific. Y. Tanaka, Y. Kaneko, and S. Sato. 1985. J. Yamashina Inst. Ornithol. 17:23–31. (Japanese, English summary, figure and table captions.)—Data are presented for cruises in the northwest Pacific from May–November between 1980–1984 and emphasize *Pterodroma nigripennis, P. longirostris,* and *P. hypoleuca.* Maps show seasonal distributions of each species; tables relate observed numbers to surface water temperature, and identify other species (*Diomedea, Pterodroma, Bulweria, Calonectris, Puffinus, Oceanodroma*) associated with each.—Jerome A. Jackson.

POPULATION DYNAMICS

(see also 17, 24, 31)

3. Studies on a colony of colour-ringed Herring Gulls *Larus argentatus*: I. Adult survival rates. J. C. Coulson and J. Butterfield. 1986. Bird Study 33:51–54.—Annual adult survival rates of Herring Gulls nesting at a small colony near Sunderland, England were estimated by making repeated sightings of 50 color-banded gulls during a 6-year period. Gulls not observed for more than one month were presumed dead. Considerable effort was made searching at neighboring colonies for gulls that disappeared, but none was ever found. Mean annual survival of males was lower (87.3%) and more variable than female survivorship (94.5%), but the difference in survivorship was not significant; the pooled annual survivorship of gulls was 91.7% (95% CI = 87.8–94.8%). The life expectancy of an average gull as an adult is therefore about 11 years (95% CI = 7.7 to 18.7 years) assuming that the mortality rate is independent of age.

Assuming that birds died during the month they were last sighted, half of the marked gulls died during the 3-month post-breeding period, whereas only 27% died during the 6-month winter season. This result corroborates other studies on adult gulls (e.g., Coulson et al., Ardea 71:235–244, 1983) that reveal higher adult mortality at the conclusion of breeding, when gulls also undergo a complete molt, than during winter.—Stephen R. Patton.

4. Decreases in the Brown Pelican population in southern Florida. J. A. Kushlan and P. C. Frohring. Colonial Waterbirds 8:83–95.—In 1985, the U.S. Fish and Wildlife Service removed the Brown Pelican from endangered status in the states of Alabama, Georgia, Florida, and the Carolinas, while retaining it as endangered in Mississippi, Louisiana, Texas, California, the West Indies, and Central and South America. The decision to delist Florida populations of Brown Pelicans was partially based on results of aerial censuses conducted once a year during 1970–1984.

An intensive study of pelican populations in Florida Bay was conducted by the authors from December 1976 through September 1981. Brown Pelican populations in Florida Bay decreased steadily from 849 nests in 1977 to 513 in 1981 (40% decrease). This decline was likely due to changes in food availability in the study area. They found that nesting chronology among individual colonies was inconsistent among years. Both initiation and peak nesting varied by a month or more between successive years at a single colony site. Due to

the highly variable nature of Brown Pelican nesting chronology, aerial censuses conducted one month early or late can underestimate peak nesting effort by 40 to 60%. The type of aerial survey used to determine the population size of Florida Brown Pelicans has a high degree of error involved and would be able to detect only a very large loss of pelicans in the state.

The authors make the following recommendations: (1) future censuses and monitoring programs should not rely on aerial censusing alone, and (2) the status of Brown Pelican populations should be evaluated on biological rather than geopolitical boundaries.—Fred L. Burnside.

5. Status, dispersion, and population changes of the Least Tern in coastal Mississippi. J. A. Jackson and B. J. Jackson. Colonial Waterbirds 8:54–62.—Populations of Least Terns were monitored along the Mississippi Gulf coast from 1972–1984. Least Tern colonies were found on mainland and barrier island beaches, on dredged spoil, and on gravel-covered rooftops of buildings. Mainland populations were larger and more stable than populations on islands. Twenty-three colonies, each having at least 20 nests, were located during the period 1975–1984. Of these, 14 were on the mainland and 9 were on islands. Numbers of mainland nests fluctuated between 3200 and 6300 during the period 1977–1984. A mainland colony located on a man-made beach supported 3000+ nests yearly. Colonies on the barrier islands generally had 20 or fewer nests per colony. A large island-nesting colony of 1500 nests was located on the spoil island between Horn and Petit Bois islands in 1979.

Most Least Tern colony sites in Mississippi were in areas having a sand and shell substrate with little, or no, vegetation present at the beginning of the breeding season. Increases in the density of vegetation at colony sites caused a lowered site fidelity. Factors negatively affecting Least Tern colonies are discussed. These include weather, human disturbances, pollutants, predators, and disease. Historical changes in habitat and recent efforts to conserve Mississippi Least Tern populations are discussed.—Fred L. Burnside.

6. Fall age ratios of the Black-bellied Whistling-Duck. M. Heins-Loy. 1986. Southwest. Nat. 31:107–108.—Few data on the reproductive success of Black-bellied Whistling-Ducks (*Dendrocygna autumnalis*) exist. This study attempts to estimate the fecundity of Black-bellied Whistling-Ducks during the fall of 1981 in south Texas by comparing juvenile-adult ratios of post-nesting birds. Nine samples consisting of 1665 birds revealed a ratio of 3 young per adult. This ratio is not significantly different from a ratio of 3.9 per adult reported by Bolen (The ecology of the Black-bellied Tree Duck in southern Texas, Ph.D. dissertation, Utah State Univ., Logan, 1967). An average of 6 ducklings per nesting pair (both male and female Black-bellied Whistling-Ducks attend broods) were raised to the fledging stage in this south Texas population. This figure is higher than for most waterfowl species.

Potential flightless broods and differential migration between juveniles and adults probably did not have an appreciable affect on the results. Long-term studies of juvenile and adult mortality rates in the species are needed to elucidate the meaning of fall age ratios.—Danny J. Ingold.

NESTING AND REPRODUCTION

(see also 4, 5, 6, 12, 17, 18, 21, 26, 33, 35, 36, 38, 40)

7. Why do Cuckoos *Cuculus canorus* use so many species of hosts? N. Riddiford. 1986. Bird Study 33:1–5.—Observations of 3 male Cuckoos at Dungeness, Kent, England, revealed that males arrived and established territories about 2 weeks before females arrived. The habitat chosen by each male was sufficiently different that a different host species overlapped with each. These 3 hosts, the Dunnock (*Prunella modularis*), Reed Warbler (*Acrocephalus scirpaceus*), and Meadow Pipit (*Anthus pratensis*) are the 3 most common hosts of Cuckoos at Dungeness. Although individuals were not marked, Riddiford's impression was that each female consorted with one male only and occupied a territory that was slightly smaller than the male's. Additional "unpaired" female Cuckoos were expelled by females holding territories, but the territorial males sometimes associated with the expelled

females in surrounding shingle habitat. It was in this neighboring habitat where Cuckoos were found in the nests of 2 other host species: 2 Whitethroats (*Sylvia communis*) and one Skylark (*Alauda arvensis*). Riddiford suggests that females failing to obtain territories containing preferred hosts, whose eggs they can mimic, are forced to use other species as hosts, whose eggs they cannot mimic. This hypothesis deserves further testing using a marked population of Cuckoos.—Stephen R. Patton.

8. Breeding biology of Leach's Storm-Petrels *Oceanodroma leucorhoa* on Daikoku Island, Hokkaido, Japan. Y. Watanuki. 1985. J. Yamashina Inst. Ornithol. 17:9–22. (Japanese, English summary.)—This paper quantifies nesting habitat characteristics and numerous aspects of the breeding biology of Leach's Storm-Petrels. All figures (5) and tables (8) have English captions, and the "meat" and high quality of the paper are clear. Although the summary indicates that the study was done between late April and late October 1982, the tables provide comparative data on burrow dispersion among 4 vegetative habitat types for 1981 and 1982. The smallest sample sizes (n = 3–7) are for chick growth data (wing and tarsus length, weight), for which Watanuki uses Ricklefs' (Ecology 48:978–983, 1967) graphical method of analysis, fitting the data to a Gompertz growth curve. The incubation period averaged 41.8 days; incubation bouts, 2.9 days; chick growth rate (K), 0.078; chick asymptotic weight, 69 g; fledging weight 58.3 g; fledging period 61.2 days; adult weight, 48.5 g; and egg weight 11.2 g. Hatching success was 75%, but was higher in deeper burrows and for earlier laid eggs; chick survival averaged 92%. The birds laid earlier in the best habitats.—Jerome A. Jackson.

9. Behaviour and breeding biology of the cooperatively breeding Grey-backed Fiscal Shrike (*Lanius excubitorius*) in Kenya. S. Zack. 1986. Ibis 128:214–233.—Grey-backed Fiscal Shrikes (*Lanius excubitorius*) were studied 2½ years near L. Naivasha, Kenya.These shrikes are cooperative breeders with group sizes ranging from 2 to 11. Only one pair breeds per group, with all other group members aiding in the rearing of young. Male helpers were more numerous than female helpers, and non-breeding helpers made up to 66% of the population. Male breeders contributed the most food to the incubating female and to the nestlings. Male helpers and female breeders contributed more to nestlings than did female helpers. The annual survival rate was 65% with no sex differences nor differences between helpers and breeders. Only male helpers acquired breeding status within the natal territory, although some female helpers acquired breeding positions in territories adjacent to their natal territory. Overall reproductive success was low (14% of the breeding attempts fledged young). Groups of 4 or more had greater reproductive success than smaller groups, but factors other than, or in addition to, group size may have contributed to this pattern. As the author notes, a long term study would be necessary to evaluate the relative roles of environmental variation and group size in reproductive success.

Grey-backs differ from other cooperative breeders in that they can be considered an "asocial social" bird. The author substantiates this claim by describing 3 behavioral characteristics. However, in many respects the Grey-back cooperative system is most similar to that of the Florida Scrub Jay (*Aphelocoma c. coerulescens*).

The author's shrike studies have contributed to our understanding of the evolution of cooperative breeding by suggesting that the saturation of high quality habitat in conjunction with high adult survivorship favor the retention of offspring in natal territories and perhaps encourage cooperative behaviors. This appears to be a major pattern emerging from cooperative breeding studies.—J. M. Wunderle, Jr.

10. Mating systems among European passerines: a review. A. P. Moller. 1986. Ibis 128:234–250.—The mating systems of European passerines were reviewed 15 years ago in an important paper by von Haartman (Ornis Fenn. 46:1–12, 1969). However, since that time numerous studies with color-banded populations have examined the mating systems of a variety of European passerines. This review examines studies for 122 relatively well-studied European passerines (out of 172 species). Of the species studied, 39% are polygynous and 25 of 47 polygynous species are regular polygynists exceeding the limit of 5% polygyny in a population. Of the polygynous species, 63% are monoterritorial (having a maximum of one territory), the rest being polyterritorial (having at least 2 territories). Regular polygyny is more common among polyterritorial passerines, which tend to have

tropical wintering grounds. Absent from the polyterritorial group are colonial species. Polygyny is frequently encountered among species breeding in open habitats (marshes, pastures, meadows, etc.)—a finding consistent with those from surveys of North American species.

As expected, monogamous male passerines participate more frequently in feeding nestlings than their polygynous counterparts. Regular polygynists tend to be sexually dimorphic in plumage more often than infrequent polygynous species, and polyterritorial passerines similarly tend to be plumage dimorphic more often than monoterritorial species. Sexual size dimorphism was more pronounced in monoterritorial than in polyterritorial species.

Of the polygynous species, 37% are polyterritorial and thus are exceptions to the polygyny threshold model (Verner and Wilson, Ornithol. Monogr. 9:1–76, 1966). It appears that the male deception model (Alatalo et al., Am. Nat. 117:738–753, 1981) is most appropriate for these cases. As predicted from this hypothesis, most of the polyterritorial species are long-distance migrants wintering in tropical Africa. Therefore, females cannot afford long pre-copulatory pair bonds, and thus the opportunity for deception by males occurs. Deception by males probably cannot occur in colonies due to shorter inter-territory distances, and this may partially account for the absence of colonial species from the polyterritorial group.

The addition of more European passerine mating system data has helped to negate some of the previous generalities based on inadequate data (i.e., von Haartman's suggestion that polygyny should be more common among cavity nesters than open nesters). In summary, this is a valuable review, which should be read by all those interested in avian social behavior.—J. M. Wunderle, Jr.

BEHAVIOR

(see also 9, 10, 25, 38, 45, 50)

11. The use of radio-tracking for monitoring Great Tit (*Parus major*) behaviour: a pilot study. M. L. East and H. Hoffer. 1986. Ibis 128:103–114.—Three male Great Tits (*Parus major*) were tracked intensively in sequence between January and April with varying efficiency. The radio transmitter plus clip weighed 1.8 g and was within the limit of 10% of the bird's body mass (mean = 29.1 g) as recommended by earlier workers. All birds carried the transmitters attached to the base of their tail feathers. The transmitters had zinc-air and mercury batteries (zinc-air batteries were unreliable in wet weather), with a mean life of 7 days. The distance over which the signal could be detected in woodland was limited (usually less than 50 m), which made the relocation of lost birds difficult. Only one individual was influenced noticeably by the attachment of a transmitter, which caused him to spend 20% of visible time preening.

As with previous radio-tracking studies, this work provided useful information on home range size and spatial patterns of habitat use. It also facilitated behavioral observations and the construction of time budgets. The data gathered with this technique suggest that standard observations may be highly biased.—J. M. Wunderle, Jr.

12. Are female Black Grouse *Tetrao tetrix* territorial? P. K. Angelstrom, M. Jaarola, and N.-E. Nordh. 1985. Ornis Fenn. 62:124–129.—Female Black Grouse make a loud, far-reaching cackle-call during the mating season, for which a function is unknown. The hypothesis that female Black Grouse are territorial was tested by examining the seasonal distribution of cackle-calls, by playback experiments, and by territory mapping. Twenty censuses were made along a 6 km transect in Sweden during 1984, beginning in the mating season and extending into the incubation period when the calling stopped. Playback experiments were conducted using 3 repeated cackle-calls of female Black Grouse, and calls of female Capercaillies (*Tetrao urogallus*) and Cuckoos (*Cuculus canorus*) as controls. The tape was played at every third stop along the census route. A second experiment used a continuously repeated call of a female Black Grouse, played at locations of radio-transmitted females. A stuffed Black Grouse female was set in an open place as the repeating recording was played, and the behavior and vocal responses of the local female were observed.

Both the temporal distribution and intensity of the cackle-calls showed a marked peak

in the beginning of the breeding season. Females began to cackle one week before the mating period and stopped in the beginning of the incubation period. The results of the playback experiments were inconclusive and did not produce any evidence of female territorial defense. The authors suggested that the cackle-call may be a behavioral mechanism for spacing out territories during the mating season, using avoidance behavior rather than aggression. An alternative hypothesis was that the call may synchronize and stimulate the sexual behavior of other grouse. The authors suggested that the cackle-call of female Black Grouse may have an intra- and inter-sexual function.—Lise A. Hanners.

13. Juvenile Loggerhead Shrike "begging" from its prey. F. L. Burnside and J. A. Jackson. 1986. Miss. Kite 16:28–30.—A juvenile Loggerhead Shrike (*Lanius ludovicianus*) was observed repeatedly "begging" from a mouse in a bal-chatri trap. The authors theorize that, since shrikes learn to beg before prey in the nest, such behavior may carry over into the period of early independence.—Malcolm F. Hodges, Jr.

ECOLOGY

(see also 5, 8, 18, 45)

14. Habitat selection of breeding birds in relation to forest succession in Northeastern Finland. P. Helle. 1985. Ornis Fenn. 62:113–123.—Breeding birds were censused once in 5 different successional stages of dry and moist forest types. The 3 younger stages (2, 10, and 25 yr) originated from clear-cutting, and the older stages (75 and 150 yr) developed after slash-and-burn cultivation or forest fires. In stages I–III a study plot method of censusing was used, and in stages IV and V a line transect method. In every plot and transect, 5 vegetation features were determined: (1) height, (2) total cover, (3) proportion of hardwoods, (4) foliage height diversity, and (5) number of dominant tree and shrub species within a 25-m radius.

In the dry habitat, only the Tree Pipit (*Anthus trivialis*) nested in all 5 stages; in the moist habitat, 3 species (the Redwing *Turdus iliacus,* Willow Warbler *Phylloscopus trochilus,* and Redpoll *Carduelis flammea*) nested in all 5. The most abundant species used the habitat spectrum widely, such that species inhabiting 4 or 5 stages of a series made up 46% of the total number of pairs; species breeding in 1 or 2 stages comprised 37% (dry and moist habitats combined). The "mid-point of density" weighted for species abundance was used as a measure of where the "average" pair of a species was situated in the forest regeneration gradient. These midpoints were practically the same in the moist and dry series. The habitat amplitude (inverse of Simpson's Index) was higher in moist than dry sites. The habitat amplitude and abundance of species were positively correlated; habitat amplitude of congeneric passerines exceeded that of noncongeneric passerines. No significant correlations were found between the densities of the species and the proportion of hardwood in the total foliage volume. The 4 other vegetation features studied were positively correlated with the densities of species considered habitat specialists but not with generalists. An extensive appendix listed species observed on the censuses and their occurrence in each successional stage.—Lise A. Hanners.

15. Studies on a colony of colour-ringed Herring Gulls *Larus argentatus*: II. Colony occupation and feeding outside the breeding season. J. C. Coulson and J. Butterfield. 1986. Bird Study 33:55–59.—Year-round observations of Herring Gulls marked for individual recognition were made at a colony near Sunderland, England. Some gulls occupied the colony site year-round, but the colony site was not occupied at night during winter. Thirteen of 15 marked males were at the colony during every month between August and April; most females were absent for one or 2 months. Nesting space at this colony is suggested to be "limited"; nest density is "high." It is suggested that the males' habit of remaining at the colony site year-round contributes to their retention of nesting territories from one year to the next. This hypothesis deserves further testing.

Few gulls from this colony were observed foraging at local landfills or fish quays, leading the authors to suggest that most of the marked birds foraged at sea. By contrast, migrant Herring Gulls that wintered in the area were observed much more frequently at the local landfills.—Stephen R. Patton.

16. Home range and foraging habitat of Red-cockaded Woodpeckers in northern Florida. M. L. Porter and R. F. Labisky. 1986. J. Wildl. Manage. 50:239–247.—The Apalachicola National Forest (ANF), Liberty County, Florida, "supports the largest known population" of Red-cockaded Woodpeckers (*Picoides borealis*) on Federal land. Nineteen individually marked birds were tracked from dawn to dusk one day per month for 12 months in the ANF to determine year-round and seasonal home range sizes. Within home ranges of 4 clans, vegetation measurements and foraging observations of marked birds were used to quantify use and availability of foraging habitat.

Annual home range sizes varied among clans from 85 to 157 ha (mean, 129 ha) and did not differ significantly among seasons. Birds foraged almost exclusively in either longleaf (*Pinus palustris*) or slash (*P. elliottii*) pine, with longleaf preferred over slash. Within a forest stand, woodpeckers foraged selectively on taller trees and trees of greater diameter, and selected stands having those characteristics. Young stands with high stem density, swamps, savannahs, and clearcuts were avoided by foraging woodpeckers.

Red-cockaded Woodpeckers in the ANF required a greater area of foraging habitat than that reported from studies in South Carolina. Composition of foraging habitat thus appears to influence *P. borealis* home range size. These results have important implications for management of this endangered species. The South Carolina work has been "the foundation for management of red-cockaded woodpeckers on federal lands in the Southeast." Porter and Labisky, however, stress that their results now indicate the importance of evaluating management needs for Red-cockaded Woodpeckers "on a population-by-population basis."—Richard A. Lent.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 1, 4, 46)

17. Cavity-nesting birds and the cavity-tree resource in plains cottonwood bottomlands. J. A. Sedgwick and F. L. Knopf. 1986. J. Wildl. Manage. 50:247–252.—Populations of cavity-nesting birds are often limited by availability of snags (dead trees), which provide a resource for nest cavity excavation and for foraging. This study demonstrated the opposite effect, i.e., a relatively high density of cavity nesters (≤463 birds per 100 ha) in a Colorado plains cottonwood (*Populus sargentii*) community having a low density of snags (0.66 per ha). The reason for the reverse relationship between snag density and cavity-nester density was that most nesting substrate was provided by large, dead limbs attached to living trees rather than by dead trees. Total length of suitable dead limbs (those 15–30 cm in diameter) and the number of live trees with attached dead limbs, rather than snag density alone, were "good measures of suitable nesting substrate for cavity nesters."

Management implications of these results are that "The importance of snag retention aspects . . . of habitat models for cavity nesters appears diminished in deciduous forests." As an alternative to snag management in plains cottonwood forests, the authors recommend "live-tree management." This includes practices such as limiting harvest (for commercial firewood) of living cottonwoods with large dead limbs, as well as the usual practice of retaining snags.—Richard A. Lent.

18. Bird nesting in Iowa no-tillage and tilled cropland. N. S. Basore, L. B. Best, and J. B. Wooley, Jr. 1986. J. Wildl. Manage. 50:19–28.—To test whether no-tillage agricultural techniques (leaving undisturbed crop residue on the soil surface to retard soil erosion) enhanced habitat for ground-nesting birds, Basore et al. conducted nest searches in 355 ha of no-tillage and 129 ha of tilled cropland in southwestern Iowa from 1982 through 1984. Three no-tillage treatments were studied: corn planted in corn residue, corn in sod residue, and soybeans in corn residue. The control treatment was corn planted in tilled soil. Treatments were replicated and fields chosen to minimize edge effect and internal habitat heterogeneity. Nests were monitored to determine success, and habitat characteristics associated with each nest site were measured.

Twelve bird species, averaging 36 nests per 100 ha, nested in no-tillage fields; only 3 species (4 nests per 100 ha) nested in tilled fields. Of the no-tillage fields, corn planted in sod residue had the greatest overall nest densities (77 per 100 ha), but also the greatest loss of nests to predators (68%). Killdeers (*Charadrius vociferus*) were the most successful nesting

species, with 90% success and no nest predation. Grasshopper Sparrows (*Ammodramus savannarum*) had a high rate of nest predation and the lowest success rate (10%).

No-tillage fields were thus more attractive than tilled fields to nesting birds, probably because they contained greater coverage of crop residue for nest concealment. However, this was true only to a certain point, as birds showed "a definite aversion to nesting in tall, dense residue," possibly because shorter residue allowed incubating adults a better view of approaching predators.

Results suggest that "no-tillage cornfields and soybean fields are used by more bird species and at greater nesting densities than are tilled fields." However, this effect may be countered by high nest losses to predators. Production of most species was probably below that required to maintain viable populations without subsidy by surplus individuals from more productive areas.—Richard A. Lent.

19. Resistance of sweet corn to damage by blackbirds and starlings. R. A. Dolbeer, P. P. Woronecki, and R. A. Stehn. 1986. J. Am. Soc. Hort. Sci. 111:306–311.—This well-designed study, done under aviary conditions, involved both free-choice and no-choice tests of the susceptibility of 25 cultivars of sweet corn to damage by Red-winged Blackbirds (*Agelaius phoeniceus*), Common Grackles (*Quiscalus quiscula*), and European Starlings (*Sturnus vulgaris*). There were significant differences among cultivars in the extent of damage done, and these differences were attributable to characteristics of the husk. Cultivars with heavier husks and those with husks which extended farther beyond the kernels suffered less damage. The one cultivar which did not fit the pattern had exceptionally long ears, a characteristic favored by the birds. Starlings did the most damage, followed by male red-wings, female red-wings, and grackles. This approach to bird damage control is a refreshing one that deserves more consideration by all concerned.—Jerome A. Jackson.

20. Starling nest box trap. R. Wood. 1986. Sialia 8:15–17.—Specific instructions are given to build a trigger-operated nest box trap. Box dimensions and instructions for placement of the trap enhance the probability of capturing European Starlings (*Sturnus vulgaris*). Captured birds other than starlings or House Sparrows (*Passer domesticus*) should be released.—Danny J. Ingold.

21. Hole size for Mountain Bluebirds. L. Zeleny. 1986. Sialia 7:11, 16.—Increasing evidence suggests that numbers of Mountain Bluebirds (*Sialia currucoides*) using nest boxes with 1½ inch entrance holes are moderate to few. This problem was alleviated at one Washington location by enlarging entrance holes to 1⅝ inches. European Starlings (*Sturnus vulgaris*) are increasing in numbers throughout much of the Mountain Bluebirds' range, and readily usurp bluebird nest boxes with entrance holes 1⅝ inches in diameter or larger. A recent study demonstrated that starlings could be excluded from bluebird boxes by decreasing cavity entrances to $1^{9}/_{16}$ inches. Bluebirds that did not use nest boxes with 1½ inch entrance holes, entered boxes with $1^{9}/_{16}$ inch holes. In areas where starlings are absent, 1⅝ inch entrance holes are satisfactory. Otherwise hole size should be decreased to $1^{9}/_{16}$ inches. Nest boxes should be placed within 15 m of at least one suitable perch. Bluebird nesting habitat is described to aid in nest box placement.—Danny J. Ingold.

22. Scent tube leads snakes astray. R. L. Hoffman. 1986. Sialia 8:3–5.—In an effort to prevent snake predation of Eastern Bluebirds (*Sialia sialis*) and Purple Martins (*Progne subis*) nesting in houses, posts supporting the houses were encircled with a hollow plastic tube (10 cm in diameter) approximately 1 m in length positioned a few centimeters below the house bases. The upper ends of these "guard tubes" were covered with meshed cloth to prevent snakes from climbing through. Inside each bird house a small piece of plastic tubing was extended downward through the base to the inside of the guard tube. This "scent tube" functions to transfer the bird odor from the house to the guard tube, thus diverting the snake up the support pole into the guard tube blocked by the meshed cloth. Once lured up the guard tube, no snakes exited and climbed up the outside of the tube to the nest house. As a result of this snake-proofing innovation, predation on bluebird and martin nestlings dropped significantly.—Danny J. Ingold.

23. On the control of parasites in nest boxes and the use of pesticides near birds. J. A. Jackson. 1985. Sialia 7:17–25.—Infestations of mites (*Dermanyssidae*), blowflies (*Cal-*

liphoridae), and other ectoparasitic insects in nest boxes potentially reduce the fecundity of such birds as Eastern Bluebirds (*Sialia sialis*) and Purple Martins (*Progne subis*). Several chemicals have been recommended for the control of ectoparasites in bird houses, but often these chemicals are devoid of necessary instructions for their use around birds and/or have not been approved for such use. The author cites an example of at least 19 Purple Martins dying at a colony because of the use of sulfur mixed with a potent pesticide inside the houses.

Jackson warns that when selecting a chemical to control parasites around small wild birds, one should be aware that most pesticides have been tested only with poultry. Toxicity levels tolerable to poultry may be fatal to smaller birds. He presents an annotated list of chemicals that have been suggested for the use in controlling ectoparasites in birds. These chemicals are categorized into inorganic, chemicals of botanical origin, carbamates, organophosphates, and others. "Signal" words established by the U.S. Environmental Protection Agency ("caution," "warning," and "danger") are used in reference to each chemical for comparative purposes. Lethal doses (LD_{50}s determined in experiments with rats) and/or lethal concentrations (LC_{50}s determined in experiments with Northern Bobwhites (*Colinus virginianus*)) are also listed for each chemical. This list clarifies alternatives when considering chemical control of ectoparasites around box-nesting birds. However, the author does not advocate the use of any chemical, suggesting instead that "in the final analysis, control methods other than chemical pesticides may be the more desirable approach."—Danny J. Ingold.

24. Guidelines for the management of the Purple Martin, Pacific coast population. B. Sharp. 1986. Sialia 8:9–13, 30.—The Purple Martin (*Progne subis*) has declined dramatically along the Pacific coast, due mainly to loss of nest sites resulting from forest management practices, competition with European Starlings (*Sturnus vulgaris*), weather, and nest parasites. The major objectives for helping the population are to monitor it more closely and to try to increase martin numbers by providing artificial nesting sites. Other management strategies are to reduce starling and House Sparrow (*Passer domesticus*) numbers in the vicinity of martin colonies, and to manage habitat in order to provide more nesting and foraging opportunities.—Malcolm F. Hodges, Jr.

PARASITES AND DISEASES

(see 23, 45)

CONSERVATION AND ENVIRONMENTAL QUALITY

(see 1, 4, 5, 32, 46)

PHYSIOLOGY

(see also 28)

25. Digestive physiology is a determinant of foraging bout frequency in hummingbirds. J. M. Diamond, W. H. Karasov, D. Phan, and F. L. Carpenter. Nature 320: 62–63.—The small size and costly foraging (hovering) behavior of hummingbirds combine to produce very high energy requirements. By marking glycol and glucose, it was demonstrated that hummingbirds have rapid crop-emptying times, owing to high active glucose transport and low glucose permeability in the intestine. Paradoxically, hummingbirds spend about ¾ of their waking time perching. The temporal aspects of crop-emptying suggest that the hummingbirds' feeding bouts may be determined by digestive physiology and that the birds may actually be energy maximizers despite their behavioral appearance as time minimizers. This study indicates some of the intricate, easily overlooked, ways in which different behavioral and physiological levels of organization are interwoven into ecological patterns.—W. A. Montevecchi.

26. A test for regulation of egg dehydration by control of shell conductance in Mourning Doves. G. E. Walsberg. 1985. Physiol. Zool. 58:473–477.—The rate of water loss ($\dot{M}_{H_2O}$) from eggs during incubation affects their hatchability. One method by which

$\dot{M}_{H_2O}$ might be regulated physiologically would be for a female bird to produce eggs in which the conductance of the eggshell to water vapor ($\dot{G}_{H_2O}$) varied according to the levels of environmental vapor pressure to which she was exposed while nesting. Walsberg examined $\dot{G}_{H_2O}$ of eggs from a wild population of Mourning Doves (*Zenaida macroura*), which are regularly exposed to a major seasonal change in ambient humidity during their breeding season on the Sonoran Desert: low ambient humidity (4–6 torr) during early summer, high ambient humidity (12–18 torr) during late summer.

He found that average nest humidity, and the vapor pressure and temperature of incubated eggs were significantly higher in late summer than in early summer. However, $\dot{G}_{H_2O}$ of the eggshell did not change and consequently the daily rate of water loss from the egg was 25% higher during the dry part of the nesting season than during the humid part of it. These findings should be accepted with caution because (1) $\dot{G}_{H_2O}$ of the eggs was determined by keeping them in a desiccator for only 1 day, rather than the customary 4–6 days, (2) no information is given about the age of the eggs when their $\dot{G}_{H_2O}$ was determined, and (3) the temperature and vapor pressure of the eggs were not measured directly, but obtained with allometric equations.

Be that as it may, this is the first published test of the hypothesis that nesting female birds maintain embryonic water balance in their eggs when faced with variable ambient humidity by altering $\dot{G}_{H_2O}$ of the eggshell. In this species, such compensation apparently does not occur. Also, since nest humidity doubled in the second half of the breeding season, Mourning Doves apparently do not regulate nest humidity actively while they incubate.—Michael D. Kern.

MORPHOLOGY AND ANATOMY

(see also 8)

27. Visual evaluation of tibiotarsus and femur marrows as a method of estimating nutritive conditions of Short-tailed Shearwaters. N. Oka and N. Maruyama. 1985. J. Yamashina Inst. Ornithol. 17:57–65.—From 1982 to 1984, 276 *Puffinus tenuirostris* were collected/salvaged in Japan and Australia. Many were killed in fishing nets, others were found emaciated (dying or dead) on beaches. Australian birds were from nesting areas and included nestlings. Dry weights of the tibiotarsus and femur marrows expressed as a percentage of their fresh weights were good indices of physical condition.—Jerome A. Jackson.

PLUMAGES AND MOLTS

(see also 45)

28. Molt and resting metabolic rate in the Common Teal *Anas crecca* and the Shoveler *Anas clypeata*. G. Qian and H. Xu. 1986. Acta Zool. Sinica 32:68–73. (Chinese, English abstract and table captions.)—Oxygen consumption, and body weight of captive Green-winged Teal (n = 12) and Northern Shovelers (n = 10) were studied during molt from July–December 1983. Sex of the birds is not indicated in English. Completion of wing molt required 21–25 d for the teal, 25–30 d for the shoveler. Molt of the prenuptial plumage was considered a continuation of the eclipse molt. Body weight of both species increased rapidly at the beginning of wing molt and remained relatively constant throughout molt. Weight decreased rapidly at the beginning of flight. Resting oxygen consumption was 3.12 ml/g/h in the teal, and 2.33 ml/g/h in the shoveller during molt at 16 C. Oxygen consumption increased (24.8% for teal, 34.7% for shovelers) during molting and the increase was correlated with the intensity of molt.—Jerome A. Jackson.

29. A study on the moult of the chicks of Brown Eared Pheasant *Crossoptilon mantchuricum*. F. Li and S. Huang. 1985. Acta Zool. Sinica 31:290–295. (Chinese, English summary and figure and table captions.)—Figures, tables, and abstract allow adequate interpretation of the results of this study, which may have been done at a zoo (the authors are from the Beijing Zoo). Birds (n ?) were followed from week 1–21 post-hatching. The post-juvenile molt of the Brown-eared Pheasant includes molt and replacement of all primaries except P 1 (according to the abstract), which is retained in the first year. There

is a complete centripetal molt of rectrices. Details are also given for molt and replacement of the alular feathers, secondaries, and tertials.—Jerome A. Jackson.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 1, 2, 14, 39, 47)

30. Birds of the Solander Islands. W. J. Cooper, C. M. Miskelly, K. Morrison, and R. J. Peacock. 1986. Notornis 33:77–89.—Just off the southern tip of South Island, New Zealand, lie the Solander Islands, two tiny, steep-sided projections of an undersea volcano. An inventory of the avifauna during 1985 revealed 37 species, of which 19 breed. Among the most important is the southern race of Buller's Albatross (*Diomedea b. bulleri*), the 4000–5000 pairs comprising about half of the entire population. Most of the seabirds are typical of cold temperate waters, the exception being ca. 20 pairs of Australian Gannet (*Sula basana serrator*), a warm temperate species. As elsewhere, introduced Wekas (*Gallirallus australis*) seem to have had important adverse effects on many species of seabirds, and may account for the absence of Fernbirds (*Bowdleria*) and snipe (*Coenocorypha*), as well.—J. R. Jehl, Jr.

31. The distribution and abundance of Sand Martins breeding in central Scotland. G. Jones. 1986. Scottish Birds 14:33–38.—Bank Swallows were studied near Stirling from 1982–1984, where the maximum numbers of pairs attempting first broods were estimated for 27 colonies. Colony sizes ranged from 1–920 pairs. Most sites were where glacial sand and gravel deposits have been quarried, leaving large cliffs suitable for excavation; others were along river banks. The number of colonies containing more than 500 burrows declined from 5 in 1982 to one in 1983, and no colony included more than 200 pairs in 1984. The declines were attributed to drought conditions on the wintering grounds in the Sahel region of Africa. This apparently caused a population crash in Bank Swallows on a national scale.—Jerome A. Jackson.

32. Preliminary studies on geographical ecology of birds and mammals on some islands of Zhejiang Province. G. Zhu, S. Jiang, Z. Zheng, and G. Fang. 1986. Acta Zool. Sinica 32:74–85. (Chinese, English summary, figure, and table captions.)—The authors surveyed the mammalian and avian fauna of Dongtou Island, the adjacent mainland, and 5 islands of the Zhoushan Archipelago during 1979 and 1981–1982. As would be predicted, there were fewer species on Dongtou Island (11 birds, 5 mammals) than on the mainland (Mount Yandang, 31 birds, 20 mammals). Bird and mammal species and their status are listed for the five islands of the Zhoushan Archipelago. The dominant bird and mammal of all islands were *Passer montanus* and *Rattus ratoides*. Decreases in species' populations and possible extinction of some are attributed to overhunting and habitat destruction. Conservation measures are suggested (but not in English).—Jerome A. Jackson.

33. Nesting and summer records of Osprey in Oklahoma. L. D. Isley and J. W. Lish. 1986. Bull. Okla. Ornithol. Soc. 19:2–3.—The first valid nesting accounts of Osprey (*Pandion haliaeetus*) for Oklahoma are reported: one in the 1950s and one in 1983.—Malcolm F. Hodges, Jr.

34. Observations of species submitted for verification, in France during 1984. (Les observations d'espèces soumises à homologation en France en 1984.) P. Dubois and the National Committee for the Verification of Rare Birds. 1986. Alauda 54:25–48. (French.)—In 1984, its third year of deliberations, the National Committee received 221 reports of rare birds from various parts of France and verified 89% of them. This number does not include numerous data for 1983 that are still under consideration.

Thirty-two species listed in the Committee's first or second annual report (see J. Field Ornithol. 56:205, 444, 1985) were again seen in France in 1984. Of note among them are Great Egrets (*Egretta alba*) which have become so numerous that the Committee will stop verifying reports of them after 1 April 1986—they have overwintered in Bas-Rhin and Vendée for several years; Green-winged Teal (*Anas crecca carolinensis*), reported for the second time in France; Ruddy Ducks (*Oxyura jamaicensis*), all of which were seen in 14 days of November; White-tailed Sea Eagles (*Haliaeetus albicilla*) which now regularly over-

winter in west central France and Somme; Terek Sandpipers (*Xenus cinereus*), which apparently overwintered (for the first time) in Camargue; Black Guillemots (*Cepphus grylle*), extremely rare in France, and reported for the first time in 3 years; and Rose-colored Starlings (*Sturnus roseus*), seen in France for the second consecutive year after an absence of 11 years. Small numbers of Iceland Gulls (*Larus glaucoides*), Red-breasted Flycatchers (*Ficedula parva*), and Little Buntings (*Emberiza pusilla*) invaded France, as well as other European countries. Five species of North American Scolopacidae, including Pectoral Sandpipers (*Calidris melanotos*), Buff-breasted Sandpipers (*Tryngites subruficollis*), Long-billed Dowitchers (*Limnodromus scolopaceus*), Lesser Yellowlegs (*Tringa flavipes*), and Wilson's Phalaropes (*Phalaropus tricolor*), were more numerous than in previous years. The pair of Black-shouldered Kites (*Elanus caeruleus*) first reported in 1981 has moved several 100 m into the department of Landes.

The presence of 2 species was verified for the first time since the Committee began its deliberations: Long-billed Dowitcher and Audouin's Gull (*L. audouinii*). Two other species were observed in France before 1984, but are included for the first time in this report: Blue-winged Teal (*A. discors*; already observed 11 times in France) and Black-headed Bunting (*Emberiza melanocephala*; 2 males, perhaps escaped cage birds).

Also included are (1) a "second list" of 6 species whose wild origin has not been established (all members of this list appeared on similar lists in previous years) and (2) 6 unconfirmed reports.—Michael D. Kern.

35. First nesting of the Cliff Swallow on the Mississippi coast. J. L. Spence and J. A. Toups. 1986. Miss. Kite 16:20–21.—Cliff Swallow (*Hirundo pyrrhonota*) nesting in s.w. Mississippi documents the continued spread of this species along the Gulf Coast.—Malcolm F. Hodges, Jr.

36. First breeding of the House Finch in Mississippi. J. A. Jackson, B. J. S. Jackson, and M. F. Hodges, Jr. 1986. Miss. Kite 16:10–12.—Summering adult House Finches (*Carpodacus mexicanus*) were seen feeding a full-grown juvenile bird, suggesting the first Mississippi breeding of this species.—Malcolm F. Hodges, Jr.

37. Possible breeding of Lesser Nighthawk in Tulsa County, Oklahoma. R. Dickerman. 1986. Bull. Okla. Ornithol. Soc. 19:1–2.—The author discovered a misidentified study skin of a prefledging Lesser Nighthawk (*Chordeiles acutipennis*) labeled Tulsa County, Oklahoma. If the location is correct, this represents a dramatically extralimital breeding record.—Malcolm F. Hodges, Jr.

EVOLUTION AND GENETICS

(see also 7, 9, 10, 12, 45)

38. Time-energy budgets during reproduction and the evolution of single parenting in the Superb Lyrebird. A. Lill. 1986. Aust. J. Zool. 34:351–371.—In the Superb Lyrebird (*Menura superba*), the polygynous male does not assist the female in nest-building or rearing of the (usually) single young. Lill estimated reproductive energy expenditures in females, all of which he found to be low, except for nest-building. Females maintain the chick over long periods, and the nestling grows slowly, traits which Lill suggests have enabled the evolution of emancipation in males of the species. He hypothesizes that assistance by the male could increase the growth rate of young, but not the brood size. Asynchrony in egg-laying allows the polygynous males to attend more than one female. Male singing investment was estimated to be comparable to that of species in which breeding roles are similar.—Malcolm F. Hodges, Jr.

FOOD AND FEEDING

(see also 13, 25)

39. The distribution and feeding ecology of murres in the northwestern Bering Sea. H. Ogi, H. Tanaka, and T. Tsujita. 1985. J. Yamashina Inst. Ornithol. 17:44–56.—The distribution and food habits of Common (*Uria aalge*) and Thick-billed (*U. lomvia*)

murres were studied in the Gulf of Anadyr and the n.w. Bering Sea during 1973. Populations in the Gulf of Anadyr included 300,000+ Common and about 55,000 Thick-billed murres. Stomach contents of 425 Common and 369 Thick-billed murres were examined (the latter were discussed in detail in Ogi and Hamanaka (J. Yamashina Inst. Ornithol. 14:270–280, 1982)). The most important prey for both species was the pelagic amphipod *Parathemisto libellula*; Common Murres ate fish and euphausiids to a greater extent than did Thick-billed Murres. Both species showed considerable dietary plasticity.—Jerome A. Jackson.

40. The size of minnow prey in the diet of young Kingfishers *Alcedo atthis*. P. Raven. 1986. Bird Study 33:6–11.—The contribution and sizes of fish fed to young Kingfishers was assessed by studying prey remains collected from 2 nest tunnels, excluding the nest chamber, on the River Roding, Essex, England. The number of pharyngeal bones (i.e., the larger number of either the left or right pharyngeal bone count) was used to obtain an estimate of the composition of fish prey. In addition, regressions of fish snout to tail-cleft length and weight (log 10) on pharyngeal bone length using a sample of 33 minnows (*Phoxinus phoxinus*) permitted accurate estimates of minnow size and weight from pharyngeal bones obtained from nesting sites.

Remnants of 9 species of fish were obtained from the 2 Kingfisher nest sites during the 3 years. In each year, 2 species, the minnow and three-spined stickleback (*Gasterosteus aculeatus*) made up more than 90% of the prey remains found at the nest sites. Roughly 50% of the minnow remains came from fish ranging from 49–59 mm in size and 1.11 to 2.04 g live weight. Electrofishing samples taken from a stream in the study area revealed that the composition of the Kingfisher's diet paralleled the availability of fish in the stream. The mean size of food ($\bar{x}$ = 54 mm) obtained from the tunnels, where older chicks normally are fed, agree with a previous study of the young Kingfishers' diet in Belgium (C. Hallet, Revue Ecol. 36:211–222, 1982).—Stephen R. Patton.

41. The diet of Dippers (*Cinclus cinclus*) wintering in the catchment of the River Wye, Wales. S. J. Ormerod and S. J. Tyler. 1986. Bird Study 33:36–45.—Fecal samples from more than 50 Dippers were collected at 38 sites during January and February. Larval simuliids (Diptera), baetids (Ephemeroptera), leuctrids/nemourids (Plecoptera), and hydropsychids (Trichoptera) were the most common families recorded in the fecal pellets. Bullheads (*Cottus gobio*) were the most prominent portion of the diet by weight (>60%), Trichopterans were second (~20%). Comparisons of diets among several sites possessing different environmental qualities (e.g., water hardness, pH, and altitude) revealed only one trend that was associated with water hardness. Most macroinvertebrate taxa occurred in nearly similar proportions in fecal and stream samples, suggesting that Dippers are not selecting particular prey. An exception to this trend was found among the Trichoptera, that were more abundant in feces than in kick-samples taken from streams. The apparent opportunistic foraging behavior of Dippers in winter is in marked contrast to observed selection for prey weight that occurs when Dippers obtain food for nestlings (S. J. Olmerod, Ibis 127:316–331, 1985).—Stephen R. Patton.

42. Diet of the Kestrel (*Falco tinnunculus*) in the breeding season. E. Korpimaki. 1985. Ornis Fenn. 62:130–137.—The diet of the Kestrel in western Finland was examined in relation to fluctuations in the small mammal populations during 1972, 1975, and 1977–1983. Pellets were collected at 92 nest sites from the nest or ground as often as 2–3 times per day (2613 prey items). The diet was composed of 11 mammal, 29 bird, 1 lizard, and 1 frog species. Voles were the most abundant prey group (46.3% by number), followed by insects (25.3%), shrews (11.9%), birds (9.1%), mice (6.7%), lizards (0.5%), and frogs (0.3%). Kestrels were able to capture almost all the available animals of the same size as themselves or smaller. The diet varied significantly between consecutive years. The proportion of voles in the diet correlated positively with their densities in the field (based on trapping) during the study period, but the densities of other small mammal species did not correlate with their numbers in the diet. The author suggested that these results support optimal foraging theory. Seasonal variation in the diet was caused by changes in the snow and vegetative cover and in the behavior of the prey animals. Korpimaki found that diet varied with the size of the field in which the kestrels hunted; in smaller fields fewer microtines and more

shrews and birds were caught than in medium-sized and large fields. Korpimaki's data suggested that clutch sizes were larger for nests in territories in larger fields. An appendix to this paper provides a review of the diet of kestrels in 11 countries.—Lise A. Hanners.

43. The diet of the Tawny Owl (*Strix aluco* L.) in two forested regions of central France. (Composition et structure du régime alimentaire de la Chouette hulotte (*Strix aluco* L.) dans deux régions forestières du Centre de la France.) C. Henry and A. Perthuis. 1986. Alauda 54:49–65. (French, English summary.)—This study is based on the analysis of >2000 regurgitated owl pellets which the authors collected between 1972 and 1984 in forested areas of Beauce (n. of the Loire R.) and Sologne (s. of the Loire R.), department of Loir-et-Cher. The pellets were produced by 6–8 pairs of Tawny Owls in each area, primarily in winter and spring.

The diet of these French owls is similar to that of Tawny Owls from forested regions elsewhere in western Europe. Species of small mammals (1111 items in all) were those typically found in wooded habitats. Particularly numerous were *Apodemus sylvaticus, Cleithrionomys glareolus, Sorex araneus,* and *Microtus agrestis.* Most of the birds (corvids, parids, sturnids, sylviids, ploceids, and fringillids; 93 items in all) were also woodland species. The only amphibian (99 items) was *Rana dalmatina.* Most of the insects (766 items) were large beetles that live in forest litter: the geotrupid, *Typhoeus typhoeus*; the carabid, *Carabus nemoralis*; and the scarab, *Melolontha melolontha.*

In general, the same prey species occurred in pellets from both areas, but there were significant quantitative differences between north and south. Amphibians and birds were more heavily used in the north, insectivore, murid, and cricetid mammals in the south.

The numbers of each species captured by the owls in north and south collectively are accurately described by a log-linear mathematical model in which the log of the number of prey of each species is plotted as a function of its rank (by abundance) in the diet. Separate log-linear models describe the capture rate for major prey species and minor prey species in each of the 2 sampling areas. These models and the authors' tabular data suggest that Tawny Owls are dietary generalists.—Michael D. Kern.

44. Downy Woodpecker feeding on mud-dauber wasp nests. K. G. Smith. 1986. Southwest. Nat. 31:134.—A male Downy Woodpecker (*Picoides pubescens*) was observed cracking open and feeding on the contents (wasp larvae/pupae and/or provisioned spiders) of common mud-dauber (*Sceliphoron caementarium*) nests. The only previous report of this behavior involved a Tufted Titmouse (*Parus bicolor*). Woodpeckers and parids are 2 of the few insectivorous bird groups capable of penetrating mud-dauber nests.—Danny J. Ingold.

SONGS AND VOCALIZATIONS

(see 12)

BOOKS AND MONOGRAPHS

45. An analysis of physical, physiological, and optical aspects of avian coloration with emphasis on wood-warblers. E. H. Burtt Jr. 1986. Ornithol. Monogr. No. 38. The American Ornithologists' Union, Washington, D.C. x + 126 pp., 41 text figures, 24 tables. $15 ($12.50 to A.O.U. members).—In this monograph Burtt explores a number of hypotheses that relate color and color patterns in wood-warblers to attributes of the physical environment. In the opening chapter Burtt presents the 3 major categories of hypotheses considered in the monograph to account for the evolution of color and color patterns: (1) physical hypotheses, e.g., the effect of different colors on abrasion resistance in feathers, or in heat exchange, (2) visual hypotheses, in which color or pattern may reduce reflection, thus aiding the bird's own vision, and (3) optical hypotheses, in which color or pattern may affect the bird's visibility to other animals. Identity hypotheses, in which color and pattern in an individual are related to those of competitors, were not considered. The author chose to concentrate on the wood-warblers (Parulinae) in testing hypotheses because the group has many common species, and substantial phylogenetic and ecological diversity.

Burtt details the topography and coloration of wood-warblers. Reflectance patterns were matched with swatches in the Munsell color system for simplicity. Colors were found

not to be equally frequent nor randomly distributed in either males or females, suggesting a non-random selection for color and pattern. The frequency of colors in males and females is significantly different, with males having heightened contrast.

Feathers containing melanin are more durable than those without it. Comparison of experimentally and naturally abraded feathers suggests that the former is a reasonable approximation of the latter, and that particle abrasion may be an important source of feather wear in wild birds. In a flying bird the effects of airborn particles striking the feathers is different on different parts of the body. Four predictions that melanin would be higher in feathers receiving more abrasive force were confirmed, suggesting, among other things, that the dark dorsal, light ventral color pattern may add abrasion resistance advantages to the advantages of countershading. Although the focus was on wood-warblers, Burtt occasionally used other birds in his investigations. The prediction that desert-dwelling birds, which are subject to higher levels of abrasion than ocean birds, would have higher melanin levels, was confirmed. The prediction that melanin would be higher in feathers at major body joints where friction during movement would be high was, however, not confirmed.

Burtt examined the heat exchange with the environment from the legs and beaks of wood-warblers in relation to behavioral energetics. There is little intraspecific variability in leg color, but substantial interspecific variability. Dark-legged species are more tolerant of conditions of high heat loss than light-legged birds. The prediction of an increase in the probability of a wood-warbler drawing one or both legs into its feathers as convective heat loss increases was verified, but the increase was similar in both dark- and light-legged birds. Burtt suggests that light-legged birds may pump metabolic heat into their legs to compensate for heat loss. In addition, smaller diameter legs correlated with darker, more efficient energy absorbing colors. As predicted, wood-warblers with the less energy efficient light-colored legs migrate north later, leave sooner, and winter in warmer areas, than do dark-legged species. Similar predictions based on mandible color failed to predict migration patterns, and Burtt suggests that this may be explained by the low proportion of heat loss from mandibles, or that mandibular color may have evolved in response to selective pressures unrelated to heat flow.

Burtt evaluates the hypothesis that facial color is an adaptation to minimize reflectance (glare) that could interfere with vision, but concluded that the reasons for color and pattern around the eye remain obscure. The dark color of the upper mandible, however, seems to be an adaptation to minimize reflectance.

Color patterns that increase visibility are discussed at length. Wood-warblers show a significant tendency to have either both wingbars and tailspots, or neither. Shorter intervals between movements in wood-warblers with wingbars and/or tailspots suggest that these color patterns emphasize conspicuous movements in routine behavior. Burtt presents data that suggest that certain displays evolved to reveal the color patterns in wood-warblers with wingbars and/or tailspots. However, all the predictions made were not verified, and the relationship between patterns of color and display movements in an evolutionary sense is complex.

Burtt presents a method which quantifies contrast between a bird's feather colors and the background. If the wingbars and tailspots in wood-warblers function to produce optical signals, Burtt predicted that coloration has evolved to produce maximum visibility, hence maximum contrast with the background. The predictions that white wingbars and tailspots should be most common, and that yellow and orange should be most common in wood-warblers in broad-leaf forests and least common in coniferous forests, were verified in the field.

Burtt points out many of the limitations in his study. For example, some of the modeling used to make predictions was of necessity, based on some fairly arbitrary assumptions. Many hypotheses about color and pattern were not discussed. The identity hypotheses (including sexual selection), and status signaling were avoided because Burtt found them unquantifiable. This is regretable because these evolutionary processes may have strongly influenced wood-warbler color patterns. Throughout the work the predictions deduced were based on the assumption that color and pattern are adaptive.

The study is well documented, with nearly 300 references, and when looking for words to describe Burtt's work, the adjectives meticulous, careful, and thorough came to mind

first. The figures are large and easy to read and the tables straightforward. Some of the more detailed mathematics, for example in the equations describing energy balance in the legs of wood-warblers, were relegated to appendices, which simplifies reading the text. The great strength of this work lies in Burtt's experimental approach, in which parameters were quantified, and the predictions generated from hypotheses were tested in the field. Overall the monograph is well done, and is clearly a must for anyone interested in any aspect of feathers, color, and color patterns.—William E. Davis, Jr.

46. Proceedings of the symposium on birds as environmental indicators Kuusamo, Finland, 2 July 1984. T. Solonen, ed. 1985. Ornis Fenn. 62:34–105.—This volume of *Ornis Fennica* includes the proceedings of an international symposium at the Oulanka Biological Station in Kuusamo, Finland. The objectives of the symposium were to (1) examine cases where bird population changes could be related to environmental changes, (2) describe ongoing bird population monitoring programs, and (3) discuss how bird population studies can be used in environmental planning. The 10 papers in this volume effectively achieved the objectives providing details specific to Finnish bird populations, but also incorporating frank review of the theory and methodology used for bird conservation.

Four papers reviewed bird populations in Finland: the effects of forest fragmentation on birds of the boreal forests (P. Helle), recent changes in archipelago bird populations (M. Kilpi), the relationship between agriculture and birdlife (T. Solonen), and the status of Finnish birds of prey (P. Saurola). S. E. Svensson related changes in tropical environments to populations of North European avifauna. R. J. O'Connor and J. Tianinen each provided thorough descriptions of current bird population monitoring programs in Britain and Finland, respectively. E. Bezzel reviewed bird population trends in intensively used rural and urban environments in Central Europe over the last 100 years. Y. Haila and O. Jarvinen provided theoretical review papers discussing birds as tools in reserve planning and use of conservation indices in land use planning. Jarvinen's paper was a dry-humored, frank review of methods currently available for birds as indicators in land-use planning. This volume is thorough in its coverage and should be noted as a useful reference for the study of birds as environmental indicators.—Lise A. Hanners.

47. Birds of the Sudbury River valley—An historical perspective. 1984. R. K. Walton. Massachusetts Audubon Society, Lincoln, Massachusetts. 220 pp.—In 1635 the General Court of Massachusetts cleared the way for settlement of the Musketaquid valley:

> "It is ordered that there shall be a plantation att Musketaquid, and that there shall be 6 miles of land square to belonge to it . . . and the name of the place is changed and here after to be called Concord."

Settlement of the Sudbury River valley had begun. In the 17th century the valley was a wilderness to be conquered; by the early to mid-nineteenth century the forests were gone, cattle and crops covered the land, and farmers were preparing to sue mill owners whose upstream factories and dams threatened the quality and quantity of water in the Concord and Sudbury rivers. This is the familiar story of settlement and exploitation of natural resources, but in the mid-19th century this particular story took a not so familiar turn. Henry David Thoreau moved to Walden Pond and with him was established a tradition of concern for natural history, a tradition that has included many prominent naturalists, among them William Brewster, Ludlow Griscom, Ruth Emery, Edwin Way Teale, and Allen Morgan.

Walton has drawn freely from the journals of the area's naturalists to provide a detailed list of the valley's resident and migrant birds. Each species account includes the species' current status, notes on arrival, departure, nesting, winter status, maximum numbers, and a brief historical sketch of demographic changes. Following the species accounts is a description of the best birding habitats in the valley and the best times to visit each. The book concludes with a tabulation of the Concord Christmas Bird Counts from 1960 to 1983 providing the reader with an unusual chance to look at population changes; the numbers of party hours are stated thereby allowing the reader to adjust population estimates for observer effort. The information will interest zoogeographers and anyone living in the area, but the book's greatest claim to a more general audience comes from the chapters that

precede the list. In these chapters Walton recounts the history of the Sudbury Valley from 1635 to the present and then takes us into the field in the company of Thoreau, Brewster, and others. He has organized the journal accounts of the area's many naturalists to lead us day-by-day through the seasons—a truly fascinating journey into the sights, sounds, and thoughts of naturalists who have been observing and writing about the Sudbury River valley for over 140 years. Even if you have never been to or expect to go to the Sudbury River valley the historical insight and excitement of the journal accounts are worth the price of the book.—Edward H. Burtt Jr.

48. Families of birds. 1985. O. L. Austin, Jr. and A. Singer. Golden Press, New York. 200 pp. $7.95.—For those with a working knowledge of birds, this book is a convenient guide to the 34 orders (29 living, 5 fossil) and 185 families (150 living, 35 fossil) in the Class Aves. Orders are briefly described, but the emphasis is on families, which are identified by common and Latin names, for example: Hoopoe, Upupidae. A brief description of the family includes the number of living and fossil species, the geographic distribution, preferred habitat, migratory tendency, physical characteristics, and habits. The latter includes not only behavior, but also nest site, clutch size, and developmental stage of the young at hatching. Each family's description is accompanied by a full color illustration of one or more species chosen on the basis of typical family characteristics. In addition, special features of the family are highlighted with small black-and-white drawings peripheral to the color illustration(s).

Accounts of the smaller families are helpful. Where families are large and diverse (e.g., Emberizidae) each subfamily is described and illustrated. Nonetheless some taxa are so diverse and the description so broad that the reader is left to wonder what the distinctive familial features are. A more aggravating problem is the lack of identification accompanying the black-and-white drawings. The point illustrated is often clear from the text, but not always. For example, the text on penguins reads in part ". . . Paddle-like wings do not fold; no flight feathers, . . ." and one of the drawings is the skeleton of the wing. Is the drawing supposed to show the rigid structure of the wing or the lack of flight feathers? Whatever its minor drawbacks, this is an excellent guide for those who can identify birds, but would like to learn more about their taxonomic and evolutionary relationships.—Edward H. Burtt Jr.

49. Identification guide to European passerines. 1984. L. Svensson. British Trust for Ornithology, Beech Grove, Tring, Herts HP23 5NR, England. 312 pp.—This guide is for persons with a basic knowledge of birds, particularly those who band fledged birds or work with museum skins. The guide covers all European passerines, those that occur regularly and some that occur only rarely. The species accounts include a brief, general description; detailed descriptions of sex- and age-differences; and detailed descriptions of these differences as affected by the spring, if present, and autumn molt. The descriptions are illustrated with detailed, black-and-white drawings of critical features. One of the most helpful aspects of the guide is a 30 p. section on techniques: numbering the remiges, holding the bird to determine the wing-formula, measurement of birds with comparison of different measurement techniques (e.g., chord length vs. flattened wing-length), determining color, and what to look for when aging and sexing birds. All points are crisply illustrated. The book concludes with an excellent bibliography.

American ornithologists working with museum specimens will find the book helpful. Banders may find the section on techniques useful, but will have little use for the information in the species accounts. In his forward, Svensson foresees the need for a similar guide to American passerines. I agree, but would like to see such a guide use a standardized color reference system such as Smithe (Naturalist's Color Guide, Am. Mus. Nat. Hist., New York, 1975, 1981).—Edward H. Burtt Jr.

50. Birds worth watching. 1986. G. M. Sutton. University of Oklahoma Press, Norman, Oklahoma. 207 pp.—That **Birds Worth Watching** has been published posthumously is testament to a prolific writer. This is the late George Sutton's 14th book, written in a style familiar to followers of the great ornithologist/artist.

Sutton provides information on 60 species, concentrating on raising interesting, yet

unanswered, questions about them. Most questions in the book are concerned with breeding ecology.

The species accounts are accompanied by mostly high quality photos of each species. Their relevance to the discussion is typified by the photo of a male House Sparrow with a feather in its beak, one of the behaviors of this species mentioned by Sutton. I was slightly disappointed by the absence of Sutton illustrations, and this may be the first book authored by him without such.

The accounts make fascinating reading, peppered as they are with Sutton's personal experiences. It is interesting to me to learn how inquisitive Sutton was at such a late age. Such unflagging enthusiasm for ornithology is infectious; I recommend this book highly.—Malcolm F. Hodges, Jr.