RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

BANDING AND LONGEVITY

(see also 18, 33)

1. Annual report to banders—summary of bird banding in Canada in 1980. C. Hyslop and A. M. Demers. 1983. Can. Wildl. Serv. Prog. Notes, No. 135, 13 p.—This is the 4th annual report on Canadian bird-banding. It lists the number of individuals of each species banded in each province and territory during 1980. Canadians banded 187,480 birds of 292 species. About 45,000 fewer birds were banded in 1980 than in 1979 (10 yr average = 190,092). Over 220 of the 292 species and 37% of the total bandings occurred in Ontario where 49% of the active banders resided. An average of 1453 birds were banded by each active Master permittee. Species banded most often were: Mallard (*Anas platyrhynchos*) (34,720), Blue-winged Teal (*A. discors*) (16,941), and Canada Goose (*Branta canadensis*) (14,176). The mean ratio of young per adult banded was 0.9. A map shows the distribution of banding sites.—Richard M. Zammuto.

2. Age and sex determination of Purple Finches during the breeding season. R. P. Yunick. 1983. N. Am. Bird Bander. 8:48–51.—This study of *Carpodacus purpureus* was carried out in the Adirondack Mountains (Corinth, Saratoga County, New York) over 13 years (August 1970 to August 1982). It involved 10,007 captures, 5443 bandings, 1039 returns and 3525 repeats of individuals of this species. Purple Finches arrive from 27 March to 24 April (mean = 13–14 April, n = 9), lay eggs from 15 May to 17 July (n = 22), first fledge young from 28 June to 20 July (mean = 7 July, n = 12), with the last fledging being 28 August (n = 2), and "departure" [based on last capture dates] being 6 August to 26 September (mean = 28 August, n = 12). Double brooding is strongly suggested and 7.0% of the males during the breeding season were non-breeders whereas only 2 of 1272 females (0.16%) during the breeding season were found to be non-breeders.—Richard J. Clark.

3. Cooper's Hawks banded at Hawk Cliff, Ontario: 1971–1980. B. W. Duncan. 1981. Ont. Bird Banding. 14:21–31.—This study is based on banding of 960 Cooper's Hawks (*Accipiter cooperii*) which are regular but uncommon migrants in southern Ontario. While more males than females are banded (1.27:1 ratio) fewer males than females are recovered or retrapped (0.57:1 ratio, n = 22). The migration period of the Cooper's Hawk coincides with the migration of medium-sized birds, their usual prey, with the first-year (HY) males preceding AHY males by a week to 10 days. A similar trend is suggested for females. Many more HY birds (740) were banded than AHY's (220). The oldest bird recovered was a female that was "at least in its eighth calender year when retrapped." The recoveries (10) show that the hawks follow the north shoreline of Lake Erie from east to west and then head generally southward once they are west of the west end of the lake.—Richard J. Clark.

MIGRATION, ORIENTATION, AND HOMING

(see also 3, 33, 34, 37)

4. Expression and significance of partial migration in a southwestern Germany population of the European Blackbird *Turdus merula*. [Auspragung und Bedeutung des Teilzugverhaltens einer sudwestdeutschen Population der Amsel *Turdus merula*.] H. Schwalb. 1983. J. Ornithol. 124:101–116. (German, English summary)—The Blackbird of southwestern Germany is partially migratory with some individuals of each sex migrating and others remaining sedentary. Using banded individuals, this study compared the influences of age and sex on individual migratory strategies. Males tended to be more sedentary than migratory, whereas females were about evenly divided. Migratory males were more commonly first-year birds than adults. Individuals rarely switched from one category to another in successive years, except first-year migratory males often became

winter residents in succeeding years. Resident males were more likely to obtain better quality territories, resulting in earlier breeding and higher reproductive output. The migratory status of the female was not correlated with the status of her mate or her reproductive success. The author hypothesizes that a balanced polymorphism exists between the migratory strategies. Differential reproductive success and mortality keep the system in check. There was no attempt to establish the genetic basis of migration for this species as has been done with other species (Berthold and Querner, Science 212:77–79, 1981; Biebach, Auk 100:601–606, 1983).—Robert C. Beason.

5. On juvenile development, migratory restlessness, and migratory behavior in the Black Redstart *Phoenicurus ochruros*. [Uber Jugendentwicklung, Zugunruhe und Zugverhalten des Hausrotschwanzes *Phoenicurus ochruros*.] P. Berthold. 1983. J. Ornithol. 124:117–131.—This paper discusses post-juvenal molt, and the changes in diurnal and nocturnal activity during the first autumn migratory period of 12 hand-reared Black Redstarts. The birds were maintained on a photoperiod that duplicated what they would have encountered normally during their migration. Molt and weight changes were similar to wild birds. The birds showed nocturnal activity during November and December when their free-flying counterparts showed maximal migratory activity. There was no simultaneous increase in diurnal activity. Berthold concluded from these results that, contrary to some earlier reports, the Black Redstart is a nocturnal migrant and any diurnal "creep migration" is unimportant to the migration of this species. This technique could be applied to determine the diurnal/nocturnal status of other species whose migratory habitats are disputed.—Robert C. Beason.

POPULATION DYNAMICS

(see also 13, 23, 32)

6. Population biology of White-crowned Sparrows: residence time and local movements of juveniles. M. C. Baker, G. L. Sherman, T. C. Theimer, and D. C. Bradley. 1982. Behav. Ecol. & Sociobiol. 11:133–137.—Forty-three fledglings from May's first-broods were captured as "soft-tails" and subsequently recaptured over an approximately 40-day period. The authors infer that the average juvenile remains within about 60 m of its first capture site until about 37 days of age. At 41 days recaptures are at about 110 m from the original capture sites. At about 60 days these juveniles are 270 m from the site of first capture. The authors conclude that many White-crowned Sparrows (*Zonotrichia leucophrys nuttalli*) spend their first 50 days in their natal area. Early-life philopatry may result in the birds learning their natal dialect prior to significant dispersal.—Patricia Adair Gowaty.

7. Detection of density-dependent effects in annual duck censuses. W. L. Vickery and T. D. Nudds. 1984. Ecology 65:96–104.—An extensive literature (cited here) exists for ways to detect whether a population is undergoing density-dependent (DD) or density-independent (DI) regulation. Vickery and Nudds both extend this literature by offering new simulation tests and apply both the old and new tests to census data for Canadian duck populations. Their methods entail comparing observed patterns of variation in population size with those of 100 sets of population sizes generated as a random walk (therefore DI) having the same mean and variance as the observed series of population sizes. A significant difference between observed and simulated patterns shows DD regulation. No single method, old or new, is ideal in all circumstances, but the authors indicate which are best in any given case. Choosing test results according to these criteria for reliability, Vickery and Nudds report more instances of DD changes in population size for diving ducks than for dabbling ducks. This result supports Nudds' (Ecology 64:319–330, 1983) contention that competition is of greater importance for diving ducks than for dabbling ducks. Furthermore, the authors interpret their results to mean habitat stability (predictable aspen-parkland vs. variable mixed-prairie) increases the likelihood of finding DD regulation. Only the two intraspecifically most aggressive dabblers, the Gadwall (*Anas strepera*) and the Northern Shoveler (*A. clypeata*) show evidence of DD fluctuations in the prairie habitat.—A. John Gatz, Jr.

NESTING AND REPRODUCTION

(see also 2, 4, 16, 18, 20, 29, 49, 58, 62, 63, 65, 66, 69)

8. The relationship between parental age and reproductive effort in the California Gull (*Larus californicus*). B. H. Pugesek. 1983. Behav. Ecol. & Sociobiol. 13:161–171.—Reproductive effort in terms of foraging effort and offspring defense increased with age of gull parents in this study. Young gulls (3–9 years old) wait longer to establish territories than do older gulls (11 years or more). Young parents (3–6 years) had one or 2 eggs per nest; middle-aged (7–9) and older (11–18) generally had 2-egg nests; the incidence of 3-egg nests was highest for older parents. Older parents hatched their first eggs sooner than younger parents and fed their offspring more frequently than did younger parents at all chick ages. Younger parents left nests unattended for longer periods than did older parents. Older parents attacked a human intruder during 27.4% of visits, middle-aged parents attacked in 16%, and young parents during only 6.7% of visits. Older parents fledged more offspring per pair than did younger parents and suffered higher mortality than younger parents. These results taken together strongly support the hypothesis that reproductive effort increases with age.—Patricia Adair Gowaty.

9. Colonial breeding of the Eared Dove (*Zenaida auriculata*) in northeastern Brazil. E. H. Buccher. 1982. Biotropica 14:255–261 (Spanish summary).—The large, temporary breeding colonies of the Caatinga population of the Eared Dove in eastern Brazil are unique for this species. The doves migrate into the semi-arid thorn-scrub Caatinga at the end of the wet season to breed and then disperse. *Croton*, especially *C. jacobinensis*, shrubs are abundant in disturbed areas and their seeds are an important food of the dove. Seed production is immense and synchronous within a local area, but varies from area to area. The timing of seed production appears dependent on local rainfall, which is highly variable. The establishment of breeding colonies by the doves follows the SW-NE pattern of rainfall. Locations of the colonies vary from year to year. Although the size of the colonies (5 km × 1 km) makes them easily detected by predators, the advantage of ground nesting (speed) appears to outweigh the risk of predation. This is in contrast to semi-permanent colonies elsewhere where most nests are on branches. Adult birds stay in a colony only long enough to rear young to independence (2 months). Then they depart to attempt breeding again in a new colony which has locally abundant *Croton* seeds. The author has labelled this as "itinerant breeding." The unique temporary breeding colonies of the Caatinga Eared Dove appear to be consistent with optimal central place foraging theory where the resource is unpredictable, but locally abundant.—Robert C. Beason.

10. Food availability and reproduction by Great White Herons, *Ardea herodias*: a food addition study. G. V. N. Powell. 1983. Colonial Waterbirds 6:139–147.—Food supply has been widely suggested as a factor in timing of the reproductive cycle, fledging success, and clutch size (Lack, The Natural Regulation of Animal Numbers, Oxford Univ. Press, 1954). Food addition studies have provided mixed data in support of this idea (see review **11**). Various aspects of the breeding cycle, but not all aspects, may be affected by the availability of an added food supply. Powell studied 169 pairs of Great White Herons (*Ardea herodias*) on 10 islands in Florida Bay. Even though these herons feed mainly at night, he observed them defending areas of canals during the day and receiving food handouts from local canal-side residents. These handouts varied from a slight increase in available food items (parts of fish not used for human consumption) to intensive feeding (fish purchased specifically to feed the herons). Ninety percent of the herons in the study area were observed leaving the islands for supplemental feeding. Nests were located by aerial survey and then visited 3 times to determine status, number of eggs or young, and estimated age of young. Nestlings were weighed and tagged. Supplemental food was observed being transferred to nestlings. Food consumption by one male (?) increased from 343 g fish/day during incubation to 754 g fish/day during the first month post hatching and to 962 g fish/day during the second month post hatching.

Clutch size was significantly smaller for unsupplemented colonies. Hatching success was about equal for both groups (slightly less for supplemented clutches). The failure rate for unsupplemented clutches was significantly greater than that for supplemented clutches

(27% vs. 12%). Successful nests of supplemented pairs produced more young/nest than unsupplemented pairs (supplemented = 2.04, unsupplemented = 1.44). Weight differences between siblings of both groups were not significantly different. Data collected support the theory that more food will lead to more young. Diet supplements significantly altered the clutch size (supplemented = 3.10, unsupplemented = 2.88). Clutch size was significantly greater than in previous studies of unsupplemented birds (Holt, Cleveland Mus. Nat. Hist. 1:1–35, 1923). More data should be collected over a longer period of time in order to adequately analyze this discrepancy in clutch size. One cannot use a single year's data as there are too many variables involved to make an accurate assessment.—R. W. Colburn.

11. Food supply and egg mass variation in the European Coot. J. A. Horsfall. 1984. Ecology 65:89–95.—Brood reduction is the phenomenon of birds laying more eggs than are likely to survive in an average year. If food supplies turn out to be exceptionally good in a given year, then the "extra" chicks may survive to fledging, otherwise they will starve and the brood will be reduced. Typically, egg mass increases with order of laying in brood reducing birds, perhaps as a means of decreasing the probability of starvation of chicks from late-hatching eggs on occasional days of poor food supply. European Coots (*Fulica atra*) fit the normal pattern for brood reducers and do show brood reduction. Horsfall investigated whether or not the increase in egg mass with laying order is a facultative response to day-to-day variability in food supply by adding grain to the territories of some but not all female coots during egg laying. Statistically, the intraclutch variation in egg mass was decreased by the food supplements. The result is not obvious from the figure relating egg mass (means and standard errors) to order of laying (Fig. 5). The consistently higher mass of the first through fifth eggs laid by grain-supplemented females than the corresponding eggs of non-supplemented females as shown in the same figure was not considered significant. My point is not to be quibbling with either the statistics or interpretation Horsfall presents. Rather, because the ideas underlying the investigation are of general evolutionary interest (see review **10**), I would urge further work both with this species and others before the results are generalized.—A. John Gatz, Jr.

12. Avian and river otter predation in a storm-petrel colony. S. E. Quinlan. 1983. J. Wildl. Manage. 47:1036–1043.—Quinlan reports on an unusual case of predation on storm-petrels (Fork-tailed, *Oceanodroma furcata* and Leach's, *O. leucorhoa*) that nested on 4.1 ha Fish Island, Alaska, in 1976–1977. She found carcasses and castings of storm-petrels eaten by Bald Eagles (*Haliaeetus leucocephalus*), Common Ravens (*Corvus corax*), and Peregrine Falcons (*Falco peregrinus*). Conclusive evidence, primarily scat contents, was found of predation by River Otters (*Lutra canadensis*). Otter predation "was the major cause of Fork-tailed storm-petrel nest failure," with most nests being destroyed during egg-laying and incubation.

Quinlan discusses a model of the relationship between probability of predation on an individual nest and nest density. Drawing on "selfish herd" theory (Hamilton, J. Theor. Biol. 31:295–311, 1971), she suggests that storm-petrels "could reduce their susceptibility to river otter predation by nesting in dense colonies." The author concludes by stating that naturally-occurring river otters may pose a threat to small storm-petrel colonies in addition to that posed by introduced predators.—Richard A. Lent.

13. Biology of the Buller's Shearwater (*Puffinus bulleri*) at the Poor Knights Islands, New Zealand. P. C. Harper. 1983. Notornis 30:229–318.—Buller's (or New Zealand) Shearwaters nest exclusively on the Poor Knights Islands, off North Island, N.Z., where the population comprises ca. 2.5 million birds. Although the breeding grounds were discovered in 1915, the species has remained largely unstudied, in part because it deserts its nests readily. After 18 years of opportunistic study, Peter Harper has provided the first detailed compilation of its breeding biology, which will become the standard reference on the species. On some islands, the species is rapidly increasing. This has been accomplished by outcompeting other procellariiforms for nesting sites, and there is concern that the expansion may have deleterious effects on the colony of Pycroft's Petrel (*Pterodroma longirostris pycrofti*) on Hen Island.—J. R. Jehl, Jr.

14. The Black-winged Pratincole in southern Baraba (Stepnaya tirkushka na iuge Baraby). A. I. Koshelev. 1983. Priroda 9:40–42. (Russian)—Black-winged Pratincoles (*Glareola nordmanii*) spend only 3 months on their nesting grounds in the Kazakh Republic of the USSR, arriving in mid- to late May and departing in mid-August. They set about nesting immediately upon arrival on the flat open steppes and solonchaks covered with low-growing saltwort and wormwood. The nest is a shallow flat depression on dry ground, usually near a lake, rarely concealed except by the cryptic coloration of the eggs, young, and parents. A clutch is usually 4 eggs; incubation begins when the first egg is laid. If the clutch is lost, the pair will nest again, laying 2 or 3 eggs. Both parents incubate and care for the young, who hatch in about 3 weeks. A chick's first action is to seek shade by crawling under an ever-attentive parent. When all young have hatched, the family moves to thickets by the shore, where by age 12 days the young can catch insects by themselves. By age 25 days they are beginning to fly.

Although some pratincole colonies are found 5–10 km from water, a lake or reservoir is a more common location. Frequently other shorebirds and ducks nest amongst the pratincoles. Although this situation means the colonies are very well defended, eggs and chicks are taken by predators and trampled by the cattle that often graze at the shore.—Elizabeth C. Anderson.

15. Reproductive behavior and distribution of the Houbara Bustard (*Chlamydotis undulata macqueenii*) on its nesting grounds. (Reproduktivnoe povedenie i raspredelenie dzheka [*Chlamydotis undulata macqueenii*] v mestakh gnezdovaniia). T. S. Ponomareva. 1983. Zool. Zh. 57:592–602. (Russian, English summary)—The Houbara Bustard occurs on vast open areas of semi-desert, its populations now separated from one another due to human disturbance. It is characterized by moderate intraspecific competition, weak mutual aggressiveness among males, and ritualized sexual behavior. Although the species has usually been considered monogamous, this has never really been proven, and, as in the Great Bustard, the sex ratio in a nesting population may determine whether the birds are monogamous or polygamous. Observations of birds living in natural conditions in a dzheiran (goitred/Persian gazelle) reserve near Bukhara, Uzbek Republic, USSR, are summarized in this article.

Birds return to the nesting area in March and promptly court and nest. The young hatch in late April and can fly by the end of May. They stay in a brood with their mother for a month more.

In the study area, the males displayed for more than 2.5 months, most intensively from the end of March to the beginning of May, i.e., almost till the young are fledged. Display areas (about 0.25–0.30 km^2) are used year after year, although not necessarily by the same birds. Within this area the male holding a display area has one or two favored mounds on which he usually displays.

Usually males display singly, but sometimes in groups of two or more. Most display behavior was observed without females present, and indeed at times when it would be difficult for them to be present since they would be incubating or tending young. The poses and routines of male display are described in detail and illustrated. Most displaying occurs in morning and late afternoon, ceasing completely at mid-day.

Group displays are performed at the beginning of the breeding period. One or more males may enter another's territory; a slow, brief, ritualistic chase takes place, marked by changes in direction and by running, pausing, dispersing, and regrouping. If sufficiently agitated the birds may threaten each other and then, with flapping wings, fanned tails, and elevated ruffs, "attack" by jumping at each other, breast to breast. No real fighting was ever observed.

The female sits on her eggs all day; when danger appears she either freezes on the nest, or leaves it and does not return until the danger has passed. Females are not territorial and do not defend their nests, but are very protective of their broods.

The author postulates that the prolonged display period of the males, who do not tend eggs or young, could be useful to the population only if it is polygamous and unattached females—first-time breeders, birds that lost a clutch—are available. Of course, display also serves an informative purpose, especially in widely dispersed populations:

displaying their contrasting plumage on elevated parts of their territory increases the males' visibility (to indicate that the territory is occupied, and that a male is available) and also improves their ability to spot approaching danger. Group displays function at the start of the breeding season to determine territorial boundaries. Later the holder's individual display suffices to maintain the territory. Group displays occur again later, when females start to move about with their broods and males cease to be so strongly territorial, at which time the group displays become a ritualized form of intraspecific contact. Although no real fights were observed, the author thinks that they might develop if the birds were more crowded (as they would be in captive breeding facilities).

The author never clearly states whether the population described here was monogamous or polygamous or whether she could not decide. The prolonged nuptial behavior of the males, who do not tend eggs or young, suggests facultative polygamy, which is more probable for birds in a relatively dense population in protected habitat (such as her study population). Monogamy would be more characteristic of the less dense populations that would be found in unprotected habitat.—Elizabeth C. Anderson.

BEHAVIOR

(see also 6, 8, 9, 15, 23, 29, 57, 58, 62, 69)

16. Parental feeding rate in relation to begging behavior in asynchronously hatched broods of the Great Tit *Parus major*. H. Bengtsson and O. Ryden. 1983. Behav. Ecol. & Sociobiol. 12:243–251.—A series of experiments explored the effect of hatching asynchrony on the proximate controls of parental feeding effort and the distribution of food within broods. In the first experiment, begging calls were played during parental feeding visits near 3 nests containing manipulated broods of 8, 8, and 10 nestlings. Comparison of weight changes in small and large nestlings on experimental versus control days indicated that parental feeding rate significantly increased on experimental as compared with control days and that recorded begging calls favored the growth of the smallest young. In the second experiment, using 4 two-week old broods to artificially create 3 broods of 6, 9, and 12 young, feeding frequencies were observed when a brood had been starved for 4 h, when it had been richly fed by the experimenter, and when no intervention was made. Parental feeding rate varied with the intensity of begging of the brood independent of its size, corroborating the conclusion from the first experiment that intensity of begging behavior affects feeding rate. In a third experiment, using natural broods of 9 nestlings each, the 3 largest or 3 smallest nestlings were temporarily removed and the subsequent changes in parental feeding rate compared. Removal of the lowest weight nestlings resulted in decreased feeding visits, suggesting that cues from the lightest nestlings stimulate parental feeding effort more than cues from heavier nestlings. This paper convincingly argues that begging intensity of nestlings influences parental feeding rates.—Patricia Adair Gowaty.

17. Display dispersion and diet of birds of paradise: a comparison of nine species. B. Beehler and S. G. Pruett-Jones. 1983. Behav. Ecol. & Sociobiol. 13:229–238.—Display dispersion among 9 species of birds of paradise probably affects individual gametic success in these species, however such assumptions are ignored, by and large, in this refreshingly operational study. Four patterns of spatial dispersion occur among the 9 species of birds of paradise (Paradisaeidae) and for 7 species for which data were considered reliable, there is a statistically significant correlation between diet and dispersion. Insectivorous species eating less than 40% fruit defended exclusive territories; frugivorous species showed clumped dispersion by displaying males.—Patricia Adair Gowaty.

18. Radio-tracking confirms a unique diurnal pattern of spatial occurrence in the parasitic Brown-headed Cowbird. S. I. Rothstein, J. Verner, and E. Stevens. 1984. Ecology 65:77–88.—As brood parasites, Brown-headed Cowbirds (*Molothrus ater*) are not encumbered by the need to be able to feed both themselves and their offspring from a single home range. Eggs can be deposited in host nests during morning egg-laying and afternoons are free for feeding. Rothstein et al.'s study of 13 radio-tagged birds illustrates how the

species uses its freedom in the Sierra Nevada of California. All 5 female birds and 4 of the 8 male birds that were radio-tagged "commuted" daily 2.1–6.7 km each way from large (average 68 ha) morning breeding ranges to communally used afternoon feeding sites and then back to their respective breeding areas just prior to roosting. The non-commuting males were all yearlings and subordinates; the commuting males tended to be older. The behavioral patterns identified seem to be geographically specific (cf. Dufty, Auk 99:316–327, 1982). The observed plasticity reemphasizes that freedom from caring for their young permits a variety of behavioral patterns that satisfy the parents' own energy requirements.—A. John Gatz, Jr.

19. Polygyny in the Pied Flycatcher (*Ficedula hypoleuca*) at the western edge of its central European range. [Polygynie des Trauerschnappers (*Ficedula hypoleuca*) am Westrand seines Areals in Mitteleuropa.] W. Winkel and D. Winkel. 1984. J. Ornithol. 125:1–114. (German, English summary)—This 10-year study of the Pied Flycatcher showed that 21% of the females were the second or third mate of a polygynous male. Polygyny was thought to be the result of the population being near the edge of the species' geographic distribution. Of 418 males studied, 55 were polygynous; 114 of 552 females were paired with polygynous males. Seventy-five broods did not have a male in attendance. The females of these broods were younger and produced fewer offspring than monogamous females or the primary females of polygynous males. Polygynous males provided minimal care for secondary broods if they provided any care at all.—Robert C. Beason.

20. Social structure of a population of Hooded Crows (*Corvus corax*) in the Lenin Hills section of Moscow. (Sotsial'naya struktura populyatsii serykh voron [*Corvus cornix* (sic)] na Leninksikh gorakh v Moskve). V. I. Grabovsky. 1983. Zool. Zh. 52:389–398. (Russian, English summary)—A population of Hooded Crows on the Moscow University campus was observed year-round from 1976 to 1980 to establish connections and relationships between individualistic behavior of a bird (directed to its survival) and social behavior of a bird (as a member of a group).

Winter aggregations of birds separated into breeding pairs and non-breeding flocks. Pairs that nested the year before returned to their old territory and spent more and more time there in early spring, and less and less time with their wintering flock. Birds nesting for the first time encountered difficulty nesting among established pairs.

Nests were randomly distributed throughout the area, 10–200 m apart. There was no apparent synchrony in hatching among 100 nests, but there was some division of the nesting population into "neighborhoods": when danger was present, birds responded to alarms only from a certain grouping of nests and ignored those even from the nearest nest if that nest were not part of their sub-group. Nonbreeders stayed in the general vicinity in flocks of 30–60; unsuccessfully nesting pairs joined these flocks.

Broods which had left the nest first explored and ranged only within their parents' territory. Gradually they were included in group activities, loosening ties to their nest and parents and becoming acquainted with more and more strange birds.

All successfully nesting well-established pairs wintered in their territory or at least visited it regularly. Other birds behaved variously. They kept to their natal territory or ranged more widely in search of food. There were both sedentary and wandering winter flocks, the former with a fixed feeding area, the latter without. A sedentary group would form around one or two pairs of established nesters; it would contain their offspring, some neighbors, and some outsiders. A sedentary group's territory contained a reliable food source (garbage) throughout the winter.

Sedentary groups usually fed only within their area and would wait for a regular delivery of garbage rather than take advantage of some other unexpected source nearby. But the boundary was not defended and wanderers could come in. Filming of feeding at regularly-filled garbage bins revealed a pecking order. The local adult pair came first. Then came other local (indigenous) birds, including young-of-the-year. At the bottom were interloping wanderers temporarily feeding in a sedentary group's area. The third-ranked birds were usually the first to come to a new food source. The desirability of a feeding area is determined by the availability of perches on which to eat or to congregate, and of caches. Caches could be emptied by any bird, not necessarily the filler, but usually by a local bird who knew the area and not by a visitor.

Hooded Crows also congregated for defense (in response to another flock's appearance, or to move to a roost); to roost (the parents and young, through whose territory roost-bound groups fly, watch them pass and then bring up the rear); and to play (as in wind gusts around tall buildings).

Since even nesting pairs are affected by their neighbors and flocks of non-breeders, and since all birds react to information from others about food and danger, the behavior of an individual Hooded Crow is an indivisible mix of social and individualistic behavior.—Elizabeth C. Anderson.

ECOLOGY
(see also 7, 12, 35, 53, 55, 58, 62, 66, 67)

21. Ecological energetics of the Long-eared Owl (*Asio otus*). H. Wijnandts. 1984. Ardea 72:1–92.—This study was based on free-living owls, with some metabolized energy data from the laboratory, with the view toward identifying energetic bottlenecks in the annual cycle in relation to seasonal variation in prey abundance. Diets were determined from pellets at nests, and small rodents, mainly *Microtus,* provided 72% of all prey. Using data on food intake and weight of prey, a metabolizable energy coefficient was determined. A BMR and SMR were also determined from captive owls and the mean BMR was found to be 4.25 for a mean body weight of 229 g. Having determined a basic energy intake/outgo in the laboratory, the author then used telemetry to follow active birds throughout the day and arrived at an energy budget for free-living owls. An extensive study was done on nesting cycles and molt as a part of the energy budget. The peak energy demands occurred during breeding and fell relatively early in relation to main prey abundance. The molt was also a critical energy demand. Aside from the theoretical physiological data and correlations presented, this paper gives a lot of basic data on the biology of this species.—Clayton M. White.

22. Seasonal changes in habitat use of resident passerines. G. Bilcke. 1984. Ardea 72:95–99.—Year-round censuses were done on 9 plots with different habitat structures to determine use by 11 different species. Eight species showed significant habitat shifts between summer and winter and 7 of them showed smaller habitat diversity during the breeding season. The author proposed that nest-site availability and special food requirements during breeding, along with high population densities following fledging, are the major causes of habitat shifts.—Clayton M. White.

23. Socio-ecology of the Grey-crowned Babbler: population structure, unit size, and vegetation correlates. J. L. Brown, D. D. Dow, E. R. Brown, and S. D. Brown. 1983. Behav. Ecol. & Sociobiol. 13:115–124.—Forty-six social units of Grey-crowned Babblers (*Pomatostomus temporalis*) ranged in size from 2–13 AHY birds. They found 63% in units of 4 to 7 birds. In every unit the parents were the oldest (age based on iris color) of their sex in the unit, and older females and males appeared to mate assortatively by age. Older breeders tended to be favored in larger units; younger ones in smaller units. Analyses of the variation in vegetation on territories establish that vegetation was weakly correlated with unit size. This paper, as the authors suggest, is a useful backdrop for their other published studies on this species.—Patricia Adair Gowaty.

24. Fig-seed predation and dispersal by birds. P. Jordano. 1983. Biotropica 15: 38–41.—Observations at a single fruiting fig tree showed that most (65%) of the fruit (ca. 100,000 figs) were taken by birds. A majority (95%) of the figs were taken during the first 3 days of observations, but only 6% of the seeds were carried off undamaged by avian dispersers. Because of the ephemeral nature of fruiting trees in the tropics and the importance of chance in determining which species discover the tree, these results may or may not be relevant to other trees and other times of the year.—Robert C. Beason.

25. Downy Woodpecker foraging behavior: Efficient sampling in simple stochastic environments. S. L. Lima. 1984. Ecology 65:166–174.—Lima reports the results of an experiment in which 3 male Downy Woodpeckers (*Picoides pubescens*) foraged in a woodlot on sunflower seed kernels placed in tape-covered holes drilled in sections of sapling ash. Number of kernels placed randomly in "full" saplings and number of "empty" saplings

without any kernels was varied. Behavior was compared under different arrangements of prey with behavior expected based on a stochastic model of optimal foraging. To forage optimally, the birds needed to be capable of approximating various complex probability functions. After 6–8 d of a given treatment, behavior stabilized at a different pattern for each arrangement of prey and the differences showed qualitative, but not quantitative fit to the model. For example, the woodpeckers sampled more holes before leaving a sapling when a higher percentage of empty holes was present. However, the Downy Woodpeckers sampled longer than they should based on the model and never sampled just the one best number of holes. Putting it somewhat facetiously, Downy Woodpeckers are smart, but not statisticians. Lima's results do not permit him to state whether the behavioral changes are based on keeping track of time, counting seeds, or what. The results do show that some sampling strategy is used, not a simple strategy such as leaving a patch after either a fixed total time, a fixed time after last food capture, or a fixed total number of food captures. The experiment indicates an interesting direction for further experimental study of optimal foraging.—A. John Gatz, Jr.

26. The nitrogen pathway in a penguin rookery. H. J. Lindeboom. 1984. Ecology 65:269–277.—Lindeboom sought to produce quantitative models of the nitrogen cycle for 2 species of penguins having rookeries on Marion Island, South Africa. He succeeds admirably. For Macaroni Penguins (*Eudyptes chrysolophus*), greater than 84% of the nitrogen is excreted as uric acid-N and lesser quantities as protein-N (8.6%), ammonia-N (6.4%), and nitrate-N (0.6%). The uric acid is rapidly converted, primarily by aerobic bacteria, to ammonia-N which then is volatilized in the wind. Rain absorbs this ammonia and redeposits it in the vicinity of the rookery, producing enhanced vegetation despite an absence of guano deposits. Instead, peat has accumulated because not all the dense vegetation is decomposed. Carbon dating of the peat layer shows the Macaroni Penguin rookeries to have been where they are today for the last 7000–8000 yr. For King Penguins (*Aptenodytes patagonica*), the story is slightly different. Although the proportions of nitrogen excreted in the several forms are similar, a difference in the behavior of the species leads to a different overall result. King Penguins move about more than Macaroni Penguins which means King Penguins both trample the vegetation and deposit excreta directly on the vegetation. Because both processes kill the vegetation, the net result is less dense vegetation and no peat layer similar to that at the Macaroni Penguin rookeries.—A. John Gatz, Jr.

27. Invertebrate fauna of four tree species in Orongorongo Valley, New Zealand, as revealed by trunk traps. A. Moeed and M. J. Meads. 1983. N. Z. J. Ecology 6:39–54.—Although not directly about birds, the article describes a trap devised by the authors which deserves use as a possible method of assaying the abundance of bark-dwelling insects, an important food source of birds. The trap is rapidly constructed from a microwave oven ring dish, and acts as a miniature funnel trap. It adequately captures and discriminates between diurnal insects (available to bark surface gleaners) or nocturnal insects (available to birds that do some excavation). No good method yet exists for assaying populations of bark-boring insects that doesn't involve destructive sampling.—C. J. Ralph.

28. Effects of heavy browsing on a bird community in deciduous forest. D. Casey and D. Hein. 1983. J. Wildl. Manage. 47:829–836.—A 2100-ha fenced wildlife preserve in Pennsylvania contained artificially high densities (1 animal per 1.2 ha) of White-tailed Deer (*Odocoileus virginianus*), Elk (*Cervus elaphus*), and Mouflon Sheep (*Ovis musimon*). Overbrowsing caused habitat changes that affected the bird community. Heavily browsed habitat inside the preserve had less understory but larger trees and more dead timber than unbrowsed habitat outside the preserve.

Hairy and Downy woodpeckers (*Picoides villosus* and *P. pubescens*), Great Crested Flycatchers (*Myiarchus crinitus*), Eastern Wood Pewees (*Contopus virens*), White-breasted Nuthatches (*Sitta carolinensis*), American Robins (*Turdus migratorius*), and Chipping Sparrows (*Spizella passerina*) were significantly more abundant on browsed sample plots. Black-capped Chickadees (*Parus atricapillus*), Red-eyed Vireos (*Vireo olivaceus*), Black-and-white Warblers (*Mniotilta varia*), and Rufous-sided Towhees (*Pipilo erythrophthalmus*) were more abundant in unbrowsed habitat outside the preserve. Cluster analysis indicated that the

avifauna of browsed habitat was distinct from that of unbrowsed habitat. Differences in bird species composition appeared to be related to (1) the denser understory layer outside the preserve, which favored species such as the towhee, and (2) the greater abundance of large trees and dead standing timber inside the preserve, which attracted the bark-foraging guild. Interestingly, the authors found higher bird species diversity on sample plots lacking low and middle foliage layers, contrary to traditional theories on correlations between bird species diversity and foliage height diversity (MacArthur, Am. Nat. 98:387–397, 1964). This study suggests that management for high-density ungulate populations may significantly affect forest bird communities through overbrowsing of habitat.—Richard A. Lent.

29. Ecology of a population of Hoopoes, *Upupa e. epops*, in Valais: distribution, habitats and nesting sites (Ecologie d'une population de Huppes, *Upupa e. epops*, en Valais: répartition spatiale, biotopes et sites de nidification). R. Arlettaz. 1984. Nos Oiseaux 37: 197–222. (French, English summary)—Hoopoes were widely distributed in central Europe during the 19th century, but have disappeared in many areas and are now rare in this part of the Old World. Hence, the work of R. Arlettaz on a Swiss population of the species is particularly timely.

R. Arlettaz describes a population of Hoopoes that inhabited the Fully-Saillon region of central Valais, southwestern Switzerland (between Martigny and Brigue) during 1978–1982. His area of study (24 km²) was a wedge of land extending from the Rhône River Valley (455 m elev.) to the neighboring alps (1400 m). It featured riparian vegetation; orchards and truck gardens in the valley; extensive vineyards and chestnut orchards upslope; oak groves and brushy dry steppe above this; pinewoods succeeded by spruce and larch plantations beginning at 1000 m; and alpine meadows at 1200–1400 m. The landscape is nicely illustrated in a figure. (However, it would have been immensely useful to readers not familiar with this area had Arlettaz also included a topographical map of the area showing the locations of the villages to which he refers in the text.)

Only 18 of the 24 km² were frequented by Hoopoes. In all, 20–28 pairs occupied this area, depending on the year. Hence, their density was 1.1–1.6 pairs/km² or on average 1 pair/64–90 ha. This density was considerably higher than the 0.4 pair/km² in a censused area of Germany (Steckby). The average distance between occupied nest sites in Valais was 755 m, but the variation was considerable (350–1125 m) and two successful nests were only 40 m apart in 1982.

Nesting pairs were mostly restricted to deciduous woods above the valley: 70% of 21 active nests were at elevations between 465 and 750 m, whereas only 25% were on the valley floor. Although the cultivated valley provided food and foraging sites for Hoopoes, it offered few nest sites. Yet, only 3–4 decades ago, it was pasture criss-crossed by lines of willows and Italian poplars in which Hoopoes commonly nested. The gradual and continuing conversion of the valley and adjacent hillsides to vineyards has probably contributed to the decline of Hoopoes in this part of Switzerland by eliminating nest sites. Nonetheless, since there is still a surplus of nest sites in Valais and since Hoopoe density is known to fluctuate markedly, statements about the impact of the changing landscape on numbers of these birds is speculative at best.

Hoopoes nest in cavities: in Valais, 54% of the nests were in *natural* cavities (including vacant woodpecker holes) of trees, particularly oaks (*Quercus pubescens*) and chestnuts (*Castanea vulgaris*); only one was in a crack among rocks on a sheer face (such "rupestrine" nest sites are more common among southern populations of this species); 36.3% of the nests were in *semi-natural* sites including cavities in rock walls, manure piles, and buildings. Hoopoes also used *artificial* sites, i.e., nestboxes, but sparingly: only 2 of 23 boxes put up by Arlettaz were used and only once each. He suggests that providing more nestboxes will not affect population size at Valais, just as it has failed to change the Hoopoe's density in Germany.

Nests were on the ground or as much as 12 m above it. The average height was 2.24 m. The type of nest site (natural, semi-natural, artificial), its distance from the ground, and the direction in which its entrance faced (not described by the author) did not determine which cavity the birds selected for use. Nest entrance openings were usually less than 8–9 cm in diameter. Such preference for small openings probably reduces predation

and perhaps exposure to inclement weather. The 2 nests in the study with openings larger than 9 cm in diameter were both destroyed by predators.

Pairs of Hoopoes did not have a territory in the traditional sense, but did defend the area near their nest. In contrast, foraging areas were communal. Arlettaz's illustration of the "area of activity" of one, presumably representative, pair of Hoopoes, occupied between 1979 and 1982, indicates that it was polygonal in shape, at least 500 m wide, and about 1500 m across at its longest point. It included singing posts, many potential and actual nest sites, sites where he observed copulation and intraspecific contacts, and the foraging area of the pair.

Foraging areas at Valais were open, dry surfaces including roadways, pastures, the sandy beaches defining the Rhône River, orchard lawns, garden plots, and the bare soil in the vineyards. Hoopoes fed on insects on the ground. They maneuvered through higher vegetation with difficulty and it is likely that their presence in Valais depends on the presence of such exposed foraging areas.

This article is accompanied by 15 figures, many of which show the location of nest sites in various parts of the landscape. One summarizes the number and height of each type of nest found at Valais. Another illustrates how the distribution of Hoopoes in Switzerland has shrunk (drastically!) since 1952–1953. Another shows the distances between actual or suspected nest sites. Another compares the temperature and precipitation of central Valais and Thuringe, West Germany (both are Hoopoe areas), with that of Lausanne, Switzerland. Hoopoe areas are warm and dry, semi-arid; Lausanne is wetter. Summer rains are typical in both Hoopoe areas.—Michael Kern.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 7, 28, 29, 33, 34, 54)

30. Relationships between cornfield characteristics and blackbird damage. W. T. Bridgeland and J. W. Caslick. 1983. J. Wildl. Manage. 47:824–829.—Counts of blackbird flocks (mostly Red-winged Blackbirds, *Agelaius phoeniceus*) and assessment of blackbird damage to ripening corn in Cayuga County, New York suggested a strong correspondence between early maturation and heavy bird damage. Simple regression analysis showed that habitats adjacent to cornfields had little influence on the amount of damage suffered by the corn. Other cornfield characteristics (size and shape of field, onset of corn milk stage, and cornfield weediness) likewise explained little of the variation in blackbird damage. The authors recommend that farmers lessen blackbird damage to their corn by planting later in the season or by switching to late maturing varieties. Alternatively, bird-control measures should be concentrated in the earliest maturing fields.—Richard A. Lent.

31. Responses of birds and deer mice to prescribed burning in Ponderosa Pine. C. E. Bock and J. H. Bock. 1983. J. Wildl. Manage. 47:836–840.—The authors describe short-term effects of 2 prescribed burns on vegetation, breeding birds, and deer mice (*Peromyscus maniculatus*) in Ponderosa Pine (*Pinus ponderosa*) forests in the Black Hills of South Dakota. Effects on vegetation were slight, with some reduction in litter and young pine. The burns improved habitat for mice and 7 songbirds (American Robin, *Turdus migratorius*; Mountain Bluebird, *Sialia currucoides*; Solitary Vireo, *Vireo solitarius*; Yellow-rumped Warbler, *Dendroica coronata*; Western Tanager, *Piranga ludoviciana*; Dark-eyed Junco, *Junco hyemalis*; Chipping Sparrow, *Spizella passerina*), but only for a short time. The enhancing effect of the fire had disappeared by the 2nd year. The authors suggest that "mice and songbirds were attracted to the burn by some unmeasured temporary increase in the quantity or quality of their food supplies," possibly triggered by physical or chemical effects of the fire.—Richard A. Lent.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 29, 68)

32. Tests of compensatory vs. additive hypotheses of mortality in Mallards. K. P. Burnham and D. R. Anderson. 1984. Ecology 65:105–112.—The question is whether Mallards (*Anas platyrhynchos*) killed by hunters represent mortalities added to a constant

natural mortality rate or whether natural mortality rates vary inversely with kill rate by hunters up to a threshold. In the former additive case, total mortality will vary from year to year according to the kill rate; in the latter compensatory case, total mortality will remain constant. Band recovery data for Mallards banded between 1951 and 1979 were analyzed by seeing for which of these two extreme cases the data show the maximum likelihood function. The additive mortality hypothesis was conclusively rejected for male Mallards. Data are much less good for females, so a less strong statement is possible for them. Still, for both sexes and all years, the results of the analyses are as expected based on the completely compensatory mortality hypothesis. While this is good news for duck lovers and hunters alike, the need remains for more data on female Mallards and both sexes of other species of ducks.—A. John Gatz, Jr.

33. Fall migration and mortality of Interlake, Manitoba Sandhill Cranes in North Dakota. S. M. Melvin and S. A. Temple. 1983. J. Wildl. Manage. 47:805–817.—Radiotelemetry was used to monitor movements and activities of 38 Sandhill Cranes (*Grus canadensis*) in North Dakota. Birds were color-marked as chicks in the Interlake region of Manitoba during fall migration in 1978 and 1979. The authors examined the fall distribution of Interlake cranes, the impact of hunting on distribution, and band-recovery rates.

Interlake birds remained in North Dakota from late August through October, with much movement of individual birds between various locations. The mean first-year recovery rate from hunting was 14% with most mortalities occurring in Pierce, Kidder, and Stutsman Counties. Some birds were disturbed by hunters and moved to areas of lower hunting pressure (see review **34**). However, hunting did not appear to accelerate movement of cranes through North Dakota. Although results do not suggest that the Interlake crane population is over-exploited, the authors discourage liberalization of hunting regulations in the central flyway if it would increase the kill of Interlake Sandhill Cranes.—Richard A. Lent.

34. Fall migration of Sandhill Cranes in west central North Dakota. M. J. Carlisle and T. C. Tacha. 1983. J. Wildl. Manage. 47:818–821.—The authors describe the chronology of fall migration by Sandhill Cranes (*Grus canadensis*) in McLean County, North Dakota, an important migration stopover. The intent was to aid in establishing crane hunting regulations (see review **33**). This is critical because the Sandhill Crane harvest is set to minimize danger to migrating Whooping Cranes (*G. americana*).

Aerial censuses (1 Sept. to mid-Nov.) of roosting cranes in 35 lakes in 1979–1980 showed that numbers peaked in October. Migration was earlier in 1979 than in 1980. Hunting occurred when ≤25% of the peak crane population was available to hunters. Early migrants were mostly nonbreeding adults whereas late migrants included more breeding adults and young. Fluctuations in percentage of juveniles with changing population levels and time of migration "make estimates of annual recruitment of Sandhill Cranes based on age-ratio data from North Dakota unreliable." Manipulating the hunting season in relation to Sandhill Crane migration chronology may be useful in managing the population.—Richard A. Lent.

35. Density as a misleading indicator of habitat quality. B. Van Horne. 1983. J. Wildl. Manage. 47:893–901.—While not strictly about birds, this paper has important implications for anyone involved with wildlife habitat studies. An assumption of most assessments of wildlife habitat quality is that the density of a species in its habitat is directly correlated with habitat quality. Van Horne questions this fundamental assumption, giving examples of situations where the density-habitat quality relationship is "decoupled." An example for birds is site tenacity in breeding passerines, which may produce local high densities that actually reflect past, not current, habitat quality. A census taken in this situation would yield a false indication of habitat quality. Social dominance interactions can produce similar effects. For example, it is widely known that populations of breeding birds in limited habitat often consist partly of "floaters" that do not breed. These subdominant individuals may accumulate in marginal habitats where their high densities may mislead an investigator into thinking he is looking at high-quality habitat, if density of

the species is the only factor considered. Similar examples are described for other avian species and for mammals.

Van Horne suggests that "habitat quality" be defined in terms of the survival and production characteristics (i.e., fitness), as well as density, of species occupying that habitat. Given this definition (described in detail by an equation) one would essentially need to collect enough data to construct a life table for the species in question. As the author states, "Such a determination will be impractical for most studies," particularly those seeking to define critical habitats for species preservation. Nevertheless, this paper reminds us that we "cannot afford to ignore the processes that produce the densities we observe," and that we should collect the population data to support assumptions about density-habitat relationships whenever possible.—Richard A. Lent.

36. The influence of browsing by introduced mammals on the decline of the North Island Kokako. J. R. Leathwick, J. R. Hay, and A. E. Fitzgerald. N. Z. J. Ecol. 6:55–70.—The Kokako, *Callaeas cinerea wilsoni,* a frugivorous wattlebird, was once widespread on the North Island of New Zealand. Today it occupies quite restricted areas of native forests. As is the case with many island endemics, the causes of the species' decline are not known. Through an intensive set of foraging studies, the authors compare the diet of the Kokako with 3 introduced herbivores (the Australian possum, the red deer, and the feral goat). No definitive results were obtained: all of the herbivorous mammals are generalists, and the Kokako appears to be opportunistic as well. It seems clear, however, that the decline of the Kokako can be ascribed in part to the impoverishment of native forests by these feral herbivores. This study was remarkably free of the usual fault of such studies. That is, although the authors were looking at a single potential cause, they make the reader well aware of other factors. Everyone has a favorite villain for the decline of a species, whether it be predators, disease, habitat destruction, or whatever. This study attempts to bring another piece of the puzzle into perspective. That the authors succeed in making a good case is due to their moderation on their theme, and their healthy skepticism of their own theory.—C. J. Ralph.

PHYSIOLOGY

(see also 5, 21, 26, 40)

37. Metabolic adjustments of small passerine birds for migration and cold. W. R. Dawson, R. L. Marsh, and M. E. Yacoe. 1983. Am. J. Physiol. 245:R755–R767.—This review paper summarizes current knowledge of the similarities and differences existing between biochemical processes involved in shivering thermogenesis and long-distance flight. Despite the differences in modes of muscle contraction, duration of metabolic expenditure, etc., certain biochemical features are common to both shivering and flight. Use of lipid as the primary substrate for ATP production heads the list; however, enzymatic processes, amount of lipid stores available, and use of other substrates may differ considerably. This is a valuable paper for physiologists and ornithologists who need to update their lectures on these topics.—Cynthia Carey.

38. Mammalian and avian antidiuretic hormone: Studies related to possible species variation in osmoregulatory systems. D. A. Gray and E. Simon. 1983. J. Comp. Physiol. 151:241–246.—Birds and mammals have structurally different kidneys, but use structurally similar hormones (argenine vasopressin and argenine vasotocin) for control of renal excretion of water. This study compared the relation between circulating levels of these hormones, measured by radioimmunoassay, and the osmotic pressure of plasma in control and dehydrated dogs and Pekin ducks (*Anas platyrhynchos*). The threshold for release of these hormones and the correlation between plasma osmotic pressure and hormonal concentrations were very similar in the 2 groups. Despite the diversity in structure and function of the target organs of birds and mammals, the properties of the regulatory systems appear to be quite similar.—Cynthia Carey.

39. Endogenous factors of annual periodicity in resident birds and in less typical migratory birds. [Endogene Grundlagen der Jabresperiodik von Standvogeln und wenig

ausgepragten Zugvogeln.] P. Berthold. 1982. J. Ornithol. 123:1–17 (German, English summary).—This set of experiments investigated circannual rhythms in 4 species (*Parus cristatus, Passer montanus, Loxia curvirostra, Sylvia conspicillata*) for 2 to 4 years under constant photoperiods. Most of the birds were hand-reared for these experiments. The feature that showed the most obvious circannual rhythm was molt in all species except *P. montanus*. Testis size in *P. montanus* and body weight in *L. curvirostra* exhibited cyclic variation in some, but not all, individuals. There was a great deal of interspecific variation in the amplitude and periodicity of the rhythms studied. In general, non-migratory and irruptive species show weaker circannual rhythms than migratory species. This difference may be due to the experimental conditions of this study or, more likely, the species studied might have less well developed circannual rhythms.—Robert C. Beason.

MORPHOLOGY AND ANATOMY

(see also 50, 51, 52)

40. A comparison of the effects of eggshell porosity on the respiration and growth of domestic fowl, duck and turkey embryos. F. G. Burton and S. G. Tullett. 1983. Comp. Biochem. Physiol. 75A:167–174.—This paper illustrates a generally ignored principle that is basic to understanding gas exchange in all avian eggs. The prevailing dogma asserts that the porosity of eggshells must be precisely adjusted to egg mass and incubation period of each species so that exchange of water vapor, oxygen, and carbon dioxide between the embryo and the environment falls within restricted limits. However, eggshell porosity varies considerably within a given species. Using domesticated species, this paper illustrates that gas exchange and hatchability are independent of such variation over a considerable range. Even when porosity is low enough to restrict oxygen consumption in the latter stages of incubation, most embryos hatch successfully. Hopefully, this paper will lead to a reassessment of thinking about the importance of eggshell porosity in regulation of embryonic gas exchange.—Cynthia Carey.

41. Continental patterns of morphological variation in a South American sparrow. P. Handford. 1983. Evolution 37:920–930.—Six skin measurements were taken from each of 1554 museum specimens of the Rufous-collared Sparrow (*Zonotrichia capensis*) from localities throughout its range (Mexico to Argentina). This is a notoriously geographically variable species with 25 subspecies currently recognized. Handford ignored the subspecies designations and sought overall patterns of geographic variation of individual characters and their multivariate combinations. About 75% of the total morphological variation could be summarized by 3 principle components that varied approximately clinally with distance from the Bolivian altiplano. It seems clear that subspecific designations have obscured this overall clinal pattern in the past. A growing trend among researchers involved in microevolutionary studies such as this has been to disregard the often arbitrary, discrete units of subspecies and instead try to describe the variation with geographically continuous variables.—George F. Barrowclough.

42. Allozymic heterozygosity and morphological variation in House Sparrows. R. C. Fleischer, R. F. Johnston, and W. J. Klitz. 1983. Nature 304:628–630.—Greater heterozygosity (inter-individual and inter-population) has been associated with lower morphological variance in poikilotherms. The present study, which generated evidence in support of this trend among House Sparrows (*Passer domesticus*), contrasts with the only other such avian study on Rufous-collared Sparrows (*Zonotrichia capensis*), which did not support the general inverse relationship between morphological variance and degree of heterozygosity (Handford, Nature 268:261–262, 1980). Fleischer et al.'s data on enzyme polymorphism (in kidney and liver tissue and serum) yielded significant inverse trends between skeletal variance and 3 classifications of increasing heterozygosity in 4 of 16 comparisons (4 locations × sex × 2 analyses). Comparisons of the highest and lowest heterozygous groups indicated that limb elements as compared to body core and skull components were most responsible for the observed results. The authors suggest a greater "developmental homeostasis for heterozygotes and pose directions for the study of the

mechanisms involved. With only 2 avian studies (both with passerines) to date, and ones which present opposing findings, there is much ground to be covered in order for a fuller range of patterns to be assessed and for potent generalities to emerge.—W. A. Montevecchi.

PLUMAGES AND MOLT

(see also 21, 39)

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 36, 50, 60, 61, 64, 66, 68)

43. Distribution of postbreeding diving ducks (*Aythyini* and *Mergini*) on southern boreal lakes in Manitoba. R. O. Bailey. 1983. Can. Wildl. Serv. Prog. Notes, No. 136, 8 p.—This paper reports the distribution and numbers of Canvasbacks (*Aythya valisineria*), Redheads (*A. americana*), Ringnecks (*A. collaris*), Lesser Scaups (*A. affinis*), Common Goldeneyes (*Bucephala clangula*), and Common Mergansers (*Mergus merganser*) observed during several postbreeding aerial surveys over the Lake Winnipegosis drainage. Lake Winnipegosis water levels played a significant role in the distribution and numbers of Redheads throughout the drainage from 1962–1974.—Richard M. Zammuto.

44. Seabirds and estuary birds along the Netherlands coast, 1974–79. [Zee-en kustvogels langs de Nederlandse kust, 1974–79.] K. C. J. Camphuysen and J. Van Dijk. 1983. Limosa 56:83–230. (Dutch, English summary)—This article presents results of observations by the Dutch Seawatchers Club on movements, distribution, and numbers of seabirds over the 6-year period and represents over 20,000 record sheets. The weather is characterized during this period and correlations are made with weather patterns. The major themes discussed prior to presenting the long annotated species list include (1) breeding distribution and migration routes relative to the North Sea, (2) seasonal occurrence in Dutch waters, (3) differences in numbers among the 6 years with the coastline divided into 6 sections, (4) velocity and direction of wind, (5) observation hour when the greatest numbers were seen, and (6) notes on plumage (sex, age, etc.). In all, 6 loons and grebes, 8 seabirds, 15 waterfowl, 14 shorebirds, and 26 gulls, terns, and auks were discussed. Heavy northward spring migrations of waders correlated with strong winds from the N to E quadrant, seabirds were recorded mostly in autumn during periods of strong onshore winds, and some massive movements of waterfowl and waders were best correlated with severe frost and heavy snow fall that apparently reduces feeding opportunities.—Clayton M. White.

SYSTEMATICS AND PALEONTOLOGY

(see also 41, 58)

45. Intraordinal relationships of the Pelecaniformes and Cuculiformes: electrophoresis of feather keratins. A. H. Brush and H.-H. Witt. 1983. Ibis 125:181–199.—The possibility of using feather proteins to investigate avian relationships has great appeal. Museum specimens could be used, and if the proteins evolved in a clock-like fashion, as some investigators believe, then the system would represent a panacea for avian systematists. In this paper, Brush and his colleagues continue their investigation of the utility of the technique. Two different pH electrophoretic systems were used; in some cases these resulted in different patterns of similarity among the species. In general, the Pelecaniform species that were examined did group into traditional genera and families; however, the inferred branching patterns of the cuckoos and turacos were less consistent. The degree of variation of the results with different biochemical conditions and methods of data analysis is disquieting.—George F. Barrowclough.

46. An empirical evaluation of qualitative Hennigian analyses of protein electrophoretic data. J. C. Patton and J. C. Avise. 1983. J. Mol. Evol. 19:244–254.—Electrophoretic data from 26 species of North American waterfowl (Anatidae) were used to

investigate the efficacy of cladistic methods for inferring phylogenetic relationships using this kind of molecular data. It was assumed, *a priori*, that geese and swans (Anserinae) and ducks (Anatinae) represent two sister clades in the family. This allowed the authors to infer primitive vs. derived states of electrophoretic mobility for some loci: e.g., an allele with a mobility shared between both major clades was assumed to represent the primitive condition; any other alleles at the locus were assumed to be derived. Thus, a fundamental, unstated assumption was that in the ancestral species only a single allele was present (i.e., the loci were not polymorphic); further justification is needed for this counter-intuitive assumption. Based on this methodology, a tree was produced that was considerably more consistent with the traditional view of waterfowl phylogeny than were either phenetic clustering or phylogenetic distance approaches. This result suggests that when it is possible (i.e., when alternative, non-polymorphic alleles are found), qualitative analysis of electrophoretic data may be superior to some of the commonly used genetic distance procedures. Unfortunately, this will not always be possible as several previous avian electrophoretic surveys have not turned up sufficient fixed differences among the taxa being investigated.—George F. Barrowclough.

47. The affinities of the New Zealand passerine genus *Turnagra*. S. L. Olson, K. C. Parkes, M. H. Clench, and S. R. Borecky. 1983. Notornis 30:319–336.—Teamwork pays off. Detailed information on external morphology (Parkes), pterylography (Clench), myology (Borecky), and osteology (Olson) places the so called New Zealand Thrushes (*Turnagra turnagra* and *T. capensis*: "Turnagridae") in the bird-of-paradise and bowerbird assemblage. The authors merge the Ptilorhynchidae in the Paradisaeidae and consider *Turnagra* to be a primitive member of that group.—J. R. Jehl, Jr.

48. Evolutionary genetics of the Anatidae. K. Numachi, M. Watada, R. Kakizawa, N. Kuroda, and S. Utida. 1983. Tori Bull. Ornithol. Soc. Jpn. 32:63–74.—Starch-gel electrophoresis was used to analyze blood samples from 31 species of ducks, geese, and swans at 10 enzymatic loci. Genic heterozygosity within species was found to be low by avian standards. Genetic distances among the various species, genera, and subfamilies were typical of comparable values from other non-passerine and passerine birds. A dendrogram was used as an estimate of phylogenetic relationships. The branching pattern was in general agreement with traditional ideas about anatid relationships; however, the Egyptian Goose (*Alopochen*) and the Cape Barren Goose (*Cereopsis*) both clustered with the true geese, rather than with the ducks, contrary to some current opinion. Unfortunately, the small numbers of loci examined yield standard errors of genetic distances that are sufficiently large that most details of the branching order cannot be considered significant; nor was a cladistic analysis of the alleles attempted (see review 46).—George F. Barrowclough.

EVOLUTION AND GENETICS

(see also 42, 46, 56)

49. Genetic and morphological similarity of two California Gull populations with different life history traits. R. M. Zink and D. W. Winkler. 1983. Biochem. Syst. Ecol. 11:397–403.—Modal clutch sizes of California Gulls (*Larus californicus*) nesting at Mono Lake (California) and Great Salt Lake (Utah) are 2 and 3, respectively. The authors used electrophoresis and mensural measurements in a search for genetic variation between the populations. No significant differences in allelic frequencies or multivariate morphology were found between the colonies. The authors conclude that the clutch size difference is either recently evolved, determined by loci not linked to those examined by electrophoresis, or environmentally induced. This is a case in which electrophoresis was not helpful in answering questions concerning the genetic basis of a geographically varying trait.—George F. Barrowclough.

50. Genetic differentiation of starling (*Sturnus vulgaris*: Aves) populations in New Zealand and Great Britain. H. A. Ross. 1983. J. Zool. Lond. 201:351–362.—Samples of European Starlings were collected from Great Britain and from the introduced populations in New Zealand. Electrophoresis was used to assay genic variability and differentiation of

the ancestral (Great Britain) and descendent (New Zealand) populations. Genic variability, measured as observed heterozygosity, did not differ between the localities; this is not surprising given the founder population, which numbered several hundred. The pattern of geographic variation of allelic frequencies was unexpected: there was substantially more variation among the New Zealand localities than among the Great Britain populations. This may be due to more pronounced migratory movements of European and British starlings than of the apparently sedentary New Zealand birds. For whatever reason, appreciable geographic variation has arisen in the introduced population in only 100 years; this is reminiscent of the North American House Sparrow (*Passer domesticus*) story.—George F. Barrowclough.

51. Inheritance of size and shape in a population of Darwin's finches, *Geospiza conirostris*. P. R. Grant. 1983. Proc. R. Soc. Lond. B 220:219–236.—Parents and offspring of the Large Cactus Finch on Isla Genovesa in the Galapagos were measured for several traits, including mass, wing and tarsus length, and bill dimensions. A regression of offspring measurements on those of their parents indicated that these characteristics were highly heritable. The mean of the heritabilities was 0.84. The same high heritability was indicated for overall size and shape based on a principle components analysis. In previous reports, Grant and colleagues have shown that the Large Cactus Finches on this island were of 2 song types with different bill lengths. Thus, the results reported here strongly suggest a genetic basis for that difference. Grant argues that the bill length difference might have been the result of disruptive selection due to a drought and consequent reduced food availability. As in some other recent studies of avian morphological heritabilities, these results are problematical. Strong selection depletes genic variation, hence decreasing heritability. To maintain heritable variation in a population, selection must be weak, infrequent, or vacillating in direction.—George F. Barrowclough.

52. Evolutionary and systematic significance of temporal variation in the Fox Sparrow. R. M. Zink. 1983. Syst. Zool. 32:223–238.—Zink collected skeletons of Fox Sparrows at 7 sites in California from which J. M. Linsdale had collected a similar series of skeletons approximately 50 years earlier. Morphological distances among temporal and geographic samples were computed based on 21 skeletal measurements. The differences between samples taken at the same locality 50 years apart were of the same magnitude as current differences among geographically distinct samples (including different subspecies). Moreover, the pattern of phenetic similarity of the 7 geographic samples had changed over the last half century. Thus, at least for this species (the only one analyzed to date in such a fashion), intraspecific patterns of geographic relationship of skeletal morphology were not stable over a relatively short period of time.—George F. Barrowclough.

FOOD AND FEEDING

(see also 9, 10, 21, 24, 25, 27, 67)

53. Late summer food habits of three heron species in northwestern Louisiana. K. R. Neilhammer and M. S. Kaiser. 1983. Colonial Waterbirds 6:148–153.—A quantitative analysis of food items taken by 3 species of herons (Yellow-crowned Night-Heron, *Nycticorax violaceus*; Little Blue Heron, *Egretta caerula*; and the Green-backed Heron, *Butorides striatus*) over a short period of time (15 July–15 Sept., 1980) is the topic of this paper. Herons were collected, carcasses weighed, measured, and the organs of the digestive tract were removed and preserved in 70% alcohol. Seventy-four food items from 19 Yellow-crowned Night-Herons, 442 items from 17 Little Blue Herons, and 193 items from 27 Green-backed Herons were soaked for 24 h before being weighed and identified. The numbers, weight, frequency, and size of prey items were recorded. Each species had distinct dietary preferences, with Yellow-crowned Night-Herons predominantly taking crayfish, Green-backed Herons predominantly taking fish, and Little Blue Herons taking a wide variety of prey with fish being the predominant food item. This information when correlated with size of individuals does not support Kushlan's idea that "A greater total range of prey size and a greater mean and median size of prey should be taken by larger birds" (**Wading Birds.** Natl. Aud. Soc. Res. Rep. 7, 1978:249–297). The author speculates that

the discrepancy is due to behavioral differences (none of which is noted or substantiated in the article), habitat selection (which does not appear to be unusual for the species based on the brief description presented), or prey selection in this study, since size considerations did not explain differences between sizes chosen by Little Blue and Green-backed Herons.—R. W. Colburn.

54. Benthic sampling for waterfowl foods in emergent vegetation. G. A. Swanson. 1983. J. Wildl. Manage. 47:821–823.—A core sampler is described that is useful in sampling waterfowl foods in densely rooted vegetation where standard grab samplers are ineffectual. It consists of a copper coring tube with cutting teeth and a hand suction device for removing the core. A photograph illustrates construction details, and field sampling procedures are described.—Richard A. Lent.

55. Honeydew and its importance to birds in beech forests of South Island, New Zealand. P. D. Gaze and M. N. Clout. 1983. N. Z. J. Ecol. 6:33–38.—The authors describe how in some New Zealand forests one of the biggest potential (although little documented) sources of food for nectarivorous birds is honeydew, a sugary exudate produced by aphids and scale insects. The authors found that two nectar specialists, the Bellbird (*Anthornis melanura*) and the Tui (*Prosthemadera novaeseelandiae*) were more abundant in two forests where there was abundant honeydew, than in a single forest with low production (and a low proportion of beech trees). The Silvereye (*Zosterops lateralis*) did not appear to respond to the honeydew abundance, probably because of the more catholic nature of its diet. Although the sample size for each of the 3 study sites was large, this study suffered a bit because more sites were not sampled. Despite this, I feel that the authors' conclusions will be found to have wide applicability as observers in New Zealand discover that honeydew is a major source of sugar for nectarivores, not only in the beech forests, but in many others as well.—C. J. Ralph.

SONGS AND VOCALIZATIONS

(see also 6)

56. The behavioral response of female Nuttall's White-crowned Sparrows to male song of natal and alien dialects. M. C. Baker. 1983. Behav. Ecol. & Sociobiol. 12:309–315.—Given two territorial males with alternative dialects and all other things equal, and given a yearling female that spent her early life in one dialect, with which male will she mate? In experimental presentations of natal and alien dialect songs, captive, estradiol-treated females gave significantly more copulation displays with greater intensity to presentation of their natal dialect than to presentation of non-natal dialect. These differences in response are interpreted as supportive of the notion that Nuttall's White-crowned Sparrows (*Zonotrichia leucophrys nuttalli*) mate assortatively.—Patricia Adair Gowaty.

57. Epigenesis of cowbird song—A joint endeavor of males and females. A. P. King and M. J. West. 1983. Nature 305:704–706.—On the basis of long-term research on the social ontogenesis of "song" in male Brown-headed Cowbirds (*Molothrus ater*), the case is made in this study that male "songs" are biased toward the preferences of nonsinging female companions. Females had been previously found to prefer the male "song" types of their geographic subspecies (*M. a. ater* compared with *M. a. obscurus*). In the present study, *ater* taken from nests at 4–5 days posthatch were reared in auditory isolation until age 50 days. Some of these birds were tutored with their subspecific "song" for 3 months, some were not; males were then housed with other species (Canaries, *Serinus canaria*) or with females of their own or of the *obscurus* race. Females produced some simple "kek" calls during feeding (as did males with equal frequency) and produced "rattle" vocalizations during spring, but never uttered "songs" nor have been observed to do so in either the lab or wild. Despite this lack of female song, there was clear evidence that (1) tutored *ater* males housed with *obscurus* females produced fewer tutored *ater* "songs" and more original "songs" than males housed with canaries and (2) the "songs" of untutored males were biased toward the subspecific (geographic) types associated with the females with which they were housed. These results point out a role of nonsinging female influence on the

male's vocal development, perhaps via male experiences with the consequences of their vocal activity. The authors suggest that such an influence may be widespread, especially with regard to males' acquisition of adaptive repertoires (dialects). These findings are all the more interesting in view of the facts that cowbirds are brood parasites that are reared by other species and that their "songs" are relatively simple affairs. Studies of female influence on the development of male song will no doubt be stimulated by this paper, and its possible role among species with different life history patterns and song complexity are to be looked forward to, as are further experimental unravellings of the mechanisms involved.—W. A. Montevecchi.

BOOKS AND MONOGRAPHS

58. Handbook of Middle European Birds [Handbuch der Vögel Mitteleuropas]. U. Glutz von Blotzheim and Kurt M. Bauer. 1982. Akad. Verlag Wiesbaden. Bd. 8-1, 8-2. 1270 p., 217 fig.—The eighth volume of this magnificient handbook treats the Stercorariidae (112 pp.), Laridae (574 pp.), Sternidae (345 pp.), and Alcidae (203 pp.). All the Atlantic American species of these 4 families are treated in this handbook in monographic manner. About 10–15 pages are given even to each of the species that do not nest on the European side of the Atlantic. Species that nest on both sides receive exhaustive treatment, for instance the Great Skua, *Catharacta skua* (33 pp.), the Parasitic Jaegar, *Stercorarius parasiticus,* (34 pp.), Black-legged Kittiwake, *Rissa tridactyla,* (34 pp.), Black-headed Gull, *Larus ridibundus,* (87 pp.), Herring Gull, *L. argentatus,* (84 pp.), Great Black-backed Gull, *L. marinus,* (25 pp.), Arctic Tern, *Sterna paradisaea,* (31 pp.), Gull-billed Tern, *Gelochelidon nilotica,* (26 pp.), Common Murre, *Uria aalge,* (56 pp.), Razorbill, *Alca torda,* (33 pp.), Atlantic Puffin, *Fratercula arctica,* (28 pp.). Particularly valuable are the figures, including such of courtship postures or flight views drawn from photographs, as well as exhaustive literature lists with every species. Since there is no North American Handbook, Glutz's Middle European one is indispensable as a reference source, even for American ornithologists.—Ernst Mayr.

59. Eco-ornithological glossary. [Oko-ornithologisches Glossarium.] R. Berndt and W. Winkel. [R. Jellis, translator.] 1983. Duncker and Humbolt, Berlin. 79 p. Softcover. DM30. (German-English).—This is a revised, dual language version of an earlier German glossary (Vogelwelt 98:161–192, 1977) which should prove valuable to ornithologists and ecologists alike. It translates and defines terms which are frequently encountered in avian ecology studies, but not normally found in a German-English dictionary, or which have a particular meaning in avian ecology. Because there are many papers published on avian ecology in the German literature and many English speaking biologists have a limited command of German, this publication should prove to be a valuable reference to English-speaking as well as German-speaking ornithologists by providing access to the German literature.—Robert C. Beason.

60. West Virginia Birds. G. A. Hall. 1983. Carnegie Museum of Natural History Special Publication Number 7. Pittsburgh. 180 p. $20.00.—Dr. Hall writes in his forward that this book is meant to be a "benchmark for future generations." Most of the book is devoted to descriptions of the species' general status, arrival dates, distribution, and departure dates or wintering distribution. Breeding Bird Survey and Christmas Count data are used to describe population levels. In a brief introductory section the author recognizes 3 avifaunal zones: the Western Hills Region, which occupies most of the State, the Allegheny Mountain Region, and the Ridge and Valley Region. Species characteristic of the Allegheny Mountain Region are at, or close to, the southern limit of their range in West Virginia. The other two regions are quite similar to each other, and the author expresses doubt that they should even be distinguished. Some authors have recognized southern West Virginia as distinct from the northern part of the State. Hall remarks that he once considered this a useful distinction but no longer does, although he does not consider the issue in detail. He also notes that all of the "northern" species found in West Virginia are migratory, and suggests that the non-migratory species which might be expected to occur there may have been extirpated during the warm period presumed to have occurred "about 9,000 to 2,500 years ago."—Jonathan Bart.

61. The native forest birds of Guam. J. M. Jenkins. 1983. Ornithol. Monogr. 31., American Ornithologists' Union, Washington, D.C. 61 p. $9.00.—This brief, but thorough, review of the present status and life histories of the avifauna of this, the most western part of the U.S., is well done and timely. Guam is the southernmost of the Mariana Islands, about 1930 km east of the Phillipines. Jenkins documents, from his own research and the unusually good files of Guam's Division of Aquatic and Wildlife Resources, the present status and certain aspects of the life histories of Guam birds. This is an excellent contribution to our knowledge of these birds and Pacific Island birds in general.

The resident land birds currently consist of 12 species, most of which have undergone dramatic and largely inexplicable declines in the past 20 years. We are quite used to some species declining on Pacific Islands. These are largely those that have become adapted to primary native forests which, since the advent of man some 2000 years ago in the Pacific, have undergone severe reductions. Jenkins documents a similar reduction on Guam. Now, virtually all of the birds are largely restricted to the northern quarter of the island in some remnant primary forest. However, much of the forest in the rest of Guam looks, at least to me, quite capable of supporting these land birds. Indeed, I have observed similar or identical bird species to be quite common in similar habitat on other islands in the Marianas. On some of these islands the forests were virtually leveled as U.S. forces took the islands towards the end of WW II. Jenkins points out that two factors are different on Guam from these other islands with fairly intact avifauna. The first is the Phillipine rat snake (*Boiga irregularis*) which has become quite widespread since its introduction in 1945. The other is the widespread use of herbicides and pesticides by farmers and especially the U.S. military. Both are quite probably involved with the birds' precipitous declines. Time is quite short if something is to be done to protect the avifauna.

Jenkins is to be congratulated on a fine job. I hope that the steps he advocates for preservation of what is probably our most endangered avifauna can be implemented soon.—C. J. Ralph.

62. The Grouse of the World. P. A. Johnsgard. 1983. University of Nebraska Press, Lincoln. 413 p. $42.50.—In a first look at this new monograph of the grouse, one irresistibly gravitates to the superb illustrations. Over 50 are in color, many of them a full page in size. In them one sees the 16 species of grouse in all their spectacular variety: birds in their natural habitats, males in display, females on their nests or with young, birds with intricate camouflage, and others with extraordinary tails and inflatable sacs. Over 70 black and white plates continue the themes begun in color. As in the author's other recent monographs, many of the best photographs are his own. Then there are some 30 pages of line drawings, many of which show details of the varied displays and postures of the males. To my surprise, I could find no indication of the artist responsible for these superb drawings. After the first half hour or so with this volume, having yet to read a word of the text, one feels privileged to have shared the family album of the Tetraonidae.

The illustrations include many that also appeared in the author's earlier volume, **Grouse and Quails of North America** (University of Nebraska, Lincoln, 1973). Of course, photographs of the Eurasian species were not included in the earlier book. In addition, there are some new photographs of the North American species, and all the extraordinary line drawings of the later volume are new. In addition to this gain, the present volume has a more concentrated impact. The grouse of North America and Eurasia make a more coherent theme than do the grouse and quails of North America.

The text follows the traditional organization for a monograph of an avian family. The initial chapters discuss the general biology of the family with suitable comparisons among the species. Topics include molts and plumages, vocal apparatus, hybridization, reproduction, population ecology, social behavior, aviculture, and hunting. The remainder of the book is then devoted to accounts of the individual species, with emphasis on habitats, population densities, food, nesting biology, and behavior.

The text excels in its up-to-date and thorough coverage of the literature. Many of the references are difficult to find in their original form, such as unpublished dissertations and articles in journals not widely available in the United States. In spite of these resources, the result comes closer to a compilation than a synthesis of our knowledge of grouse. This effect is most pronounced in those sections that cover subjects treated in the earlier volume

on the grouse and quail of North America. In many cases, discussion of recent references is simply inserted in the previous text without more than a superficial attempt to integrate the new material with the old.

All monographs of avian families face the pitfalls of encyclopedic treatment. The accumulation and classification of the masses of detail can overwhelm the special characteristics of the subject. In the end this volume does not successfully avoid this pitfall, at least in so far as the text is concerned. The unique features of grouse, such as their extraordinary mating systems and specialized herbivory, fail to emerge from the compilation of facts. Likewise, the contributions that studies of grouse have made to current issues in population biology and animal behavior fail to surface in the detailed comprehensiveness of the treatment.

Perhaps in a work of this sort the text is best taken in small doses. Indeed I found it difficult to persist in reading long passages. But here and there on practically every page one finds some remarkable fact about one or another species of grouse or some hint of a fascinating problem for the future. In leafing forward or backward in search of another tidbit, one encounters the striking photographs and line drawings. It is from these illustrations, rather than the text, that the grouse come alive as the extraordinary creatures they are.—R. Haven Wiley.

63. Life history studies of woodpeckers of eastern North America. L. Kilham. 1983. Nuttall Ornithol. Club Publ. No. 20. vii + 240 p. Frontispiece, 58 figs. $19.00.—When I began studying woodpeckers in earnest nearly 20 years ago, one of the men whose work most inspired me was Lawrence Kilham. Dr. Kilham is one of those rare individuals who successfully leads dual lives: he is an M.D. and a microbiologist by training, and an ornithologist by avocation. Although his studies have never been quantitative and have never involved the use of banded birds, they have been done with such scrutiny and with such insight that they have commanded the respect of the ornithological community and have provided the foundation for numerous thesis and dissertation projects. This volume is a compilation and expansion of Dr. Kilham's 51 articles and notes published over the past 25 years.

Detailed life history information is presented for 8 of the species: Downy (*Picoides pubescens*), Hairy (*P. villosus*), Black-backed (*P. arcticus*), Pileated (*Dryocopus pileatus*), Red-headed (*Melanerpes erythrocephalus*), and Red-bellied woodpeckers (*M. carolinus*), Yellow-bellied Sapsuckers (*Sphyrapicus varius*), and Northern Flickers (*Colaptes auratus*). In addition—and seemingly quite out of place in a volume on woodpeckers of eastern North America—is a chapter on the Crimson-crested (*Campephilus melanoleucos*) and Pale-billed (*C. guatemalensis*) woodpeckers of Central America. Kilham rationalizes the inclusion of these species as surrogates for our Ivory-billed Woodpecker (*C. principalis*).

When contemplating writing the volume, Kilham considered 2 options: (1) doing a comprehensive treatise which would pull together all that is known on each species, or (2) relying primarily on his own work. He opted for the latter. The result is a personal summation of his life's work with woodpeckers, but, of necessity, includes uneven coverage of the various species. The general topics discussed for each species are: winter behavior, foraging ecology, breeding activities, and communication. For some species there is discussion of the behavior of captive birds and an appendix provides some information on care of captive woodpeckers. The many illustrations in the book were skillfully done by Dr. Kilham's wife, Jane. Except for his own work, there is minimal coverage of recent literature. There are few typographical errors, though the reference to "agnostic" behavior of Red-headed Woodpeckers (p. 113) is amusing.

Although I fould the volume very useful and very readable, there are some negative aspects: (1) although Dr. Kilham includes his own publications in the literature cited following each chapter, those publications are not cited in the text; (2) although there are few sentences that are exactly verbatim from his previous publications, a majority of the book consists of paraphrased material from those publications. Similarly, most of the illustrations seem to be from previous publications. Since credit is not given within the text for his previously published material, and figure captions do not credit the previous

publication, it is impossible to identify the new contributions provided in this volume. The major contribution of the volume seems to be "putting it all together."

I highly recommend the book as a handy compilation of Kilham's detailed studies of the behavioral ecology of woodpeckers. The style of writing and the quality of the illustrations make the book quite appropriate for the interested bird-watcher as well as for those who are more research oriented.—J. A. Jackson.

64. The Birds of the Ligonier Valley. R. C. Leberman. 1976. Carnegie Museum of Natural History Special Publication No. 3. Pittsburgh. 67 p. $5.00.—The major purpose of this book is to provide accounts of the arrival, departure, and general habitat preferences of each species occurring annually in the Ligonier Valley of southwestern Pennsylvania. The author has extensive experience banding at the Powdermill Nature Reserve. There are few attempts at discerning or explaining patterns of occurrence or inter-specific relationships. However, the monograph summarizes a great deal of otherwise unavailable information, and will be useful to specialists for that reason.—Jonathan Bart.

65. Owls of Europe. H. Mikkola. 1983. T. & A. D. Poyser Ltd., Town Head House and Buteo Books, Vermillion (South Dakota). 397 p. $40.00.—If you are looking for a book on owls of just Europe you will get more than you bargained for in this book. It treats owls of the Mediterranean area; i.e., Striated Scops Owl (*Otus brucei*), Brown Fish Owl (*Ketupa zeylonensis*), Hume's Owl (*Strix butleri*), and the African Marsh Owl (*Asio capensis*) as well! It is set up in 3 parts with chapters as follows: Part I; special characteristics of owls with chapters on owl's origin, taxonomy, anatomical characteristics, external features, unique aspects of the owl physique, and owl pellets. Part II has species' chapters on the above mentioned species as well as the 13 "true" European species, and Part III (ecological relationships in the European owls) has chapters on sexual dimorphism, interspecific relations among all birds of prey, relationship of the owls with their prey, ecological isolating mechanisms, and the conservation and legal status of European owls. The 17 species' chapters each include sections on: description, in the field [field characters], voice, behavior, food, breeding biology, and distribution. The 69 tables, 75 photographs, 42 figures, and 8 color plates are all of consistently high quality. The color plates, by Ian Willis, show all 17 species in flight and perched, thus the book can serve as a field guide as well. Line drawings by the same artist are found on the title page of each species' chapter. The author brings together a vast array of data from the literature [much of it his own] published in numerous languages, e.g., Finnish, German, and Russian, and his own personal experience and presents it in a very readable style. A disturbing point raised in the text is that there are still countries in Europe where basic conservation measures affording owls protection from shooting are still not enacted or where stronger laws or enforcement are wanting. Specifically, "no protection exists for owls at all" in Egypt, and in East Germany the only owls known to be protected are the Eagle Owl (*Bubo bubo*) and the Pygmy Owl (*Glaucidium passerinum*) although "the picture appears to be incomplete" there. Countries where laws are in place but where enforcement is still weak include Finland [at least insofar as Short-eared Owls (*Asio flammeus*) and Eagle Owls are concerned] and Italy. In Greece all owls are protected "except those within breeding, hunting and wildlife reserves where they are regarded as harmful." In the Netherlands a scheme "whereby 25 Dutch guilders could be paid for instances of successful Barn Owl [*Tyto alba*] breeding in buildings" is being continued. A similar sort of scheme was initiated a number of years ago by the Federation of New York State Bird Clubs for successful nestings of Red-tailed Hawks [=Buzzards] on landowners' property in that state. The landowner was paid $5 if young Red-tailed Hawks were successfully fledged from his property. It was termed a reverse bounty. There are very few typographical errors in this definitive work on the owls of Europe.—Richard J. Clark.

66. Breeding birds of the Baraboo Hills, Wisconsin: Their history, distribution and ecology. M. J. Mossman and K. I. Lange. 1982. Wisconsin Department of Natural Resources and Wisconsin Society for Ornithology, P.O. Box 7921, Madison. 196 p. $8.00.—This book provides a detailed, well-integrated descriptive ecology of the region's avifauna. The study area included approximately 360 km^2 in south central Wisconsin.

The Baraboo Hills rise as much as 150 m above the surrounding terrain, and the deep gorges in these hills attract numerous species normally not found that far south. As a result, the avifauna is particularly rich. During the study, standardized surveys were conducted in 77 locations and numerous other incidental observations were made. Both authors had extensive field experience in the area prior to beginning this study.

Following introductory material and methods, several analyses are presented, of which the first concerns effects of temperature on spring arrival dates. They show that dates of arrival may be speeded up or delayed as much as 2 weeks by unusual temperatures. Song phenologies are presented for 12 species, indicating that even closely related species breeding in the same habitats may differ considerably. For example, the number of Acadian Flycatchers (*Empidonax virescens*) recorded by song reached its maximum value in late May and was fairly constant throughout June and July. In contrast, the number of Least Flycatchers (*E. minimus*) recorded by song declined rapidly during June and by 1 July was less than 20% of its maximum value.

In the next section, 13 habitats and their characteristic bird species are described. They are distinguished successfully using a Bray-Curtis ordination, though I would have liked some assurance that the assumptions of the method were satisfied. Habitat preferences of species in 4 intensively studied gorges are next described. Southern birds tended to prefer southern habitats, and, to a somewhat lesser extent, northern birds preferred northern habitats. Some species deviated from this pattern, however. For example, Least Flycatchers are at the southern limit of their breeding range in the study area, yet they showed a strong preference for southern habitats. The authors suggest that such species may be limited at the edge of their range by physiological factors or competition rather than by lack of preferred habitat. Several other analyses of habitat preferences are presented. Comparative ecology of 6 foraging guilds is described next. The analysis of flycatchers is particularly interesting because all 5 eastern deciduous forest flycatchers occurred together in some of the study areas. The authors conclude that differences in habitat preferences separate most of the species most of the time, but that competition between Acadian and Least flycatchers is important, each species excluding the other in certain situations. This section is followed by a short account of historic changes in the avifauna.

The species accounts occupy a little more than one-third of the book. Preferred habitats, historic trends, and arrival and departure dates are given for each species. Detailed comparisons with other species and with the same species in other parts of its range are provided for many species, and these sections provide some of the most interesting reading in the book. Most of the original data are provided in a series of appendices.

This account is more quantitative and more analytical than most regional or state bird books. It also contains more historical information and more comparisons with the species in other areas. It will be extremely useful to researchers studying the distribution and abundance of North American birds.—Jonathan Bart.

67. Feeding strategy. J. Owen. 1980. University of Chicago Press, Chicago, Ill. 160 p.—This dramatic little book captures the complexity of nature, using food as its central theme. Phenomena as diverse as avian brood parasites, grassland ecosystems, and aquatic filter feeders all have something in common—unyielding individual needs for food, no matter what phyla may be involved. The comprehensive breadth of examples in this book, ranging from protozoa, to aphids, to bats, and shearwaters removes it from the realm of ornithological literature per se. While birds provide a significant subset of examples, they are by no means a dominant component of the book.

Superb photographs make this a visual treat throughout. The text is authoritative, somewhat classical in philosophy, and marred only occasionally by technical errors. Flowerpiercers (*Diglossa*) are erroneously called Hawaiian Honeycreepers, for example (p. 60). Coupled to text discussion of fruit eating by New World orioles (p. 63) is a photograph of an Old World *Oriolus*. A photograph of a perched Sword-billed Hummingbird (p. 57) was inadvertently rotated 90° counterclockwise.

Feeding Strategy is well-written for general audiences at the high school level. It is nontechnical natural history. Some current research results are included, but the text is not encumbered by theory, jargon, or references to the primary literature. The topics

and examples included are well chosen and well balanced. As a whole the book provides a readable overview of familiar natural history and the interactions of plants and animals as they relate to feeding ecology.—Frank B. Gill.

68. Breeding bird atlas of the Peoples Republic of Germany. [Brutuogelatlas der Bundesrepublik Deutschland.] G. Rheinwald. 1982. Dachverband Deutscher Avifaunisten, Bonn. 128 p. DM18. (German)—This publication gives the breeding distribution maps for 1980 and covers West Germany and West Berlin. The census was conducted on a 25 × 25 km grid with very few uncensused locations. A distribution map is given for each species with a confirmed breeding status. A variable-sized dot at each grid location denotes the species' breeding status in that quadrat (possible, probable, positive). The accompanying text for each species gives its distribution in the world, the palearctic, Europe, and Germany. The 1980 census results are compared with the 1975 census. The estimated number of breeding pairs and the species' Red List status (if any) are also provided.—Robert C. Beason.

69. Behavior of fledgling Peregrines. S. K. Sherrod. 1983. The Peregrine Fund, Inc., Ithaca, New York. 202 p. $10.00.—In comparison to the wealth of information about the behavior of nestling birds, one is struck with the relative dearth of information on fledglings. Once they have left the nest, most young birds have apparently been too difficult for ornithologists to study and hence have been largely ignored. Yet, the available information suggests that the period between fledging and independence from parents is an extremely crucial one in a bird's life when much of the behavior that will determine an individual's subsequent fitness is first expressed or learned. Careful behavioral studies of fledgling birds should have great potential for rewards.

Sherrod has carefully studied the behavior of fledgling Peregrine Falcons (*Falco peregrinus*), and this publication is the result of his 6-year doctoral study under Tom Cade at Cornell University. In 10 chapters and 3 appendices he describes the fledging process, the development of behavior that leads to hunting, the relationship between parents and fledglings, and finally the development of self-sufficient hunting.

His approach is largely descriptive, and he focuses primarily on behavior that has to do with the ontogeny of hunting. His subjects are fledglings in 4 broods of normal wild peregrines and in 3 groups of fledglings that were part of The Peregrine Fund's reintroduction program in the eastern United States. Fledglings in the latter groups lacked true parents and were raised by human beings using a modification of the "hacking" technique of falconry.

Because the birds he studied differed with respect to the presence of natural parents, one of Sherrod's major contributions seems to be an assessment of the role of parents in the behavioral development of fledgling peregrines. He found that both normal and "hacked" fledglings became comparable hunters in a similar time period even though the actual sequence of behavioral events leading to independence differed in several respects. His conclusion is that the main role of the parents is to protect the young from predators and to provide food hand-outs while the fledglings' instinctive hunting behavior is expressed and modified by experience. Another important contribution is, of course, his thorough descriptions of peregrine behavior. They will certainly be among the standard references for future work on the ethology of the species.

Most readers who are not already falcophiles will probably not share Sherrod's obvious enthusiasm for fledgling peregrines, and unfortunately the book's style is not likely to win many converts. Conventional wisdom suggests that few doctoral theses should be published without substantial editing, and this dissertation appears not to be an exception. The text is far too expansive for the overall contribution it makes. Over 15% of the text is a recital of excerpts from Sherrod's field notes, and the remainder is often not concisely written. Even though I am very enthusiastic about falcons, I found the text to be somewhat tedious.

This book will probably be of most interest to raptor specialists, but avian ethologists who are interested in post-fledgling behavioral ontogeny will also want to take the time to see what Sherrod has to offer.—Stanley A. Temple.