RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

BANDING AND LONGEVITY

(See also 18, 19, 86, 87)

1. Modelling heron survival using weather data. P. M. North and B. J. Morgan. 1979. *Biometrics*, **35:** 667–681.—Using banding and recovery records the authors derive several models to explain the dependency of survival by Grey Herons (*Ardea cinerea*) upon mean temperatures. Banding and recovery data from the British Trust for Ornithology cannot be analyzed the same way as Brownie et al. (Fish & Wildl. Serv. Resource Publ. No. 131, 1978) analyzed North American banding and recovery records. The models of Brownie et al. cannot be used to develop age- and time-specific survival from birds banded as young-of-the-year. North and Morgan use 20 years of survival data derived from records of herons banded as nestlings and found dead as yearlings or adults. They generate several models under several assumptions and accept or reject each component to end up with a model which, in my opinion, is quite impressive when the maximum likelihood functions are inspected.

It seems that mortality of young herons occurs mostly during the winter after the ponds from which they feed freeze over. At that physical threshold, fish are harder to obtain and 65% of the young, inexperienced (<2 years old) birds die. Adults experience a constant, high survival rate (≈60%; Poisson adjusted) for about a decade once they have passed their second winter.—Richard M. Zammuto.

2. Aspects of the life cycle of the Bewick's Swan, based on recognition of individuals at a wintering site. M. E. Evans. 1979. *Bird Study*, **26**(3): 149–162.— Bewick's Swans (*Cygnus columbianus bewickii*) were observed in southern England during 15 consecutive winters, and individuals were identified by their bill markings or leg bands. These observations provide many useful inferences about population structure, association of offspring with parents during their second and subsequent winters, age of birds at the time of their first pairing, duration of the pair and occurrence of divorce (never observed) and remating (57% found new mates in the same year), breeding success of individuals and of the population as a whole, and annual rates of survival for adult birds (at least 87%). These are valuable data, most of which could not have been obtained in a shorter-term study.—Scott R. Robinson.

3. Annual report to banders: summary of birds banded in Canada in 1977. R. M. Poulin, K. L. Newell, S. J. O'Donnell and S. Wendt. 1979. Can. Wildl. Serv. Prog. Note, 102, 18 p.—This is the first annual report on Canadian bird-banding. It lists the number of individuals of each species banded in each province and territory during 1977. Canadians banded 238,264 birds of 301 species, an average of 1,610 birds for each active Master permit holder. Of the 238,264, 54% were anatids, 31% passerines, 11.4% other shore and water birds, and 3.4% raptors. Species banded most often were: Mallard (*Anas platyrhynchos*) (38,377), Snow Goose (*Chen hyperborea*) (31,610), Blue-winged Teal (*Anas discors*) (16,581), and Canada Goose (*Branta canadensis*) (13,118). A total of 28,294 birds were banded at the Prince Edward and Long Point Bird Observatories, the two locations with the most bandings in the country. About 75% of the 301 species and 38% of the bandings occurred in Ontario where 45% of the banders reside. The Canadian Wildlife Service plans on producing subsequent annual banding reports in ensuing years.—Richard M. Zammuto.

MIGRATION, ORIENTATION, AND HOMING

(See also 50, 58)

4. The three-dimensional structure of airborne bird flocks. P. F. Major and L. M. Dill. 1978. *Behav. Ecol. Sociobiol.*, **4:** 111–122.—The three-dimensional structure of Dunlin (*Calidris alpina*) and Starling (*Sturnus vulgaris*) flocks was studied by photographic/photogrammetric methods. The three-coordinate position of birds in flocks was determined from stereoscopic pairs of simultaneously copied photographs. Flock densities were calculated based on nearest neighbor distances. Flight speeds were obtained from high-speed super-8 movie and 35-mm still camera serial photographs. Much of the paper is a valuable assessment of the stereoscopic camera technique. The authors point out similarities in both structure and behavior of fish schools and bird flocks.—Frank R. Moore.

5. **The magnetic compass of Blackcaps (*Sylvia atricapilla*).** W. Viehmann. 1979. *Behaviour,* **68:** 24–30.—The experiments described here repeated some of the basic Wiltschko procedures on a previously untested species, one known from the work of the Sauers to exhibit stellar orientation. Birds caught in autumn in Frankfurt were tested in closed rooms at night under diffuse light (0.01 lux). The autumn mean of means under the natural magnetic field was toward SSW, but with great spread. Under a reversed field (magnetic N = 180°, +67° inclination), a significant NW mean was obtained. Under the natural magnetic field in spring, directions were very spread but yielded a significant NNE direction. The most important data came from a test of the Wiltschko and Wiltschko model of the magnetic compass, the only one published since the original paper. In fall under a normal intensity field with magnetic N = 350°, but with the vertical component reversed (−60° inclination), the significant mean direction was toward magnetic NNE as predicted by the model. In another fall test, mean directions were not oriented under a magnetic field of reduced intensity (0.34 Gauss).—Kenneth P. Able.

6. **Figs as a food source of migrating Garden Warblers in southern Portugal.** D. K. Thomas. 1979. *Bird Study,* **26:** 187–191. —Some Garden Warblers (*Sylvia borin*) eat figs prior to their trans-Saharan migration, whereas others do not. Fig-eaters are significantly heavier than nonfig-eaters, and the author concludes that warblers are choosing figs as a means of premigratory fattening. However, I wonder how much of the weight difference is due to a temporary retention of water (figs are 82% water), if these apparent individual differences in food habits are maintained throughout migration, and if fig-eaters are more successful migrators than nonfig-eaters.—Scott R. Robinson.

7. **Avian orientation and navigation: a brief overview.** W. T. Keeton. 1979. *British Birds,* **72**(10): 451–470.—This invited review paper is a shortened and slightly altered version of a paper to be published in the *Proceedings of the XVII International Ornithological Congress,* Berlin. Professor Keeton's review includes discussion of the familiar and the unusual in orientational and navigational systems of birds. The sun and the stars are used by birds as compasses, although the way birds read the star compass is fundamentally different from the way they read the sun compass. In addition, abundant evidence now exists to suggest that neither is essential for proper orientation, that, in fact, avian orientation systems include redundant, or back up, cues. Among the unusual sensory capabilities of birds that he discusses are detection of magnetic fields, gravity variation, barometric pressure, infrasound, and polarized light. The final section of the paper reviews the experimental work designed to differentiate how the cues are integrated and what constraints there are on the flexibility of avian navigation systems. This paper fulfills its goal of providing readers entrée into the field and literature of avian navigation systems. I suspect that almost all significant contributions to the field are included. I recommend this paper for those who wish a review or an introduction to the questions and methods of the field.—Patricia A. Gowaty.

8. **A critique of theories of biological effects of magnetic fields.** (Kriticheskie zamechaniya o o teoreticheskikh obosnovaniyakh biologicheskikh effektov magnitnogo polya.) V. Aristarkhov. 1979. *Izvest. Akad. Nauk, SSSR, Seriya Biol.,* **1979**(1): 122–124. (In Russian.) —Two principal hypotheses have been advanced: (1) diffusion oriented effects of magnetic fields on "diamagnetic polymer" substances, and (2) kinetic effects on biochemical reactions with free radicals involved (see review **10**). This account points out certain errors in published conclusions. The significance and consequences are pointed up in a *Reader's Digest* article: **The Menace of Electric Smog** (1980). New approaches are suggested for analysis of the biophysical effects of human-originated effects on magnetic fields. New theoretical suggestions and more experiments are invited.—Leon Kelso.

9. **Soaring migration of the Common Crane (*Grus grus*) observed by radar and from an aircraft.** C. J. Pennycuick, T. Alerstam, and B. Larsson. 1979. *Ornis Scand.,* **10:** 241–251.—Tracking radar and a small airplane were used to measure flight speed and soaring dynamics of the Common Crane (*Grus grus*) during spring migration in Sweden. Thermal soaring behavior was used when lift was available. The soaring behavior differed from that of strictly soaring birds by incorporation of varying amounts of flapping during interthermal glides. Flapping between thermals reduces sink rate, while increasing glide speed. Measured interthermal speeds were higher than optimal soaring theory predicted, yet slower than powered maximum range speed predicted from flight power curves. Thus, migration using thermal lift followed by a partially powered glide is a compromise between fast, energetically costly powered flight and slower, energetically efficient, glide-and-soar migratory flight. The adaptive value of this option in large, long-distance migrants is discussed in a section on the evolution of soaring migration. Although this paper suffers from a paucity of data, it is a good example of the difficulty in studying in-flight migratory behavior and that the simultaneous use of differing technologies is often needed to study this type of behavior.—Paul Kerlinger.

10. **Pigeons have magnets.** C. Walcott, J. L. Gould, and J. L. Kirschvink. 1979. *Science,* **205:** 1027–1029.—From the first suggestion that birds might use the earth's magnetic field for orientation, much discussion has centered on how the field might be sensed. Indeed, the early presumption that birds must perceive the magnetic field via a voltage gradient or current induced as the body passed through the field presented severe theoretical obstacles (the limitations are much less in water where sharks and other fish utilize that mechanism). The recent discovery that bees contain minute quantities of magnetite led directly to this work on pigeons. Using the same SQUID magnetometer, progressively smaller pieces of pigeon head and neck were examined. Magnetic remanence was found and localized in a small area between the dura and the skull in the anterior dorsal portion of the head. Contrary to the paper, the tissue seems to be medial (Walcott, pers. comm.). The magnetic material was determined to be magnetite and the structure appeared to be innervated. The crystal size and magnitude of inducible remanence implied that approximately 10^7 to 10^8 single domain magnets are present. Whether or how this structure mediates magnetic compass orientation remains unknown, but work is continuing and this in no way detracts from the excitement generated by this glamorous piece of research. Some reports in the popular press notwithstanding, this discovery was made by Walcott et al. and this paper constitutes its first official presentation to the scientific community.—Kenneth P. Able.

11. **Speeds of migrating waders Charadriidae.** H. Noer. 1979. *Dansk. Orn. Foren. Tidsskr.,* **73:** 215–224.—Two observers using walkie-talkies and stopwatches timed the passage of migrating flocks of shorebirds along a 500–525-m baseline. An interesting, if enigmatic, result emerged. Oystercatchers (*Haematopus ostralegus*), Red Knots (*Calidris canutus*), and Dunlins (*C. alpina*) in single species flocks flew significantly faster as flock size increased. For example, straight lines fitted to the data showed that on one day, single Dunlins flew an average of 46 km/hr whereas flocks of 60 averaged nearly 60 km/hr. The other two species showed similar trends although the Oystercatchers were not consistent from day to day. The explanation for this is not obvious. The relationship between ground speed and flock size was apparently not a function of wind direction, and I doubt that it can be accounted for by the aerodynamic advantage of flocked flight (of these species, only the Oystercatcher flies in V-formations). Imposed upon these speed changes, the birds increased air speed as the headwind component increased, a relationship now reported for a number of passerine migrants. Because all these observations were made on flocks flying very near the ground where the wind could be monitored frequently, there is no reason to think that the results were subject to artifact.—Kenneth P. Able.

12. **Observations on probable primary orientation of nocturnal migrants with the help of first and last twilight points.** (Beobachtungen über wahrscheinliche Primäre Orientierung von Nachtziehern mit Hilfe des ersten und letzten Dämmerungspunktes.) D. A. Vleugel. 1979. *Vogelwarte,* **30**(1): 65–68.—Casual observations by the author suggest

that nocturnal birds may orient by the position of the setting sun. No recent references on the more systematic work on this problem in North America are cited.—R. B. Payne.

POPULATION DYNAMICS

(See also 1, 2, 18, 19, 21, 74, 86, 87, 89)

13. Long-term changes in the bird community of farmland in Åland, SW Finland. Y. Haila, O. Järvinen, and R. A. Väisänen. 1979. *Ann. Zool. Fenn.*, **16:** 23–27.—The relative densities of most avian species breeding on farmlands in Åland have remained unchanged since the 1920's (see review **15**). Among those species that have changed, the population of Ortolan Buntings (*Emberiza hortulana*) has decreased catastrophically, possibly because of changes in its winter habitat. Reduced grazing has resulted in the growth of bushes and small trees in former pastures and a subsequent decline in the population of Wheatears (*Oenanthe oenanthe*) in Åland and throughout Europe. Linnets (*Acanthis cannabina*) have become somewhat less common in recent years. However, Starlings (*Sturnus vulgaris*) have become more common. Comparison of present estimates with earlier less accurate estimates are difficult. Nonetheless, drawing confidence limits by eye seems unjustified especially when they add nothing to the interpretation. Absolute densities would have been informative in addition to the relative densities. I am uncomfortable when asked to accept conclusions in the absence of the original data.—Edward H. Burtt, Jr.

14. Avian population dynamics in territories adjacent to the Baltic Sea in 1960–1976. (Dinamika chislennosti ptits pribaltiiskikh populyatsii v 1960–1976.) V. Dolnik and V. Paevskii. 1979. *Ekologiya,* **1979**(4): 59–69. (In Russian.)—Standard traps were operated on the Baltic Courish Spit from April to November for 17 years. Forty-one species were trapped. Fluctuations in the number of residents and transients trapped coincided with fluctuations in other European countries . Detailed analyses of variations at various trophic levels and biotopes gave no clear evidence of contamination by pesticides. All population fluctuations coincided with cyclic trends of 5 to 17 or more years.—Leon Kelso.

15. Long-term population changes of the most abundant south Finnish forest birds during the past 50 years. O. Järvinen and R. A. Väisänen. 1978. *J. Ornithol.,* **119:** 441–449.—The population size of most (72.5%) of the species sampled on the mainland increased from 1926 to 1977. Ten percent decreased, and the remainder showed irregular fluctuations. Most of the changes are attributed to changes in the composition of the Finnish forest: a decrease in mature stands, and an increase in the amount of edge habitat (see review **13**).—Robert C. Beason.

16. An account of a small population of Hawfinches. L. von Haartman. 1978. *Ornis Fenn.,* **55**(3): 132–133. (In English with English summary.)—One of the rarest breeders in Finland, the Hawfinch (*Coccothraustes coccothraustes*) was observed at Lemsjoholm for 15 years. The Hawfinch nested only when and where elm seeds were abundant, especially in 1976 and 1978. This followed upon extremely cold winters. It seems that the food situation rather than the severity of winters is decisive in the breeding of Hawfinches. Being known as a partial, or short-distance migrant, the species is presumably well conditioned to cold. Here is another instance of rarity, decline, and transience in a granivorous species.—Leon Kelso.

NESTING AND REPRODUCTION

(See also 24, 27, 51, 61, 62, 65, 73, 74, 86, 87, 89)

17. Two models for the evolution of polygyny. S. A. Altmann, S. S. Wagner, and S. Lenington. 1977. *Behav. Ecol. Sociobiol.,* **2:** 397–410.—Avian biologists have contributed substantially to our understanding of the evolution of mating systems. Certainly one of the better known efforts to explain the evolution of polygyny is the Orians-Verner model (see Orians, *Am. Nat.,* **103**: 589–603, 1969). Succinctly, if reproductive success increases with increasing quality of the male's territory and if individual male territories vary sufficiently in quality, it may be more advantageous for a female to mate bigamously than become the only partner of a male on a poorer territory.

The authors do us a service by making explicit the various assumptions of the Orians-Verner model, formulating the model in mathematical terms, and examining certain implications. They draw attention to an important assumption of the model, namely that the addition of more females to a harem intensifies competition for limited resources of the harem and reduces the fitness of those females already present. Hence, the authors regard the Orians-Verner model as a competitive female choice model. What if the addition of another female *improves* the fitness of all females in the harem (within limits) rather than reduces fitness? It is not unreasonable to expect certain advantages to accrue from group living. The authors provide a sufficient set of assumptions for this alternative, cooperative female choice model.—Frank R. Moore.

18. Annual turnover in a Belgian population of Marsh Warblers, *Acrocephalus palustris*. F. Dowsett-Lemaire. 1978. *Le Gerfaut,* **68:** 519–532.—Marsh Warblers were studied in a dense population; between 10.6 and 13.6 pairs/ha were followed in an area for four years. Few young (two, both males, out of 244 nestlings) banded as young returned to breed. Among adults, only 26.0% of breeding males and 17.4% of breeding females returned in successive years. This rate of return is almost certainly lower than the annual survival, because with an average local yearly productivity of 2.5 to 3 fledglings per pair, the population could not maintain its numbers with such a high mortality rate. A few Marsh Warblers banded in the study population as adults also bred in other years at some distances (5, 21, and 28 km).

Marsh Warblers imitate the songs of many other species of local birds and also the songs of African birds heard when they migrate to and winter in Africa. Because young do not leave their birthplace and disperse within Europe until late July and early August, they may hear only the local songs of the European birds near their birthplace. About half of the local Marsh Warblers imitated the species typical of their site, and also the local dialectal variant of the flight song of the Stonechat. One such mimic was banded as a dependent juvenile 5 km north of the study area. As the extent of the Stonechat dialect is not known, it could not be determined from how local an area the breeding Marsh Warblers may have come. Although the analysis of mimetic song suggested that about half of the breeding birds came from habitat similar to the local breeding site, the results suggest that nearly all breeding birds immigrated there from outside the study area.

Marsh Warblers have extended their breeding range northwards into Scandinavia in the last few decades, and the low local return of adults and young is consistent with dispersal into new areas and colonization of new habitats. The patchy distribution of Marsh Warblers suggests that dispersing birds are attracted to the older adults and settle there, at least until the habitat is saturated.—R. B. Payne.

19. Fifteen years of observation of reproduction in a forest population of Tawny Owls. (Quinze années d'observations sur la reproduction d'une population forestière de chouettes hulottes (*Strix aluco*).) E. Delmée, P. Dachy, and P. Simon. 1978. *Le Gerfaut,* **68:** 590–650.—Banded Tawny Owls (*Strix aluco*) were studied using nest boxes in a local population in southern Belgium. Owls use the same breeding site and remain paired for life, the survivor remaining and remating at the same site. Breeding activity, particularly the proportion of birds breeding and clutch size, varies with the year, especially with the vole population. Unfortunately the authors do not include their data on mammalian populations in this paper, but cite a manuscript in preparation, so it is impossible to compare their results on owl response to prey density with those by H. N. Southern in Britain.

Incubation begins with the first egg, and the brood may hatch staggered over a week, with the smallest young starving or being cannibalized when the food supply is short. The female remains with the young for the first 15 days, then leaves the nest box but like the male remains in the area. Loss of young in the nest was low (6%), but young once fledged have a high mortality (58%) during the first year. This figure may overestimate mortality because some owls disperse from the study area. Of 92 Belgian owls banded as young and recaptured, 76 were less than 10 km from the nest, but 14 dispersed from 10 to 30 km, and two others were recovered at 53 km and 450 km.

The population of adults remained stable, but, taking into account the known banded females, the average female laid only two years out of three. Some owls breed when a year old. Adults have a low mortality; the average age of 12 females was more than 11 years.—R. B. Payne.

20. Predation on Sooty Terns at Raoul Island by rats and cats. R. H. Taylor. 1979. *Notornis,* **26:** 199–202.—In 1967 the Sooty Tern (*Sterna fuscata*) population at Raoul Island, in the Kermadecs, comprised 80,000 pairs. Mortality of chicks (from cats) and eggs (from rats) approximated 77.5%. Some evidence from 1978 indicates that exceptionally high mortality rates persist and that the population may be declining. A good, though brief, discussion is included for mortality of Sooty Terns in other colonies.—J. R. Jehl, Jr.

21. The social structure, breeding and population dynamics of Paradise Shelduck in the Gisborne-East Coast district. M. Williams. *Notornis,* **26:** 213–272.—The Paradise Shelduck (*Tadorna variegata*) is an endemic New Zealand anatid that has prospered with the conversion of forest to pasture. Williams studied the biology of this species for four years on North Island and presents comprehensive data on its life history and behavior. On North Island the shelduck prefers to nest on hillsides or in relatively flat areas, where the visibility is unrestricted. Most males start breeding at age two, whereas half of the females delay until age three. Territories are reclaimed each year and a high degree of fidelity to nest sites exists. The mean clutch is 9.4; incubation requires 32–33 days and is by the female only. Cold, wet weather is a major cause of duckling mortality. Preliminary data from South Island indicate that the biology of that population may differ significantly from the population reported on here. This excellent paper will be useful to anyone interested in waterfowl.—J. R. Jehl, Jr.

22. Brooding of young ducklings by female eiders *Somateria mollissima*. V. Mendenhall. 1979. *Ornis Scand.,* **10**(1): 94–99.—Through field observations of eider creches in Scotland, activity budgets of chicks were used to determine brooding requirements and efficiencies. Total time spent sleeping by chicks did not vary from good to poor weather conditions but time spent feeding increased significantly in poor weather. The increase in feeding occurred at low tide and was compensated by more sleeping at higher tides. Sleeping chicks less than one week of age were brooded, except in favorable weather. These data contrast with those for the Mallard, in which an inverse relationship between brooding time and feeding time has been shown. Apparently eider chicks are able to thermoregulate more efficiently than Mallards under cold conditions.

The ratio of chicks to adult females in creches varied widely from 0.33 to 35. Less than 5% of the chicks observed, however, were subject to a chick–adult ratio of greater than 10 to 1, 10 being the maximum number of chicks that can be effectively brooded. Chicks in this category probably experience thermal stress, but the anti-predator benefits of creching are believed to counterbalance this minor disadvantage. No direct evidence of thermal stress or chick mortality is presented.—Marshall A. Howe.

23. Development of nestlings from different populations of the same species: investigations of Garden Warblers (*Sylvia borin*) from southern Finland and southwestern Germany. (Steuerung der Jugendentwicklung bei verschiedenen Populationen derselben Art: Untersuchungen an südfinnischen und südwestdeutschen Gartengrasmucken *Sylvia borin.*) P. Berthold. 1977. *Vogelwarte,* **29**(1): 38–44.—To test the hypothesis that differences in the development of Garden Warblers in Finland and southwest Germany are caused by local differences in photoperiod, Berthold raised and kept young birds from each area on different local photoperiod regimes. Differences in developmental pattern of the young examined were in growth rate, time of the postjuvenal molt, the time of premigratory fat deposition, and the time of migratory restlessness. The typical age-related differences were maintained according to the population of origin, and were not shifted by photoperiod. The results suggest that these population-specific characteristics result from local genetic differences and not from immediate environmental differences. It will, however, be more difficult to test directly the hypothesis of causal genetic differences between populations. This study is remarkable in being one of the very few experimental studies of local phenotypic differences in birds outside of studies of song.—R. B. Payne.

BEHAVIOR

(See also 22, 36, 38, 39, 79, 81, 83, 86, 87, 89)

24. Do Savannah Sparrows commit the Concorde fallacy? P. J. Weatherhead. 1979. *Behav. Ecol. Sociobiol.,* **5:** 373–381.—Parental investment is defined as any activity increasing the probability of producing offspring that live to reproduce at a cost ultimately measured in terms of decreased ability to invest in future offspring. How much to invest (or whether to invest at all) should be determined by expected returns (future reproductive success) rather than the amount invested (see Dawkins and Carlisle, *Nature,* **262:** 131–133, 1976; Boucher, *Am. Nat.,* **111:** 786–788, 1977). To do otherwise is to commit the so-called "Concorde Fallacy"—letting monies already spent on a project justify continued expenditure.

Weatherhead attempts to evaluate the relative importance of past investment and future reproductive prospects in shaping the nest defense behavior of a tundra population of Savannah Sparrows (*Passerculus sandwichensis*). If future expectations and their associated costs relative to continued investment in current offspring are as important as predicted, then the renesting potential of parent Savannah Sparrows should have an impact on nest defense behavior. As renesting potential approaches zero, the strength of response to a threatening situation should increase to a maximum. Two measures of defensive behavior were scored: (1) distance from the nest by parents when the nest was threatened by proximity of a human observer and (2) number of alarm calls by parents when the nest was threatened. Weatherhead found that the change in renesting potential within a breeding season had little influence on either distance from the nest or number of alarm calls. Rather, he discovered that nest defense behavior differed markedly between sexes and closely reflected past investment. The author provides an interesting discussion of his results relative to current P.I. theory and raises an important question. How, in a proximate sense, does an animal assess expected costs and benefits? This may be particularly problematic when the factors used to assess costs and benefits vary in an unpredictable fashion. Possibly the Savannah Sparrows he studied rely on feedback from past investment: the more an individual invests, the greater the expected returns. Weatherhead suggests that if this is so, the degree to which parental investment behavior (e.g., nest defense) deviates from that predicted by past investment will be positively correlated with the predictability of future events.—Frank R. Moore.

25. Functions of Dipper roosts. G. Shaw. 1979. *Bird Study,* **26**(3): 171–178.—Dippers (*Cinclus cinclus*) often roost in bridges on cold winter nights, with different individuals occupying separate cavities in the bridge. All bridges containing suitable cavities are used as roosts, and nearly every bird uses the bridge nearest to its daily feeding area. More Dippers come to roosts when the weather turns especially cold or windy, probably because the cavities provide shelter and a consequent saving in energy. Because Dippers are solitary hunters and interact little at the roost, they appear to be drawn to roosts based on the limited availability of shelter rather than the presence of other Dippers.—Scott R. Robinson.

26. Interactions between House Sparrows and Sparrowhawks. C. J. Barnard. 1979. *Brit. Birds,* **72**(12): 569–573.—This anecdotal report of four unsuccessful attacks on House Sparrows (*Passer domesticus*) by Sparrowhawks (*Accipiter nisus*) compares the efficiency of hunting by a juvenile Sparrowhawk and three adult females. Although none of the attacks was successful, the attacks by adults were judged more effective than attacks by the juvenile and "seemed to depend on a rapid flick over the top of a hedge" near which the House Sparrows were feeding and in which they took cover. The juvenile Sparrowhawk made five further strikes after failure of the first in contrast to the adults which left immediately after an unsuccessful first attack. The persistence of the juvenile can be explained by hunger or deceptive prey availability. The House Sparrows remained steadfastly in the hedge when under severe danger of attack by Sparrowhawks, a strategy that probably also minimizes the cost of predator avoidance. This brief and anecdotal report is distinguished by relevant comparisons and speculation against hypotheses.—Patricia A. Gowaty.

27. Aggression, superterritories, and reproductive success in tree swallows. R. N. Harris. 1979. *Can. J. Zool.*, **57**(10): 2072–2078. —Aggressive defense of a territory larger than that needed for the successful rearing of an animal's own offspring, i.e., a superterritory, can be selectively advantageous if such behavior prevents other conspecifics from breeding and contributing to the future gene pool. Conversely, such defense of a superterritory can be disadvantageous if frequent aggressive encounters cause the animal to neglect its own young. By manipulating the distance between nest boxes for Tree Swallows (*Iridoprocne bicolor*) breeding on Kent Island, Harris was able to achieve conditions under which the birds defended superterritories. He found no evidence of aggressive neglect. No significant correlations existed between aggression rate and feeding rate, percentage of young fledged, growth curve constants, or fledgling weights. Apparently preventing other birds from nesting in nearby nest boxes is an adaptive behavior in Tree Swallows.—A. John Gatz, Jr.

28. Agonistic and spacing behaviour of the Noisy Miner *Manorina melanocephala*, a communally breeding Honeyeater. D. D. Dow. 1979. *Ibis*, **121:** 423–436.—A complex social system is described for the Noisy Miner, a highly aggressive Australian honeyeater living year-round in colonies numbering approximately 50–65 individuals. "Activity spaces" of males overlap extensively among individuals living closely together in contrast to those of females that live at widely spaced intervals. Males temporarily join "coteries," groups with fairly constant membership, or "coalitions" which vary in membership over time and space. The functions of such groups are not well documented by observational or experimental evidence although intraspecific aggression is postulated to be reduced among members of a coterie. A few observations are briefly made indicating that the social system of this species could be a valuable tool for addressing questions ranging far beyond the scope of this paper. Several males appear to feed the offspring of a single female. It would be interesting for application to current evolutionary theories to know the degree of genetic relatedness among the males themselves, their genetic relation to the female, and the probability that one or more of the males had fathered the offspring. Second, mortality appears to be exceptionally high in the nestlings: no more than 10% of the young fledged. The causes of such mortality and the implications for population regulation and the function of this social system would be interesting to examine. Finally, the author states that the size of the colony probably precludes individual recognition of many fellow members. A cursory review of the literature indicates little information not only regarding the abilities of colonial birds to recognize individuals other than mates and offspring but also the maximal number of individuals that can be recognized and remembered by one bird for a given breeding season or longer. I hope that this paper will stimulate further research on these birds.—Cynthia Carey.

29. Studies of mobbing behaviour abound. M. D. Shalter. 1978. *J. Ornithol.*, **119:** 462–463.—The author presents references on mobbing behavior to counter Barash's (*Condor*, **78:** 120, 1976) claim to have conducted the first replicable quantitative study on the mobbing response of free-living birds.—Robert C. Beason.

30. Social behaviour of the Great Snipe *Capella media* at the arena display. P. A. Lemnell. 1978. *Ornis Scand.*, 9(2): 146–163.—This is a descriptive account of nine years of observations on one of the most poorly known of the lek species of birds. The Great Snipe has a greatly reduced range in western Europe—now found only in the subalpine bogs of Scandinavia. It is unusual among lek species in being sexually monomorphic, a feature that correlates with its nocturnal habits. Males arrive on the lek in open hummocky bogs at dusk and begin displaying on territories that average 120 m^2. Three display peaks occur during the night. Much aggression, mostly ritualized, follows between males on the arena. Female-attracting displays include "drumming" (producing a sound likely of tracheal origin) and "flutter-leaping." Lemnell made very few observations of females entering the arena, but these are the only such observations available. Males trespass onto territories in which a female is present and the territorial system seems to break down at such times. Very small sample sizes suggest the possibility that a small number of older males performs the majority of copulations, as in other lek species that have been studied in detail. Non-territorial males make appearances, but there appears to be no true behavioral dimorphism in males, as there is in Ruffs.

Accumulating meaningful data on a nocturnal species like the Great Snipe must be a frustrating endeavor. This paper provides important new information and must be considered a major contribution to our understanding of this species' social system.—Marshall A. Howe.

31. The effects of reduction of feeding space on the behaviour of captive starlings *Sturnus vulgaris*. 1979. *Ornis Scand.,* **10** (1): 42–47.—Stimulated by observations in the wild that indicated an inverse U relationship between feeding rate and numbers of starlings, the authors established a captive flock of 4 male and 7 female starlings. Using a constant amount of food, feeding trials involving feeding troughs of three different sizes were conducted to determine the effects of crowding on feeding rates and aggressive interactions. Careful analysis of the behavior of individuals recorded on film permitted detailed, stepwise regressions of many factors on feeding rates. Neither body weights nor feeding rates varied as a function of trough size. A fairly linear dominance hierarchy emerged and frequency of aggressive encounters increased with decreasing trough size. The hierarchy was independent of weight and sex, but both dominant birds and males had overall higher feeding rates than subordinates and females respectively. Feeding rates increased as a function of nearest neighbor feeding rate and number of birds present. The inverted U relationship could not be duplicated in these trials; the authors interpreted this as a probable failure to restrict feeding space to a sufficient degree to produce enough interference competition. Increased anti-predator vigiliance is invoked to explain decreased feeding rate at low densities.—Marshall A. Howe.

32. On the photoperiodic synchronization of circannual rhythms in warblers (*Sylvia*). (Über die photoperiodische Synchronisation circannualer Rhythmen bei Grasmücken (*Sylvia*).) P. Berthold. 1979. *Vogelwarte,* **30**(1): 7–10.—Garden (*S. borin*) and Sardinian warblers (*S. melanocephala*) were monitored on a six-month cycle in contrast to the normal 12-month cycle. Birds shifted the timing of their nocturnal restlessness by doubling the normal number of active periods. Body weight, presumably indicating fat deposition, did not show the same cycle as nocturnal restlessness, but rather increased only once per photocycle, in the artificial autumns. Garden Warblers molted twice per cycle, Sardinian Warblers only once per cycle. The timing of nocturnal restlessness was in phase in the two species. Berthold concludes that these events in nature normally follow an internal circannual rhythm, that the lack of association of the behavioral and physiological cycles suggest that they are controlled independently, and that the events occurred rather late in the experimental birds thus being in "agreement with predictions derived from general oscillator theory." The paper includes no statistical analysis of the data, the nocturnal activity appears to be summed for all birds rather than being analyzed for each individual, and no control group of birds was kept on a normal photocycle.—R. B. Payne.

ECOLOGY

(See also 41, 74, 77, 86, 87)

33. Interactions between Snowy and Short-eared Owls in winter. M. R. Lein and P. C. Boxall. 1979. *Can. Field-Nat.,* **93:** 411–414.—Snowy Owls (*Nyctea scandiaca*) inhabit much of the northern range of the Short-eared Owl (*Asio flammeus*). However, Lien's observations suggest that the two species are not competitors, except for occasional kleptoparasitism by Snowy Owls on the smaller Short-eared Owls. —Edward H. Burtt, Jr.

34. Selectivity of avian predation in declining populations of the vole *Microtus townsendii*. T. D. Beacham. 1979. *Can. J. Zool.,* **57**(9): 1767–1772.—Do avian predators have an impact on the downward phase of vole population cycles, and, if so, do these avian predators show selectivity relative to size and sex of prey? Beacham attempts to answer this dual question with the results of a descriptive study of a population of ear-tagged voles. The primary avian predators were the Great Blue Heron (*Ardea herodias*) and the Marsh Hawk (*Circus cyaneus*) although several species of owls were also seen. Predation data were gathered by examination of pellets for the ear tags. Results indicated that the intensity of avian predation was directly proportional to the population size of voles, males were preferred to females as prey, and small voles were more likely to be eaten than large voles. Although these latter selectivities tend to parallel results from similar studies of predation on voles by both birds and mammals, the results on predation intensities reported here for birds are different from those in studies of mammalian predators. Whereas relatively non-mobile mammals continue to prey on voles in the downward phase of their population cycle, the avian predators studied here apparently leave areas with low densities of voles and seek alternative food sources. However, as Beacham points out, with only 3 to 15% of disappearing voles accounted for by tags recovered in avian pellets, the full story of predation on voles is far from known. Avian predation may actually be much higher if significant numbers of pellets were never found, or it may truly constitute a rather minor cause of mortality in voles.—A. John Gatz, Jr.

35. Distribution of summer birds along a forest moisture gradient in an Ozark watershed. K. G. Smith. 1977. *Ecology,* **58:** 810–819.—Singing males of eight avian species were studied on adjacent moist and dry Ozark slopes. Principal component analysis indicated that moisture gradient variables were important in separating respective species habitats. Independent measurement of the moisture gradient was used to ordinate species using linear discriminant analysis. Hooded Warblers (*Wilsonia citrina*), Ovenbirds (*Seiurus aurocapillus*), and Acadian Flycatchers (*Empidonax virescens*) were found to be "obligatory" moist forest species. Downy Woodpeckers (*Picoides pubescens*) and Tufted Titmice (*Parus bicolor*) were found in dry forest areas. White-breasted Nuthatch (*Sitta carolinensis*), Blue-gray Gnatcatcher (*Polioptila caerulea*), and Red-eyed Vireo (*Vireo olivaceus*) habitats were intermediate on the moisture gradient. All species except the Tufted Titmouse were found more often in moist forest areas; the titmice were found equally in both forest types. Dry post-oak habitats were occupied by relatively fewer species of birds. Smith proposes that this may be due to the recent origin of this community since the disappearance of extensive prairies in the area.

This multivariate study shows general trends in species distributions but still leaves unexplained the mechanisms for habitat selection. Supposedly the moisture gradient reflects actual requirements of the species such as food or nest sites in different microhabitats.—Doris J. Watt.

36. Structure and foraging patterns of flocks of Tits and associated species in an English woodland during the winter. D. H. Morse. 1978. *Ibis,* **120:** 298–312. —This paper analyzes the structure of flocks of small, insectivorous birds in England in an attempt to discern the relative importance of the advantages of foraging efficiency and predator-avoidance in selecting for flocking behavior. The 5–6 most common species appear to forage on specific areas of limbs, trunks, and twigs, therefore avoiding some competition for food resources. Close contact with the most dominant species, the Great Tit (*Parus major*) was avoided by the other species, but many species tended to congregate more closely around Blue Tits (*Parus caeruleus*) when they were present. The author hypothesized that the advantages of flocking in these birds may be more related to foraging efficiency, whereas flocking in North American *Parus* involving fewer numbers of species may be more related to predator-avoidance.—Cynthia Carey.

37. Comparisons among populations of hawks of the coastal plains of Mexico and the Ivory Coast. (Comparisons entre les peuplements de Falconiformes des plaines côtières du Mexique et de Côte d'Ivoire.) J. M. Thiollay. 1978. *Le Gerfaut,* **68**(2): 139–162.—The abundance and diversities of diurnal raptors were compared during the breeding season in Mexico (Tabasco and Vera Cruz) and in the Ivory Coast (coastal area near Abidjan and Lamto). Several open habitats were compared between the New and Old World. Densities, numbers of species, habitat range and range of foods of each species, and even the breeding success were very similar in the two areas. Niche breadths were estimated by comparing the numbers of individuals of each species in each habitat as entries in an entropy measure H′ of species diversity and in an evenness measure J. This approach seems reasonable because the number and abundances of species were so similar. By these measures, species diversities are quite similar in the two areas. It is less expected that diversities were so similar among the different habitats within each area. The New and Old Worlds differed mainly in the additional numbers of nonbreeding winter visitors—the African area had more visitors. Vultures were more important in Mexico—West Africa has fewer resident vultures compared to other parts of Africa; the reasons are not at all clear. There seem to be more habitat specialists in Mexico with aquatic raptors in Africa also feeding in forest edges and in savannas. Winters are cooler in Mexico and this is probably responsible for bird and mammal predators being more numerous there, whereas insectivorous predators are more numerous in the Ivory Coast.—R. B. Payne.

38. Search image formation in the Blue Jay (*Cyanocitta cristata*). A. T. Pietrewicz and A. C. Kamil. 1979. *Science,* **204:** 1332–1333.—The responses of Blue Jays to slides of species of *Catocala* (cryptically colored moths) were tested. The subjects were hand-reared from the age of 10–12 days, and trained to respond to the presence or absence of projected images of the moths on their usual roosting substrate. A complex sequence of slides with and without one or another of three species of *Catocala* showed that jays learn to see the moths but the percentage of correct responses increases from start to finish of each "run" of 16 slides, half of them without moths. The authors state that jays actively hunt for *Catocala.* However, Tyler, in Bent's "Life Histories," mentions caterpillars and beetles as important insect prey, and because only about one quarter of the jay's food is animal matter, adult moths must be a quite minor item in the bird's food intake.—C. H. Blake.

39. Feeding ecology of wading birds. J. A. Kushlan, 1978. *In* Wading Birds. Res. Rpt. #7, Nat. Aud. Soc., NY, p. 249–297.—In contrast to the much-studied raptors and passerines, analyses of the feeding ecologies of wading birds are few and are scattered diffusely through the ornithological literature. Kushlan's goals are "to summarize what is known (about wading bird feeding ecology), to seek generalities, and to provide tentative explanations for the patterns found." In this interesting and thorough review, Kushlan succeeds admirably.

The paper is divided into four major sections. First is a review of foraging behavior, which occupies about 60% of the text. This section is subdivided into 11 parts, some of which are themselves subdivided. Space limitations prevent a complete review of their contents, but some highlights follow.

Under "Nomenclature" Kushlan reviews 38 behavioral patterns recognized in the literature, and then presents tables summarizing the uses of these behavior patterns by 37 species of herons, storks, ibises, and spoonbills. In a section on correlates of feeding activity, Kushlan points out that large and small waders tend to be sluggish feeders with small behavioral repertoires, whereas medium-sized species tend to be active feeders with large repertoires. He suggests that since small herons cannot wade deep they must feed perched at the water's edge; thus, their behavioral repertoire may be limited by the linearity of their foraging domain. Perhaps more controversial is his contention that large waders are inactive foragers because of the large energy expenditures required to overcome their inertia.

Kushlan's brief section on the evolution of feeding behavior is excellent, especially Figure 4, in which he presents a scheme for the evolution of feeding strategies based on a dichotomy between visual and tactile foraging, and relates it to the feeding ecologies of present-day groups of waders. Another interesting segment is a lengthy treatment of morphological adaptations in which Kushlan suggests that plumage colors in waders function either to reduce or increase conspicuousness to prey or to other waders, and are thus adaptations for foraging. This idea runs counter to the view that avian plumage color functions mainly in predator avoidance, epigamic displays, or as species-recognition signals. Kushlan supports his ideas by successfully predicting the plumage colors of waders based on their time of foraging, habitat, feeding habits, and gregariousness (Table 4).

However, Kushlan's theory does not explain the presence of dimorphic or polymorphic plumages in some species.

Kushlan discusses spacing, which "ranges from wide dispersion to aggregation, (and) correlates with the nature and defensibility of food resources. Aggregative foraging leads to behavioral associations such as commensalism and prey-robbing." He presents graphic models relating size of foraging territory to resource dispersion and food availability. Mixed foraging aggregations are shown to be centered on species that feed either by standing or slow non-visual feeding. The first major section closes with a discussion of prey-robbing, a behavior little noted until Kushlan's own work in Everglades National Park. Robbing seems an inefficient strategy because of a high energy cost and a low success rate, but is still practiced frequently by medium-sized herons.

The second major section, called "Food ecology," includes discussions of food consumption, feeding requirements, feeding risks, habitat use, prey availability, prey selection, impact on prey, and sympatric foraging. Here, the organization is not as cohesive as in the first section. In particular, the last portion on sympatric foraging could just as well have been presented earlier, and the impact of waders on their prey is also treated in the third major section (see below). Kushlan points out that more research is needed on the food supply of waders, including the effect of prey availability on feeding behavior (a major bottleneck in avian ecology generally) and the role of behavior in prey selection. One of Kushlan's more interesting suggestions is that the putrid regurgitations of nestling waders reduce predation by attracting would-be nest raiders to the vomitus—certainly anyone who has walked beneath an active heronry has appreciated the availability of this resource!

The most important portions of the second section deal with prey availability and prey selection. Here Kushlan treats the effects of tropical and temperate seasonality on food supplies, and stresses how little we know about the environmental determinants of prey dispersion for most species (the Wood Stork is a rare exception). In the last portions of this section Kushlan implies that the impact of waders on their prey may be negligible under most circumstances; apparently he sees interspecific competition as relatively unimportant in wading birds. This is a promising area for further work.

The last two sections are quite brief. One is called "Functional relationships;" here Kushlan describes latitudinal diversity trends (higher toward the tropics) and attempts to summarize the role of waders as ecosystem components. He makes the interesting suggestion that waders may have the greatest impact on their prey in ponds that become crowded with fish as a result of dry-season evaporation; in these situations waders may enhance fish survivorship by removing enough prey to prevent oxygen depletion that would otherwise kill 99% of the fish population. The title of this section is uninformative and I feel its content could have been incorporated elsewhere. However, this is a small complaint in view of the valuable insights presented throughout the paper.

Kushlan closes with directions for future research, a fairly comprehensive summary, a literature citation section which attests to Kushlan's thoroughness and mastery of the literature (over 600 references), and helpful appendices that give references to behavior patterns and diets by species. In approaching his topic Kushlan has gleaned information from species the world over, but those interested primarily in the feeding ecology of North American species will not be disappointed. This comprehensive paper is an obvious starting point for anyone wanting to assess the current state of knowledge of wading bird ecology.—Elliot J. Tramer.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

40. Trends in accuracy of counting birds. A. J. Prater. 1979. *Bird Study,* **26**(3): 198–200.—Censuses and field surveys necessarily involve counting individual birds in a flock, but how accurate are such counts? In this study, 11 experienced birdwatchers were shown photographs of flocks comprising 100 to 3,000 birds and were allowed to study the photographs for at least 30 sec. Most observers overestimated the size of small flocks (100–500 birds) and underestimated large flocks (500–3,000 birds). Interestingly, the same observer, tested on different days, showed different tendencies to over- or underestimate.

It is somehow reassuring, however, that the largest errors came from the least experienced observers.—Scott R. Robinson.

41. Habitat selection by dabbling ducks in the Baie Noire marsh, southwestern Quebec. R. Courcelles and J. Bedard. 1979. *Can. J. Zool.*, **57**(11): 2230–2238.—The habitat preferences of the Black Duck (*Anas rubripes*), the Mallard (*Anas platyrhynchos*), and the Blue-winged Teal (*Anas discors*) in terms of mean number of birds per hectare were similar for all species. Open cattail marsh was the most preferred habitat in all cases. Heavy growths of ivy-leaved duckweed (*Lemna trisulca*), whitish water milfoil (*Myriophyllum exalbescens*), and common bladderwort (*Utricularia vulgaris*) occurred in the open cattail area, and high densities of macroinvertebrates were found in association with these hydrophytes. The authors suggest that the highly nutritional food available there was critically important for the brooding or molting ducks that comprised their sample. Exact order of preference for the other habitat types identified varied slightly between species, but basically went: marsh with few aquatics and few stumps, semi-open area with bur reed or many stumps, areas of dense cattails, deep water area. Implications of these results in terms of waterfowl management are discussed.—A. John Gatz, Jr.

42. Preliminary measurements of grain wasted by field-feeding Mallards. G. Sugden and D. W. Goerzen. 1979. Can. Wildl. Serv. Prog. Note, No. 104, 5 p.—The amount of mowed, harvestable barley wasted by field-feeding Mallards (*Anas platyrhynchos*) was determined from several plots in Last Mountain Lake Wildlife Management area, Saskatchewan. When ducks feed on mowed grain, they waste some by trampling and fouling what they do not eat. The amount ingested plus fouled is the total loss to the farmer. Crop protection managers use lure crops to decrease usage of commercial crops by ducks. The crop protection manager must justify his feeding program by demonstrating a high benefit/cost ratio (at least >1). The objective of this study was to estimate the ratio of wasted barley to eaten barley at several levels of use by Mallards. The ratio of wasted grain to eaten grain was highest (2:1) when only a few Mallards were feeding and decreased as more fed. The authors feel that for each unit of lure crop eaten, twice that amount of commercial grain is saved. In my opinion, the data show that this ratio is highly speculative.—Richard M. Zammuto.

43. A comparison of counting methods to obtain bird species numbers. A. V. Ratowsky and D. A. Ratowsky. 1979. *Notornis*, **26:** 53–61.—A comparison of stationary counts with those made by continuous slow walking through forests revealed that walking methods are more efficient if only short periods are available. The authors recommend that "a basic 10-minute walking unit will yield a reasonable percentage of the number of species present" and recommend this procedure if time is limited.—J. R. Jehl, Jr.

44. Evaluating call-count procedures for measuring local Mourning Dove populations. M. J. Armbruster, T. S. Baskett, W. R. Goforth, and K. C. Sadler. 1978. *Trans. Missouri Acad. Sci.*, **12:** 75–90.—The results indicate that population size cannot be estimated from the number of male Mourning Doves (*Zenaida macroura*) heard singing the five-syllable perch coo during three-minute stops along the 32-km routes prescribed by the U.S. Fish and Wildlife Service. The authors conclude that the census technique serves only as an index to population trends. However, I find even such limited usefulness doubtful in light of the almost complete lack of correlation between the number of calling males, number of active nests, and reproductive success.—Edward H. Burtt, Jr.

CONSERVATION AND ENVIRONMENTAL QUALITY

(See also 8, 13, 15, 20, 88, 89)

45. High pesticide residues in Sparrow Hawks (*Accipiter nisus*) as a possible cause of death. (Hohe Pestizidrükstände in tot aufgefundenen Sperbern (*Accipiter nisus*) als mögliche Todesursache.) B. Conrad. 1979. *Vogelwarte,* **30**(1): 21–28.—Sparrow Hawks found dead by accident, shot, or trapped had measurable levels of eight pesticide residues. Sparrow Hawks found dead, apparently dying from causes other than accident, shot, or being trapped, had higher levels for all eight residues. No statistical analysis of data is included, but all the original individual measurements are included. For two residues (DDE, PCB) no overlap occurred in the levels (n = 10, 12), indicating obviously higher levels in the "nonaccidental" deaths.—R. B. Payne.

PHYSIOLOGY

(See also 7, 32, 51, 75)

46. An evaluation of heart rate as a measure of daily metabolism in pigeons (*Columba livia*). R. K. Flynn and J. A. Gessaman. 1979. *Comp. Biochem. Physiol.,* **63A:** 511–514.—Heart rate measured by telemetry was demonsrated to be linearly related to oxygen consumption in pigeons. Use of equations to predict existence metabolism from heart rates of birds ranging freely from a coop produced values that were 41.7% higher than those measured. Some of the data suggest that heart rate–oxygen consumption relationships of solitary birds change in the presence of conspecifics. This study provides a valuable evaluation of an important technique for estimating the metabolic rate of free-living birds and should be useful in future development of telemetric assessments of metabolic rate, especially since, as the author points out, the D_2O_{18} technique may be unreliable.—C. R. Blem.

47. Heat production induced by photoperiodicity in the pigeon. A. Haim, S. Saarela, and R. Hissa. 1979. *Comp. Biochem. Physiol.,* **63A:** 547–549.—Comparison of metabolic rates of pigeons held at different experimental photoperiods suggests that length of light may influence heat production. However, lack of analysis of fat deposition or changes in insulation of the pigeons severely hampers interpretation of the results. For example, a significant difference found in birds held at 4L:20D as compared to controls disappears when one corrects for weight changes during the study. Metabolic rate is given as ml O_2/100 g body weight. Although both groups entered the experiments at similar weights, the control group gained 20 g while the experimental group lost a similar amount. Such weight changes are almost certainly due to variations in body fat which is relatively inert metabolically. The experimental (lean) group, therefore, appears to have a high weight-specific metabolic rate while the control (fat) group has a lower rate. The story would be more convincing if metabolic rates had been presented in a less biased fashion.—C. R. Blem.

48. A comparison of flight energetics in hirundines and other birds. C. J. Hails. 1979. *Comp. Biochem. Physiol.,* **63A:** 581–585.—Metabolism of swallows and swifts in flight is 49.3%–72.6% lower than other birds of similar size. Features of morphology and flight behavior contribute to the savings. This paper provides an interesting summary of the costs of flight as measured empirically. The main equation generated for the relationship of energy expenditure in flight to body weight in all species except the swallows and swifts is confusing. Although it is presented as a linear equation, it is graphed on exponential axes. Apparently the correct equation was somehow garbled in publication and actually is: $cal \cdot g^{-1} \cdot h^{-1} = 426.57W^{-0.351}$, where W is weight in g.—C. R. Blem.

49. Neuronal chemotaxis: chick dorsal-root axons turn toward high concentrations of nerve growth factor. R. W. Gundersen and J. N. Barrett. 1979. *Science,* **206:** 1079–1080.—Dorsal-root axons in solution of BU/ml of β-nerve growth factor (NGF) turn toward a concentrated (50 BU/ml) flow of NFG coming from a micropipette. The displacement was 20 μm in 9–21 mins. The turning was not rheotactic and the growth rate of the axon was not increased.—C. H. Blake.

50. Physiological adaptation of Blue Tits (*Parus caeruleus*) to migration. C. Frelin. 1979. *Vogelwarte,* **30:** 33–41.—Blue Tits migrating through the French Alps were caught, weighed, fat indexed, and CO_2 production measured in a 30-min test. The species is a short-range migrant; banding recoveries indicated that a bird moved an average 29 km in a day. Given the amount of fat they carry and their metabolic rate, the fat reserves theoretically could provide energy for 20–30 km of flight. The fat reserves seem just sufficient to support their daily flights in migration.—R. B. Payne.

MORPHOLOGY AND ANATOMY

(See also 10, 49, 72, 77, 80)

51. The plugged pores of Tinamou (Tinamidae) and Jacana (Jacanidae) eggshells. R. G. Board and H. R. Perrott. 1979. *Ibis,* **121:** 469–474.—The variety of shapes of pores in avian eggshells and the physiological mechanisms leading to the production of such structures during eggshell formation are poorly understood. Board and his colleagues have previously attempted to describe and classify the types of pores in avian eggshells and this paper describes yet another type, the plugged pore. Scanning electron micrographs of tinamou and jacana eggshells show plugs closing the outer orifices of the pores. The plugs contain significant amounts of sulfur or iron, elements not ordinarily found in significant quantities in the other parts of these shells or those of other species. The differences in elemental content between the plug and rest of the shell raise intriguing questions concerning the formation of these structures. The function of the plug is unclear, particularly as it influences gas exchange of the embryo and the water repellency of the eggshell.—Cynthia Carey.

52. Wake of a flying bird. (Sled letiashchei ptitsy.) N. V. Kokshaiskii and V. I. Petrovskii. 1979. *Priroda,* **1979**(5): 100–102. (In Russian.)—Any body moving through a liquid or gaseous medium leaves a wake. The structure of the wake portrays the interaction between the moving body and the medium. To study the wake of flying birds, a large, covered aquarium was outfitted with perches at each end, and with a device for dispensing dust in the lid. Cameras with strobe flash were focused where the cloud of dust would be after released, and an electric eye was beamed through this area. When the subject of the experiment, a Chaffinch (*Fringilla coelebs*), left one perch and, as the dust was released, flew to the other, it passed through the electric eye beam, tripping the flash and cameras, which photographed the swirls of dust left by the bird.

The wake of a flying finch is a succession of thick, vertical rings and an air stream that fluctuates in steps with the rings as if it were threaded on it. Each ring represents one full flap although it is formed only on the downward stroke, since the Chaffinch, like most small birds, has its wings compressed on upstrokes.

If there were some way to calculate the amount of draft generated by a flapping bird and represented by its wake in a cloud of dust, we might be able to evaluate the avian wing as a propelling agent and compare it with analagous systems. However, since the elements of a bird's wake are dynamic, calculations would be extremely complicated.—Elizabeth C. Anderson.

53. On the identification of Reed Warbler (*Acrocephalus scirpaceus*) and Marsh Warbler (*A. palustris*). (Zur Unterscheidung von Teich- und Sumpfrohrsänger (*Acrocephalus scirpaceus, A. palustris*). B. Leisler and H. Winkler. 1979. *Vogelwarte,* **30**(1): 44–48.—The authors measured seven characters and developed a discriminant function analysis to aid in identification of these two similar species.—R. B. Payne.

ZOOGEOGRAPHY AND DISTRIBUTION

(See also 18, 19, 23, 35, 39, 69)

54. Colony fidelity and interchange in the Sand Martin. C. J. Mead. 1979. *Bird Study,* **26**(2): 99–106.—An analysis of banding returns of Sand Martins (*Riparia riparia*) reveals that most birds return to the immediate vicinity of their natal colony to breed (but see review **57**). Only 2% of young birds and 1% of adults move farther than 100 km from their original colony. However, the statistical analyses and presentation of data in this paper detract from an otherwise competent study. In several places statistical comparisons were implied by presenting probability values, but I could find no mention of the statistical tests used. For example, "a very good fit was obtained" by comparing the distribution of distances moved to a log normal distribution (Fig. 1), but no quantitative measures of variation, confidence, or goodness of fit were provided. This "best-fitting" curve was then used to predict the number of Sand Martins that moved less than 10 km from their original colony, and the deviations of these predictions from observed numbers served as a measure of the "attraction" of martins to the home colony. I question the legitimacy of such statistical manipulations, and find them to be more obfuscating than illuminating.— Scott R. Robinson.

55. Historical review of the Carolina Parakeet in the Carolinas. D. McKinley. 1979. *Brimleyana,* **1:** 81–98.—This is a good example of the problems of dealing with 18th and early 19th century literature. The species almost certainly occurred in both Carolinas.— C. H. Blake.

56. Birds of the Pacific Rim National Park. D.F. Hatler, R. Wayne Campbell, and A. Dorst. 1978. *Brit. Col. Prov. Mus. Occas. Pap.,* No. **20:** 1–194. No price given.—This beautiful park extends for 75 miles along the west coast of Vancouver Island and consists mainly of shoreline areas with fringing forests. This paper is an excellent guide to the birdlife, especially marine species, of the entire southern British Columbia coast and includes comparative data from other areas in southern British Columbia. Indices contain detailed information on nesting surveys of Brant's (*Phalacrocorax penicillatus*) and Pelagic (*P. pelagicus*) cormorants, Black Oystercatchers (*Haematopus bachmani*), and Glaucous-winged Gulls (*Larus glaucescens*) in the park.—J. R. Jehl, Jr.

57. Dispersal and survival in the Bank Swallow (*Riparia riparia*) in southeastern Wisconsin. W. N. MacBriar, Jr. and D. E. Stevenson. 1976. *Contr. Biol. Geol. Milw. Pub. Mus.,* **10:** 1–14.—MacBriar and Stevenson suggest that the strikingly low recapture rate characteristic of Bank Swallows results from lack of philopatry, not from unusually high mortality as suggested by Stoner (*Bird-Banding,* **12:** 104–109, 1941). Their conclusion is supported by several lines of evidence (see review **54**). First, return of two-year-olds to the site of their first nest is far below the adult survival rate. Second, of 86 adults found in colonies different from the site of their first nest, 55 had moved "voluntarily," i.e., their original colonies were still active. Third, adults moved up to 402.6 km between nest sites in consecutive seasons. Finally, the lack of subspecific variation among Bank Swallows suggests rapid gene flow which would be facilitated by frequent, widespread dispersal of adults. The discussion, based on Howard (*Amer. Midl. Nat.,* **63:** 152–161, 1960), explains the phenomenon as having "considerable survival value for the species," but what of the wandering swallow? It and individual selection are ignored.—Edward H. Burtt, Jr.

58. Palaearctic raptors in Rwanda. (Les Rapaces palearctiques au Rwanda.) J.-P. Vande Weghe. 1978. *Le Gerfaut,* **68:** 493–538.—Field observations in this small country in Central Africa, lying between Lake Victoria and the more western Rift, have shown 15 species of Palaearctic birds of prey. Some both migrate through Rwanda and winter in part there, while others (the majority of species) are migrants only. Occasional "summer" records are known for the European Buzzard (*Buteo buteo*), Osprey (*Pandion haliaetus*), and Lesser Spotted Eagle (*Aquila pomarina*). The area between the lakes to the east and west is an important transit area especially for the Buzzard, European Hobby (*Falco subbuteo*), and Lesser Spotted Eagle. This last species winters in Rhodesia and Botswana, and the observations in Rwanda indicate the flight path used by that species.—R. B. Payne.

59. Notes on the avifauna of South Georgia. J. R. Jehl, Jr., F. S. Todd, M. A. E. Rumboll, and D. Schwartz. 1978. *Le Gerfaut,* **68:** 539–550.—This island in the South Atlantic, within the Antarctic Convergence, was visited in March and April 1977, to document new or unusual birds as well as to census breeding colonies of the more numerous birds. King Penguins (*Aptenodytes patagonica*) have apparently doubled in number since 1971; 16,000 adults and grown young were estimated. On the Willis Islands, off the west tip of South Georgia, 13 million Macaroni Penguins (*Eudyptes chrysolophus*) were estimated (aerial photographs suggest that this estimate may be high). Wandering Albatross (*Diomedea exulans*) were censused at 163 nesting pairs in the Bay of Isles, far fewer than the number that were suspected. The two Giant Petrels (*Macronectes giganteus* and *M. halli*) both bred. Dove Prions (*Pachyptila desolata*) were the most common breeding species, according to an unpublished report by P. A. Prince and M. R. Payne. The diving petrels (*Pelecanoides*), a difficult species group, could be separated locally; *exsul* and *georgicus* had a different shape of the tip of the lower mandible. Cattle Egrets (*Bubulcus ibis*) were seen (one collected) at sea at 54°S, the first record of the species south of the Antarctic Convergence. Two species were reported for the first time from the island (Fairy Prion (*Pachyptila turtur*), Arctic Tern (*Sterna paradisaea*)). Preliminary examination of specimens suggests that the local breeding populations of Blue Petrel (*Halobaena caerulea*) and Kelp Gull (*Larus dominicanus*) are morphologically distinct.—R. B. Payne.

60. Midsummer seabird distribution in the Chilean fjords. P. Devillers and J. A. Terschuren. 1978. *Le Gerfaut,* **68:** 577–588.—January observations of seabirds are compared to counts by others in March and May, with counts and age ratios suggesting population movements.—R. B. Payne.

61. Faunistic and bioecological notes of Península Valdés and Patagonia. V. Birdbanding in Patagonian maritime littoral for studies of migratory behavior (Chubut and Santa Cruz Provinces, Argentina). (Notas faunísticas y bioecológicas de Península Valdés y Patagonia. V. Anillado de aves en el litoral marítimo Patagónico para estudios del comportamiento migratorio (Provincias de Chubut y Santa Cruz, Rep. Argentina)). J. Daciuk. 1977. *El Hornero,* **11**(5): 349–360. (In Spanish with English summary.)—This paper documents the banding of 4,785 individuals of 23 species from 1969–1976. Almost half the birds banded were *Spheniscus magellanicus* and most of the rest were also colonial-nesting seabirds. To date there have been 20 recoveries of six species. Recoveries and observations of marked *S. magellanicus* suggest that a northward movement by part of the population during June–August contrary to the normal southward migration. For most species, postbreeding migration seems to follow the coastline northward; however, the single recovery of *Egretta alba egretta* was south of the point where it was banded and *Larus dominicanus* was recovered both north and south of its breeding area. Individuals of *Spheniscus magellanicus, Phalacrocorax magellanicus* and *Stercorarius skua antarctica* returned to breed in the area where they hatched.—Robert B. Waide.

62. Breeding of the Cape Pigeon (*Daption capense*) at the Snares Islands. R. M. Sagar. 1979. *Notornis,* **26:** 23–36.—Details of the breeding biology of *D. c. australe* at its northernmost locality, including good data on nest-site fidelity of adults, growth and fledgling success of young. Breeding begins earlier than in the Antarctic colonies but is highly synchronous.—J. R. Jehl, Jr.

63. History and account of the birds of the Hunua Ranges. H. R. McKenzie. 1979. *Notornis,* **26:** 105–119.—This detailed historical account of a mountain range on North Island, New Zealand, covers 90 years. It contains comprehensive information on the activities of early collectors, location of specimens, and causes of faunal changes.—J. R. Jehl, Jr.

64. The birds of Antipodes Island, New Zealand. J. Warham and B. D. Bell. 1979. *Notornis,* **26:** 121–169.—Antipodes Island is virtually unmodified by man. Prior to this study, which was undertaken from January–March 1969, the island had received only cursory study by ornithologists. At present, 25 species breed, of which 20 are seabirds. The paper includes data on population sizes, weights, measurements, and biology. Several species are recorded for the first time and the status of others is re-evaluated. This is an important faunal work, required reading for seabird specialists.—J. R. Jehl, Jr.

65. Ducks and Coots in Leningrad. (Utki i lysukhi v Leningrade.) V. Khrabryi. *Okhota i okhot. khoz-vo.,* **1979**(4): 17. (In Russian.)—Wild waterfowl have long wintered in the open water of the rivers, canals, and ponds of Leningrad, resting there by day and flying to empty lots amid new apartments to feed at dusk. A trend noticed previously in Western Europe is now apparent in the USSR: more and more birds are staying in the city, to nest in parks and around new suburban housing, using hollow trees, roofs, ruins, heaps of scrap metal, and smokestacks. Fifty Mallard (*Anas platyrhynchos*) pairs nested in Leningrad in 1978, as did a few Coots (*Fulica atra*) and Moorhens (*Gallinula chloropus*). This process of adaptation to new nesting conditions is probably not chance and, abetted by human actions (feeding the birds, protecting them, providing nesting places), is likely to continue.—Elizabeth C. Anderson.

66. Analysis of movements of Bullfinches *Pyrrhula pyrrhula* ringed in southern Germany. (Analyse der Ortsbewegungen in Süddeutschland beringter Gimpel *Pyrrhula pyrrhula.*) F. Bairlein. 1979. *Vogelwarte,* **30**(1): 1–6.—Of 12 birds banded in the breeding season and recovered during the winter, 7 were found from 230–740 km from the banding site, all SW of their home area. Of 26 birds banded in the winter and recovered during a later breeding season, 8 were found within 10 km, 8 from 11–50 km, and 7 more than 100 km from their banding site. The birds moving longer distances tended to go NE; one went to southern Finland. The study shows directional migration in some local Bullfinches; other birds apparently remain near their home area all year. No instances are reported of birds banded as young and found breeding in a later year, hence, we cannot know from this paper whether the species generally returns to breed in its home site. Although the summary of local migrations is useful, no original data are listed by which we could determine a mean for the samples and the only statistics reported are for the subsamples of birds moving the longer distances.—R. B. Payne.

SYSTEMATICS AND PALEONTOLOGY

(See also 59)

67. A new species of the genus *Sporophila.* (Una nueva especie del género *Sporophila* (Emberizidae).) S. Narosky. 1977. *El Hornero,* **11**(5): 345–348. (In Spanish with English description of type specimen.)—*Sporophila zelichi* nov. sp. is described from four specimens, two adult males collected at Colon, Entre Rios (deposited in the collection of the Divisi6n Ornitologia del Museo Argentino de Ciencias Naturales) and two live males, also from Entre Rios. The species is named for Dr. M. R. Zelich, for many years a naturalist in this province. The author quotes Dr. Zelich to the effect that among other members of the genus (or other color phases; see below), *palustris* has declined in Entre Rios since 1925 and *ruficollis* and *cinnamomea* have increased. Members of the genus form mixed species flocks in March, in which *zelichi* is the rarest. Zelich describes a nest with three young birds and notes that female *zelichi* are identical to other females in the genus. The author quotes R. A. Buceta, a cage-bird fancier who specializes in *Sporophila,* who says that members of the genus require 4–5 years to attain mature plumage in captivity, and that captive birds placed in traps to call in other birds seldom attract anything but their own species. The author mentions that other authorities have suggested that the members of the genus may actually be male color phases rather than distinct species and that *zelichi* could be regarded as a hybrid between *palustris* and *cinnamomea,* but he maintains that the long history of the form in Argentina, its occurrence in fair numbers and its well-defined coloration suggest that it is a separate species.—Robert B. Waide.

68. A new ground-thrush from Africa. A. Prigogine. *Le Gerfaut,* **68:** 482–492.—Two specimens of ground-thrush taken in the Kibale Forest, western Uganda, and identified by Friedmann and Williams as *Turdus camaronensis prigoginei* [*Zoothera camaronensis graueri*] were compared by Prigogine with other forms of ground-thrush. He concluded that the two specimens were unique—and so named them a new species, *Zoothera kibalensis.* The two specimens were said to be intermediate in size between the two nearby thrushes typical of lowland forest, *Z. princei batesi* and *Z. camaronensis graueri,* but Prigogine's measurements showed that the specimens fell in the range of the former. In color the specimens were intermediate to the two species in the color plate, but unfortunately Prigogine did not illustrate the local subspecies of *Z. princei.* Prigogine also noted that the bill of the Kibale birds appeared more compressed than in either of the other thrushes. He stated that "*Z. kibalensis* cannot be considered a hybrid between *Z. princei* and *Z. camaronensis,* as the two *kibalensis* specimens known are very similar," but this is the usual result of bird species hybrids, and it would be rather in the backcross combinations that we would expect to find any independent assortment of character states. I was not convinced by the author's argument that the two Kibale specimens merit species status.—R. B. Payne.

69. Remains of birds at St. Peter's Abbey, Ghent, Belgium (7th to 18th century). (Knochenfunde von Vögeln aus der Abtei Sankt Peters zu Gent, Belgien (VII bis XVIII Jahrhundert).) P. Ballman. 1978. *Le Gerfaut,* **68:** 551–576.—Most remains were from the last two centuries and were common domestic birds. This paper deals mainly with the wild birds, represented by nearly 300 bones. Over 30 species were identified. Most species are common in Belgium today, although Ravens (*Corvus corax*) have disappeared. Tufted Duck (*Aythya fulvigula*) was found, a record of interest because this species is thought to have expanded its range into western Europe mainly in the past century.—R. B. Payne.

70. Pleistocene birds from Swanscombe, Kent. C. J. O. Harrison. 1979. *London Nat.,* **58:** 6–8.—Fossil remains from the High Terrace at Swanscombe, Kent have been identified as from the following birds: Cormorant (*Phalacrocorax carbo*), ? White-fronted Goose (*Anser* cf. *albifrons*), ? Barnacle Goose (*Branta* cf. *leucopsis*), Shoveler (*Anas clypeata*), Common Scoter (*Melanitta nigra*), Red-breasted Merganser (*Mergus serrator*), Capercaillie (*Tetrao urogallus*), Eagle Owl (*Bubo bubo*), Garden Warbler (*Sylvia borin*), and Serin (*Serinus serinus*). These species represent a boreal to cool temperate type fauna.—Richard J. Clark.

71. Fossil counterparts of giant penguins from the North Pacific. S. L. Olson and Y. Hasegawa. 1979. *Science,* **206:** 688–689 and cover.—Giant flightless pelecaniforms with paddle-like wings occurred in the North Pacific in the late Oligocene and early Miocene. Forming the family Plotopteridae, they were coeval vicariants of the giant penguins of the southern oceans. They ranged in size from that of a modern cormorant to a tip-to-tip length of some 2 meters. Great diversification of seals and porpoises in the Miocene may have been responsible for the extinction of both giant penguins and plotopterids.—C. H. Blake.

EVOLUTION AND GENETICS

(See also 17, 24, 27, 54, 83)

72. Heritability of some morphological characters in a Song Sparrow population. J. N. M. Smith and R. Zach. 1979. *Evolution,* **33:** 460–467.—The authors present a well-conceived and statistically valid procedure for determining the narrow heritability (h^2) of various morphological characters in field populations of birds. In their island population of Song Sparrows (*Melospiza melodia*), they demonstrated significant additive genetic variance in most beak dimensions and in tarsus length (h^2 ranging from .32–.51). Their main conclusion that natural selection could, therefore, operate to change these characters' phenotypic distribution is certainly correct. I do not quibble with their data or their statistical and genetic conclusions. However, I am wary of the flavor of their discussion of the evolutionary implications of such studies of heritability.

They suggest, "To evaluate the evolutionary significance of intraspecific morphological variation, we must investigate the heritability of quantitative traits" and "thus, a simple correlation between morphological variation and diet breadth does not demonstrate the evolutionary utility of the niche variation model, without evidence that the morphological differences are heritable." Their implication appears to be that unless phenotypic variation can be directly attributed to genetic variation (and additive at that), then it cannot be viewed as an evolved adaptation. I believe this view is based on a common misinterpretation of the significance of heritability.

The niche-variation model in question (Van Valen, *Am. Nat.,* **99:** 377–390, 1965) simply suggests that intraspecific variation in feeding apparatus may be an adaptation that reduces intraspecific competition. The hypothesis does *not* require that the variation be heritable, in the narrow sense, in order to have been, or be, favored by selection. For example, the genetic variation required for adaptation could have occurred in the substrate controlling feeding apparatus development. Substrate A might have permitted environmental factors to influence final bill dimensions. In contrast, substrate B might have been associated with a more rigid development, such that bill dimensions were immune to environmental influence. Epigenetic system A, then, would be associated with greater phenotypic variability than would system B. If the environment favored phenotypic variability, e.g., due to its capacity to increase niche-variation, then A would be expected to increase in frequency until finally *fixed* (i.e., selection would *reduce* the genetic variation controlling development). Bill dimension variability would show little or no heritability (h^2), but the phenotypic variability would still have originated, and still be maintained, as an adaptation by selection acting on alternative epigenetic systems. Smith and Zach's error, if I read them correctly, is to assume that zero heritability is indicative of adaptively irrelevant characters. There may be little room for selection now, but one of the more likely reasons for that lack of genetic variation is that there was *strong* selection on the trait in question in the recent past. Low heritability is associated, not with adaptively irrelevant, but with adaptively important characters.—Williams M. Shields.

73. Sexual selection and body size in male Red-winged Blackbirds. W. A. Searcy. 1979. *Evolution,* **33:** 649–661.—Searcy explores the logic of the major hypotheses explaining sexual size dimorphism in birds, deduces critical predictions, and tests them with data gathered for the purpose from the Red-winged Blackbird (*Agelaius phoeniceus*). He does this clearly, convincingly, and in great detail. His conclusion that sexual selection is implicated in the maintenance of the 20% size difference between male and female Red-winged Blackbirds is not unique, but the mechanism he proposes for that action is certainly novel. He concludes that the advantage of greater size in direct aggressive encounters is likely to increase mating success, as is traditional. But he also suggests and documents an energetic cost of large size such that larger males can afford less energy for territorial advertisement with a concomitant reduction in mating success. Because no consistent mortality differences were associated with male size, he concluded that Selander's (*Am. Nat.,* **99:** 129–141, 1965) suggestion that sexual selection favors increased male body-size was not applicable to his system. Rather, he concludes that sexual selection *alone* may provide sufficient cost and benefit to stabilize male blackbird size at slightly larger than the female. Searcy's work is a stimulating model of the synthetic problem-solving approach to evolutionary questions.—William M. Shields.

74. Role of heredity in egg size variation in the Great Tit *Parus major* and the Pied Flycatcher *Ficedula hypoleuca*. M. Ojanen, M. Orell, and R. A. Väisänen. 1979. *Ornis Scand.,* **10**(1): 22–28.—This paper is part of a detailed population study of Finnish Great Tits and Pied Flycatchers patterned after the Wytham Wood studies at Oxford, which have yielded data on very subtle but evolutionarily significant details of population ecology rarely found in the bird literature. This paper takes egg size as the dependent variable and examines the influence of factors such as genetic relatedness of females, body weight, and timing of breeding. The best data are for the Great Tit. From 1,382 clutches over five years, 10,200 eggs were used in the analyses. The authors found no significant relationship between body weight and egg size, but comparisons of mother-daughter pairs revealed a high heritability of egg size. A curious result was that, while egg size in replacement clutches averaged greater than in first clutches, as in Oxford, eggs in true second clutches were the same size as first-clutch eggs. The authors tentatively interpret this as evidence of genetic control of egg size in both first and second clutches. Second clutches are rare at Oxford so no comparative information is available. Better food supplies in Finland than at Oxford may account for the following differences between the Finnish and English populations: (1) the correlation between body size and egg size in England, (2) the fact that smaller birds nest earlier than larger birds in England, and (3) the correlation between egg size and clutch size in England.

This information is of significant interest. It is unfortunate that most studies of birds are not pursued to the depth that permit realistic, critical evaluation of both ecologic and genetic influences on population phenomena. The potential of continuing studies like these is exciting, to say the least.—Marshall A. Howe.

75. Genetic resistance to aflatoxin in Japanese Quail. H. L. Marks and R. D. Syatt. 1979. *Science,* **206:** 1329–1330.—This carcinogenic mixotoxin is a metabolite of *Aspergillus flavus* and *A. parasiticus.* Breeding from survivors of a line dosed with aflatoxin for five generations produced birds whose mortality was $1/8$ and $1/11$ that of untreated controls. Back-crosses with control birds showed a mortality in the F_1 generation intermediate between the controls and the pure-bred birds. It is not shown that this resistance is a permanent acquisition but is inferred to be so by analogy to resistance to Rous sarcoma.—C. H. Blake.

FOOD AND FEEDING

(See also 6, 31, 34, 38, 39, 42, 86, 87, 89)

76. The diet of the Kestrel in the Lake District. D. W. Yalden and A. B. Warburton. 1979. *Bird Study,* **26**(3): 163–170.—An analysis of Kestrel (*Falco tinnunculus*) pellets reveals that voles (*Microtus agrestis*) are their most important prey, constituting 45% of the estimated live weight of all prey. Other important prey include other small mammals (20%), small birds (7%), caterpillars (12%), beetles (8%), and earthworms (5%). Vertebrates are more common in pellets collected during the summer, whereas caterpillars and earthworms are more common in winter.—Scott R. Robinson.

77. Foods and feeding of the Wrybill (*Anarhynchus frontalis*) on its riverbed breeding grounds. R. J. Pierce. 1979. *Notornis,* **26:** 21.—This is an excellent and comprehensive study of the New Zealand plover whose unique bill morphology has enlivened much discussion but little direct study. The Wrybill feeds in a variety of habitats along large rivers but preys mainly on mayfly larvae which cling to the undersides of large rocks. Prey may be taken by a direct peck or by a clockwise motion which utilizes the curvature of the bill. Pierce shows that the sideways curvature of the bill allows the Wrybill to capture prey in situations that would be unexploitable by a species with a straight or upturned bill, and he speculates that the species' feeding habits may have evolved during the Pleistocene, when prolonged cold temperatures would tend to keep insect populations low and inactive.—J. R. Jehl, Jr.

78. Nutritional and ecological studies of migratory birds in a southwest German migratory area during migration. (Nahrungsökologische Untersuchungen an Zugvögeln in einem südwestdeutschen Durchzugsgebiet während des Wegzuges.) D. Brensing. 1977. *Vogelwarte,* **29**(1): 44–56.—The paper describes a method of sampling the stomach contents of a bird by flushing the digestive tract. The technique is a slight variation on a technique described by D. T. Moody (*Auk,* **87:** 579, 1970). Food samples of 35 species (2,189 individuals) of European migrants (all but one a small songbird) are described, but only as to the presence of "animal" or "vegetable" matter. The flushed stomach contents were often well digested and unsuitable for detailed identification or quantitative analysis. I have used another variation on this theme, sucking up the contents from the crops of finches, with better results, because seeds and small insects in the crops were not digested or smashed and were generally recognizable (Payne, *Ibis,* **122:** 49, 1980).—R. B. Payne.

SONGS AND VOCALIZATIONS

(See also 18, 86)

79. The influence of learning on simple and complex songs of Marsh Tits (*Parus palustris*). (Der Einfluss des Lernens auf einfache und Komplexe Gesangsstrophen der Sumpfmeise (*Parus palustris*).) P. H. Becker. 1978. *J. Ornithol.,* **119:** 388–411.—Nestling Marsh Tits were reared in four experimental groups in sound-proof rooms. Two groups were raised without any songs played to them, one group heard taped songs of wild birds, and one group heard artificial songs. All individuals developed the simple species-specific "Klapperstrophe" songs, but none developed any of the complex natural songs. All the birds developed improvised songs consisting partially of calls. One individual in the group reared with the artificial songs learned one artificial song. None of the individuals reared with recorded natural songs learned them.—Robert C. Beason.

80. Songbirds' brains: sexual dimorphism. F. Nottebohm and A. P. Arnold. 1979. *Science,* **208:** 769.—Birds such as the canary and zebra finch, in which species only the male normally sings, have a marked difference in size of the telencephalic vocal control nuclei. Numerous references are included.—C. H. Blake.

81. The songs of Marsh Tit (*Parus palustris*) and Willow Tit (*Parus montanus*)—species-specific song characters. (Der Gesang von Sumpf- und Weidenmeise (*Parus palustris* und *Parus montanus*)—reaktionsauslösende Parameter. E. Romanowski. 1979. *Vo-*

gelwarte, **30**(1): 48–65.—The author noted the reactions of males to recorded songs of their own species, the other species, and artificial songs. In Marsh Tits the frequency modulation and the time intervals between notes seemed to be the most important cues in song recognition. In Willow Tits the endings of single notes were important. Sequences of notes did not appear to be important cues in song recognition.—R. B. Payne.

PHOTOGRAPHY AND RECORDINGS

(See 4, 52)

MISCELLANEOUS

82. The brothers Brimley: North Carolina naturalists. J. E. Cooper. 1979. *Brimleyana,* **1:** 1–14.—Here are biographies with portraits of Herbert H. and Clement S. Brimley, English brothers who played a major role in the development of the N. C. State Museum of Natural History (H. H. was its first director, 1928–1937). They were skilled preparators and taxidermists. With T. Gilbert Pearson they co-authored one of the first state bird books: "Birds of North Carolina" (1919).—C. H. Blake.

BOOKS AND MONOGRAPHS

83. The Behavioral Significance of Color. Edward H. Burtt, Jr., ed., 1979. New York, Garland STPM Press. 456 p. $27.50.—Why are Cardinals red and Indigo Buntings blue? The kneejerk reply, because natural selection has produced those phenotypes, is obviously worthless unless we know the various selection pressures involved. Indeed, the *assumption* that natural selection is wholly responsible for all phenotypic details is currently under attack from numerous scientific directions (e.g., certain neutralists), but it remains the only working hypothesis. That is, to propose that a particular color pattern is due purely to chance kills the question, whereas supposing that it has evolutionary function(s) forces one to ask *what.* On the other hand, pitfalls arise for the naive selectionist who conjures up a plausible scenario for some phenotypic trait and considers the matter settled. That approach, which has been likened to Kipling's "Just So Stories," is ubiquitous and largely to blame for the bad name selectionism has acquired recently. It may seem like a trivial distinction, but keeping plausible explanations as explicit hypotheses—which can be falsified, supported, modified, and supplemented—allows the basic process to continue generating new ideas and understanding.

The symposium from which this book's chapters were collected seems to have been based on the *operational working assumption* of selectionism: colors exist, therefore, they must be good for something. What are the various functions of animal coloration? Intuitively aware of the selectionists' pitfall, the authors have generally resisted oversimplification. The result is, thus, not neat-and-clean, but it is honest and useful. Most important, it points to some promising future research.

The 10 papers, originally presented at an Animal Behavior Society symposium in 1977, are organized in four sections: (1) the physical properties of light, (2) some physiological consequences of coloration, (3) photoreception, and (4) communication. All of these topics are reviewed to a greater or lesser extent, none exhaustively. To diversify opinion, the chapters are followed by expert commentary from C. Richard Tracy and William J. Hamilton, III, audience response, and general interrogation of the authors.

The first chapter, "Physics of light: an introduction for light-minded ethologists" by B. Dennis Sustare, is essentially a refresher course in basic physics. A physics-major-turned-ethologist, Sustare guides us quickly and clearly through the concepts and vocabulary used in the rest of the book. As one who has retained little of my own physics training, I was especially grateful for this help.

The next two chapters, comprising the physiological section, present review material and fresh data from current investigations. David Hoppe's discussion of how color affects thermoregulation and hydroregulation describes some interesting aspects of desiccation tolerances in chorus frogs. It seems that brown morph frogs (*Pseudacris triseriata*) desiccate more slowly than green conspecifics. This presumably imparts a survival advantage during the terrestrial phase of the life cycle when a significant shift occurs in the morph frequencies. Furthermore, Hoppe was surprised to find that the greens absorb more incident radiation than the browns, which look "darker" to us. Obviously, the eyes can mislead or, as Hoppe puts it, ". . . a green frog is not necessarily a 'green' frog."

Jed Burtt's chapter addresses the seemingly esoteric riddle of why so many birds have black wing tips, even if all their other feathers are pure white. He proposes, then supports, two hypotheses about melanized feathers in general: (1) they are structually stronger and (2) they shield underlying tissues from ultraviolet radiation. His clever method for testing the first idea deserves mention. Burtt simulated natural abrasion from airborne particles by blasting feathers with powdered silicon particles shot from an air pressure gun. Indeed, the dark (melanized) feathers suffered less barbule breakage: they *were* stronger. He continued to show that parulid feathers are melanized in the body regions most exposed to natural abrasion, which suggests that this may be *a* significant selection pressure on warbler coloration. Similarly, the patterns of dorsal coloration in warblers correlate well with predicted strategies for minimizing UV radiation damage. However, because dark dorsa were already predicted by the abrasion hypothesis, it is unclear which factor(s) is (are) important. Not unexpectedly, this ambitious chapter was also the most controversial: for example, Hamilton pointed out that we have no reason to suspect that UV radiation poses any significant danger.

The three chapters on photoreception begin with an interesting, but somewhat out-of-place, review of "Extraretinal photoreception" by Herbert Underwood. His discussion of biological clocks, pineal function, and photoperiodism was not clearly related to the kinds of behavior and color promised by the book's title and treated by the other authors. As a consequence it seems to float off by itself.

Back in the mainstream, Samuel Gruber's chapter ("Mechanisms of color vision: an ethologist's primer") extends the background building that Sustare began. He summarizes physiological and anatomical aspects of color perception and briefly suggests way of measuring animal sensitivities using standard conditioning procedures. Max Snodderly then offers a "mammalian" chapter that has much for ornithologists to ponder: given that primates rely more on vision than other mammals, why do New World species have poorer color vision than their Old World relatives (including us, of course)? Specifically, why are the New World primates relatively insensitive to longer wavelengths (yellow to red)? Depicting the New World *Callicebus torquatus* as a fruit "predator," Snodderly draws provocative analogies between the cryptic *vs.* aposematic color patterns found on many prey animals and those found on fruit. The color vision of primate frugivores must have coevolved with the signals broadcast by fruit, so Snodderly measured the optical properties of fruit. Many pages of spectrophotometry data later, he concludes that New World monkeys live in a green world. They must find food in an evergreen arboreal habitat, so their visual sensitivities peak in the green part of the spectrum. This enables them to discriminate the green-camouflaged fruits (apparently a green fruit is not necessarily "green" any more than frogs are). On the other hand, Old World primates inhabit regions with extensive dry periods that produce brown vegetative cycles: thus, they need to see well in the longwave part of the spectrum too.

The fourth and final section of the book focuses on the communication aspects of coloration. Jack Hailman's chapter analyzes the *conspicuousness* of animals in their natural habitats, echoing (but summarizing) considerable material from his own "Optical Signals" book. The three primary factors affecting conspicuousness are irradiance (amount of light reaching the animal), background against which the animal is viewed, and attenuation of light before it reaches the observer. Measurements of irradiance in various forest habitats show that the *quality* of light (i.e., wavelengths present) is little-influenced by the vegetation, but quantity is substantially reduced. This allows some predictions. For example, because blue coloring requires more irradiance than longwave colors, forest birds are not expected to be blue. Agreeably, few are. Hailman notes that such predictions are likely to be most useful when comparing closely related species. Thus, Indigo Buntings (dark, saturated blue) display from open sites whereas sympatric Painted Buntings (which have bright longwave patches) call from the shadows.

In a short but stimulating chapter concerned with interspecific communication, Jeffrey Baylis selectively reviews some of the better-understood cases of aposematic coloration, mimicry, and "cleaning symbiosis" before drawing a series of generalizations about interspecific communication. He argues that, because signals between species usually encode less precise identification (e.g., just membership in a *set* of organisms, such as "toxic," "inedible," etc.), much of the variation found in intraspecific signals is unnecessary. That is, selection on interspecific signals need not favor the variability essential to make individual recognition possible. Furthermore, because such signals are often intended for animals with entirely different perceptual sensitivities, some of the signal components are unusually accessible for analysis. For example, when the signaler is a toxic insect and the receiver is a predaceous bird, the signal cannot be in the ultraviolet spectrum (although that is where the sender may be most sensitive): it must cater to the bird's abilities.

In the final chapter, William Rowlands summarizes the colossal literature on intraspecific visual communication with a fairly even hand. I was a little disappointed to find no new ideas, interpretations, or twists but it seemed ideal as a general reading assignment for a behavior class.

Overall, the volume offers the strengths and weaknesses inherent in the symposium format. One finds a lack of consistency and balance but also a diversity of opinion and approach. Considering the extent of the subject, this gives the reader a good place to start. I came away from it with the sensation that we are somehow between major advances: the classical ethological findings are summarized and a handful of new attack methods are indicated. The next few years should see a lot of excitement in the field of animal coloration.—Douglas W. Mock.

84. A Bibliography of British Columbia Ornithology. R. Wayne Campbell, H. R. Carter, C. D. Shepard, and C. J. Guiguet. 1979. Heritage Record No. 7. Brit. Col. Prov. Mus. 185 p. Paperbound, no price given.—This bibliography contains 2,100 entries listed sequentially and cross-referenced by author, species, and geographic area within the Province. A very large proportion of the literature on British Columbia birds appears in local journals, often of limited accessibility, which might be overlooked by most workers. Thus, this compilation will be extremely useful to anyone interested in Canadian ornithology.—J. R. Jehl, Jr.

85. Birds of Pennsylvania: When and Where to Find Them. M. Wood. 1979. University Park, Pennsylvania State University College of Agriculture, 148 p. $2.00 (paper available from Box 6000, University Park, PA 16802).—An updated version of a similar 1973 publication, this work includes a brief discussion of all species that have been reported (with apparent credibility) for Pennsylvania. A list of 35 escaped species is given as well as seven extirpated and extinct species for the state. About 35 pages of material have been added to the earlier edition. The 8½" × 4½" size makes it convenient to carry and many well executed line drawings of species enhance this thoroughly prepared work which should be in the pocket of the field jacket of every serious birder in the Keystone state.—Richard J. Clark.

86. The Ecology and Behavior of the Prairie Warbler *Dendroica discolor*. V. Nolan, Jr. 1978. A. O. U. Ornithol. Monogr. No. 26, 595 p. $29.50 cloth.—Every library, private or public, should have this work. To describe it, one gropes for adequate terms—monumental, definitive, encyclopedic. Although the Prairie Warbler breeds only in scattered locations in the eastern United States and southernmost Ontario, as a fairly typical member of the largest order of birds, it shares many features with the majority of birds on earth and therefore will be of interest everywhere. The 8-page table of contents will serve as a check-list for future works on passerine species.

This study focuses on a small population studied in southcentral Indiana over a period of 21 years, 1952–1972. However, it treats the species comprehensively, drawing on an extensive literature for information from the whole breeding range as well as the wintering range in the West Indies. Comparisons with other birds are numerous, as attested by the 22-page bibliography. Anatomy and physiology, although not suggested by the title, are treated also. A frontispiece painted by Ted Miley illustrates, in color, nine variations in plumage, including a tailless fledgling.

This work illustrates the great power of intensive study on a small area near the observer's home, in this instance five minutes' walk away. Nolan greeted each bird on arrival in spring, and marked virtually every one, finding the nests while they were being built. He followed each individual, including fledglings, through the summer and in many cases up to the day of migration. Where can you match such complete coverage in a field study? It approaches the total surveillance possible with captive subjects. His manipulations of birds and eggs are also reminiscent of the laboratory. Detailed familiarity with each bird was accomplished in part with the aid of student assistants. Learning to capture these quick, tree-nesting birds was no mean feat.

A few examples illustrate the kinds of information yielded by this study but often hard to find elsewhere. Reports on reproductive success center on nests and eggs, but since many birds attempt more than one nesting a year and not all of these are discovered, it is usually impossible to deduce the actual yield of fledglings per pair, a crucial figure in population dynamics. Here each female was followed through all the intricacies of repeated nesting attempts (mean, 3.2 per year), movements to different territories, and changes of mates to arrive at the true figure for each female (mean, 2.5 fledglings per year). Predictably, nest losses were higher and renestings were more frequent than in most studies of related species.

A topic of special interest to me was the interaction with the Brown-headed Cowbird (*Molothrus ater*). The cowbird deposited eggs in 27.4% of the warbler nests and lowered the host's production by 13.3%, apparently not a devastating loss. Once I hypothesized (*Condor,* **65:** 257–263, 1965) that the distribution of cowbird eggs among available nests was as impartial as though deposited by a roulette wheel, and the number of nests receiving 1, 2, 3, or more eggs could be predicted by the Poisson series by knowing simply the number of eggs to be deposited and the number of nests to receive them. I argued that the accuracy of this prediction usually was not fulfilled because many nests abandoned early as a result of the deposit of a cowbird egg were never found by the human observer and, therefore, were lost from the sample. In Nolan's uniquely complete sample the distribution of cowbird eggs was almost exactly random as predicted. Another interesting fact revealed by this study was the extremely low fledging success of cowbird eggs (5% of those laid) in nests of Prairie Warblers and with similar rates for other hosts in the same region. This has an implication for the persistent question about the number of eggs cowbirds need to lay in a season to reproduce themselves, adding fuel to the suspicion that cowbirds lay many more eggs than most of their hosts.

Another subject on which little information is available elsewhere is the survival of fledglings from nest-leaving to independence (82% of fledglings) and from independence to return the following spring (39% of independent juveniles, inferred from various lines of evidence).

Although this book is long and detailed (186 tables), it is not wordy. Indeed, it is almost forbiddingly compact and crammed with facts. Apparently the years of preparation and editing have condensed it beyond the point that I might have wished. It is not easy to skim. At times I wished Nolan had expended a few more words on summary in each segment, with perhaps a summing up comparable to the lead in a news story to aid the reader in getting the essence of a section without reading every paragraph and searching every table. However, the frequent subheadings and the complete index ease the problem of reference. In the same vein, I often wished Nolan, in referring to another work with "see" or "compare," had not merely given me a reading assignment (Is this the teacher at work?) but had indicated in a word or two whether these other findings were supportive or conflicting.

As a model for future studies, this work may have particular appeal to amateur ornithologists, who are likely to be attracted by studies of the whole bird, whereas professionals today are likely to get quicker results and recognition from directing their attentions more narrowly to testable hypotheses and other problem-oriented investigations.

Let us hope this storehouse of information is not buried by being placed in a big book and that the price (not excessive by modern standards) will not discourage purchasers. It has been my experience that many students turn more often to journals than to monographs, perhaps because the journals are more widely available. No student of passerine birds can afford to overlook this work.—Harold F. Mayfield.

87. The Gannet. J.B. Nelson. 1978. Buteo Books, Vermillion, SD, 316 p. $20.00 and **The Sulidae: Gannets and Boobies.** J. B. Nelson. 1978. Oxford, Oxford University Press. 1012 p. $98.00.—Every so often an ornithologist establishes a long-term relationship with a species or restricted group of birds. Some examples among marine researchers include Richdale with penguins, Fisher with fulmars, and Tuck with murres. For 20 years Bryan Nelson has studied (and continues to study) sulids, concentrating on gannets in Scotland. Nelson, always a highly productive researcher, has produced a truly voluminous compilation on the Sulidae and an extended monograph on Gannets (*Moris bassanus*). Fine photographs and drawings add vitality to both presentations. These books, as Nelson points out in his Preface to "The Gannet," do not substitute for one another, but are independent works with very different styles. "The Sulidae" is a reference work that draws together what is known about the family and is written for the specialist or those with a specific interest in these birds. Each of the nine sulids is considered extensively in a separate section and a comparative overview rounds out the work; each section is subdivided into four main parts: nomenclature and description, distribution and population, ecology and behavior. As is usual with a comprehensive reference work, it is often slow going. By contrast, "The Gannet" without sacrificing the high standard and caliber of the larger work is light and swift and exposes the reader to the wonderment of these seabirds. It too provides a compelling family comparison from which one might delve more deeply into details via "The Sulidae."

Nelson prefers to classify the sulids as monogeneric (*Sula*) with the three gannets grouped in the super-specific category (*bassana*). The resultant trinomials are cumbersome. The known colonies and breeding distributions of each sulid are described in "The Sulidae." When the existence of the gannetry on Baccalieu Island, Newfoundland was first formally documented, Peters (*Auk,* **59:** 100, 1942) estimated 200 not 2,000 pairs, an apparent typo in both books. The aerial and ground census data of the Newfoundland colonies are in much closer agreement than appeared to be so when "The Gannet" went to press; the reported ground counts on Funk and Baccalieu Islands are now known to be low. Nelson provides substantial documentation for interpopulation exchange among gannetries. It appears that as a consequence of wandering during the prebreeding years (from four to seven), gannets may initially nest in any of many colonies including the natal one, although once this choice is made they return in successive years. Demographic findings have shown conclusively that gannetries frequently exhibit considerable expansion and growth due to the large scale immigration of new breeders. The oceanic distribution maps in the last chapter are difficult to compare because of apparently large seasonal fluctuations in these patterns that are not accounted for in the figures. Many thought-provoking arguments about adaptive significance are provided throughout both books, but in places there is a tendency for lapses into dogmatic and question-begging interpretations. For example, the vigorous begging of tree-nesting Red-footed Boobies (*Sula sula*) is considered adaptive in view of scarce food supplies and danger of starvation, whereas elsewhere the maladaptiveness of such activity among other sulids that nest in precarious sites (Northern Gannet, Abbott's Booby) is emphasized. Group selection is invoked fairly often, but especially in considerations of the temporal distributions of egg-laying, e.g., ". . . no population can ever achieve in any one year, the theoretically perfect distribution of laying . . . but it is always striving towards the distribution which on average does best . . ." (p. 176, "The Gannet"). ". . . it is advantageous for the red-foot to stagger its breeding so that all do not fail due to one unfavorable spell . . ." (p. 706, "The Sulidae"). Nelson is without equal in his descriptions, analyses, and interpretations of sulid behavior. When one watches gannets in the field (and I presume other sulids), it is easy to be taken aback with the accuracy of his descriptive accounts. The behavioral interpretations derive from motivational conceptions; sociobiological ones that might complement these are left to the reader's imagination. These minor criticisms fail to weigh in view of the scope and breadth of these works, which have much to offer and raise many fascinating issues that should stimulate interest and future investigation for some time to come.—W. A. Montevecchi.

88. A Manual for Bird Watching in the Americas. D. S. Heintzelman. 1979. New York, Universe Books, 255 p. $17.95.—This book is not intended to be a field guide but rather to consolidate information that would be most useful to beginning and less experienced birders (birdwatchers). Early chapters deal with basics, e.g., what is birding and what equipment is used? Listings include field guides, references, checklists, rare bird alerts, birding organizations, and ornithological organizations. Also discussed are life lists, Christmas Bird counts, and Big Day counts. Chapters on breeding bird projects and backyard birding complete the basics. An individual chapter deals with each of the following groups of birds: seabirds, waterfowl, hawks, owls, shorebirds, and warblers. Birding is then discussed by the climatic/geographic regions of the arctic and subarctic, United States, West Indies, Central America, South America, and Antarctica.

This book should fulfill its objective in that it brings together information that is dispersed in the literature and is easy reading. It will facilitate new birders getting more enjoyment out of this rapidly growing form of recreation. Many photographs in both black and white and color must add considerably to the cost and one wonders if five half-page photographs of Whistling Swans in southeastern Pennsylvania are warranted in a book that should have a fairly wide audience.—Richard J. Clark.

89. Population Ecology of Raptors. I. Newton. 1979. Buteo Books, Vermillion, SD, 399 p. $35.00.—This book, sure to be a landmark in falconiform conservation history, presents the population ecology of *diurnal* raptors in 18 chapters including the discussion of intersex relationships, dispersion, density (breeding and winter), problems concerning nest sites, breeding (seasons, strategies, rates, behavior), fidelity to breeding areas, movements, mortality, human persecution, DDT and other organochlorines, other pollutants (e.g., heavy metals) and pesticides, conservation management, breeding from captive birds, and conclusions. Splendid black-and-white plates (32 pages) show 39 species and 68 tables, 50 figures, and 809 references exhaustively document this versatile work. Summaries at the end of each chapter (except the last) effectively present a condensation of the chapter. The author's style is readable because of its lucidity and directness.

The title is unfortunate because it promotes the European "raptors and owls" concept. It will mislead many North American biologists who include owls as raptors in their thinking. The only part of the text where they are included is in the chapter on mortality and a table that includes 11 species of Falconiformes taken by the Eagle Owl (*Bubo bubo*) as prey. Also included is lengthy discussion of Falconiformes that scavenge for their food.

The only errors that I detected were the misplacing of an asterisk (denoting statistical significance) on a female/male ratio (Table 2) determined from nestling hawks. A ratio of 1.16 is identified as being "different from equal" whereas the value of 1.47 (immediately below it) is not. The above values are for the Hen Harrier (*Circus cyaneus*) and a third value (0.87–1.0) from the literature (Clark, *Blue Jay*, **30:** 43–48, 1972) was overlooked. Also the author mistakenly implies that a year of very low production in a Hen Harrier population (Hamerstrom, *In* Hickey, pp. 367–383, 1969) was attributed to "DDT poisoning." The author herself had indicated that "the cause of the decrease in nesting is still unknown." These are relatively minor shortcomings compared to the assets of this splendid book.

The author has done a remarkable job of reviewing the world literature pertinent to falconiform population ecology. He has clearly identified ideas based on fact, suggestive but resting on insufficient evidence, and untested, and provides many ideas on further study needs. He has done an admirable job of reducing problems (e.g., in areas of falconiform conservation) to an understandable level without implying simplicity of problems and subsequent solutions.

He has treated most of the controversial subjects that deal with Falconiformes and discussed value judgments with great tact and logic. He fails to treat the effect that oologists and falconers may have had on certain falconiform populations. He has noted the very important contributions the latter group has, and is, making on various aspects of the conservation of this group of birds. The book represents an excellent state-of-the-art report on falconiform research and conservation.

Fine line drawings by James Gammie greatly enhance this work. Lists of plates, figures and tables, and a thorough index insure that this book will be heavily used by both amateurs and professionals who deal with Falconiformes. I hope those interested in owls will carefully consider this volume when producing a comparable edition on the *nocturnal* raptors.—Richard J. Clark.

90. Research is a Passion with Me. Margaret Morse Nice (ed. by Doris Huestis Speirs). 1979. Consolidated Amethyst Communications, Inc., Toronto. 322 p.—Mrs. Speirs, who edited this volume, suggests (in litt.) that I was probably the last ornithologist to visit with Mrs. Nice, who founded this review section. On 24 January 1970, my family and I drove to Chicago so that I could spend the afternoon with Margaret Morse Nice. She had completed this autobiography, showed me parts of the manuscript, and talked of her frustrations in failing to find a publisher. Thanks to her brother, to the Margaret Morse Nice Ornithological Club of Toronto, and to Doris Huestis Speirs, posthumous publication is a reality. Margaret Nice died at the age of 90 at her Chicago home on 26 June 1974, a few months after the death of her husband.

What fortunate set of factors produced this extraordinary woman? Very likely we will never know with certainty, but the combination of her autobiography and Milton Trautman's outstanding memorial (*Auk,* **94:** 430–441, 1977)—compiled without access to the autobiography—will remain principal source materials. The book is what one might expect from this tough New England woman: a factual, straightforward, often dry account revealing little introspection but executed with marvelous detail taken from her copious diaries and notes. Margaret Nice reminded me of my maternal grandmother; indeed, the two women were born only a few months apart and a few miles apart, Margaret on 6 December 1883 in Amherst, MA. The same clarity of purpose, physical stamina, unrelenting perseverance, emotional reserve and unpretentious conversation that I knew in my grandmother I found in Margaret Nice.

I shall not recount the chronology of her life, her extraordinary accomplishments, nor the many honors bestowed upon "MMN" (as many referred to her). Indeed, Trautman summarizes these admirably, and if that be one's only interest I recommend reading the memorial rather than the autobiography. Instead, I shall try to show why reading the book provides not just more detail but better understanding of one of this century's greatest ornithologists.

The Foreword by Konrad Lorenz at once hits the nail on the head and misses the mark completely. MMN was indeed a keen observer, as "unbiased and free from any hypotheses or prejudice" as is probably possible, but I doubt seriously that she "was fully conversant with the subtlest and most difficult problems of modern ethology." Indeed, she left theory and the intricacies of science to her friends such as Lorenz, Ernst Mayr, and other enormous intellects of our times. MMN probably deferred too readily to *certain* authorities: those whom she especially admired, including many women. For example, she recounts (p. 88) the opinions of Charlotte Perkins Stetson Gilman on the "Fundamental Falsity of Freud" that "Sex is not the life force . . . not essential to individual life but to the race. Its purpose is the improvement of the species." MMN reveals no perception of the difference in sexuality as a force in the psyche (Freud's concern) and the problem of the evolution of sexual reproduction. Nothing in this autobiography, nor anything I can remember reading by MMN, shows clarity of distinction between proximate and ultimate questions, or even fundamental understanding of either evolutionary or ontogenetic processes. MMN passes by the opportunity to unravel Mrs. Gilman's double confusion, merely stating instead her admiration and implying acceptance of Gilman's views. Indeed, Margaret Nice herself says (p. 124) that in preparing reviews for the then *Bird-Banding,* she "could read and review factual studies in an amazing array of languages," it should be noted, "but theoretical discussions remain beyond me."

Her forte was two-fold: detailed factual observation, as illustrated by her classical volumes on the Song Sparrow (*Melospiza melodia*), and correction of empirical errors by others. She was a marvelous nest-finder, as revealed repeatedly in the autobiography, and who but MMN could have documented all 2,305 songs by an individual bird in a single day (p. 142)? "Refutation" she comments (p. 80) "never overtakes a well-launched error." The autobiography is laced with her frustrations concerning errors and incompetence, such as concerned the vocal repertoire, incubation period, and parental duties of the Song Sparrow (p. 95), attributing 27 of her own publications to Charles N. Gould (p. 103), a wrong letter sent to her (p. 103), and a most illuminating quarrel she had by correspondence with Schjelderup-Ebbe, discoverer of the dominance hierarchy in animals (p. 158–159). She was delighted to be appointed an Associate Editor of *Wilson Bulletin* so that she could "correct errors before they were published rather than after the damage had been done" (p. 202). Perhaps her most famous critical endeavor was correcting the outlandishly inaccurate figures on avian incubation periods, which she traced to extrapolations from an off-hand statement by Aristotle (chapter 32).

Perhaps the ultimate irony is the existence of errors in this, her last work: minor in content but many in number. Margaret would not have missed "classed" for "classes" (p. 22), Mississippi "Kit" for "Kite" (p. 73), "wintered" for "bred" (p. 95), "heirachy" (p. 108), "Gatlinsburg" for the Tennessee town (p. 162) and the humorous slip "navel officer" on page 132. Latin names of birds are editorially footnoted at first occurrence, but the *Ictinia mississippiensis* occurs twice (pp. 39 and 64), *Zonotrichia* is misspelled (p. 22), Woodhouse's Jay is marked with a number that is both out of sequence and has no footnote (p. 66), *Geococcyx* bears two numbers, one wrong (p. 73) and so on. And I doubt that MMN wrote repeatedly of "colour" or that she used the reflexive ungrammatically (p. 202).

As history, the autobiography has its moments, such as her breakfast in 1923 of "T-bone steak, hot cakes and coffee—all for 40 cents" (p. 71). She traveled to see the 1925 total eclipse of the sun (p. 78) and has sprinkled comments on the times. She was apparently the first ornithologist to use the automobile for bird censuses, and includes much material useful in the history of ornithology. The biography of Jan Joost ter Pelkwyk (chapter 28) is particularly salutory, and Margaret mourns his death and those of other European ornithologists in World War II. At several points she speaks out against war, and she documents the efforts of Joe Hickey, Fran Hamerstrom, John Emlen, and others in organizing relief for European ornithologists after the War. MMN has repeated words for "the formal atmosphere of the A.O.U." (p. 120), the "very friendly, democratic" Wilson Club (now Society), the all-male Wheaton Club in Columbus that finally admitted her as an "unofficial honorary member" (p. 151), and numerous individual ornithologists who are easily divided into white-hats and black-hats. I was particularly happy to see frequent mention of R.M. Strong (white-hat), a frequently overlooked American pioneer (who in 1914 published descriptions of feeding in Herring Gull chicks).

Margaret Morse Nice wrote about 15 papers on child psychology, another 250 articles (popular to technical) on birds, more than 3,000 reviews for *Bird-Banding*, and some 30,000 letters. How did she write all this, bear five children, run a household, stay married to the same man and still manage to spend more time in the field than a lot of professional biologists? "My technique of housework . . . was based on efficient preparation of good and simple meals, scalding water instead of dish towels, sending out the washing and ironing, and dispatch in the matter of cleaning" (pp. 34–35). Later, she spent "*all* my available energies on Song Sparrows . . . except what has to go for sleeping, eating, getting breakfast and lunch and a little more house work. (Our daughters prepare dinner and wash all the dishes.)" (p. 121). But the frustration often emerged: ". . . in what seemed to be cramped quarters, no one enjoying housework, and much of the time without even a college girl to come in an hour a day to wash the dishes, with no means of transportation but our own legs and the baby carriage, and no free Sunday afternoon for tramps to the river, I was truly frustrated. I resented the implication that my husband and the children had brains, and I had none. He taught; they studied; I did housework" (p. 41).

MMN resented being called a housewife because she was a trained biologist. She had a bachelor's degree from Mount Holyoke and in 1926 was awarded a Master of Arts from Clark University, which institution sensibly backdated the degree to 1915, when she had done her thesis research. Later she would feel frustration: "Publishers . . . do not necessarily judge a book on its merits, and my lack of a Ph.D. and of professional status was far more of a handicap" in child psychology, where her book never saw print, "than it was in ornithology" (p. 79). And "Sometimes I rather regretted that I had not gone ahead and obtained this degree . . . . But no one had ever encouraged me to study for a doctor's degree; all the propaganda had been against it" (p. 33). She was eventually awarded honorary doctorates from both Mount Holyoke and Elmira College.

The life and career of Margaret Morse Nice are paragons for all women of science. Today's woman does not have to find her field sites on horseback with a revolver tucked under her dress; indeed, she will no doubt be in jeans when she steps from her jeep. No longer will she be excluded from learned societies merely because of her sex, nor will she have to pioneer recognitions (Margaret was the second woman A.O.U. Fellow, the second female Brewster Medalist, first of her sex to be President of the Wilson Club, and so on). It is fitting, I think, that the Margaret Morse Nice Ornithological Club—the first (and I believe, only) exclusively female organization of its kind—was created in 1952 because the Toronto Ornithological Club did not allow women. And it is the ultimate demonstration of their protest against sex-discrimination that these women have provided us with the autobiography of one courageous member of their sex, who showed beyond a doubt that despite incredible obstacles a woman can achieve true greatness.—Jack P. Hailman.

REQUESTS FOR INFORMATION

During the fall and winter of 1979–1980, as part of a two-year study on the comparative winter foraging ecology of gulls on southeastern Lake Erie, the wings and tails of Ring-billed Gulls will be color marked with green paint. Persons observing these gulls are requested to report the date, time, exact location, plumage or age class, area of wings and tail marked, activity, and their name, address and telephone number to the BIRD BANDING LABORATORY, *Office of Migratory Bird Management, USFWS, Laurel, MD 20811.* Please send a copy to BETTY-ANN CHAPMAN, *Biology Department, State University College, Fredonia, NY 14063.*

Research on the population dynamics and distribution of Texas Least Terns will be continued in 1980. Adult and young terns will be marked on each wing with colored patagial tags that each bear a single letter and digit for individual recognition. Observers of Least Terns so marked are requested to record: date, time, specific location, tag color, alphanumeric symbol, general activity, association with other birds, observation distance and direction, and name, address, and telephone number of observer. Please send information to BIRD BANDING LABORATORY, *USFWS, Laurel, MD 20811* with a copy to BRUCE C. THOMPSON, *Dept. Wildl. & Fish. Sci., Texas A&M Univ., College Station, TX 77843.*