RECENT LITERATURE

Edited by John A. Smallwood

RESEARCH TECHNIQUES

(see also 41, 52)

1. **Survival and reproduction of radio-marked adult Spotted Owls.** C. Foster, E. Forsman, E. Meslow, G. Miller, J. Reid, F. Wagner, A. Carey, and J. Lint. 1992. J. Wildl. Manage. 56:91-95.—The influence of backpack transmitters on Spotted Owls (*Strix occidentalis*) was studied by comparing survival and reproductive rates of radio-marked and nonradio-marked (color-banded) birds. Data were examined from 14 studies in Washington and Oregon. No differences were found in survival rates between radio-marked and nonradio-marked owls. Body mass of owls before and after they had worn transmitters did not differ for males or females. However, radio-marked owls tended to fledge fewer young than owls without transmitters. The authors suggest that a 19-26 g backpack could reduce the amount of prey that could be carried by males, thus reducing the amount of food delivered to nestlings. Smaller transmitters mounted on tail feathers are discussed as an alternative. [USFS, Pacific NW Research Station, Olympia, WA 98502, USA.]—Robin J. Densmore.

2. **Assessing bias in studies of Bald Eagle food habits.** T. J. Mersmann, D. A. Buehler, J. D. Fraser, and J. K. D. Seegar. 1992. J. Wildl. Manage. 56:73-78.—Biases of three techniques used in food habit studies of Bald Eagles (*Haliaeetus leucocephalus*) were examined. Pellet analysis and food remains analysis were conducted using two captive Bald Eagles on regulated diets. Direct observations were made by boat, car, and foot on eight highly used foraging areas of the northern Chesapeake Bay. Pellet analysis resulted in a significant underrepresentation of fish, while bird and mammal food items were detected in more than one pellet. Food remains analysis resulted in an overrepresentation of birds, medium-sized mammals, and large bony fish, and an underrepresentation of small mammals and small fish. Although the direct observation technique showed biases for easily identifiable species, it also allowed for identification of small, soft-bodied fish not documented by other techniques. Due to the existing biases in all three techniques, the authors recommend use of a combination of these techniques. [Dept. of Fisheries and Wildlife Science, Virginia Polytechnic Inst., Blacksburg, VA 24061, USA.]—Robin J. Densmore.

3. **A mist net design for capturing Marbled Murrelets.** P. W. C. Paton, C. J. Ralph, and J. Seay. 1991. N. Am. Bird Bander 16:123-126.—In this paper the authors describe a method for capturing forest canopy birds. Five mist nets are sewn together, the bottom of one to the top of the next, to make one large (10.5 × 18.3 m) net. A rigging system, used to hoist the net into a gap in the forest canopy to a height of 45 m, also is described. Professional climbers were employed to erect the rigging, and a crew of 2-4 people operated the net. Although this technique was designed to capture Marbled Murrelets (*Brachyramphus marmoratus*), the system should be effective for other canopy-dwelling species. [Utah Coop. Fish and Wildlife Research Unit, Utah State Univ., Logan, UT 84322, USA.]—John A. Smallwood.

BEHAVIOR

4. **Post fledging behavior of American Kestrels in central Kentucky.** C. Kellner. 1990. J. Raptor Res. 24:56-58.—Movements and behavior of newly fledged American Kestrels (*Falco sparverius*) from two nests are reported. Data were collected in spring and summer of 1983 in central Kentucky. Juveniles from the first nest remained close to their natal area for 24 days after fledging; the second group traveled over their parents' hunting range soon after fledging. The first group left their natal area in early summer while the second group remained with the adults into late summer. Groups of foraging juvenile kestrels consisting of individuals from more than one nest were observed on two occasions. The first observance of prey capture occurred on the 25th day after fledging. Roost sites were alternated daily and nest boxes were not used after fledging. Possible reasons for behavioral differences

between the two groups of fledglings are discussed. [Dept. of Biological Sciences, Eastern Kentucky Univ., Richmond, KY 40475, USA.]—Robin J. Densmore.

5. **The adaptive significance of male subadult plumage in Purple Martins: plumage dyeing experiments.** B. J. Stutchbury. 1991. Behav. Ecol. Sociobiol. 29:297–306.—The author tested two hypotheses which propose mechanisms by which subadult plumage in Purple Martins (*Progne subis*) enhances their reproductive success (the subordinance signaling and female mimicry hypotheses) by observing interactions between subadults and adult territory owners at martin colonies in Marshall County, Oklahoma, and Grayson County, Texas. Both the subordinance signaling and female mimicry hypotheses predict that adult male territory owners will be less aggressive toward subadult male than adult male intruders. Contrary to these predictions, however, the data indicate that adult male owners were not significantly less aggressive toward subadult male versus adult male intruders for any category of intruder behavior ($P > 0.10$). Moreover, adult males were clearly able to distinguish subadult males from females, and attacked intruding young males significantly more often than intruding females ($P < 0.01$). In order to test summer adaptation hypotheses (proposed in a variety of previous studies), which predict that young birds with subadult plumage should be more successful in territory and mate acquisition than young birds with adult plumage, subadult male "floaters" were dyed to mimic the appearance of adult males. Subadult male martins dyed to appear adultlike acquired territories significantly sooner than control subadult males ($P < 0.025$), which disputes the critical prediction of existing summer adaptation hypotheses. However, there was no difference in the time it took dyed and control males to attract a mate after they obtained a territory. These data suggest that subadult plumage in martins does not confer an adaptive advantage on young birds competing for access to breeding territories. In late winter, subadults were growing mostly female-colored feathers on their undersides, suggesting that the subadult plumage is not the result of a molt constraint. The author proposes that subadult plumage could be adaptive for winter competition and survival, but maladaptive during the breeding season. [Dept. of Zoological Research, National Zoological Park, Smithsonian Inst., Washington DC 20008, USA.]—Danny J. Ingold.

6. **Nestling American Robins compete with siblings by begging.** H. G. Smith and R. Montgomerie. 1991. Behav. Ecol. Sociobiol. 29:307–312.—Begging behavior in nestling birds may be the evolutionary by-product of a variety of selection pressures involving both inter- and intra-brood conflict. During intra-brood conflict the investment a parent makes in a brood is fixed and each nestling attempts to manipulate parents to provide it with a larger portion of the investment. This leads to the prediction that begging intensity will not only be dependent on hunger level but on the begging intensity of siblings as well. The authors observed 12 pairs of nesting American Robins (*Turdus migratorius*) in Chaffey's Lock, Ontario, Canada, during the 1989 breeding season to test whether: (1) increased begging behavior enhances the probability that a nestling will receive a greater portion of food, (2) food deprivation affects the relative share of food that a hungry nestling subsequently receives, and (3) a nestling's begging intensity was influenced by the begging intensity of its siblings. Nestlings that received food first initiated begging significantly earlier than their nestmates ($P = 0.002$) and with significantly more intensity ($P = 0.002$). Moreover, food-deprived nestlings begged with significantly greater intensity after food deprivation than before ($P < 0.04$), and received a significantly greater proportion of first feedings from parents ($P = 0.001$). After food-deprived nestlings were returned to their nests, there was a significant correlation between the amount of begging of food-deprived and control nestlings ($P = 0.013$). The results of this experiment support the hypothesis that begging evolves in response to sibling competition, and that conspicuous begging seems to be an evolutionarily stable strategy. [Dept. of Biology, Queen's Univ., Kingston, ON K7L 3N6, Canada.]—Danny J. Ingold.

7. **Correlates of male mating success in the Ruff *Philomachus pugnax*, a lekking shorebird.** W. L. Hill. 1991. Behav. Ecol. Sociobiol. 29:367–372.—Male Ruffs opt for one of two mating strategies during the lekking season: (1) independent males aggressively defend small territories on a lek, while (2) satellite males are nonterritorial and use the display sites of temporarily tolerant independent males to compete for access to females.

The author studied a variety of potential correlates of the mating success of independent male Ruffs on the island of Oland, off the southeastern coast of Sweden, during two breeding seasons. Independent males accounted for 89% of all copulations observed, and a multiple regression analysis revealed two variables significantly correlated with this success ($P <$ 0.001). The more satellite visits a male received and the longer he attended a lek, the more matings he achieved. However, since the mating success in male Ruffs is so unevenly distributed, independent males were categorized into two groups, those successful at mating and those that were unsuccessful. A subsequent discriminant function analysis revealed that three variables significantly discriminated between successful and unsuccessful birds, including the two mentioned above. A third variable, aggressive rate, also was a significant factor ($P < 0.05$). The use of multivariate analyses in this study helped to resolve conflicting conclusions regarding Ruff mating success in previous studies which employed only univariate statistics. [Dept. of Psychology, Lafayette College, Easton, PA 18042, USA.]—Danny J. Ingold.

8. A case of polyandry in Black-capped Chickadees J. L. Howitz. 1991. Loon 63: 152–153.—Breeding Black-capped Chickadees (*Parus atricapillus*) were observed from March through early July 1991 in Anoka and Isanti counties, Minnesota. The author reports an instance of polyandry in which a male chickadee (M1), after its mate had died, ceased defending a territory and formed a pair bond with a female that already had a mate. The female, already feeding young nestlings sired by its original mate, engaged in extra-pair copulations with M1. A few days later all three birds (M1, the female, and its original mate) were observed feeding the nestlings. No subsequent nesting efforts were undertaken by any of the three birds during the season. Until this instance, confirmed polyandry in Black-capped Chickadees had been reported only once. [1700 Silver Lake Rd., New Brighton, MN 55112, USA.]—Danny J. Ingold.

9. Why do male House Wrens feed their incubating mates so rarely? L. S. Johnson and L. H. Kermott. 1992. Am. Midl. Nat. 127:200–203.—The authors observed only eight of 21 (39%) male House Wrens (*Troglodytes aedon*) feed their incubating mates during three breeding seasons in Sheridan County, Wyoming. No significant difference was detected in the feeding rates of males who did and did not advertise for second mates ($P > 0.40$), nor was a correlation detected between the rate of incubation feeding and rate of advertising song output among males ($r = 0.01$). Previous research suggests that low male feeding rates are not the result of selection pressures on males to reduce the risk of predation on incubating females or eggs. The authors suggest that male House Wrens do not feed females at higher rates simply because there is little or no benefit to the male's fitness to do so. Those which fed their mates may have done so inadvertently, with the real intention of feeding anticipated nestlings. [Dept. of Biological Sciences, Univ. of Calgary, Calgary, AB T2N 1N4, Canada.]—Danny J. Ingold.

10. Behavioral adaptations to cliff nesting in the [Black-legged] Kittiwake (*Rissa tridactyla*): convergences with the [Northern] Gannet (*Sula bassana* [=*S. bassanus*]) and the Black Noddy (*Anous tenuirostris* [=*A. minutus*]). E. Danchin and J. B. Nelson. 1991. Colon. Waterbirds 14:103–107.—Black-legged Kittiwakes have a number of behaviors not possessed by ground nesting larids, and several authors have suggested that these are adaptations for cliff nesting. The authors test this hypothesis by comparing kittiwake behaviors, some newly described, with those of other cliff nesting gulls, and particularly with Black Noddy and Northern Gannet. There are many parallel behaviors among these species in the establishment and maintenance of territory. For example, in both gannets and kittiwakes, males establish the nest site and territorial fighting is intense. Aggressive upright postures of ground nesting gulls do not exist in kittiwakes, and kittiwakes have unique long distance threat behaviors, e.g., the Bow and Moan, which has an equivalent in the noddy. There also are analogous behaviors among kittiwakes, gannets, and noddies in sexual behavior, egg laying, nest building, egg and chick care, and nest relief. Similarly, noddy and kittiwake fledgling periods and time between first flight and leaving the colony are long compared to other gull species. The authors also find some parallels between the behavioral repertoire of kittiwakes and cliff nesting larids. They conclude that the many convergences among kittiwakes, gannets, and noddies and cliff nesting larids provide strong support for the hypothesis that these behaviors are adaptations to cliff nesting. [C.R.B.P.O./M.N.H.N. 55 Rue Buffon, 75005, Paris, France.]—William E. Davis, Jr.

11. Egg retrieval by Slavonian Grebe. M. J. Pollard. 1991. Scott. Birds 16:139.—Like other podicipeds, Slavonian Grebes (*Podiceps auritus*) build floating nests constructed of vegetation. The authors extensively observed a breeding pair incubating a clutch of four eggs on one such nest at Loch Ruthven in 1990. During an episode of heavy rainfall, the nest became unstable and the rim of the nest cup was depressed. The clutch remained intact for four more days, when one egg rolled down the side of the nest and into the water as the adult shuffled around on the nest platform. The egg floated as it was at an advanced state of development. The adult was able to retrieve the egg by rolling it back up onto the nest platform using the underside of its bill. In a note, the editor points out that egg retrieval is well known in gulls and geese, and has been observed previously in grebes, but that retrieval from water is unusual. [Royal Society for the Protection of Birds, Munlochy, Ross and Cromarty IV8 8ND, Scotland.]—John A. Smallwood.

12. Brood adoption and deceit among African Marsh Harriers *Circus ranivorous*. R. Simmons. 1992. Ibis 134:32–34.—Altruism, including helping behavior, is any behavior by which an individual (the donor) appears to raise the fitness of others (the recipients) at the expense of its own fitness. The existence of such behaviors is paradoxical in light of natural selection. The author lists three categories of apparent altruism: (1) reciprocal altruism, where the helping behavior is an investment which is expected to be repaid; (2) misdirected parental care, in which parents are not able to recognize their own offspring, and inadvertently provide care to nonoffspring; and (3) complete adoption of eggs or young by a donor which replaces a biological parent that has disappeared. The first category represents one mechanism by which apparently altruistic behavior may actually be selfish, i.e., the behavior increases the fitness of the donor. The third category may be maladaptive, although some benefits may accrue in terms of acquisition of territory or a widowed mate. In this paper the author gives the details of a full adoption in which the adoptive parent may have gained long term benefits.

The author studied a small breeding population of color-marked African Marsh Harriers in South Africa during a three-year period. Most pairs remained mated for the duration of the study, and few extra-pair copulations were observed. In the second year of study a female (F1) apparently lost her mate when her brood of three nestlings were approximately 39 days old, about one week prior to their first flights. Two males, a nonbreeding adult (PM) and a 2- to 3-year old (NM) fought over the vacated territory for about one week; NM succeeded in acquiring the territory. F1 engaged in solicitation behavior with NM, but no copulations were observed, and NM frequently dove aggressively at the food-begging nestlings, but did not strike them. Five days later NM began to deliver food to the nest, and subsequently defended the flying young from PM's frequent intrusions. Although F1 was observed chasing NM when he carried prey, he did not make a food transfer to her, but rather provisioned the young directly until their independence (day 86). About two weeks prior to independence, F1 began pairing with the nearby PM, who began "courtship feeding." F1 delivered these food items to her offspring. F1 did not capture any prey for her offspring; thus, she was raising a brood in which all food items were provisioned by unrelated individuals.

The behavior of the adoptive father, NM, may have increased his fitness. The following year he bred with F1 and produced three young; the average for that harrier population was only 1.16 young per nest. The next year, still on the same territory, he produced two young with a different female. [Directorate of Wildlife Conservation and Research, P/Bag 13306, Windhoek, Namibia.]—John A. Smallwood.

FOOD AND FEEDING

(See also 2, 6, 9, 24, 28, 31)

13. Diet of the Chucao (*Scelorchilus rubecula*), a terrestrial passerine endemic to the temperate rain forest of austral South America. [La dieta del chucao (*Scelorchilus* *rubecula*), un passeriforme terrícola endémico del bosque templado húmedo de Sudamérica austral.] A. Correa, J. J. Armesto, R. P. Schlatter, R. Rozzi, and J. C. Torres-Mura. 1990. Rev. Chil. Hist. Nat. 63:197–202. (Spanish, English summary.)—This species belongs in the Rhinocryptidae, one of the most primitive passerine groups in South America. They generally inhabit the forest floor, and *S. rubecula* in particular is confined to those terrestrial habitats in the broad-leaved forests of southern South America (i.e., Chile and Argentina). The diet of this species had not previously been reported on a quantitative basis, and is here documented on the basis of 41 stomachs obtained from individuals captured in mouse traps placed in three different localities (38°–42° S latitude) within Chilean temperate forests. The data are presented as numerical incidence of items over the stomachs examined (not over the total number of food items identified). Generally, all three samples (n = 17, 15 and 9 stomachs) contained 23–67% of solely invertebrates, 6–7% of solely seeds, and 33–71% had mixed invertebrates and seeds. Among invertebrates, coleopterans predominated across all stomachs examined, with the highest incidences being of curculionids, scarabaeids and tenebrionids, all typical inhabitants of the forest floor. Ants were the second most common prey in the stomachs, followed by spiders. Volant insects were scarcely represented. Among seeds, the most common were those of local trees and shrubs with fleshy fruits. Seeds of perennial and annual herbs were scarcely represented. Consequently, *S. rubecula* may be categorized as an omnivore, because it eats plant and animal items, and more specifically as an insectivore-frugivore, on account of the species composition detected in its diet. The authors commented that summer samples contained more seeds than samples obtained on other dates, and that this was in correspondence with the fructification of local trees. They also speculated that *S. rubecula* may be an important dispersal agent for local trees, particularly those in the Myrtaceae. [Dept. Biología, Fac. Ciencias, Univ. Chile, Casilla 653, Santiago, Chile.]—Fabian M. Jaksic.

14. Environmental influences on Osprey foraging in northeastern Nova Scotia. S. P. Flemming and P. C. Smith. 1990. J. Raptor Res. 24:67–67.—The purpose of this study was to determine if environmental conditions influenced Osprey (*Pandion haliaetus*) foraging behavior. Data were collected at Antigonish Harbor, Nova Scotia, during the summers of 1985 and 1986. Environmental factors examined included time of day, tidal direction, tidal amplitude, water clarity, and cloud cover. Ospreys foraged more often at dawn and dusk than at midday, and more Ospreys foraged at midtide than high or low tides. Furthermore, dive success was greatest at midtide. Tidal direction had no influence on foraging behaviors. Fewer Ospreys foraged when the water was murky; however, dive success appeared to increase during murky conditions. Although the number of foraging Ospreys increased as cloud cover decreased, cloud cover did not affect the number of dives/hour or dive success. [Dept. of Biology, Acadia Univ., Wolfville, NS B0P 1C0, Canada.]—Robin J. Densmore.

15. Foraging behavior of the American White Pelican (*Pelecanus erythrorhyncos*) in western Nevada. J. G. T. Anderson. 1991. Colon. Waterbirds 14:166–172.—Foraging behavior of American White Pelicans was studied at three Nevada sites from 1984–1986. Most foraging was in groups, either entirely of pelicans, or pelicans with Double-crested Cormorants (*Phalacrocorax auritus*). Fifty-two instances of piracy of fish from cormorants were noted in 37 hours of observation. Group foraging involved "cooperative herding" of schools of chub and carp, the principal prey items, into shallow water. In herding experiments with pelican decoys, carp responded by clustering and moving away, and could be steered into shallow water. Pelican decoys attracted pelicans while goose decoys did not. Groups of 20–150 pelicans herded fish up creeks and sloughs at night. Pelicans along the banks fished from the schools driven by the "beater" pelicans. Prey capture rates at night were apparently higher than during daytime. Nearly fledged young pelicans were fed about 10 fish per day, and daytime capture rates appeared to be too low for adults to feed both themselves and the young. This suggests that nocturnal feeding in American White Pelicans may be an important aspect of their foraging ecology. The authors suggest the group feeding in these pelicans is true cooperative behavior. [College of the Atlantic, Bar Harbor, ME 04609, USA.]—William E. Davis, Jr.

SONGS AND VOCALIZATIONS

(see 40)

NESTING AND REPRODUCTION

(see also 1, 7, 8, 9, 10, 11, 12, 26, 27, 28, 43, 44)

16. The effect of feather nest lining on reproduction in the Swallow Hirundo rustica. A. P. Møller. 1991. Ornis Scand. 22:396–400.—Many birds line their nests with feathers, a practice thought to improve the insulative properties of the nests. The reproductive advantages of feather use in nests have not been confirmed experimentally. Toward filling this void, Møller manipulated the number of feathers in Barn Swallow nests and measured egg temperatures, egg cooling and warming rates (during and after recesses), and nest attendance by adult females (males did not incubate). He also compared the success of nests from which all feathers were removed with that of a control group.

Egg cooling rates were faster in nests where feathers were removed, and egg warming rates were faster in nests where feathers were added. Moreover, the mean duration of incubation recesses was shorter, and of incubation bouts longer, at the removal nests. Thus, incubation temperatures were independent of the presence or absence of feathers in the nests because females compensated behaviorally for the changes in the nest environment. Reproductive success (viz., hatching, fledging, and nesting success) did not differ between removal and control nests, but duration of the nestling period increased, and nestling body mass decreased, at the removal nests.

Although there were no direct effects of the experimental treatments on reproductive success, Møller suggests that feather removal could have two important consequences. First, a lengthening of the nestling period could increase the risk of nest predation or of ectoparasite infestations. Second, because nestling mass is positively correlated with recruitment into the population, lighter fledglings may have poor survival. [Dept. of Zoology, Uppsala Univ., S-751 22 Uppsala, Sweden.]—Jeff Marks.

MIGRATION, ORIENTATION, AND HOMING

17. Pigeon homing in relation to geomagnetic, gravitational, topographical, and meteorological conditions. K. Dornfeldt. 1991. Behav. Ecol. Sociobiol. 28:107–123.—Unlike many previous studies, the homing pigeons (*Columba livia*) in this study that were released at magnetic anomalies under sunny skies were not disoriented. Rather, birds released within magnetic anomalies tended to be more homeward oriented than controls released elsewhere. When released at gravity anomalies, however, the pigeons showed less homeward orientation and longer homing times than control birds. These discrepancies are in part the result of stronger gravity anomalies than in earlier studies by other workers. Whether differences are also caused by strain differences was not addressed. [Zoologisches Inst., Univ. Göttingen, Berliner Straße 28, W-3400 Göttingen, Germany.]—Robert C. Beason.

18. Metabolic responses to flight and fasting in night-migrating passerines. S. Jenni-Eiermann and L. Jenni. 1991. J. Comp. Physiol. 161B:465–474.—These authors present the only published data on the plasma levels of metabolites in free-living migrants. During migratory flight there are high levels of fat metabolites in the plasma, including a high triglyceride level. There is a high protein metabolism during flight, as evidenced by the increased uric acid levels. Whether the protein utilization is a result of flight metabolism or an adjustment by the bird to match muscle mass to the lower fat load (and total mass) during migratory flight is unresolved. Birds kept inactive after a night's flight showed low levels of free fatty acids, glycerol, triglyceride, and uric acid. Birds allowed to forage after landing showed a decreased triglyceride level only, perhaps indicating that fat was being resynthesized into triglycerides. There were interspecific differences in metabolism patterns correlated with migration patterns. Garden Warblers (*Sylvia borin*) relied most strongly on fat metabolism and had the longest migratory journey. European Robins (*Erithacus rubecula*) relied less on fat and more on glucose and protein during flight and had the shortest migratory journey. Pied Flycatchers (*Ficedula hypoleuca*) were intermediate in both metabolism and length of migratory journey. [Schweizerische Vogelwarte, CH-6204 Sempach, Switzerland.]—Robert C. Beason.

19. Pigeon orientation: Daily variations between morning and noon occur in some years, but not others. M. Becker, E. Füller, and R. Wiltschko. 1991. Naturwissenschaften 78:426–428.—In 1984, pigeons released at noon from the same site as they were released the same morning showed a mean shift of 16° clockwise from their morning headings. This deviation was not exhibited by birds released at the same site in 1989. Although the authors correlate the differences to changes in the amount of sun spot activity (which affects the earth's magnetic field), they do not propose any mechanism in which *more* sun spot activity results in *less* daily variation in headings. [Fachvereich Biologie der Univ., Zoologie, W-6000 Frankfurt a. M., Germany.]—Robert C. Beason.

20. Genetic control of migratory behavior in birds. P. Berthold. 1991. Trends Ecol. & Evol. 6:254–257.—Aspects of migration that are under genetic control include whether to migrate, how far to migrate, and which direction to migrate. Selective breeding studies on Blackcaps (*Sylvia atricapilla*) and European Robins (*Erithacus rubecula*) indicate that within partially migratory species, the control of migration is highly heritable, but controlled by multiple loci. The direction and distance (as a time factor) of migration appear to be controlled by an endogenous program in a number of species. This endogenous program allows species such as the Blackcap to circumvent the ecological barriers of the Mediterranean Sea and the Sahara Desert. As a result of an increased number of bird feeders in England, part of the central European Blackcap population now migrates northwest to England rather than south to Africa. Whether this response is the result of genetic novelty or behavioral plasticity is unresolved. [Max Planck Inst. für Verhaltensphysiologie, Vogelwarte Radolfzell, D-7760 Schloss Möggingen, Germany.]—Robert C. Beason.

21. Maximum fat deposition rates in migrating birds. Å Lindström. 1991. Ornis Scand. 22:12–19.—Birds exploiting abundant food sources during migratory stopovers gain metabolizable energy at near their theoretical maximum daily rates. Fat deposition rates for these species then depend on how much energy they utilize moving about. In other species daily metabolic energy gains are limited by foraging efficiency and time. Although larger birds have lower maximum fat deposition rates, they can compensate because they are more efficient flyers. [Dept. of Ecology, Animal Ecology, Lund Univ., S-223 62 Lund, Sweden.]—Robert C. Beason.

22. Bird flight and optimal migration. T. Alerstam. 1991. Trends Ecol. & Evol. 6: 210–215.—Research on avian migration has stimulated investigations and theoretical development in many related aspects of avian biology: flight energetics, physiology, aerodynamics, etc. Most of the topics included in this review are related to theoretical aspects of flight. The computed power curve for flapping flight is "U"-shaped, with the minimum cost of transport (energy expended per distance traveled) at some intermediate flight speed. The cost of transport is affected by drag and vortices produced by the wingtips. Body drag coefficients are larger for smaller, slow-flying species (0.4) than for large, fast-flying species (0.25). These differences are predicted from aerodynamic theory. Flight speeds also are closely predicted from quantitative speed models, with maximal migration speeds slightly faster than minimal transport speeds. Bird flight theories also provide insight into the amount of fat migrants deposit prior to migration. Because increasing weight results in increasing flight costs, the benefit of adding additional fat decreases. Optimal fat loads depend on deposition rates, the distance migrants have to fly between stops, and the migrant's flight speed. [Dept. of Ecology, Animal Ecology, Univ. of Lund, S-223 62 Lund, Sweden.]—Robert C. Beason.

23. Migration of White Storks *Ciconia ciconia* reintroduced in Switzerland compared with that of the western European and northern African populations. [Zugverhalten von Weißstörchen *Ciconia ciconia* des Wiederansiedlungsversuchs in der Schweiz im Vergleich mit jenem der West- und der Maghreb-Population.] L. Jenni, W. Beottscher-Streim, M. Leuenberger, E. Wiprächtiger, and M. Bloesch. 1991. Ornithol. Beob. 88:287–319.—The migratory behavior of the White Stork is somewhat plastic. Although previous studies have shown that the stork exhibits an endogenous migratory direction, the results of this study indicate that the direction can be influenced by topographical, social, and meteorological factors. Based on banding returns, Algerian young that were fostered in Switzerland (to reintroduce the species) initially headed south, as did their natural counterparts; but the transplanted birds were redirected southwesterly by the Alps. These birds tried repeatedly to cross the Alps, but were unable to do so. In addition to 12% of the Algerian-European hybrids that spent the winter in Switzerland, 34% of the migrants returned to near their natal areas for the summer. [Schweizerische Vogelwarte, CH-6204 Sempach, Wendia Boettcher-Streim, Gartenstraße 137, D-7000 Tübingen, Germany.]—Robert C. Beason.

HABITAT USE AND TERRITORIALITY

(see also 41)

24. Bronzy Sunbirds *Nectarinia kilimensis* relax territoriality in response to internal changes. D. F. Lott and D. Y. Lott. 1991. Ornis Scand. 22:303–307.—Individuals that modify their territorial behavior in response to changing resource levels must have some way of assessing those changes, and a mechanism that alters the individual's behavioral response in future social interactions. To determine the proximate mechanisms for these changes, the Lotts monitored territorial behavior of eight male Bronzy Sunbirds before and after giving them supplemental feedings of sucrose solution. Each male was observed for two consecutive days, one with and one without a bottle of 18% sucrose solution. When given sucrose solution, males (1) increased the time spent away from their territories, (2) permitted more intruders into their territories, and (3) were slower to attack intruders. Behavioral changes following sucrose ingestion were rapid. Within 1 min of feeding on sucrose, seven of eight males either left their territories or allowed intruders to feed from the bottle unchallenged. These changes occurred despite the fact that there was no increase in nectar levels in nearby flowers or in intruder pressure following food supplementation. Thus, information gained from a single bout of feeding was sufficient for both cost-benefit assessment and the resulting change in behavior. The proximate mechanisms that triggered the behavioral changes may have been the rate of stomach filling or changes in blood sugar levels. [Dept. of Wildlife and Fisheries Biology, Univ. of California, Davis, CA 95616, USA.]—Jeff Marks.

25. Summertime home range and habitat use of Pileated Woodpeckers in western Oregon. 1992. T. K. Mellen, E. C. Meslow, and R. W. Mannan. J. Wildl. Manage. 56: 96–103.—Home range and habitat use of Pileated Woodpeckers (*Dryocopus pileatus*) (herein "PW") were studied in the Coast Ranges of western Oregon during the summers of 1982–1985. The purpose of this study was to provide resource managers with more accurate habitat information to manage PW populations in the Pacific Northwest Region. Prior to this study, little research had been conducted on PW habitat use west of the Cascade Mountains, and little radio telemetry data had been collected. Home ranges averaged 478 ha, and home ranges of pairs with fledged young were larger than that of either member of the pair. Because home range size was studied during only part of the post-fledgling period, reported data are minimal estimates of year-round home ranges. The amount of foraging habitat averaged 310 ha and the amount of roosting and nesting habitat averaged 225 ha. Forest habitat classes older than 40 years and deciduous riparian areas were preferred for foraging and other diurnal activities. Nests and roosts were located in habitat classes older than 70 years. The mean dbh of nest trees and roost trees were 71 cm and 112 cm, respectively. The authors suggest that PWs may not be a good management indicator species for mature and old growth forest habitats in western Oregon because the birds forage in immature forest stands (<70 years). Furthermore, the authors suggest that PW management areas be increased well beyond the current guidelines. [Coop. Wildlife Research Unit, Oregon State Univ., 104 Nash Hall, Corvallis, OR 97331, USA.]—Robin J. Densmore.

26. Nesting habitat of Flammulated Owls in Oregon. E. L. Bull, A. L. Wright, and M. G. Henjum. 1990. J. Raptor Res. 24:52–55.—The purpose of this study was to describe Flammulated Owl (*Otus flammeolus*) nesting habitat in detail in order to provide information for effective management. Data were collected at the Starkey Experimental Forest in northeastern Oregon during 1987–1988. Preferences were found for the following habitat characteristics: cavities excavated by Pileated Woodpeckers (*Dryocopus pileatus*) or Northern Flickers (*Colaptes auratus*) placed at a mean height of 12 m in dead trees with a mean dbh of 72 cm and a mean height of 24 m found in ponderosa pine (*Pinus ponderosa*), douglas-fir (*Pseudotsuga menziesii*), or grand fir (*Abies grandis*) stands on ridges or upper slopes with east or south aspects. The authors recommend management for these habitat characteristics, or management for Pileated Woodpecker or Northern Flicker habitat. [USFS, Pacific NW Research Station, La Grande, OR 97850, USA.]—Robin J. Densmore.

ECOLOGY

27. The impact of Hurricane Hugo on the breeding ecology of wading birds at Pumpkinseed Island, Hobcaw Barony, South Carolina. P. Shepherd, T. Crockett, T. L. De Santo, and K. L. Bildstein. 1991. Colon. Waterbirds 14:150–157.—Hurricane Hugo did extensive damage to the South Carolina coast in September, 1989, including vegetation destruction and extensive saltwater intrusion into floodplain forests and freshwater impoundments. The authors compared the wading bird breeding population on Pumpkinseed Island in 1990 with the two years preceding the storm, and assess the role of the storm in affecting nest site availability and other breeding biology parameters for Great Egrets (*Casmerodius albus*), Snowy Egrets (*Egretta thula*), Tricolored Herons (*E. tricolor*), Glossy Ibises (*Plegadis falcinellus*), and White Ibises (*Eudocimus albus*). Following Hugo, numbers of nests increased for Snowy Egrets but decreased for Great Egrets and Tricolored Herons. White Ibises went from 4324 pairs in 1988 and 11,471 in 1989 to 0 pairs in 1990. Snowy Egrets nested mostly on the ground and experienced 86% nest failure due to flooding. The decrease in Great Egret numbers probably reflects storm damage to marsh elder (*Iva frutescens*) shrubs which are a preferred nest site. Snowy Egrets nested in close proximity to Great Egrets and may have ground nested because of the reduced availability of marsh elder. The total failure of White Ibis nesting probably resulted from saltwater damage to fresh water feeding areas and the reduced availability of freshwater crayfish, the favored food item of White Ibises during nesting. The more pisciverous heron species were not similarly affected and hence bred in substantial numbers following the storm. The authors conclude with a note of caution about inferences from non-replicatible studies such as theirs, but suggest that natural ecological "experiments" such as hurricanes may provide insight into potential effects of major anthropogenic disturbances. [Univ. of California, Hastings Natural History Reservation, 38601 E. Carmel Valley Rd., Carmel Valley, CA 93924, USA.]—William E. Davis, Jr.

28. Breeding success of egrets related to rainfall: a six-year Australian study. M. Maddock and G. S. Baxter. 1991. Colon. Waterbirds 14:133–139.—The authors test the hypothesis that drying wetland foraging areas will differentially affect breeding success of four heron species which have different foraging behaviors. This study, primarily in the Lower Hunter Valley region of New South Wales, involved the largely aquatic feeding Great Egret (*Casmerodius albus*), Intermediate Egret (*Egretta intermedia*), and Little Egret (*E. garzetta*), and the terrestial foraging Cattle Egret (*Bubulcus ibis*). All four species nest up to five months a year. Nests were monitored (but not marked), and nesting success was calculated for all nests which fledged at least one young. Diets were determined from food collected from pre-fledged chicks, and rainfall was monitored. During three years rainfall was above average, two years below, and one had both dry and wet periods. Cattle Egrets fledged significantly higher numbers of young than the other three species, among which there were no differences, and Cattle Egret was the only species not to have success correlated positively with rainfall. As wetlands dried out Intermediate Egrets shifted to orthopteran insect prey and scincid lizards, and showed the smallest fluctuations in fledgling success among wet and dry years. Great and Little egrets, which did not forage on land, had the greatest fluctuations among wet and dry years. The authors suggest that sibling aggression facilitates brood reduction in dry years in all but the Cattle Egret. [Dept. of Education, Univ. of New Castle, NSW 2308, Australia.]—William E. Davis, Jr.

29. Modifications of local and regional bird diversity after a fire in the Monte Desert, Argentina. L. Marone. 1990. Rev. Chil. Hist. Nat. 63:187–195.—A fire erupted in a locality of the Monte Desert in western Argentina in January 1986. The author conducted censuses of birds in two 4-ha plots in the burned area, and also in four other 4-ha plots located 1–6 km away from the burned area, starting in October 1986. He continued censusing in December 1986, and then again in October and December of 1987 and 1988. He assigned species to six trophic guilds: terrestrial granivores, arboreal herbivores, terrestrial insectivores, arboreal insectivores, aerial insectivores, and raptors. Of these guilds, arboreal herbivores, terrestrial insectivores and arboreal insectivores were consistently more abundant in the unburned plots, whereas aerial insectivores and raptors were consistently more abundant in the burned plots. According to Marone, arboreal herbivores and arboreal insectivores were negatively affected (indeed, they disappeared from burned plots) by virtue of the reduced foliage and associated insect fauna brought about by the fire. Instead, aerial insectivores were favored by the fire because the more open scrub afforded better visibility for spotting insects flying around. Raptors were favored as well because these particular species also require open areas for effective hunting and, in addition, a rodent species (*Lagostomus maximus*) colonized the newly opened areas and became exceedingly abundant, thus increasing prey resource levels for raptors. Terrestrial granivores, as a guild, did not show clear differences between sites. However, four of the seven species were most abundant in the burned area (e.g., *Zenaida auriculata*), whereas two behaved the opposite (e.g., *Poospiza ornata*), and one (*Junco capensis*) did not show preferences at all. The granivorous species that apparently benefitted from the fire did so because it exploited a flush of forbs that established in the area after the opening up of the scrub by fire. Overall, species richness was lower, and evenness was higher, in the burned sites. Within-plot bird species diversity (a combination of richness and evenness) did not differ between burned and unburned areas, but because some species were present in either one type of area or the other, between-plot diversity increased as a consequence of fire. [CRICYT, Casilla 507, 5500 Mendoza, Argentina.]—Fabian M. Jaksic.

30. Human disturbance in scrublands and its effect on an assemblage of nesting birds of central Chile. [Perturbación humana del matorral y su efecto sobre un ensamble de aves nidificantes de Chile central.] I. Lazo, J. J. Anabalón, and A. Segura. 1990. Rev. Chil. Hist. Nat. 63:293–297. (Spanish, English summary.)—These authors quantified the number of nests, their composition in terms of nesting species identity, and the trophic structure (percentage of insectivorous, granivorous, and omnivorous birds represented as nesters) in an assemblage of 10 passerine species. The study was conducted over two different years (1987 and 1990) in the same 1.7-ha site in an evergreen scrub area of central Chile. Between these two years, human disturbance increased markedly in regard to visitation rates, shrub thinning and cutting, humus extraction from underneath shrubs, and because of the establishment of a recreation area. During 1990 the authors also studied a 1.7-ha plot located 0.8 km away from the disturbed site, and considered it a "control" for changes observed in the "experimental" site (i.e., that subjected to an increase in human disturbance). They reported that, in comparison to 1987, the following trends were observed in the "experimental" site during 1990: a halving of the number of active nests; the disappearance (as nesters) of four out of the 10 original species, and the appearance of a new one. More specifically, the most dramatic changes involved the disappearance as nesters of two insectivorous species (*Leptasthenura aegithaloides* and *Asthenes humicola*), previously among the most abundant; their replacement by another insectivore (*Troglodytes aedon*), previously absent; a doubling in nesting by a granivore (*Diuca diuca*); and a seven-fold increase in the nesting of an omnivore (*Mimus thenca*). In contrast, during 1990 the "control" plot (i.e., the undisturbed plot) demonstrated the same features observed during 1987 in the "experimental" plot. The authors proposed the following as explanations for the changes observed: (a) shrub thinning and cutting, and removal of topsoil all reduced the abundance of insects associated with flowering and leaf shedding, and thus impacted negatively on the insectivorous birds; (b) the establishment of a recreational area was accompanied by an increase in litter, particularly of cans, which were readily used by *T. aedon* for nesting; and (c) shrub cutting allowed the colonization of the vacated areas by grasses, thus increasing seed availability, and thus favoring granivorous species. The authors noted other more subtle effects, such as the absence of an increase among the granivorous *Zonotrichia capensis*, despite increased seed availability, owing to the cutting of shrubs preferred by this species as nesting structures (those shrubs <2 m high). [Dept. Ecología, Univ. Católica, Casilla 114-D, Santiago, Chile.]—Fabian M. Jaksic.

POPULATION DYNAMICS

(see also 1, 29, 30, 52)

31. Raptor population dynamics in Utah's Uinta Basin: the importance of food resource. C. V. Grant, B. B. Steele, and R. L. Bayn. 1991. Southwest. Nat. 36:265–280.—Raptor populations were monitored during an 11-year period (1975 to 1985) at Oil Shale Tracts designated Ua and Ub. Twenty-one species of raptors resided on or visited the tracts; Turkey Vultures (*Cathartes aura*), Red-tailed Hawks (*Buteo jamaicensis*), and American Kestrels (*Falco sparverius*) were observed most commonly. The population dynamics of prey items, including certain rodent species and desert cottontails (*Sylvilagus audubonii*), were closely tied to the abundance of certain raptor species, particularly Red-tailed Hawks, American Kestrels, Loggerhead Shrikes (*Lanius ludovicianus*), Northern Harriers (*Circus cyaneus*), and Golden Eagles (*Aquila chrysaetos*). Conversely, the availability of nest sites and competition for space within and among raptor species appeared to have little influence on raptor abundance and distribution. These results emphasize the importance of small mammal populations in the maintenance of healthy raptor populations and the need to monitor both raptor and prey populations for long periods of time. [Bio-Resources, Inc., 135 East Center St., Logan, UT 84321, USA.]—Danny J. Ingold.

32. Postfledgling survival and recruitment of known-origin Roseate Terns (*Sterna dougallii*) at Falkner Island, Connecticut. J. A. Spendelow. 1991. Colon. Waterbirds 14:108–115.—This Roseate Tern paper presents banding results and reproductive studies from 1978–1990, and compares the immigrant and natal-site elements of the breeding population to determine if the Falkner Island colony is self-sustaining. Falkner Island Roseate Terns usually first bred at three or four years of age, and 16–17% were estimated to have lived to maturity. Of 1636 chicks banded from 1978–1985, 10.1% were captured as adults at Falkner Island, as were 1% of 6904 banded elsewhere in Connecticut, Massachusetts, or New York. The author estimates that 10% of Falkner Island chicks emigrate to other breeding colonies. Most banded immigrant terns were from nearby Great Gull Island, and an estimated 67% of Falkner Island new breeders were immigrant birds. Hence, Spendelow concludes that the Falkner Island population is not self-sustaining, and further suggests that only the two largest colonies may be producing excess young to stabilize the northeastern population.

Long-term studies of the kind reported in this paper are particularly important for seabirds which have delayed maturity, and low reproductive and recovery rates. [U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, MD 20708, USA.]—William E. Davis, Jr.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 48, 49, 50, 52, 53)

33. A wild Trumpeter Swan in Minnesota. P. Backstrom. 1991. Loon 63:147–150.—On 4 January 1991, eight banded Trumpeter Swans (*Cygnus buccinator*; six immatures and two adults) were sighted at Read's Landing on the Mississippi River in Wabasha County. The neck bands revealed that seven of the birds were raised and released in Burnett County, Wisconsin; the remaining bird, an adult, had been banded at Lacreek National Wildlife Refuge in Bennett County, South Dakota. Evidence indicates that the South Dakota bird is from a self-sustaining wild population. This is the first known occurrence of a wild Trumpeter Swan in Minnesota in over 100 years. [3409 Emerson Ave. South #4, Minneapolis, MN 55408, USA.]—Danny J. Ingold.

SYSTEMATICS AND PALEONTOLOGY

(see also 47)

34. **Arctic gulls 32 years later: a reply to Snell.** N. G. Smith. 1991. Colon. Waterbirds 14:190–195.—In this commentary Smith responds to R. R. Snell's criticism (1989, Colon. Waterbirds 12:12–23) of Smith's work with gulls which had led to Thayer's Gull (then *Larus argentatus thayeri*) being assigned species status (*L. thayeri*). Smith begins with a summary of the systematic and evolutionary status of *Larus* gulls in the decade 1955–1965, including the possible role of eye ring and iris color in reproductive isolation. He then replies to criticism of, or disagreement with, his conclusions by earlier reviewers of his work, including G. M. Sutton, R. Pierotti, P. A. Debenedictus, A. J. Gaston, and R. Decker, before detailing responses to the seven points made by Snell. Most attention is given to Snell's final point which implies that Smith could not have performed the reported experimental procedures in the time available in 1961. In his explanations Smith describes several errors in his published work, including mislabeled data (wrong place, wrong year), and an incorrect map, but maintains that these errors in no way alter his original conclusions. The errors are part of the explanation for the apparent difficulty of accomplishing so much work in a short period of time. Smith concludes that the thrust of his reply to Snell "is to indicate the need for replication, and that such replication is entirely feasible." Modern molecular techniques would aid in this process.

The effectiveness of this paper as a response to criticism must be judged within the context of Snell's response to it (1991, Colon. Waterbirds 14:196–202). Certainly, this continuing saga of accusation and response has ethical implications, as well as importance for those interested in larid taxonomy and evolution. [Smithsonian Tropical Research Inst., Box 2072, Balboa, Ancon, Republic of Panama.]—William E. Davis, Jr.

35. **Conflation of the observed and hypothesized: Smith's 1961 research in Home Bay, Baffin Island.** R. R. Snell. 1991. Colon. Waterbirds 14:196–202.—This commentary is a response to N. G. Smith's reply (1991, Colon. Waterbirds 14:190–195) to Snell's original criticism (1989, Colon. Waterbirds 12:12–23) of Smith's larid work. In Snell's original 1989 paper his most severe criticism implied that Smith could not have accomplished his complicated experimental protocol during the time available in 1961 at Home Bay. The major thrust of Smith's 1991 reply was to correct errors in his original papers (e.g., mislabeled data) which helped to explain seeming inconsistencies, to maintain the validity of his original results, and to emphasize the need for replication of his results. Smith also replied to published criticism of authors other than Snell.

In this commentary Snell reevaluates Smith's 1961 work, extensively quoting from Smith's 1991 response, and carefully presents the case that Smith could not have done his larid work (largely at the fiord mouth and offshore islands) and his plover work (at the fiord head) in the time available because of difficulty in travel conditions and distance involved. Further, Snell maintains that Smith could not have made the disputed gull observations at any time other than 1961 (not in 1960 as the correction in the data heading by Smith suggests). He further analyzes the time presumably spent by Smith in 1961 on his *Charadius* plover studies and concludes that this would have left insufficient time for the *Larus* gull protocols. Snell concludes with the stunning final sentence, "It is particularly regrettable that there seems to be no clear means, 30 years after Smith was in Home Bay, to unravel the events that occurred and to differentiate those data based on Smith's actual observations from those data Smith hypothesized."

These three papers of accusation and rebuttal are complex, replete with detailed arguments, and difficult to access even with the original published papers by Smith available. Nevertheless, the implications, both from an ethical and taxonomic point of view, are important and these papers should be read and carefully evaluated by every interested biologist. [Canadian Museum of Nature, P.O. Box 3443, Station "D," Ottawa, ON K1P 6P4, Canada.]—William E. Davis, Jr.

EVOLUTION AND GENETICS

(see also 20, 47)

36. Influences of fragmentation and bottlenecks on genetic divergence of Wild Turkey populations. P. L. Leberg. 1991. Conserv. Biol. 5:522–530.—The degree of genetic variation among three regional populations of Wild Turkeys (*Meleagris gallopavo*) was determined to evaluate the prediction that habitat fragmentation and reproductive bottlenecks resulted in reduced variation within populations and increased differentiation between populations. Tissues were sampled from 461 turkeys at six sites in Arkansas, 15 sites in Kentucky and Tennessee, and six sites in Connecticut. Population histories are provided for each region. Twenty-eight loci were screened for biochemical variation, from which four loci were selected for analyses. The turkey populations examined in this study were much more differentiated ($F = 0.102$) than other populations of birds ($F = 0.013$), including other populations of turkeys that underwent demographic bottlenecks. Human disruption of the population structure of Wild Turkeys has apparently affected the genetic structure of the species. [Savannah River Ecology Lab., Drawer E, Aiken, SC 29802, USA.]—Kristin E. Brugger.

PHYSIOLOGY AND DEVELOPMENT

(see also 18, 21, 22)

37. Body temperature in birds. R. Prinzinger, A. Pressmar, and E. Schleucher. 1991. Comp. Biochem. Physiol. 99A:499–506.—Avian body temperatures are about 2 C higher than similar sized mammals. Based on published and unpublished data for over 700 species, the average resting body temperature of birds is 38.5 C. This temperature increases to 41 C for active birds and to 44 C for running or flying birds. There is a negative correlation of body temperature to mass that is most evident in strenuous activities such as running or flying. A few species can enter torpor and drop their body temperatures below 25 C, as low as 5–7 C in some cases. [AK Stoffechselphysiologie, Univ. Frankfurt, Siesmayerstraße 70, W-6000 Frankfurt/Main, Germany.]—Robert C. Beason.

38. Metabolic adaptations to hypothermia in snipe hatchlings (*Gallinago media*). J. B. Steen, Ø, Tøien, and P. Fiske. 1991. J. Comp. Physiol. 161B:155–158.—Body temperature of hatchling Great Snipe is 40 C when the air temperature is 35 C or higher. At lower air temperatures, hatchlings maintain a body temperature 8–13 C above the air temperature. Below 20 C hatchlings were unable to maintain their body temperature, indicating the need for periodic parental brooding under natural conditions. [Div. of General Physiology, Dept. of Biology, Univ. of Oslo, POB 1051 Blindern, N-0316 Oslo 3, Norway.]—Robert C. Beason.

39. Black, white and UV: how birds see birds. D. Burkhawlt and E. Finger. 1991. Naturwissenschaften 78:279–280.—The UV reflectivity of black, brown, and white plumage from several species was measured with a photometer. The amount of UV reflected was not dependent on feather color, but upon species. These results suggest that because birds can perceive UV, their colorations and markings may appear differently than what we see. Because only spot measurements were made, no UV patterns of single feathers were reported. [Inst. für Zoologie der Univ., W-8400 Regensburg, Germany.]—Robert C. Beason.

40. Neuron loss and addition in developing Zebra Finch song nuclei are independent of auditory experience during song learning. M. J. Burek, K. W. Nordeen, and E. J. Nordeen. 1991. J. Neurobiol. 22:215–223.—Normal song development in the Zebra Finch (*Poephila guttata*) is dependent upon the ability to hear and memorize an acceptable song. During song learning, the song control areas of the brain undergo large increases in volume and neuron number. In the Zebra Finch, there was no difference in the volumes of the critical song control nuclei (HVc, Area X, RA, and IMAN) between control birds and birds deafened at 10 days of age. The authors conclude that while neuronal death and genesis allow for plasticity of song learning, the sizes of the song control nuclei are not correlated with song learning and do not depend on auditory feedback. [Neuroscience Program, Univ. of Rochester, Rochester, NY 14627, USA.]—Robert C. Beason.

PLUMAGES AND MOLTS

(see 5)

WILDLIFE MANAGEMENT AND ENVIRONMENTAL QUALITY

(see also 27, 36, 46, 52, 54)

41. The potential for conservation of Polynesian birds through habitat mapping and species translocations. J. Franklin and D. W. Steadman. 1991. Conserv. Biol. 5:506–621.—Historically, many species of Polynesian land birds once occupied more islands than they currently do. If suitable habitat and adequate protection could be provided, then islands could be restocked with their former species. The authors compared high resolution aerial photography and satellite imagery for six of the southern Cook Islands to estimate habitat suitability for potential translocations of 11 extant land species. Habitat preferences were determined by field observations of feeding behavior and food habits analyses. Aerial photography, in combination with ground truthing and data analysis by geographic information systems (GIS), was sufficiently detailed to assess habitat types and was less expensive than satellite imagery for these small land areas. With these data, sites for translocation could be identified. The authors do not discuss ecological questions associated with the technique of translocations. [Dept. of Geography, Univ. of California, Santa Barbara, CA 93106, USA.]—Kristin E. Brugger.

42. Nested subsets and the distribution of birds on isolated woodlots. J. G. Blake. 1991. Conserv. Biol. 5:58–60.—The question of land area required for species preservation (single large or several small, SLOSS) was evaluated in this study. Presence-absence data for bird species in 12 Illinois woodlots were analyzed to determine the degree to which species from small woodlots were also found in large woodlots (i.e., whether species occurrences were statistically nested, with small faunas subsumed in large faunas). Indeed, species assemblages were more nested than expected by chance. A mechanism was offered to explain the observation. Species that breed in forest-interior habitats and tropical migrants were highly nested; however, species that breed in forest edges and short-distance migrants were not so well nested. The author concludes that preserving many small, species-poor reserves is less likely to support a full complement of species, no matter what the total area, than preserving large land areas. [Dept. of Biology, Univ. of Missouri, St. Louis, MO 63121, USA.]—Kristin E. Brugger.

43. Effects of egging on the reproductive success of Glaucous-winged Gulls. K. Vermeer, K. H. Morgan, G. E. J. Smith, and B. A. York. 1991. Colon. Waterbirds 14: 158–165.—Nesting of 182 pairs of Glaucous-winged Gulls (*Larus glaucescens*) was followed on 18 islands in Skidegate Inlet, Queen Charlotte Islands, British Columbia, Canada. The four largest colonies were egged and had 52 replacement clutches compared to only one in non-egged colonies. Late mean laying dates in egged colonies reflect the large number of replacement clutches. At three colonies egging ceased midway through the laying period and ultimately they produced 0.86 fledglings/pair in comparison to 0.77 for nonegged colonies. This higher fledgling rate probably is related to colony size. In the fourth colony egging continued throughout the laying period and no young were produced. The second greatest cause of nesting failure was flooding. Concealed nests, which were generally located at higher locations (near the centers of nesting islands) than were open nests, were not affected by flooding. The authors conclude that egging, "if practiced in moderation," would still permit population growth. [Canadian Wildlife Service, % Inst. of Ocean Sciences, P.O. Box 6000, Sidney, BC V8L 4B2, Canada.]—William E. Davis, Jr.

44. Nesting rafts as a management tool for a declining Common Tern (*Sterna hirundo*) colony. C. L. Dunlop, H. Blokpoel, and S. Jarvie. 1991. Colon. Waterbirds 14: 116–120.—Common Tern colonies are declining in many areas due to anthropogenic factors, habitat loss, and increased competition with nesting gulls. The authors report on management of a declining colony (1694 nests in 1982 to 108 nets in 1989) in Toronto, Ontario, Canada, in which four rafts, 5 m × 5 m, were used as artificial nest sites. The rafts were emplaced after most Ring-billed Gulls (*Larus delawarensis*) had initiated nesting. Terns colonized all rafts (the raft nearest to the tern loafing area within 24 hours) and defended the raft against other species. Despite setbacks, including a storm which pushed rafts to shore and destroyed 23 of 115 nests, 128 nests fledged an average of 1.3 chicks/nest (a conservative figure). The authors detail problems which they encountered and suggest design changes to overcome them. They conclude that nesting rafts are a useful management tool in declining tern colonies. The paper includes references to other published nesting raft experiments with terns, and should be of interest to anyone involved in tern management. [Canadian Wildlife Service, 49 Camelot Dr., Nepean, ON K1A 0H3, Canada.]—William E. Davis, Jr.

45. Seabird management and future research. D. N. Nettleship. 1991. Colon. Waterbirds 14:77–84.—The author's purpose in this guest editorial is to review the main threats to seabirds, characterize changes in species status, and discuss management and research problems for the future. Seabirds, which comprise four orders, 13 families, and 280 species, are found on all oceans of Earth, and share characteristics of low reproductive and recovery rates, and hence are vulnerable to anthropogenic perturbations. They also have clumped distribution on feeding and breeding grounds, and threats include egging, hunting, persistent pollutants, over-fishing, drowning in fish nets, general disturbance, and oil spills. Generalized seabirds (e.g., many gull species) may take advantage of anthropogenic factors and thus experience population increases, while specialist species (e.g., terns and auks) may experience declines.

The global distribution of seabirds requires an international coordination of effort that will permit the immediate control of local anthropogenic problems on adversely affected species, an international system of enforcement, and development of an adequate monitoring system of important population parameters for individual species. These are difficult goals to achieve since governments often have socioeconomic priorities rather than environmental ones, and enforcement is often lacking even when adequate legislation exists.

The author suggests that seabird workers must develop management plans that are more politically attractive and aimed at altering priorities. The author lists the major international agreements protecting seabirds and discusses areas of inadequacy of legislation and enforcement, including oil discharge, commercial fisheries, human predation, and site protection. Nettleship stresses, however, that long-term successful management requires compliance with regulation which is ultimately attained through education and understanding. A program developed by seabird biologists and coordinated by international organizations (e.g., U.N. Environment Programme) should include establishment of global databases to provide baseline data for accessing population changes in seabirds, seabird colony registration, and global population survey and monitoring systems. Coordinated international research programs should target reproductive ecology, pelagic ecology, population modeling, threatened/endangered species, and threat assessment. Nettleship concludes that the management problems for seabirds are enormous and global, but offers strategies for successful management which are optimistic in tone.

This paper presents a bold blueprint for international conservation of seabirds. The paper includes nearly 50 references, and should be important to anyone interested in seabirds or avian conservation. [Seabird Research Unit, Canadian Wildlife Service, Bedford Inst. of Oceanography, Dartmouth, NS B2Y 4A2, Canada.]—William E. Davis, Jr.

MISCELLANEOUS

46. Proceedings of the 5th International Symposium on Grouse. D. Jenkins, ed. 1991. Ornis Scand. 22:181–302.—This issue of *Ornis Scandinavica* contains 18 papers from the grouse symposium held at Elverum, Norway, from 20–24 August 1990. Papers are arranged under five topical headings (forest management, hunting, captive breeding and release, predation, and "other topics"), each of which concludes with a summary. The proceedings are devoted largely to Eurasian species, with six papers on Capercaillie (*Tetrao urogallus*), three papers on Black Grouse (*T. tetrix*), and two papers on Hazel Grouse (*Bonasa bonasia*). Two papers on Spruce Grouse (*Dendragapus canadensis*) are the only New World contributions. There also are brief reviews on hunting and compensatory mortality, the effects of forestry practices on grouse populations, and patterns of life history and habitat in Palaearctic and Nearctic forest grouse. These proceedings will be of general interest to most galliform biologists and will be especially valuable to students of forest grouse. [Order from Munksgaard International Publishers, P.O. Box 2148, DK-1016, Copenhagen K, Denmark.]—Jeff Marks.

BOOKS AND MONOGRAPHS

47. Phylogeny and classification of birds: a study in molecular evolution. C. G. Sibley and J. E. Ahlquist. 1990. Yale University Press, New Haven. 976 pp. $100.00, hardcover.—Monumental works in science can arise in two ways. The first occurs when researchers toil arduously to come to a solid understanding of a phenomenon. Such work reveals the tenacity and persistence of the investigators. The second occurs when a novel insight is obtained that radically alters the thoughts of subsequent scientists. Extremely rarely do both come together at once; Darwin's *Origin of Species* (1859) is perhaps the premier example of a lifetime of meticulous research combined with revolutionary insight.

Sibley and Ahlquist's work clearly is a monument to tenacity and persistence. Their book should be thus examined by ornithologists and nonornithologists alike as it summarizes the fruits of more than 20 years of labor aimed at a single goal, an evolutionary history and phylogeny of birds. At 976 pages, this book not only reflects on first sight the toil this project required, but looks to have been a massive undertaking in its own right. Whether or not it will reshape the field of systematics remains to be seen.

Sibley and Ahlquist present the summary of their DNA-DNA hybridization studies of birds into two main sections. The first part of the book, only (!) 265 pages, reviews information about the structure and function of DNA (Chapters 2–7), the rationale and techniques behind the use of DNA-DNA hybridization for systematics (Chapters 8–11), aspects of evolutionary theory relevant to the use of DNA-DNA hybridization for phylogeny reconstruction (Chapters 12–13), and finally a review of the classification of birds and the principles of classification (Chapters 14–15). The classification from DNA-DNA hybridization is presented in Chapter 15, and then the second part of the book (pp. 271–698) presents a detailed account of all the major groups of birds. A final chapter on historical geography occurs before 103 pages of figures of melting curves (pp. 707–809), 61 pages of dendrograms, including the "Tapestry" (the series of dendrograms showing the phylogeny of birds; pp. 838–870), and 98 pages of references.

Reviewing this book seems an overwhelming prospect. Clearly, the phylogeny that has resulted will be a focus of research for years, perhaps decades to come. No single review can evaluate all of the many details provided in this book, from those on methodology to aspects of the classification of particular groups. Furthermore, I am not a systematist and so am not qualified to comment on systematic details (see reviews by Raikow 1991, Krajewski 1991, and O'Hara 1991). However, I am convinced that a book such as this must be evaluated in the broader context of all of ornithology, indeed of evolutionary biology. The true legacy of this book and Sibley and Ahlquist's work will be how it guides the thoughts and research of young scientists in a variety of fields.

Thus, as I was reading I kept three issues in mind. First, how well were the goals, methods, and current controversies of systematics presented? Second, how was the case for DNA-DNA hybridization as a tool for studying phylogeny presented? Third, what does the future hold for both systematics and the use of DNA?

Lately the field of systematics has gained a sense of vigor perhaps unmatched in recent history. In the past, there had been the perhaps exaggerated view that systematists were simply evolutionary "accountants," just involved in keeping lists of species organized. The new life of this field has in part coincided with the rise of molecular biology, which has provided new tools to answer previously unapproachable questions. Sibley and Ahlquist were involved in the early attempts to employ these powerful new techniques, and so part of the resurgence of systematics can be attributable to their contributions. However, a field cannot advance simply through improved technology. Systematics has gained new energy also because of a change and maturation in philosophy; organisms are now classified according to evolutionary relationships and such classifications are hypotheses that must be statistically confirmed. This change in perspective now allows the testing of a variety of ideas about the process of evolution using systematics. An excellent example of this is a recent analysis of the evolution of interspecific brood parasitism in blackbirds (Lanyon 1992). The number of similar studies linking systematics and subdisciplines of ecology, evolution, and behavior is rapidly increasing (e.g., Brooks and McLennan 1991).

Sibley and Ahlquist have advocated the phylogenetic and statistical approach to systematics with great vigor. Their rhetoric perhaps does not give the older school the credit they are due. Quotes such as "Intuition is not a substitute for measurement, and the failures of the [traditional] school litter the historical landscape" (p. 247) do little to improve relationships between opposing philosophies. However, the momentum behind the evolutionary philosophy and the use of statistical methods has been building, and Sibley and Ahlquist make a reasonably strong case for both. Most of today's systematists probably agree. Organisms should be classified by their geneological relationships, but the choice of characters to study and the ways in which hypothesized geneologies are supported must employ a methodology that can make use of rigorous statistical tools. If systematics as a part of evolutionary biology is to continue to be a vibrant scientific discipline, then ideas about the possible directions evolution might take can only be tested using evolutionary relationships that are based on unbiased criteria.

I found this book to be rather poor in explaining the methods of modern evolutionary systematics. Sibley and Ahlquist have a tendency to use assertion and rhetoric to make their points instead of a balanced, frank presentation of the pluses and minuses of their methods. An example of this is their discussion of the rates of evolution, which is scattered around the book in several places. In the introduction, they give the most balanced treatment of this issue, ". . . the rates of DNA evolution may differ in different lineages. Fortunately differences in rates seem to be small among avian lineages, but different rates of genetic evolution produce branches of different lengths and make the assignment of dates to branchings tentative and subject to correction." (p. 5). A whole chapter on the tempo of evolution (chapter 12, pp. 165–174) includes an interesting discussion of the neutral theory of molecular evolution, which predicts that evolutionary rates should be relatively constant (Kimura 1968, 1983). Sibley and Ahlquist go on in the next chapter (13, pp. 175–183) to present data showing that age of first breeding affects rates of sequence divergence. However, later they assert without presenting much data that, "The evolution of different lineages at somewhat different average rates introduces an error of uncertain magnitude. Present evidence suggests that this is not a major problem for avian data." (p. 253). Finally, the "Tapestry," that series of figures presenting the phylogenetic tree of birds, is based on the UPGMA method of constructing trees, which assumes constant rates of evolution. Sibley and Ahlquist do use the FITCH algorithm, which does not assume constant rates of evolution, for some additional trees (pp. 810, 813–820, 822–828, 830–832, 834-837). They conclude that most birds ". . . have similar rates of genomic change . . . shown by *roughly* [emphasis mine] equal branch lengths in the FITCH-derived dendrograms . . ." (p. 181). Because of the scattered nature of the presentation and conflicting bits of information, I had difficulty deciding whether or not birds do evolve at constant rates and if the complete tree based on UPGMA was believable.

Throughout this book there is considerable information about DNA and the techniques of DNA-DNA hybridization. DNA-DNA hybridization takes advantage of the tendency for similar sequences of base pairs to reform hydrogen bonds and become double-stranded after being made single-stranded by heating. The more similar the sequence, the more easily the double-strand will reassociate and the more stable it is when it does. Thus the time course and temperature of reannealing provides a good index of sequence similarity. DNA-DNA hybridization allows one to infer overall genetic similarity between the genomes of two species.

I found Sibley and Ahlquist's presentation of DNA and the techniques of DNA-DNA hybridization unclear. Several of the early chapters contain information on the structure of DNA, how genes work, and the way genes are structured. This information, although somewhat relevant to DNA-DNA hybridization, is largely tangential to the technique and what it shows. For example, I did not not find the presentation of introns and exons (pp. 31–33) to be connected well with the process of DNA-DNA hybridization or the interpretation of the results. Many parts of these sections contain sentences that provide the reader with references to go to but without a clear explanation of processes. Although it is useful to have those references, they seemed to detract from the flow of the writing, making the style more like a technical manual than a clear, easily read introduction to these topics.

I was particularly disappointed in the sections describing the technique of DNA-DNA hybridization. Behavioral ecologists have been well served by clear explanations of DNA fingerprinting that have used diagrams to illustrate the processes involved (e.g., Burke 1989). I am puzzled why "cartoons" of DNA molecules hybridizing and eluting in columns were not included in this book; Jon Ahlquist recently gave a seminar at the University of Kentucky that had several slides beautifully illustrating the technique in a very clear manner.

How well does DNA-DNA hybridization work for generating phylogenies? DNA-DNA hybridization measures average sequence similarity between the genomes of two species. A key assumption of the use of this similarity for phylogeny reconstruction is that such similarity reflects geneological distance. This assumption seems very compelling. DNA is what connects organisms to their ancestors. Within a species, DNA is the molecule that connects relatives to each other. Once two populations no longer interbreed, evolutionary forces act on the DNA of each separately, but the common ancestry of the two should be reflected by a high similarity of DNA sequence. All other things being equal, the longer two populations have diverged, the more one might expect their DNAs to differ. Ahlquist et. al. (1987) present some solid arguments supporting this view. In order for sequences to form stable duplexes under the conditions in their experiments about 75% of the base pairs must be in the same order. This is exceedingly unlikely to happen by chance in even a single gene, let alone over the entire genome of most birds.

Sibley and Ahlquist maintain that DNA-DNA hybridization thus is a good and perhaps the best tool for studying phylogeny. They use two arguments, one empirical and the other intuitive, to bolster their view. First, they conclude that DNA-DNA hybridization is a good technique because empirically it generally agrees with the phylogeny determined through previous methods. As Sibley and Ahlquist put it, "A simple test of congruence is whether the clusters of species produced by DNA comparisons are congruent with the clusters based on morphological characters . . . The answer is clear; the DNA comparisons reconstruct essentially the same clusters that have long been recognized." (p. 6). I find this argument rather weak. If DNA-DNA hybridization largely duplicates phylogenies determined through other means, then what is the point in doing what must be a more time consuming and technically demanding technique when the easier one gives the same answer? One answer to this question is that it is desirable to have confirmation of phylogenies using different methods. An additional point, though, is that DNA-DNA hybridization does not exactly duplicate the morphological phylogenies. There are discrepancies. The issue then becomes which method has priority in cases of discrepancies. Obviously the fact that DNA-DNA hybridization agrees with morphology for the most part in no way gives it priority in cases of discrepancies—proponents of the morphological phylogenies could use the same argument.

So how should such discrepancies be resolved? This brings us to the intuitive argument. Sibley and Ahlquist suggest that DNA-DNA hybridization is the better method because (1) it surveys the entire genome and averages the result, and (2) it is not subject to problems of convergence. In the latter case, morphologies of two groups may be similar because of common ancestry or because they have evolved to fulfill similar functions (perhaps because of similar ecologies). Sibley and Ahlquist argue that DNA is not subject to this problem, ". . . for DNA-DNA hybridization, the homology problem is solved by the criterion conditions of the experiments and the enormous complexity of the genome; the problem of convergence disappears." (p. 112).

The statements about averaging over the genome and the lack of convergence both make certain assumptions about how DNA evolves. However, much about how DNA evolves is currently unknown. For example, we know almost nothing about the relationships between DNA sequences and morphological types. Perhaps morphological convergence corresponds to sequence convergence. As far as I am aware there are no data allowing either acceptance or rejection of the possibility that certain morphological types (e.g., wing shape) can only be achieved through a combination of specific protein types—selection leading to convergence on wing shape might be selecting for convergence on DNA sequence.

The possibility that selection might act to cause DNA sequences to converge might or might not be critical to the use of DNA-DNA hybridization to determine evolutionary relationships. DNA-DNA hybridization surveys the entire genome; spots of convergence may have little effect on the overall similarity of the entire genome. Generally, I find the idea of averaging the entire genome reasonable. However, this is an intellectual argument over plausibility rather than one based on solid empirical evidence. Genomes are complicated things. Over evolutionary time, some parts are under strong selection in one direction or another, other parts are subject to random point mutations, still other parts are subject to transposable elements jumping in and out, and still other parts may contain insertions and deletions caused by currently unknown mechanisms. How all these different processes might affect the average similarity between two species is completely unknown. It seems reasonable that an average would give an adequate estimate of evolutionary relationship, but I would be willing to concede a good dose of doubt. I wish Sibley and Ahlquist had acknowledged some of these issues, but they tend to be defensive about the technique (for very understandable reasons, given the criticism it has received over the years), and that is reflected in the book.

One of the criticisms of using DNA-DNA hybridization has been that the data generated do not provide one with characters that can be assigned as ancestral or derived (e.g., Eldredge and Cracraft 1980). Sibley and Ahlquist respond with a perceptive quote from Ghiselin (1984:220) on p. 250, part of which I repeat here, "... The technique [of DNA-DNA hybridization] may, perhaps, measure absolute time, but relative time is enough to give branching sequences. The technique works. It works because, in spite of cladist animadversions, in phylogenetic research we need not merely put similar objects together. Any procedure that allows us to discriminate between lineages ought to be acceptable ..."

Unfortunately, Sibley and Ahlquist then ruin any chance for rational disagreement with their view by subsequently stating, "To reject distance measures based on the entire genome in favor of the information in a minute product of the genome is to favor ideology over reason. This attitude has more to do with politics than with science." (p. 251). In actuality the arguments have more to do with different but equally valid perspectives. The use of shared and derived characters by cladists apparently arose out of the need to rigorously measure similarity in morphological traits that are hard to measure (e.g., muscle types, wing and beak shape). Sequence analysis of proteins or DNA provides one with data that are readily analyzed using the same cladistic methods (e.g., Lanyon 1992, Hillis et al. 1992). DNA-DNA hybridization, on the other hand, generates a similarity value in a different way. Thus, although one cannot point to any particular character and maintain it is diagnostic of a particular group, the similarity value obtained from DNA-DNA hybridization is a measure of genetic similarity, one that empirically works in studies that have used it along with other methods (e.g., Britton 1986, Miyamoto et al. 1987, Koop et al. 1989, Goodman et al. 1990). One hopes that future researchers will expand on the use of both morphological and DNA methods in a more dispassionate attempt to get the most complete view of phylogeny and to empirically assess the strengths and weaknesses of each method (e.g., Hillis et al. 1992).

Finally, I had hoped Sibley and Ahlquist would use this book to help forecast the next major questions in systematics. Unfortunately, they tend to look back and dwell on protecting their own contributions rather than making a stab at explicitly charting the future. Clearly, young researchers will be influenced by the work presented in this book, but they will not find many specific predictions about the future of systematics that can be the focus of their research. Many of the details of Sibley and Ahlquist's phylogeny will be the subject of focused research, but I had a desire to know what mysteries about evolution might be revealed by systematics in coming years. Because of the lack of speculation about the evolution of DNA, I feel the subtitle of this book might have been better as "A molecular study of evolution" instead of "A study in molecular evolution." About the only data in this book on the way avian DNA evolves was the effect of age of first breeding on the rates of sequence divergence, a truly fascinating analysis, but perhaps only the tip of the iceberg of what might be possible. Those who might have had hopes of learning about other fascinating possibilities along these lines will be disappointed.

In sum, I believe this book will be extremely useful for many ornithologists, although perhaps not as useful as it could have been. Parts of it are quite enjoyable to read, as they contain extensive quotes from classic references. My main criticisms can be summarized by saying that this book reads like a very thoroughly annotated bibliography, with the addition of a massive amount of interesting data but with a somewhat slanted perspective and relatively little guide to what should be done next. I would guess that it will most often be used as a bibliography and reference. Every ornithologist should have a copy handy and take some time to browse because Sibley and Ahlquist's work will surely serve as a foundation for those who follow. This book doubly reflects their toil and thus is certainly a monumental work in ornithology.—David F. Westneat.

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48. A guide to the birds of Trinidad and Tobago (2nd edition). 1991. R. ffrench, illustrated by J. P. O.'Neill and D. R. Eckelberry. Comstock (Cornell University Press), Ithaca, New York. 426 pp. $34.50, softcover; $72.50, hardcover.—The island nation of Trinidad and Tobago has long served as a window on South American birdlife. Birders have been visiting the two islands in large numbers since the late 1960s, when Asa Wright converted an unproductive cocoa, coffee, and citrus plantation along the southern slopes of Trinidad's spectacular Northern Range into one of the first neotropical "ecotourist traps." Unlike other Caribbean islands, which are volcanic in origin, Trinidad and Tobago are quite literally erosional chips off of the South American mainland. Trinidad, the larger of the two islands, lies well within sight of the Venezuelan coast, while Tobago lies an additional

40 km northwest of its sister. Given their proximity to ornithologically diverse South America, it should come as no surprise, then, that the two islands offer an avifauna in excess of what their combined land area of some 5128 km^2 might otherwise suggest. And indeed, they do. ffrench's account lists 433 species, 246 of which breed on Trinidad, and 87 of which breed on neighboring Tobago. Nevertheless, and although a number of endemic *races* are known from the two islands, Trinidad and Tobago boasts no endemic *species*. The islands, perhaps, are best known for their hummingbirds, Oilbirds (*Steatornis caripensis*), and brilliant flocks of Scarlet Ibises (*Eudocimus ruber*).

This, the "second edition" of ffrench's field guide, closely resembles its 1973 and 1980 predecessors. The original 28 color plates and 14 black-and-white figures (several of which have been redone) by John O'Neill, together with the original nine color "portraits" by Don Eckelberry, depict over 300 images of some 239 species, well over half of those likely to be encountered on the island. (Trinidad and Tobago species that also occur in North America generally are not portrayed.) As might be expected given their sources, most of the illustrations are quite good, and Comstock (a new publisher for this edition) has done at least as fair a job as its predecessor in balancing color. For the most part, ffrench has chosen to update, rather than rewrite his text, and as such the second edition retains much of the feel of the earlier versions. Nevertheless, more than 50 of the 337 references listed in the Bibliography are new, and many species accounts have been thoroughly updated. At least one account, for example, includes sightings as recent as August of 1990. Even so, only true aficionados of Trinidadian ornithology will need to possess all three "editions."

Despite its slightly larger format of 14 × 21.5 cm (versus 12.5 × 18.5 cm for the 1980 edition), the current offering still manages to run well over 400 pages and, even in soft cover, is noticeably bulkier than most North American field guides. But this, of course, is to be expected, given that many of the species accounts, all of which include information on description, habitat associations, voice, diet, and behavior, as well as on range and local status, comprise a page or more of text. Anyone traveling to Trinidad shouldn't leave home without this work (the book is often difficult to locate on the islands), and Richard ffrench is to be congratulated for updating this important handbook, which in many ways anticipated its more recent neotropical companions.

If you do decide to visit Trinidad and Tobago, be forewarned, despite a somewhat enlightened Conservation Wild Life Act of 1980, which technically protects most of the country's birds, ffrench correctly notes an unfortunate and rather "wide gap between the theory and the practice of the law." Thus, for example, while working on the island during January and February of 1989, I managed to witness the poaching of both Cattle Egrets (*Bubulcus ibis*) and Scarlet Ibises, both of which were taken in broad daylight, well within the borders of the country's preeminent Caroni Swamp National Park. Although both perpetrators were quickly apprehended by Park personnel, events such as these appear to be commonplace on the islands.—Keith L. Bildstein.

49. Connecticut Birds. J. D. Zeranski and T. R. Baptist. 1990. University Press of New England, Hanover, New Hampshire. 328 pp. $35.00, hardcover.—Connecticut's first statewide checklist was published in 1843 by the Reverend James H. Linsley. However, the 150 years since publication of this work have yielded only two complete revisions, most recently in 1913! Changes in taxonomic classifications, as well as bird abundances and distributions which have taken place this century, have made the last volume obsolete.

In addition to the above changes, land use practices in Connecticut have also changed greatly. Cultivated land has decreased markedly in the state (850,000 ha in 1910 vs. 162,000 in 1987), and forests have reserged; timber harvesting and plant diseases have altered forest composition; coastal wetlands have been drained and developed; and urbanization and suburbanization have consumed many natural areas. Clearly a volume which reflects these changes and their effects on Connecticut's avifauna has been badly needed for over 50 years. Additionally, although serious amateur and professional ornithologists alike are aware of recent trends in abundance of many bird species, most lack knowledge of historical trends. Joseph Zeranski and Thomas Baptist have done a thorough job summarizing these trends, as well as current status of the state's birdlife in *Connecticut Birds*.

The text opens with Forward, Acknowledgement, and Introductory segments. Following the Introduction, George A. Clark, Jr., offers a brief but informative summary of Connecticut's ornithological history. Included in this segment are Alexander Wilson's visit in 1808, Mable Osgood Wright's involvement with the early Audubon movement, and publication of Roger Tory Peterson's landmark field guide in 1934. Also discussed are past and present ornithologists affiliated with the Yale Peabody Museum.

The ensuing section, with the aid of four maps, provides a physical description of the state's land area. Topography, rivers, soils, climate, and forests are thoroughly reviewed.

The succeeding chapter, "A summary of the natural and cultural history of Connecticut," is divided into two parts: the prehistoric and historical periods. The prehistoric period details periods of glaciation and retreat, floral colonization, and indigenous peoples of the region. The historical period, beginning with early European colonists in the 17th Century, includes colonization of the state, early lifestyles and their effects on the environment, and the onset of urbanization. More recent changes in land use and conservation attitudes are also discussed.

Accounts of 380 species, including 13 hypothetical and 4 extinct or extirpated species, comprise the heart of the book. Species accounts are divided into as many as five subunits: Status (current abundance and distribution and early and late migration dates of each species), Records (documentation of rare or casual species within the state), Comments (additional notes or information on the species), Subspecies (recognizable subspecies found in the state), and Historical Notes (status and fluctuations in populations obtained from reports dating back to the late eighteenth century). Species wère not recognized as authentic state records, and hence, not included in this section, unless fully documented by specimen or photographic evidence. In light of the tendency of some authors of similar books to include species based solely on individual sight records, the authors' rigid standards and careful scrutiny of past sight records is refreshing. Unsubstantiated single-observer reports (although quite often correct) serve to inflate species distributions. These observational records once printed are perpetuated within the literature.

Each species account is an integration of information obtained from extensive literature reviews, museum specimens, Christmas Bird Count sightings, reports from top birders throughout the state, and the authors' own personal observations and records. Each account is concisely written, easy to read, and clean of typographic errors.

One of the strengths of *Connecticut Birds* lies in the historical notes for each species. This information is derived from many of the sources listed above, as well as accounts from the personal journals of several of the state's early naturalists, and a number of obscure publications. These accounts provide the reader with some sense of where each population has "been" and where it may be "going." This information also provides nice documentation of species expansion into the state (e.g., Red-bellied Woodpecker [*Centurus carolinus*], Blue-gray Gnatcatcher [*Polioptila caerulea*], Tufted Titmouse [*Parus bicolor*]), and the decline of others (e.g., Long-eared Owl [*Asio otus*], Dickcissel [*Spiza americana*], Grasshopper Sparrow [*Ammodramus savannarum*]). Adding to the attractiveness of the book are illustrations of 20 species by Sheila McMahon.

Three appendices and a bibliography occupy the final portions of the book. Appendix A furnishes reports of 44 uncorroborated species, and Appendix B briefly details six of the most productive birding sites in the state, followed by a shorter city-by-city listing. Although this section does yield some useful information to the novice, it is of little value to most of the target audience. Readers would have been better served if Appendix B had been expanded to include many of the more obscure, but equally productive birding sites in the state. Appendix C contains a checklist of verified, hypothetical, and extirpated species of Connecticut.

With any "birds of" book, consensus is rare. Some readers, based on personal experience and observations, will disagree with some evaluations of current status, migration dates, and abundances. This represents an unavoidable source of criticism of these types of books. Hopefully, any disagreement will serve to kindle further investigation and observation and help resolve contention in future works.

Zeranski and Baptist have done an exceptional job with the challenging task of updating an antiquated birds of Connecticut volume. Their work will provide an excellent basis for the next update, which hopefully will appear with more regularity than once in a lifetime. In the meantime, this book will be of interest to both amateur and professional ornithologists throughout the northeastern United States.—Kenneth E. Petit.

50. A guide to the birds of Nepal (2nd edition). C. Inskipp and T. Inskipp. 1991. Smithsonian Institution Press, Washington, D.C. 400 pp., eight color plates, numerous text figures, five maps, grid maps for most species. $55.00, hardcover.—While basically an atlas, this excellent book has a lengthy and useful section (including color plates and line drawings) on the identification of Nepal's more difficult species, as well as an extensive introduction giving material on topography, climate, vegetation, bird distribution, conservation, protected areas, migration, history of Nepal ornithology, and bird-watching areas.

The bulk of the book is comprised of short species accounts of each of Nepal's 850 species of birds, including a grid map (½ degree square) of distribution for most species. Altitudinal and seasonal ranges are given. The text details each bird's distribution, both historical and current, as well as habitat preferences.

The main difference between the first and second editions is the additional distributional data in the second edition, including 14 new species for the Nepal list. The authors state that they've deleted 15 species from the Nepal list that were collected in the 19th century, but not found in the 20th. I believe this to be a mistake. These records are certainly of historical interest and illustrate changes. The disappearance of birds from old haunts will increasingly become one of the ways of monitoring and cataloging man's destructive influence on the earth. I believe an area list should include every species ever found there, not just a list of what can be found now. The latter concept would produce a list of Nepal birds in the year 2100 that totalled only 400 species. We need every possible reminder of what we're doing to our habitat.

For a more complete review (of the first edition), see my review (King 1987, Auk 104: 148–149). The erroneous call note for *Phodilus badius* mentioned in that review has not been corrected. I wholeheartedly recommend this book to anyone with an interest in Himalayan or Nepalese birds.—Ben King.

51. Czeck ornithological bibliography 1 [prior to 1934]. K. Hudec and O. Kokeš. 1981. Státní Zemědělské Nakladatelství, Prague. 217 pp. **Czech ornithological bibliography 2 [1934–1960].** K. Hudec and O. Kokeš. 1982. Státní Zemědělské Nakladatelství, Prague. 192 pp. **Czech ornithological bibliography 3 [1961–1980].** I. Kožená, K. Hudec, O. Kokeš, and B. Matoušek. 1983. Státní Zemědělské Nakladatelství, Prague. 281 pp. **Czechoslovak ornithological bibliography 1981–82.** I. Kožená and R. Křivánková. 1985. Zpr. Mos (Morav. Ornitol. Sdruzeni) 43:79–110. **Czechoslovak ornithological bibliography 1983–84.** I. Kožená and R. Křivánková. 1988. Zpr. Mos (Morav. Ornitol. Sdruzeni) 46:59–82. **Czechoslovak ornithological bibliography 1985–86.** I. Kožená and R. Křivánková. 1990. Zpr. Mos (Morav. Ornitol. Sdruzeni) 48:77–108. [In Czech, plus some English and German translations.]—*Czechoslovak ornithological bibliography* finally has been completed and published in a series of three books and three journal articles. The first two books deal with references published in the Czech region of Czechoslovakia before 1961. References published in the Slovak region have been compiled elsewhere (B. Matoušek, 1961, Acta Rerum Nat. Mus. Natl. Slov. Bratisl. 7:3–109). The third book includes both the Czech and Slovak regions, and therefore covers the whole country. Since 1981, references have been compiled on a biyearly basis and published in three journal articles. The authors have indicated that years 1987–1990 are in preparation and should appear in the same venue.

Each bibliography is divided into two sections: one section deals with ornithological works, the other with parasitological, epidemiological, and epizootological works involving birds. Although most titles are in the Czech language, about one third are translated into English or German. I presume that a translated title indicates that that article includes a foreign language summary. The authors also append Latin names to titles that are ambiguous about the species involved. These two measures make the bibliographies accessible to a foreign readership.

It is difficult to judge how comprehensive the bibliographies are. The authors are leading ornithologists who have recently finished a monumental treatise of Czechoslovak birds; thus, they should have a solid knowledge of the recent literature. They also have appealed to amateur bird watchers for help in securing little known or local publications, and judging from the obscurity of many entries, they have succeeded. Thus, I expect the coverage to be fairly exhaustive, especially with regard to literature published in this century.

I presume that the biyearly updates may be obtained from the authors, who may also direct inquiries regarding the purchase of the books. [Inst. of Systematic and Ecological Biology, Květná 8, 603 65 Brno, Czechoslovakia.]—Stanislav Přibil.

52. Bird census and atlas studies. Proceedings of the XI International Conference on Bird Census and Atlas Work. K. Šťastný and V. Bejček, eds. 1990. Agricultural University, Prague, Czechoslovakia. 492 pp. No price given.—These proceedings originate from the joint conference of the International Bird Census Committee and the European Ornithological Atlas Committee held in 1989 in Prague, Czechoslovakia. There were 78 papers presented at the conference, all of which are reprinted in the proceedings, either in full or as a summary. The papers are divided into six sections. Here, I will indicate themes of the sections and summarize some particularly noteworthy findings.

The first section deals with methodological problems. Most of the papers in this section compare the accuracy of two census techniques. A paper by T. Tuulmets demonstrates that professional birdwatchers are no better than untrained persons in the visual estimation of the number of objects (i.e., flying birds).

The second section deals with atlas and distribution studies. The section opens with a progress report on the Atlas of Breeding Birds in Europe, which is a major cooperative effort organized by SOVON (Dutch organization for bird census work) and involving all European countries. The fieldwork for the atlas has now been completed, and a preliminary schedule for publication aims for 1992. Other papers in this section provide updates on the various national and local (Prague, Warsaw) breeding and wintering atlases.

The third section is short and contains papers on the use of birds in landscape planning. The fourth section deals with the design and results of winter censuses. A Kuresoo describes the catastrophic effect of a late April cold spell on the breeding birds of Estonia, and L. Raudonikis evaluates aerial surveys of the Baltic coast for waterfowl.

A majority of papers in the fifth section documents bird densities in various habitats: 11 papers deal with forest habitats, one with a riverine habitat, and one with birds of prey in a pheasantry. A paper by I. Geister presents a discussion on how floaters and sexually immature individuals affect the accuracy of breeding surveys.

The sixth and last section deals with long-term monitoring of population changes. The opening paper reviews the organization and working methods of the eight nation-wide monitoring projects that currently are under way in Europe. O. Hilden and F. Saris propose a new, all-European monitoring system for breeding birds. Several other papers deal with the monitoring projects of various countries, and three papers with population trends of individual species, including the Eurasian Kestrel (*Falco tinnunculus*), Sand Martin (*Riparia riparia*), and European Starling (*Sturnus vulgaris*). Five papers are devoted to population changes of waterfowl in various fishpond districts of Czechoslovakia.

There is more to the proceedings than I have indicated here, and I am sure that other workers would highlight papers of their taste. I presume that the proceedings can be ordered through the editors. [Inst. of Applied Ecology and Ecotechnology, Agricultural Univ., 281 63 Kostelec and Černými lesy, Czechoslovakia.]—Stanislav Přibil.

53. Birds of prey in Virginia: a history of specimen records from 1853 to 1988. D. W. Johnston and W. J. Ehmann. 1990. Virginia Avifauna No. 4, Virginia Society of Ornithology, Lynchburg, Virginia. 58 pp. $9.00, softcover.—Beginning with a map separating Virginia into five major physiographic provinces, a brief text describing the format, data collection, and analysis, this volume presents a catalog of known specimens of falconiform and strigiform birds from Virginia and a discussion of the data presented.

The authors' Figure 2, a bar chart indicating the numbers of raptor specimens (no eggs) collected by decade from 1870 to 1988, suggests periodic surges of interest in collecting specimens. The first is a peak during the last decade of the 1800s, corresponding to the era of "hobby" collecting. This is followed by a decline during the first decade of this century, somewhat following the "protectionist" sentiment of the time. Another peak followed during the teens with a lull during the twenties, a peak during the thirties, and then a long hiatus until the 1970s, when specimens recorded reached their high of 26 during 1978. Since then additions to collections have again declined.

It is difficult to interpret these data since many earlier specimens have undoubtedly been lost. Most early specimens were probably collected (shot) intentionally for collections, whereas most of the more recent specimens probably represent salvaging the victims of accidents. Some specimens were undoubtedly collected to document rarities. Thus, the best uses for these data are as documentation of what was where when, acknowledging that absence of specimens does not preclude the species having been present. Lack of either randomness or specific plan in the acquisition of specimens limits (but does not preclude) their usefulness. Properly documented and curated specimens represent an extremely valuable resource—one that should be carefully protected and added to through the systematic preservation of specimens that become available through any source.

All too often birds found dead are ignored, discarded, or even autopsied and then discarded. There is a host of scientific uses to which such specimens can be put, the list being more or less limited by the quality of data provided with the specimen. Education is certainly high on the list, but also the addition of knowledge relative to food habits, molt, plumage variation, morphology, parasites, pesticide and heavy metal contamination, migration, distribution, breeding status, etc. Specimens need to be preserved as study skins, which are the traditional form of preservation, but also as skeletal material, alcoholics, and even as specialized tissue samples. Recent trends in training in ornithology seem to be away from specimen preservation. This needs to be reversed. The value of collections for a multitude of uses needs to be acknowledged and collections supported. There are limits to data from collections, but the data can tell us a great deal, can suggest further study needs, and can add substantially to studies of behavior, ecology, and morphology that might be based primarily on data from other sources.

This catalog, which includes sex, age, specimen type, locality, and current disposition data for nearly 2000 birds of about 25 species, will be of great use to researchers working with individual species or doing avifaunal studies. The authors' summaries and discussion of the data presented, including identification of status changes, identify most importantly gaps in our knowledge that might be filled with future collecting/salvaging efforts. [5219 Concordia St., Fairfax, VA 22032, USA.]—Jerome A. Jackson.

54. Establishing a nest box program for American Kestrels along an interstate highway: recommendations based on the Iowa program. D. A. Varland, R. D. Andrews, and B. L. Ehresman. 1992. Iowa Department of Transportation, Ames, Iowa. 8 pp., four color photographs, one color painting, two line drawings.—In 1983, Ron Andrews of the Iowa DNR began erecting nest boxes for American Kestrels (*Falco sparverius*) along I-35, the interstate highway that runs from north to south through the state. Currently, nest boxes are in place "nearly every mile of I-35 from Missouri to Minnesota." Kestrel trails (cf. bluebird trails) also have been established in other states and provinces, including Florida, Idaho, Nebraska, Rhode Island, and Saskatchewan.

The booklet begins by providing a brief summary of the natural history of the species. This is followed by explicit practical advice on how to establish a kestrel trail, including building nest boxes, choosing sites, and mounting, monitoring and maintaining the nest boxes. Illustrated plans for building a nest box are included. The authors also suggest some safety guidelines.

This booklet was designed for a lay audience, and it should be well received. Booklets, as well as more information on the program, may be obtained from the Iowa DNR. [Iowa Dept. of Natural Resources Nongame Wildlife Program, Wildlife Research Station, R. R. 1, Boone, IA 50039, USA.]—John A. Smallwood.