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RECENT LITERATURE

Edited by Robert C. Beason

RESEARCH TECHNIQUES

1. The use of isotopes for identifying populations of migratory birds. C. P. Chamberlain, J. D. Blum, R. T. Holmes, X. Feng, T. W. Sherry, and G. R. Graves. 1997. Oecologia 109:132–141.—The isotopic composition of hydrogen, carbon, and strontium were analyzed from the feathers of Black-throated Blue Warblers (*Dendroica caerulescens*) on their breeding grounds and their wintering grounds in the Caribbean. Deuterium and C^{13} isotopes varied systematically along a latitudinal gradient and were highest at the southern end of the species' breeding range in Georgia and lowest in southern Canada. Deuterium also decreased from east to west in the northern part of the breeding range. The highest values of Sr^{87} were in the Appalachian Mountains and decreased to the west. Feathers collected from the wintering grounds in the Caribbean indicate that those individuals were primarily from the more northern populations. This initial study shows the potential of this technique to determine the breeding locations of migrant and wintering birds. The analysis requires that the feathers used for the technique be grown while the birds are on their breeding grounds. Much work remains before the technique can be implemented on a large scale. [Dept. of Earth Sciences, Dartmouth Coll., Hanover, NH 03755, USA; e-mail: c.page.chamberlain@dartmouth.edu.]—Robert C. Beason.

BEHAVIOR

(see also 7, 9, 10, 11, 12, 14, 16, 27, 28, 30, 32)

2. Disturbance of wintering Green-winged Teal and Mallards by raptors. W. P. Johnson and F. C. Rohwer. 1996. Southwest. Nat. 41:331–334.—The authors observed 767 individual unmarked Green-winged Teal (*Anas crecca*) and 531 Mallards (*A. platyrhynchos*) in the Atchafalaya River Delta in Louisiana during the winter of 1994–1995 to test for a difference in flushing rate of the two species to raptors, and to see if either species is vulnerable to a particular raptor species. Green-winged Teal were disturbed significantly more often by raptors (40 flushes) than were Mallards (6 flushes). Northern Harriers (*Circus cyaneus*) accounted for 61% of all raptor-caused disturbances and had a significantly greater effect on Green-winged Teal than Mallards (27 vs. 1 flight responses respectively; $P < 0.001$). Peregrine Falcons (*Falco peregrinus*), Red-tailed Hawks (*Buteo jamaicensis*) and Bald Eagles (*Haliaeetus leucocephalus*) also disturbed both duck species, but at a significantly reduced rate. Although no waterfowl strikes or kills were observed by any raptor species, the authors suggest though that since Green-winged Teal weigh less than Northern Harriers, whereas Mallards weigh more, teal are more vulnerable to harrier predation (as well as predation by other raptors) and thus flush more readily. These data seem to suggest that other small and mid-sized dabbling ducks may face greater overwinter stress from disturbance by raptors than do larger ducks. [Texas Parks and Wildlife Dept., 10 Parks and Wildlife Dr., Port Arthur, TX 77640, USA.]—Danny J. Ingold.

3. Why do Gray Catbirds destroy eggs in nests of other birds? Experimental tests of alternative hypotheses. A. Spooner, S. Pribil and J. Picman. 1996. Can. J. Zool. 74:1688–1695.—Although egg-pecking may be widespread among passerines, surprisingly little is known of its function. The authors tested five possible explanations: (1) eggs are consumed for their nutrients; (2) eggs are destroyed to reduce competition, or to (3) alter the searching efficiency of predators or brood parasites; (4) eggs of conspecifics are destroyed to create breeding opportunities; or (5) eggs of other species are destroyed to reduce the incidence of brood parasitism. Six experiments were devised to test the egg-pecking responses of breeding and fledgling catbirds. These experiments involved varying presentations of conspecific and heterospecific eggs, with such manipulations as reducing the palatability of the eggs or offering an experimental nest with both eggs and young. The results of the experiments supported most strongly the consumption hypothesis, with weaker support for the antiparasitism hypothesis, and minimal support for the predator-avoidance hypothesis. The authors suggest that egg destruction may serve multiple purposes, which vary among species. They

conclude that the ultimate reason for egg destruction is that it addresses some breeding constraint of a species. [Ottawa-Carleton Inst. of Biology, Dept. of Biology, Univ. of Ottawa, 30 Marie Curie, Ottawa, ON K1N 6N5, Canada.]—Scott. W. Gillihan.

4. Group composition and contributions to breeding by Rufous Vangas *Schetba rufa* in Madagascar. S. Yamagishi, E. Urano, and K. Eguchi. 1995. Ibis 137:157–161.—The study suggests that Rufous Vangas breed in cooperative, territorial groups in the deciduous dry forest of western Madagascar. Groups consisted of an adult male and an adult female (7 groups); an adult male, an adult female, and a "spotted bird" (5); two adult males and an adult female (2); two adult males, an adult female, and a spotted bird (1). Spotted birds with black spots on a white throat are presumed to be immature males. The food delivery rate of each group member was recorded. Most food deliveries by a spotted bird occurred in the absence of the adult male and most frequently in the presence of the female. Fifty-seven percent of the spotted bird's nest attendance occurred in the absence of other group members. The authors suggest that the social role of the spotted bird may be similar to subordinate helpers in the Florida Scrub-Jay *Aphelocoma coerulescens* which are dominated by other members of the breeding group, but which hope to acquire their own territory (perhaps through the death of a resident male). The scientists also observed spotted birds defending group territories. The observations represent the initial stages of work on a little-studied species. The article is well written and provides an appropriate introduction to the breeding biology of the Rufous Vanga.—B. L. Sharp.

FOOD AND FEEDING

(see also 15, 25)

5. Sugar preferences of some southern African nectarivorous birds. C. T. Downs and M. R. Perrin. 1996. Ibis 138:455–459.—Seventeen individuals of three nectarivorous species, Gurney's Sugarbird (*Promerops gurney*), Malachite Sunbird (*Nectarinia famosa*), and Black Sunbird (*Nectarinia amethystina*), were captured to measure their sugar preferences. The birds were kept in three outdoor aviaries (4.2 m × 2 m × 1 m) and subjected to natural photoperiod and temperature conditions. The birds were offered a choice of fructose, glucose, or sucrose. The concentrations of solutions varied from 0.25 M to 0.73 M. During a three hour observation period the feeders were rotated every hour and the bases of the feeders were the same color to eliminate bias. All species preferred sucrose at 0.25 M concentration. As concentrations increased the birds differed in the number of visits to feeders but had no preference for sugar type. However, when offered a choice between 0.25 M and 0.73 M, the birds chose the higher concentration. The preference for sucrose at low concentrations may result from the bird maximizing its energy reward. However, the experiment would have to be repeated to learn if the bird's preference for a specific concentration is altered by energy content. Alternatively, sucrose may have been preferred because it is sweeter than fructose and glucose. However, birds do not respond to artificial sweeteners, which are sweeter than sucrose. [Dept. of Zoology and Entomology, Univ. of Natal, Private Bag X01, Scottsville, 3209, South Africa.]—M. Katriina Laine.

6. Removal of piñon seeds by birds and rodents in San Luis Potosi, Mexico. E. Martinez-Delgado, E. Mellink, J. R. Aguirre-Rivera and E. Garcia-Moya. 1996. Southwest. Nat. 41: 270–274.—The authors developed a multi-factorial experiment to examine the relative removal of piñon seeds by birds and rodents, as influenced by time of year, tree species, seed type, microhabitat and slope aspect. Seeds were placed in different combinations of factors and levels (54 total treatments) on a piñon pine (*Pinus spp.*) stand 2.2 km SE of La Amapola, Ejido Escalerilas, in the Mexican state of San Luis Potosi. Only five of 51 bird species fed regularly on piñon seeds: Gray-breasted Jays (*Aphelocoma ultramarina*), Scrub Jays (*A. coerulescens*), White-winged Doves (*Zenaida asiatica*), Mourning Doves (*Z. macroura*) and Common Ravens (*Corvus corax*). During July, prior to maximum seed production, birds consumed significantly more piñon seeds on the northeastern slope versus the southwestern slope, and consumed seeds from both *Pinus cembroides* and *P. discolor* at rates that did not differ significantly. During the September tests, overall seed removal by birds increased from 32.6% to 77.2% and no slope interaction was detected. However, birds during the later period

showed a significant preference for seeds from *P. cembroides*. The authors suggest that piñon seed removal by birds is affected by time of year and that earlier in the season birds may have preferred the northeastern slope since trees there were more robust and provided better perches. The influx of migrant birds in September resulted in the rapid removal of all piñon seeds regardless of slope or any other factor. The two most common piñon seed-eating rodents were deer mice (*Peromyscus maniculatus*) and rock mice (*P. difficilis*). During both sampling periods, consumption of seeds by rodents was significantly greater on the southwest-facing slope, which had a higher temperature, more gravel and stones, and more understory vegetation. On clear nights, which occurred mainly in July, rodents preferred to feed where there was greater canopy cover, particularly near the base of trees. In captivity, one of each *P. maniculatus* and *P. difficilis* showed a significant preference for seeds from *P. cembroides* which have softer hulls. [Calle Hidalgo #9, Ojuelos, Jalisco (EM-D), Mexico.]—Danny J. Ingold.

7. Host choice and success of gulls and terns kleptoparasitizing Brown Pelicans. D. A. Shealer, T. Floyd and J. Burger. 1997. Anim. Behav. 53:655–665.—The optimal strategy for a kleptoparasite is to maximize its food intake rate or energy gain. Shealer, Floyd and Burger studied the kleptoparasitic relationship between gulls (*Larus* spp.), terns (*Sterna* spp.) and Brown Pelicans (*Pelecanus occidentalis*) to determine the energetic and behavioral dynamics between these kleptoparasites (gulls and terns) and their host (pelican). Foraging behavior of Brown Pelicans, terns and gulls was observed in 1991 and 1992. Kleptoparasites were found to target successful pelicans irrespective of the pelican's age. It was suggested that differential behavior between successful and unsuccessful pelicans provided kleptoparasites with an obvious visual cue of a potential reward. The authors suggested that for the kleptoparasite-host system studied, that gulls and terns were maximizing the probability of an attack being successful. [Dept. of Biology, Colgate Univ., Hamilton, NY 13346, USA.]—Jeffrey P. Duguay.

NESTING AND REPRODUCTION

(see also 3, 4, 22, 23, 27, 29, 32)

8. Predation-mediated bird nest diversity: an experimental test. M. A. Marini. 1997. Can. J. Zool. 75:317–323.—In a given avian community, each species might benefit from having unique nest characteristics, since nest predators might hunt for nests based on a search image of a particular nest type and its typical placement. If each species has unique nest traits, the predator's overall success rate will be lower, since it may be searching specifically for one nest type, and overlooking nests of other types. If this "predation/diversity" hypothesis is true, hunting efficiency should be poorer in species-rich than in species-poor communities. The author tested this by distributing abandoned natural nests of 5 species of locally-breeding passerines, seeded with Japanese quail eggs, along a series of 500-m transects in wooded ravines. Each transect was assigned either species-rich (nests of all 5 species used) or species-poor (nests of only 2 species used) designation. Each nest was placed in the field at the height and on the substrate typical for that species, then checked regularly during the breeding season. The percent of depredated nests on the species-poor transects was significantly higher than on the species-rich transects, supporting the hypothesis that birds benefit by having nests that differ from other species in the community. [Dept. of Ecology, Ethology, and Evolution, Univ. of Illinois at Urbana-Champaign, Urbana, IL 61820, USA.]—Scott W. Gillihan.

9. Shiny cowbirds follow the 'shotgun' strategy of brood parasitism. G. H. Kattan. 1997. Anim. Behav. 53:647–654.—Kattan observed House Wren (*Troglodytes aedon*) nests during construction and laying periods and checked all active wren nests during these stages to determine whether Shiny Cowbirds (*Molothrus bonariensis*) synchronized their egg laying with the host's laying period, and whether the cowbird females have mechanisms to avoid competition with other cowbird females. This study was conducted over 2 years in the Cauca Valley, Colombia and included 34 natural nests and 105 nests in boxes. Female cowbirds monitored wren nests and tended to time their laying to coincide with the wren's laying period. Multiple parasitism was common, and female cowbirds did not appear to remove or destroy previously laid cowbird eggs. Thus, female cowbirds did not exhibit mechanisms to

avoid competition with other cowbird females. It was suggested that female Shiny Cowbirds rely more on high fecundity and chance than on the precise placement of each egg. [Wildlife Conservation Society, Bronx, NY, USA.]—Jeffrey P. Duguay.

10. Male detention affects extra-pair copulation frequency and pair behaviour in Western Bluebirds. J. L. Dickinson. 1997. Anim. Behav. 53:561–571.—Male Western Bluebirds (*Sialia mexicana*) were detained to determine whether the male's presence reduced the frequency with which extra-pair males entered their territories seeking extra-pair copulations (EPCs). Three types of 1-h detention experiments were used: males were visually but not vocally occluded from mates and non-resident males, both visually and vocally occluded, and neither visually nor vocally occluded. Females mated to detained males were more likely to have at least 1 extra-pair male join them and were more likely to experience at least 1 EPC attempt than were control females. The frequency of intrusion and EPC attempts by extra-pair males did not differ between the 3 treatments, suggesting that male vocalizations did not cause intrusions and EPC attempts in the experiments. Further, neither distance of females from their nests nor frequency of vocalizations by females explained the increased intrusion rates by extra-pair males during the detention experiments. Most intrusions by extra-pair males occurred within 10 min of detention of males, indicating that short lapses in mate attendance resulted in EPCs. It was suggested that the frequency of EPC attempts was due to detained males being prevented from thwarting attempts of extra-pair males to intrude and copulate with their mates. [Hastings Reservation, 38601 E. Carmel Valley Rd., Carmel Valley, CA 93924, USA.]—Jeffrey P. Duguay.

11. Do female red-winged blackbirds benefit genetically from seeking extra-pair copulations? E. M. Gray. 1997. Anim. Behav. 53:605–623.—Gray used both behavioral observations and DNA fingerprinting to investigate potential genetic gains to female Red-winged Blackbirds (*Agelaius phoeniceus*) from extra-pair copulations (EPCs). Between 50 and 64% of all broods each season (1990–1992) contained at least one nestling sired by an extra-pair male. Females participating in EPCs had higher reproductive success than females not participating in EPCs. This higher reproductive success was due to a greater proportion of eggs hatching and lower predation rates. It was suggested that female redwings gain genetic benefits from EPCs by ensuring fertilization of all of their eggs, rather than increasing the genetic quality or diversity of offspring. A need for studies that test whether females derive material gains in addition to genetic benefits is suggested to provide a complete picture of the factors that might influence female reproductive behavior. [Univ. of Nevada, Reno, ERS/186, 1000 Valley Rd., Reno, NV 89512-0013, USA.]—Jeffrey P. Duguay.

12. Female Red-winged Blackbirds accrue material benefits from copulating with extra-pair males. E. M. Gray. 1997. Anim. Behav. 53:625–639.—Several studies have suggested that females may gain genetic benefits from extra-pair copulations (EPCs). Gray tested whether female Red-winged Blackbirds (*Agelaius phoeniceus*) acquire material benefits (access to food resources and increased nest defense) from non-mate males by participating in EPCs. Copulatory behavior and DNA analysis was used to assign paternity. Male territories were supplemented with food during the nestling stage to determine if copulatory history influenced male tolerance of females foraging on their territory. Females that copulated with an extra-pair male were allowed to feed on his territory, whereas non-resident females that had not copulated with him were not. To determine if copulatory history influenced the likelihood that a male would assist a female in defense of her nest, a mounted Black-billed Magpie (*Pica pica*) was presented at 47 blackbird nests containing nestlings. Males that copulated with a nesting female on an adjacent territory were more aggressive towards a predator at her nest than were males that were not known to have copulated with her. Gray's findings suggest that female Red-winged Blackbirds in her study population do indeed acquire material benefits from copulating with multiple males. [Univ. of Nevada, Reno, ERS/186, 1000 Valley Rd., Reno, NV 89512-0013, USA.].—Jeffrey P. Duguay.

13. Red-breasted Mergansers, *Mergus serrator*, nesting in southern Texas. J. R. Rupert and T. Brush. 1996. Southwest. Nat. 41:199–200.—In North American, Red-breasted Mergansers typically nest from Alaska across Canada to the coast of Greenland. Here, the authors document two pairs of Red-breasted Mergansers nesting on the Lower Laguna Madre on

Laguna Atacosa National Wildlife Refuge in Cameron Co., Texas. Both pairs were located with pre-fledging juveniles in a hypersaline cove about 50 cm in depth. This represents the first breeding record for this species in Texas and is located approximately 2100 km south of the nearest documented breeding range for Red-breasted Mergansers, in central Wisconsin. [Dept. of Biology, Univ. of Texas-Pan American, Edinburg, TX 78539, USA.]—Danny J. Ingold.

14. Magpies' tails: damage as an indicator of quality. S. Fitzpatrick and P. Price. 1997. Behav. Ecol. Sociobiol. 40:209–212.—Long, graduated tails in birds are costly and often result from sexual selection in sexually dimorphic species, where they serve as a "strategic" handicap. Moreover, use of the same ornamental trait in mate choice by both sexes in a monomorphic species may lead to exaggerated characteristics in both males and females. In this study, the authors examined wild Magpies (*Pica pica*) in suburban parks in Northern Ireland during both the breeding and non-breeding season to determine if tail damage to the long tail may serve as an indicator of overall quality for both sexes during pair formation. As indicated by tail scores, damage to the tails of non-breeding Magpies was significantly greater ($P < 0.001$) than to breeding individuals and pairs. There was a significant positive correlation in the tail scores of the members of a pair during pair formation suggesting that to a certain degree, positive assortative mate choice by tail quality occurred. Magpie pairs with higher collective tail scores paired earlier but did not initiate nesting or fledge young earlier than pairs with broken or abraded tails. Tail quality and reproductive success were also significantly positively correlated; Magpie pairs with higher collective tail scores produced more fledglings than pairs with lower scores. In addition, females that produced two chicks had significantly higher tail scores than did females that produced only a single chick; similarly, males that produced two chicks had higher-quality tails than males that produced only one chick. On the other hand, the tail scores of Magpies were not significantly correlated with any of several habitat variables associated with their territories. Thus, these data support the hypothesis that tail damage in this species serves as an honest signal of overall reproductive potential in two seemingly contradictory ways: (1) by serving as a "strategic" handicap in which the honesty of the signal is guaranteed by its costliness, and (2) by producing a "revealing" element that would seem to reduce the cost necessary to ensure honesty in a purely strategic handicap. [74 Glenmachan Rd., Belfast BT4 2NN, Northern Ireland.]—Danny J. Ingold.

15. A test of male mating and hunting success in the Kestrel: the advantages of smallness? H. Hakkarainen, E. Huhta, K. Lahti, P. Lundvall, T. Mappes, P. Tolonen and J. Wiehn. 1996. Behav. Ecol. Sociobiol. 39:375–380.—In this study, the authors address one of several hypotheses that have been proposed to explain reversed sexual size dimorphism (RSD) in raptors, namely that selection may favor small male size if smallness is related to mating or reproductive success. The authors examined female choice for male wing and tarsus length and body mass in captive male Kestrels (*Falco tinnunculus*) to determine if females choose smaller mates. In addition, they examined hunting success in captive males as well as courtship feeding in free-living males to address if smaller males are better food provisioners than larger individuals. When the differences in body mass and tarsus length between the two competing males was small (<12 g and <2 mm respectively), female Kestrels showed no preferences; however when the difference in size between the competing males was pronounced (>12 g body mass and >2 mm tarsus length), females showed a significant preference for the smaller male. Females showed no preference for males on the basis of wing length, although this measure may not have been as critical since females did not have the opportunity to see males fly. In the hunting experiments, lighter males with shorter wings had significantly better hunting success than heavier males with longer wings. This difference was not correlated with differences in body fat reserves between small and large birds, or in hunting success between yearling and adult males. Observations of courtship feeding by free-living males revealed that shorter-winged individuals were better food provisioners than longer-winged males (although no relationship was found with respect to body mass). These findings support the hypothesis that RSD in Kestrels may be explained at least in part from both enhanced mating (resulting from female choosiness) and hunting efficiency of small

males. [Lab. of Ecological Zoology, Dept. of Biology, Univ. of Turku, FIN-20500 Turku, Finland.]—Danny J. Ingold.

16. Making sense of scents: effects of odour on survival of simulated duck nests. R. G. Clark and B. K. Wobeser. 1997. J. Avian Biol. 28:31–37.—Female ducks (and some owls, I might add) often defecate on their eggs when flushed from their nests by humans. On the one hand, such behavior would be adaptive if feces repel egg predators. On the other hand, it would be maladaptive if soiling the area in and near the nest attracts predators. Toward understanding the influence of odors on the survival of waterfowl nests, Clark and Wobeser conducted a series of experiments using artificial clutches while controlling for nest density, habitat, nest concealment, and visitation frequency. Survival was statistically equal among control clutches and those treated with commercial duck scent, pond water, and a novel odor (lemon juice and ground ginger root), and clutch survival did not vary with increasing amounts of duck scent applied to experimental nests. Clutch survival declined when a mixture of Mallard (*Anas platyrhynchos*) feces and pond water was added to vegetation covering and surrounding the nests. The odors created by diluting duck feces with water were not nearly as strong as those emanating from fresh feces produced by nesting ducks. Thus, defecation caused by human visits to duck nests could increase the rate of clutch mortality from predation. Presumably, this behavior is a fright reaction that has no adaptive function. [Canadian Wildlife Service, 115 Perimeter Rd., Saskatoon, Saskatchewan S7N 0X4, Canada; e-mail: clarkb@desoto.wxe.sk.doe.ca.]—Jeff Marks.

17. Life history evolution in tropical and south temperate birds: what do we really know? T. E. Martin. 1996. J. Avian Biol. 27:263–272.—Relative to birds from the Northern Hemisphere, tropical and Southern Hemisphere species are characterized as having small clutch sizes, extended parental care, and high adult survivorship. These life-history traits have been explained by hypotheses related to high predation pressure, food limitation, and climatic stability. Martin points out that many of the assumptions and predictions of these hypotheses have not been clearly delineated or properly tested. In this commentary, Martin identifies discrepancies in our general perceptions about life-history traits in tropical and Southern Hemisphere birds (hereafter "southern birds") and suggests assumptions and predictions for future tests. Consider the relationship between nest predation and clutch size in the tropics. High rates of predation in southern birds are thought to select for small clutch sizes. Yet, developmental rates in southern birds tend to be slow, resulting in longer incubation and nestling periods relative to those of northern species. One would think that if predation exerted strong selection for smaller clutches, then it also would select for more rapid development of embryos and nestlings. Indeed, the importance of nest predation on life-history traits of southern birds is not clear. Skutch, for example, showed that nest predation for a suite of Central American species was lower at high elevations, even though average clutch size was 2 eggs regardless of elevation. Moreover, several studies have reported nest-predation rates for tropical species that are equal to or lower than those of their north temperate congeners. The only thing that seems clear is that southern species have smaller clutch sizes. Martin goes on to systematically dismantle some of the widely held beliefs regarding food limitation, reproductive effort, and longevity of tropical versus temperate birds, concluding that "we know very little of causes of differences between north temperate and tropical/southern hemisphere regions and that much of what we think we know . . . may be incorrect or overstated." He closes with a list of 25 hypotheses and predictions under the headings "Nest Predation," "Food Availability," and "Adult Survival (Reproductive Effort)" that should go a long way toward formulating tests to explain differences in life-history traits between tropical and temperate species. A detailed discussion of these hypotheses and predictions is beyond the scope of this review. I urge anyone with an interest in this fertile and important field of research to obtain and read Martin's paper. [Montana Coop. Wildlife Research Unit, Univ. of Montana, Missoula, MT 59812, USA; e-mail: tmartin@selway.umt.edu.] —Jeff Marks.

18. Natural nest sites of Marsh Tit (*Parus palustris*) in a primaeval forest (Bialowieza National Park, Poland). T. Wesolowski. 1996. Vogelwarte 38:235–249.—The location of 413 Marsh Tit nest holes and dimensions of 198 holes were measured 1975–1995. Tits nested only in deciduous stands; over 96% of the holes were in *Alnus* or *Fraxinus* in riverine habitats.

In oak-hornbeam habitats, over 83% were in *Tilia* or *Carpinus*. The holes here higher (5.6 m) than in other areas, but were similar in size (20 mm dia, 14 cm deep, 9 cm cavity dia). [Dept. of Avian Ecology, Wroclaw Univ., Sienkiewicza 21, 50 335 Wroclaw, Poland.]—Robert C. Beason.

MIGRATION, ORIENTATION, AND HOMING

(see also 1, 21)

19. Preliminary hypotheses on migration of the Sedge Warbler (*Acrocephalus schoenobaenus*) in the eastern Baltic. N. Chernetsov. 1996. Vogelwarte 38:201–210.—The spring and autumnal migration of Sedge Warblers was studied on the Courish Spit, in the Kaliningrad Region of Russia, a well known stopover location for migrants. The spit is bounded on the east by the fresh water of the Courish Lagoon and on the west by the Baltic Sea. The mass and fat loads of the adult warblers were similar in both spring and autumn, but there was a greater proportion of birds weighing more than 13 g (classed as heavy) in the spring. Juveniles were significantly lighter. The large number (23–32%) of heavy birds in the spring may indicate that the birds were ready to migrate when they were captured. Birds captured at Rybachy Station were heavier than those captured in western Europe, perhaps because they have a long migratory path ahead of them. Although this is a useful paper because it provides information on migration from eastern Europe, some of the author's conclusions appear contradictory, especially with regards to the mass of the birds. Fig. 2 shows there to be no differences between years or seasons. However, not enough information is provided to support the conclusion that there are more heavy individuals in the spring. [Biological Station Rybachy, Rybachy 238535, Kaliningrad Region, Russia.]—Robert C. Beason.

HABITAT USE AND TERRITORIALITY

(see also 18, 25)

20. Home range and habitat selection by the Nutcracker (*Nucifraga caryoccatactes*) during autumn in the Alps. A. Rolando. 1996. Ibis 138:384–390.—Rolando captured, banded, and attached radio transmitters to 15 Nutcrackers in order to study their home range and preferred habitat. The study was done September–November 1992 and September–December 1993. The home range was studied in 11 of the 15 birds. Home ranges for 1992 were smaller than for 1993. Usually the bird concentrated its activity in part of its range. The ranges in the two years overlapped by 35% and seasonal variation occurred. The habitat was measured using three different methods. The combined results showed that Nutcrackers avoided open habitats and broad-leaved forests. The birds preferred hazel (*Corylus avellana*) hedges and hazel in coniferous forests. One third of the observed birds changed their habitat from hazel in 1992 to coniferous woods during 1993. [Dipartimento di Biologia Animale, Univ. di Torino, via Accademia Albertina 17, I-10123 Torino, Italy.]—M. Katriina Laine.

21. Helgoland only once or forever: site fidelity of waders. [Nur einmal oder immer: Ortstreue Helgoländer Watvögel.] V. Dierschke. 1996. Vogelwarte 38:211–216. (German, English summary and captions.)—Of 28 species of waders that have been recorded at Helgoländer, only 5 show any site fidelity based on banding returns: Oystercatcher (*Haematopus ostralegus*), Ringed Plover (*Charadrius hiaticula*). Sanderling (*Calidris alba*), Purple Sandpiper (*C. maritima*), and Turnstone (*Arenaria interpres*). The other species are represented only by transient juveniles. The author attributes this to differences in habitat requirements between the two groups. [Vogelwarte Hiddensee, D-28565 Kloster/Hiddensee, Germany.]—Robert C. Beason.

22. Effects of changes in land use and habitat fragmentation in breeding Curlews *Numenius arquata*. A. Berg. 1992. Ibis 134:355–360.—Decreased availability of grassland and its fragmentation has changed land use patterns of Swedish Curlews. Berg found that the presence of water near planted grasslands and meadows increased the number of territories. The proportion of grassland in the territory was negatively correlated with territory size. Furthermore, the spatial distribution of grasslands affected territory size. A minimal area of grassland was required within the territory, and unoccupied patches of grassland were sig-

nificantly smaller than occupied ones. Isolation of the patches did not affect the Curlew's territory as the birds could fly to nearby patches, although only two pairs foraged outside their territory for a significant amount of time. Berg studied only 20 pairs of Curlews, and compared habitat preferences for only a few of the primary habitats. His focus was the fragmentation of grassland by farming and its effect on Curlews. He concludes that Curlews form larger territories in patchy grassland and smaller territories in planted grassland, which appeared to contradict his finding that patch isolation is unimportant. I wished that Berg had addressed the apparent contradiction. Clearly habitat fragmentation is a problem in Europe, as well as North America. [Dept. of Wildlife Ecology, Swedish Univ. of Agricultural Sciences, Box 7002, S-750 07 Uppsala, Sweden.]—Jill Harmeyer.

23. Breeding success of ducks in relation to different habitat factors. P. Nummi and H. Poysa. 1995. Ibis 137:145–150.—Is a good habitat characterized by a high density of animals? The authors examined habitat quality in terms of breeding success of four species of ducks: Mallard (*Anas platyrhynchos*), Green-winged Teal (*Anas crecca*), Common Goldeneye (*Bucephala clangula*), and American Wigeon (*Anas americana*). Green-winged Teal had a high, stable, breeding success that was not correlated with water area, but showed a slight increase in dense vegetation as well as a significant correlation with the emergent insect density. Mallards had a lower, but more stable breeding success with no correlation between brood size and insect density, vegetation, or water area. American Wigeon had a significant correlation between reproductive success and emerging insect density. Goldeneyes had the most variable reproductive success with a slight increase in light vegetation. The variability, however, had more to do with the invertebrate density and less to do with vegetation or water area. The notion of the 'best' habitat being characterized by the highest density of breeding pairs is supported by the goldeneye. In Mallards, success closely fits the ideal-free distribution of Fretwell and Lucas (Acta Biotheor. 19:16–36, 1969). In teal, success was highest in areas of lowest pair density, suggesting that overcrowding is a concern. These data also suggest that teal may be r-selected waterfowl. [Dept. of Applied Zoology, PO Box 27, FIN-00014, Univ. of Helsinki, Finland].—Daniel F. Fink.

ECOLOGY

(see also 6, 8, 17, 20)

24. The relationship among area, elevation, and regional species richness in Neotropical birds. C. Rahbek. 1997. Am. Nat. 149:875–902.—Elevational gradients of species richness are often thought of as the same as latitudinal gradients and explained with similar causes. When area size is not considered, species richness declined monotonically with increased elevation, but when the effects of area were factored out, the result was a hump-shaped pattern with significantly more species between 500–1000 m than lower. More species were also present between 1000–1500 m than below 500 m, but not significantly so ($P > 0.05$). Area accounted for 67–91% of the variation in species richness. The author proposed that the mid-elevations are a sink for species at higher and lower elevations because of the number of species shared between zones. [Centre for Tropical Biodiversity, Zoological Museum, Univ. of Copenhagen, Universsitetsparken 15, DK-2100 Copenhagen Ø, Denmark; e-mail: cranbek@zmuc.ku.dk.]—Robert C. Beason.

POPULATION DYNAMICS

(see also 23)

25. Wintering Bald Eagle populations and behavior in the middle Rio Grande Basin, New Mexico. P. J. Zwank, B. L. Tyrrant, R. Valdez, and D. L. Clason. 1996. Southwest. Nat. 41:149–154.—The authors examined Bald Eagle (*Haliaeetus leucocephalus*) population trends, foraging behavior and perch-site preferences during the winter of 1991–1992 on Caballo Reservoir on the Rio Grande River in central New Mexico. A total of 48 eagle surveys were conducted, 58% by boat and 42% from shoreline. In addition, eagles were examined during aerial surveys on Caballo as well as Elephant Butte Reservoir, 40 km to the north, and on the Rio Grande River between the two reservoirs, to compare wintering population levels to reservoir surface area. Eagles were present on both reservoirs from December

through mid-March. Eagle numbers obtained from terrestrial surveys at Caballo Reservoir, increased through December and peaked on 23 January with 39 individuals (23 adults and 16 immatures). Adult eagles were more numerous during December and January, but immature birds were more prevalent in February and March. More eagles were observed during a single aerial survey at Elephant Butte Reservoir (55) than on Caballo Reservoir (17) or on the Rio Grande (0). No significant correlation was detected between eagle numbers at Caballo and the surface area of this reservoir, or between the state's total eagle population wintering in the Rio Grande Basin in January and the surface area of Caballo Reservoir. Wintering eagles were successful at 36.7% of their total foraging attempts, and were more successful at capturing fish (53.3%) than birds (4.3%). The majority of all foraging attempts occurred over deep water (>3 m). Eagles spent 95.3% of their time perching and 4.7% flying; foraging comprised 13% of flight time. Foraging for prey and consuming prey while perched, constituted only 0.6% and 3.8% of all observed eagle behaviors respectively. Eighty-seven percent of 488 eagles seen perching were observed in cottonwood (*Populas* sp.) snags, which was likely a reflection of the large number of snags relative to other suitable perch sites. The number of eagles at Caballo and Elephant Butte Reservoirs has increased from 1982–1992, but neither fluctuating water levels nor reservoir surface area has appeared to affect their distribution or abundance. [National Biological Service, New Mexico Coop. Fish and Wildlife Research Unit, New Mexico State Univ., Las Cruces, NM 88003, USA.]—Danny J. Ingold.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 1, 13, 24)

26. Fork-tailed Flycatcher (*Tyrannus savana*) in Arkansas in January with comments on winter occurrence in North America. W. M. Shepherd and K. G. Smith. 1996. Southwest. Nat. 41:194–195.—The authors describe the occurrence of a Fork-tailed Flycatcher in Yell County, Arkansas about 3.5 km northwest of Pontoon. This is the first record of a Fork-tailed Flycatcher in Arkansas and the first to be observed in January in North America. After examining several photographs of the bird with a dissecting microscope, it was determined to belong to *T. s. savanna,* one of three subspecies. [Arkansas Natural Heritage Comm., 1500 Tower Bldg., 323 Center St., Little Rock, AR 72201, USA.]—Danny J. Ingold.

EVOLUTION AND GENETICS

27. Female Mallard mating preferences for multiple male ornaments. I. Natural variation. K. E. Omland. 1996. Behav. Ecol. Sociobiol. 39:353–360.—At least three hypotheses have been proposed to explain why male birds evolve multiple ornaments. One hypothesis predicts that each ornament is a reliable indicator of some component of male quality; a second hypothesis suggests that multiple male ornaments are redundant and signal overall male quality; a third potential explanation is that at least some ornaments are not reliable indicators of male quality and that female preferences for certain ornaments will be weak. In this study, the author tested the multiple male ornament hypotheses by examining preferences in captive female Mallards (*Anas platyrhynchos*) for nine ornaments in male birds and scoring pairing success. Each ornament was ranked by independent observers on a scale from 1 to 6 (dull to bright). Principal component analyses revealed that male ornament brightness was in most cases positively correlated with rank pairing success. However, females chose males with the brightest bills (which accounted for 24% of the variance of pairing success in the pooled data) and apparently paid little attention to the eight plumage characteristics that were scored. The order in which males underwent molt was also a significant indicator of pairing success, suggesting that females do pay some attention to male plumage characteristics. A multiple regression model indicated that bill color and molt rank explained 39% of the variance in pairing success and that the effects of plumage ornaments and overall size approached zero. The results of this study support the "unreliable signal hypothesis" which predicts that females will evolve weak preferences for male ornaments that are not honest or reliable indicators of quality. The data also support the notion that bill color and other fleshy head ornaments common in waterfowl often play an important role in mate

choice. [Dept. of Ecology, Evolution and Behavior, 100 Ecology Bldg., 1987 Upper Buford Circle, Univ. of Minnesota, Saint Paul, MN 55108, USA.]—Danny J. Ingold.

28. Sexual selection and the intromittent organ of birds. J. V. Briskie and R. Montgomerie. 1997. J. Avian Biol. 28:73–86.—All bird species have internal fertilization, but only about 3% possess an intromittent organ (IO). Although previous hypotheses have been proposed to explain the rarity of IOs in birds, Briskie and Montgomerie correctly point out that it is the absence of an IO in most bird species that requires an explanation. Here, they evaluate two previous hypotheses and present several new ones to explain why IOs largely are absent in birds. Briskie and Montgomerie begin by reviewing the taxonomic distribution of IOs in tetrapod vertebrates and describing and illustrating the diversity in structure of avian IOs. A phylogenetic analysis (based on Sibley and Ahlquist) indicates that the IO is an ancestral character in the ratites, Craciformes, and Galliformes. IOs appear to have been lost at least three times in birds and regained at least twice. Of the 246 bird species known to possess a true IO, all belong to the above-mentioned taxa except for the two species of *Coracopsis* parrots and the two species of buffalo-weavers (*Bubalornis*). Because their analysis suggests only five independent evolutionary events, Briskie and Montgomerie could not apply statistical methods to control for phylogeny in their evaluation of hypotheses. Instead, they evaluated the evidence for each hypothesis without statistical analyses. As such, their evaluation is presented as a starting point for further study rather than as a comprehensive treatment. Both of the previous hypotheses were published in King and McClelland's *Form and Function in Birds* (1981). P. E. Lake proposed that an IO may prevent water from entering the female's cloaca during copulation, which could damage spermatozoa or dilute the ejaculate (the Water Damage Prevention hypothesis). The clear prediction of this hypothesis is that species without an IO should copulate on land, whereas those with an IO should do it on the water. Indeed, among aquatic birds, the two families that have IOs tend to copulate on the water, and 11 of the 12 families that lack IOs usually copulate on land. However, several species of aquatic birds without IOs copulate successfully on the water (e.g., some alcids), and only 84 of the 246 species with an IO are aquatic and typically copulate on the water (all are anseriforms). Thus, the presence of an IO cannot be explained as a general adaptation to reduce water damage during copulation. A. S. King proposed the Maintaining Genital Contact hypothesis in which an IO would be advantageous in situations where copulation is difficult owing to physical complications inherent in a bird's anatomy or environment. For example, IOs are prevalent in families composed of large-bodied, long-legged flightless species that have lost the balancing ability of their wings (which could make copulation complicated). Briskie and Montgomerie determined that long-leggedness is not generally associated with the presence of an IO and that even with an IO, the large ratites use behavioral methods (such as crouching) to ensure proper positioning and balance during copulation. Consequently, it is unlikely that an IO has been retained as an adaptation in large birds that might have difficulty balancing during copulation. The Minimizing Flight Costs hypothesis has been proposed informally but not discussed in the literature. Briskie and Montgomerie reject this hypothesis because even the largest avian IO must weigh less than a small meal and thus is unlikely to be a factor in the cost of flight. Moreover, waterfowl are strong fliers, yet possess IOs, and none of the more than 60 flightless species of nonratites has reacquired an IO. The Avoidance of Sexually Transmitted Diseases hypothesis suggests that the potentially hostile environment of the avian cloaca selects for minimal contact of genitalia during copulation. Avoiding disease transmission is an unlikely factor in the loss of IOs in birds because it does not explain why some groups retain IOs. Also, it cannot explain the presence of IOs in the monotremes, which are warm-blooded and have a cloaca similar to that of birds (and thus potentially providing a hostile environment). The two remaining hypotheses proposed by Briskie and Montgomerie center on sexual selection. In theory, a female copulating with a male who does not have an IO could exercise control over fertilizations by refusing to evert her vagina during copulation or by ejecting sperm afterwards. A male with an IO probably would be more successful (i.e., have more control) in placing sperm directly into the vagina without the cooperation of the female. According to the Sperm Competition hypothesis, male control of fertilization (i.e., presence of an IO) should prevail among species in which males invest heavily in offspring. Briskie and Montgomerie evaluated male investment in terms of incubation behavior because of the difficulty

in comparing parental feeding behavior between altricial and precocial species. As predicted, in most families with an IO, males invest heavily in incubation, whereas female-biased incubation prevails in families without an IO. Glaring exceptions occur in the Anatidae and Cracidae (IO present, female-only incubation) and in several families of shorebirds (IO absent, male-biased incubation). Sperm competition also could play a role in the presence of IOs independent of patterns of male investment. In support of this notion, Briskie and Montgomerie point out that many ratites have polyandrous or polygynandrous mating systems in which the intensity of sperm competition should be high. The Female Choice hypothesis suggests that loss of IOs in birds results from female control over fertilization. Briskie and Montgomerie state that this notion is plausible when females can afford to abandon eggs fertilized by males with IOs. This hypothesis is supported by the general loss of the IO in species that lay smaller (and presumably less costly) eggs than species that have retained an IO. Patterns of IO presence in mammals, reptiles, and most amphibians are consistent with predictions of the Female Choice hypothesis. Briskie and Montgomerie's paper clearly is the most thorough attempt to date at understanding the factors selecting for the presence or absence of intromittent organs in birds. As such, it will serve as a jumping-off point for much future work. Anyone with even a passing interest in avian behavioral ecology will find something of interest in this paper. [Edward Grey Inst. of Field Ornithology, Dept. of Zoology, Univ. of Oxford, Oxford 0X1 3PS, UK; e-mail: james.briskie@zoology.oxford.ac.uk.]—Jeff Marks.

PHYSIOLOGY AND DEVELOPMENT

29. Changes in the muscle condition of female Zebra Finches *Poephila guttata* during egg laying and the role of protein storage in bird skeletal muscle. D. Houston D. Donnan, P. Jones, I. Hamilton, and D. Osborne. 1995. Ibis 137:322–328.—Is the evidence sufficient to indicate a mechanism for protein storage in the Zebra finch, and, if so, how might the protein content of the pectoral muscle affect egg production? Proteins could be stored and then released in a non-selective breakdown of muscle proteins, or as labile components of muscle sarcoplasm which could be catabolized without loss of contractility. Fifty-five finches were collected at various stages of clutching: both the pectoralis major and the supracoraciodeus were removed. The water-soluble portion represented the sarcoplasm whereas the alkali-soluble portion represented the myofibrill proteins. Loss of water-soluble protein, alkali-soluble protein, and insoluble muscle material correlated with a 14% loss of pectoral muscle mass. Gel filtration of water-soluble proteins showed two peaks representing avian hemoglobin and avian myoglobin, neither of which changed significantly during laying. A third peak showed a heavier protein that dropped significantly in concentration during laying. Alkali-soluble proteins were not traced as the authors assumed that sarcoplasm was the most likely site for specific protein reserves. One explanation for protein loss is that the female is unable to satisfy her metabolic needs. Alternatively, her loss supplements protein needs of the developing eggs. A third alternative is that her proteins make selective contributions by supplying essential amino acids to the eggs. These may be amino acids that do not exist in the bird's daily diet in sufficient quantity to fulfill the short-term needs of the eggs. This alternative is supported as methionine from muscle proteins is used in egg protein synthesis. A mechanism for the storage and release of sarcoplasmic proteins used in egg formation was supported by the data. The loss of myofibrill protein must be explored as catabolization could adversely affect contractility of the muscle. Any proposed mechanism in which the role of muscle protein is to release specific amino acids must explain how proteins can be lost without loss of muscle function. [Applied Ornithology Unit, Zoology Dept., Univ. of Glasgow, Glasgow G12 8QQ, UK.]—Daniel F. Fink.

30. The stress response and autumn dispersal behaviour in willow tits. B. Silverin. 1997. Anim. Behav. 53:451–459.—Willow Tits (*Parus montanus*) do not survive the winter as solitary floaters and are poorly adapted to dispersal. Thus, it is crucial for a juvenile Willow Tit to become a flock member. Juveniles that fail to join flocks are believed to disperse. Silverin experimentally increased circulating corticosterone in free-living Willow Tits to determine if an increase in this hormone acts as a switch mechanism to change the juvenile's behavior from trying to become a flock member to dispersing. Significantly more corticosterone-

treated juveniles disappeared from the study area when flocks were being established than did controls. However, this was not the case for adults treated with corticosterone. In addition, when corticosterone levels were increased during a time when permanent winter flocks had been established, neither adults nor juveniles left their territories. [Dept. of Zoology, Univ. of Goteborg, Medicinaregatan 18, S-413 90 Goteborg, Sweden.]—Jeffrey P. Duguay.

MORPHOLOGY AND ANATOMY

(see 28)

PLUMAGES AND MOLTS

31. Prevalence of double wing molt in free-living Ruddy Ducks. W. L. Hohman. 1996. Southwest. Nat. 41:195–198.—Three species of stiff-tailed ducks (Oxyurini) including Ruddy Ducks (*Oxyura jamaicensis*), are reported to undergo two wing molts per plumage cycle. In this report, the author presents a review of published and unpublished data on double wing molt in Ruddy Ducks. Most of the published data, including data from the author's previous work, suggest that the occurrence of double wing molt in North American Ruddy Ducks is not as widespread as previously reported and that the timing of the second wing molt is more variable than the first molt which occurs in late summer. The author hypothesizes that double wing molt in free-living Ruddy Ducks occurs mainly in immature birds and is likely restricted to those individuals that reach adult size and attempt to breed during their first year. As with some dabbling ducks including Mallards (*Anas platyrhynchos*), the author suggests that the replacement of Basic I remiges with adult remiges in immature Ruddy Ducks may be critical for them to attain a successful breeding attempt during their first year. [National Biological Service, Southern Science Center, 700 Cajundome Blvd., Lafayette, LA 70506-3152, USA.]—Danny J. Ingold.

32. Plumage characteristics as an indicator of male parental quality in the American Kestrel. J. Wiehn. 1997. J. Avian Biol. 28:47–55.—Wiehn studied the sexually dimorphic American Kestrel (*Falco sparverius*) to investigate whether male plumage characters were correlated with parental quality and to determine patterns of mate choice by females relative to the plumage and provisioning ability of males. The study area was in east-central Pennsylvania. The plumage of 57 captured males was scored on a scale of 1 (dull) to 6 (bright). Provisioning rates (to females before nesting and to females and young during nesting) and reproductive success were recorded from intensive observations of birds using nest boxes. Males arrived on the study area only about one day before females. At the time females paired, they had an average of 3.4 unmated males from which to choose. No male trait was strongly related to the time between arrival and pairing in males, and most males obtained mates within one day after arriving on the study area. Older males had brighter plumage than yearlings. Male plumage brightness was positively associated with early laying by females; hatching success and provisioning rates to nestlings were negatively associated with the width of the subterminal tail band in yearling males. That is, males with bright plumage and narrow subterminal tail bands had the highest productivity. Thus, plumage characters seem to signal male quality, with plumage brightness indicating male age (and thus experience) and width of the subterminal tail band indicating foraging ability (especially of less-experienced males). [Dept. of Biology, Univ. of Turku, FIN-20014 Turku, Finland; e-mail: jyrwie@sara.cc.utu.fi.]—Jeff Marks.

WILDLIFE MANAGEMENT AND ENVIRONMENTAL QUALITY

(see 33)

MISCELLANEOUS

33. The 19th-century trade in swan skins and quills. C. S. Houston, M. I. Houston, and H. M. Reeves. 1997. Blue Jay 55:24–34.—A heretofore little-known fact among naturalists is that during the 19th century, large numbers of swan skins and quills were shipped to Britain as a side product of the enormous fur trade. Houston et al. consulted records in the Hudson's Bay Archives (from the Provincial Archives of Manitoba) to discern information on pre-settlement numbers of swans in Canada's three prairie provinces. The number of swan skins

sold by the Hudson's Bay Company in London peaked at 5000 to 8000 between 1826 and 1837. The average number of swan skins sold per year dropped to less than 2000 between 1841 and 1850 and to fewer than 200 between 1871 and 1880. The final recording was in 1891, with 108 skins listed for sale. Swan skins were used in making women's powder puffs and perhaps also for vests, ceremonial robes, and uniform ornaments such as epaulets. The quills, of course, were fashioned into pens. As an interesting aside, Houston et al. point out that metal pens became available in the 1820s, but that "most writers and almost all lawyers preferred the quill. . . " Several lines of evidence indicate that most of these swans were Trumpeters (*Cygnus buccinator*), which underwent precipitous declines in the continental United States and Canada during the latter half of the 19th century. Houston et al. "strongly suspect" that the decline in sales of swan skins in London during this same period reflects overharvesting of these birds for export to London as well as increased harvest for food following the decline in bison numbers that began in the middle of the 19th century. [863 University Dr., Saskatoon, Saskatchewan S7N 0J8, Canada; e-mail: houstons @duke.usask.ca.]—Jeff Marks.