## RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

### BANDING AND LONGEVITY

**(see also 8, 42, 43)**

1. **Band loss from Lesser Snow Geese.** R. J. Seguin and F. Cooke. 1983. J. Wildl. Manage. 47:1109–1114.—The authors directly estimate rates of band loss for metal, plastic, and vinyl-coated metal bands from double- and triple-banded Lesser Snow Geese (*Anser caerulescens caerulescens*) at La Perouse Bay, Manitoba, using data collected from 1969 to 1980. Ranking bands from lowest to highest rates of loss (uncorrected % loss/yr) shows: (1) vinyl-coated metal, butt-end closure, engraved: .04%; (2) wide PVC wrap-around engraved: .22%; (3) single-ply, wide PVC wrap-around, unengraved: 1.06%; (4) Gravoply (2-ply) butt-end pressure closure, engraved: 1.89%; (5) narrow PVC wrap-around: 40.3%. A corrected band loss rate of .06%/yr was estimated for U.S. Fish and Wildlife Service bands. This compares with 2.3%/yr for British Trust for Ornithology bands on Canada Geese (*Branta canadensis*). Band loss introduces errors into statistical inferences made from mark-recapture studies, because a major assumption in such work is that no band loss occurs.—Richard A. Lent.

2. **A bird bander's dream.** F. E. Ludwig. 1984. N. Am. Bird Bander 9:9.—This article reports the recovery of a Ring-billed Gull (*Larus delawarensis*) in November 1982 in the Eldorado Marsh north of the Horicon Wildlife area in Wisconsin. The bird was banded by the author on 27 June 1938 (Band No. 0386–48013) on Scare Crow Island east of Alpena, Michigan. This represents a longevity record of 44 yrs, 5 months.—Richard J. Clark.

3. **First analysis of banding returns for starlings, *Sturnus vulgaris*, in western France.** (Première analyse des baguages et reprises d'Étourneaux, *Sturnus vulgaris,* dans l'ouest de la France). P. Clergeau. 1983. Oiseau Rev. Fr. Ornithol. 53:53–62. (French, English summary)—This preliminary analysis of banding work done in Massif Armorica between November 1921 and July 1979 contains data for Brittany, the Island of Jersey, and such neighboring points as North Vendée and West Calvados. It describes movements of local and migrant European Starlings.

Nesting populations of starlings in western France are sedentary. Sixty percent of local birds banded in western France were recaptured within 20 km of the banding site and 41% of those recaptured more than a year after being banded had dispersed less than 1 km from the same site. Birds banded in the nest and recaptured as fledglings (8 returns) were within 2.4 km of the nest. Those banded as juveniles (36 returns) were recovered at a mean of 26.4 km from the banding site. Those banded as adults (24 returns) were recovered an average of 14.6 km from the banding site. Hence, sedentary starlings show a decided attachment to their nesting or natal areas.

Migrant starlings are in western France between October and March. Eighty-two recoveries of birds that were banded elsewhere (e.g., in Belgium, Germany, Scandinavia, and the U.S.S.R.) and overwintered there, together with 14 returns from Belgium, Germany, Sweden, Poland, and the U.S.S.R. of birds banded in western France, indicate that this region of France is a flyway for migrants. Starlings travel from northern Europe to England and then south to northern France. Many pass through Brittany to overwinter in southern France, Spain, and Portugal.—Michael D. Kern.

### MIGRATION, ORIENTATION, AND HOMING

**(see also 3, 24, 53)**

4. **European migrant birds that overwinter in the Guinean part of Mount Nimba.** (Oiseaux migrateurs européens hivernant dans la partie Guinéenne du Mont Nimba) A. Brosset. 1984. Alauda 52:81–101. (French, English summary)—European migrants that overwinter in Africa were abundant on Mount Nimba, a 1750-m peak on the frontier of

Guinea, the Ivory Coast, and Liberia. Twenty-three palaearctic migrants were identified in 6 habitats on the mountain during field work in December 1983.

On the basis of elevation, physiognomy, vegetative associations, and avifauna, Mount Nimba can be divided into 6 ecological units: (1) There was a lowland savannah of grassland dotted with gentle knolls. African species, including the Black-chested Coucal (*Centropus grillii*), unknown on Mount Nimba previously, populated the grassland. Four palaearctic migrants, of which the Whinchat (*Saxicola rubetra*) was the most conspicuous, inhabited the knolls. (2) A piedmont at the base of the mountain was covered by almost impenetrable second growth. It hosted 8 African species and high densities of 7 palaearctic migrants, especially Reed Warblers (*Acrocephalus scirpaceus*) and Nightingales (*Erithacus megarhynchos*). Grasshopper Warblers (*Locustella naevia*) also occurred here—this is the first wintering area reported for this species. (3) A gallery forest was richly populated with African species, but devoid of migrants except at its upper edge, which contained large populations of Blackcaps (*Sylvia atricapilla*), Willow Warblers (*Phylloscopus trochilus*), and Wood Warblers (*P. sibilatrix*). (4) An upland grassy plateau was populated almost exclusively by African species (11), except for Yellow Wagtails (*Motacilla flava*) in disturbed habitat near buildings. (5) A high mountain savannah was populated both by palaearctic migrants—wagtails, Pied Flycatchers (*Ficedula hypoleuca*), Spotted Flycatchers (*Muscicapa striata*), and European Bee Eaters (*Merops apiaster*)—and 12 African species. (6) Grassy slopes and rounded hills at the summit had 3 African and 8 migrant species; and 4 others (probably sedentary) that are found in Europe (where they are migratory) and in Africa (where they are not). The palaearctic birds included several thousand Tree Pipits (*Anthus trivialis*), as well as Ortolan Buntings (*Emberiza hortulana*—this is the first report of this bunting in western Africa) and Marsh Harriers (*Circus aeruginosus*—previously unknown on Mount Nimba).

Migrants avoided the equatorial forest on the mountain, probably because it was saturated by a large community (over 150 species) of resident birds. They concentrated in marginal and modified habitats to which the African avifauna has not adapted or in which there are vacant niches. Such marginal areas included the summit of the mountain and the ecotone at the upper edge of the equatorial forest. Modified areas included the knolls (which are the remains of large termite nests) in the lowland savannah and the piedmont, which is an area that was originally cleared of forest for agricultural purposes, but has since been abandoned.

Migrants selected habitats that closely resembled their natal areas. Hence, Whinchats occupied the lowland savannah, Reed Warbler and Nightingales the piedmont, and Marsh Harriers the summit. In areas where local and migrant birds coexisted, there was no interspecific competition and they sometimes formed mixed flocks. However, in areas usurped by overwintering birds, intraspecific competition was evident where they had established feeding territories.—Michael D. Kern.

**5. A radar study on the influence of expected ground speed, cloudiness, and temperature on diurnal migration intensity.** A. C. Perdeck and G. Speek. Ardea 72: 189–198.—To assess migration intensity the authors counted the number of echoes per time unit per day from pictures on radar screens. They concluded that: (1) wind had a positive influence on migration intensity in both spring and autumn; (2) during both seasons, cloud cover had a negative influence and the authors reaffirm that sun visibility is an important factor in orientation; (3) high spring temperatures stimulated migration and; (4) in autumn, temperature had no influence on migration intensity. They found that radar results confirmed in a general way the results of field observation.—Clayton M. White.

**6. Movement of Steller's Jays in western North America.** M. L. Morrison and M. P. Yoder-Williams. 1984. N. Am. Bird Bander 9:12–15.—An analysis of the existing (as of 21 September 1983) 316 recoveries of Steller's Jays (*Cyanocitta stelleri*) on file at the Bird Banding Laboratory is reported in this article. These recoveries indicate a 4.75% recovery rate for the 6646 bandings on record. Distribution of the recoveries is: California (112), Colorado (61), British Columbia (59), Washington (31), Oregon (30), Alaska (13), New Mexico (5), Arizona (3), Idaho and Montana (1). Data were tabulated for 36 recoveries as follows: showing movement between breeding (or natal) and wintering areas, mean distance 243 km, n = 6; banded in late fall or early winter and recovered several months later, mean distance 87.8 km, n = 12; banded and recovered in fall or winter in different locations and years, mean distance 86.7 km, n = 11; banded and recovered in breeding period but different years and locations, mean distance 41 km, n = 7. Forty-six birds showed no movement between breeding and wintering areas and 61 or 68 (89.7%) showed no shifts in breeding location. Their results show that populations of this species have both sedentary and mobile segments with the majority being sedentary. They conclude that Steller's Jays wander for reasons yet unknown, and do not migrate latitudinally. I found it interesting that although the authors suggest that "Steller's Jays either are resident in an area or at most exhibit altitudinal movement in severe winters," they made no attempt to look at altitudes of bandings/recoveries.—Richard J. Clark.

## POPULATION DYNAMICS

**(see also 1)**

**7. Changes in the breeding biology of the Herring Gull (*Larus argentatus*) as a result of increased numbers.** [Veranderingen in des broedbiologic van de Zilvermeeuw *Larus argentatus* door toegenomen aantallen.] A. A. N. de Wit and A. L. Spaans. 1984. Limosa 57:87–90. (Dutch, English summary).—Between 1968 and 1983 the numbers of breeding pairs in a study area in Holland increased from 6200 to 21,500. Within the authors' more limited sample plot (6 ha), the number of fledged young dropped from 1.35 young/pair to .43 over this same time perod. This change was believed to be a result of predation on eggs and young by conspecifics and Lesser Black-backed Gulls (*Larus fuscus*). Egg volume also decreased by 2.6%–4.2%. Young weighed less at fledging, having changed from 772–1050 g in 1966–1968 to 695–953 g in 1983. These changes, plus several others such as growth rates, onset of egg laying etc., are believed to have resulted from increased population pressure.—Clayton M. White.

**8. Sexual and seasonal differences in mortality of the Black Grouse *Tetrao tetrix* in boreal Sweden.** P. Angelstam. 1984. Ornis Scand. 15:123–134.—The Black Grouse is typical of lek species: males display communally and are larger and more colorful than females. There may be costs associated with sexually-selected characters of males, and the literature on Black Grouse indicates that females outnumber males. Using 5 yr of mortality data from radio-tagged grouse, Angelstam attempts to explain how these costs are paid. Except in early spring, radio-tagged females had high survival. Mortality of adult males was greatest during the peak of spring display activity, but was lower than that of females. In contrast to adults, subadult males (< 15 months old) were not as active during courtship displays and had higher survival in spring and summer than adult males. However, their survival was lower than that of adults during fall and winter, presumably because their inexperience and conspicuous plumage increased their vulnerability to predators. Angelstam further speculates that owing to faster growth and higher energy requirements in the first months of life, male chicks would have higher mortality than female chicks. Thus, the female-biased sex ratio could have arisen from high mortality of males prior to adulthood, with no apparent cost to adult males for their sexually-selected characters.

Angelstam admits that his conclusions are drawn from small samples, and I question whether mortality rates of radio-tagged birds are comparable to those without radio-tags (Angelstam contends that they are). Nevertheless, this is one of the few attempts to assess the influence of sexual selection on mortality of wild birds, and the ideas deserve further testing.—Jeffrey S. Marks.

**9. Influence of numbers and nesting colony density on reproductive success of the Herring Gull *Larus argentatus cachinnans*.** (Vliianie chislennosti i plotnosti gnezdovykh poselenii na uspekh razmnozheniia u khokhotun'i *Larus argentatus cachinnans*.) 1983. L. Iu. Zykova and E. N. Panov. Zool. Zh. 62:1533–1540. (Russian, English summary)—Herring Gulls are facultatively social birds whose nesting colonies represent a compromise between social and individual tendencies. Nests must be placed far enough apart that territorial boundaries are not breached, but close enough that birds stimulate each other's nesting behavior. This article reports a study of the varying nesting success of two subcolonies of Herring Gulls on the shore of the Caspian Sea during one breeding season (1980).

The two subcolonies were similar in number but not in density: subcolony 1 (22 nests) was four times as dense as subcolony 2 (24 nests). In subcolony 1 the minimal distance between neighboring nests varied from 1–6 m, in subcolony 2 the minimal distance varied from 3.5 to 27 m. (How the researchers decided where one subcolony ended and the other began, and that there were only two, is unclear.) Nesting success was greater in the more dense subcolony than in the less dense subcolony (58% of nests in dense subcolony had 3-egg clutches, vs. 28% in the less dense subcolony; 58% of all eggs laid in the dense subcolony were known to be fertile or to have hatched by the end of observations, vs. 23% in the less dense subcolony).

Even though the colony's "club," where the bulk of agonistic encounters occurred, was located in the middle of the dense subcolony, members of that subcolony did not incubate any less tightly as a result: they slept a lot while on their nests, rarely got up, sat down promptly when they did get up, and, even if their nests were positioned with a less than clear view of the surroundings (causing more wakeful, wary alertness), they never left their nests until their mates came to relieve them. By contrast, although there were "almost no" aggressive interactions in the more diffuse subcolony, those birds were more "skittish"—they sat more restlessly on their nests, got off them more often, or went off leaving the nest completely exposed and untended.

The authors conclude that the greater density of subcolony 1 was definitely a factor in its greater success. Phenology was not a factor—breeding proceeded in both subcolonies synchronously. (I note that while subcolony 1's terrain is described, subcolony 2's is not; but terrain and any possible advantage subcolony 1 may have had in this regard are not discussed.) The authors acknowledge that the important question of age-related breeding success is still open: the colony was believed to be only four years old (since 1977), and new Herring Gull colonies consist mostly of younger birds, less successful overall than older birds under any circumstances. Although one breeding male of subcolony 1 still wore some of the spots and stripes of juvenal plumage, subcolony 1 may have been older than subcolony 2.—Elizabeth C. Anderson.

## NESTING AND REPRODUCTION

**(see also 7, 9, 18, 21, 28, 37, 49, 59)**

**10. The relationship between nest-box size, occupation, and breeding parameters of the Great Tit (*Parus major*) and some other hole-nesting species.** J. H. Van Balen. 1984. Ardea 72:163–175.—This study was done from 1971–1975. Experimental nest boxes were placed in a study area that also had "normal-sized" nest boxes. The latter were preferred. Onset of laying and clutch size were altered when the tits used the experimental boxes. In cases of brood manipulation, nestling survival was negatively related to brood size. Earlier hatching broods tended to weigh less at any given age. Large broods in small nest boxes ran the risk of reaching hyperthermic states at ambient temperatures of 20°C and higher. The author found a relationship between clutch size and cavity (or box) bottom area and concluded that species with normally large clutches are at a disadvantage when using small cavities.—Clayton M. White.

**11. Comparison of Killdeers, *Charadrius vociferus*, breeding in mainland and peninsular sites in southern Ontario.** E. Nol and A. Lambert. 1984. Can. Field-Nat. 98: 7–11.—Killdeers nesting in undisturbed habitat on Long Point began nesting later and had smaller clutch volumes, lower egg weights, and lower hatching success than Killdeers nesting in fields, old foundations, cemeteries, parking lots, and lawns on the mainland at nearby Port Rowan. The differences appear to result from significantly cooler temperatures along the Lake Erie shore at Long Point than on the mainland, particularly during the laying period. However, temperature differences parallel habitat differences, making cause and effect relationships difficult to isolate. The authors safely conclude that human modification of the habitat may be a contributing factor in the recent range expansion of the Killdeer.—Edward H. Burtt, Jr.

**12. Gamma radiation effects on nestling Tree Swallows.** R. Zach and K. R. Mayoh. 1984. Ecology 65:1641–1647.—The research reported provides two messages: (1) analysis of growth using growth models provides an excellent way to assess environmental stresses, and (2) acute doses of gamma radiation of 2.7 or 4.5 Gy adversely affect the subsequent growth of 1–3 d old Tree Swallows (*Tachycineta bicolor*). On the first point, one can determine if the environmental stress alters growth, which growth model best fits the growth data or if the stress alters only the growth statistics within the same growth model. On the second point, this study showed that for all treatments and controls the logistic model best described the growth of both body mass and foot length while the von Bertalanffy model best described growth of primary-feathers. An experimental group that received 0.9 Gy of gamma radiation showed no apparent growth affects, whereas the higher doses caused both slowed growth (lower growth rate constants) and delayed growth (retarded primary-feather emergence) as well as stunting (lower asymptotes). Controls indicate that these responses are properly attributed to the radiation treatment. No mortality effects were observed during the nesting period, but no data were gathered on long-term survival and fertility or sterility. Further research needs to include such long-term work and also research relating the effects of acute exposures to chronic exposure.—A. John Gatz, Jr.

**13. Effect of gang brooding on survival of Canada Goose goslings.** R. A. Warhurst, T. A. Bookhout, and K. E. Bednarik. 1983. J. Wildl. Manage. 47:1119–1124.—A "gang brood" is defined by the authors as "an aggregation of goslings from at least 2 broods that travel, feed, and loaf together while accompannied by 1 or more breeding adults and sometimes subadults." Over 2 yr, 285 Ohio Canada Goose (*Branta canadensis maxima*) goslings in 56 broods (39 broods from a penned population and 17 from adjacent marsh) were marked for observation. An additional 235 unmarked broods from pen (112) and marsh (123) were also observed.

Gosling interchange between and among broods was common, with brood mixing being greater in the pen than in the marsh. Size of gang broods ranged from 8–75 goslings, usually guarded by a pair of adults that were sometimes accompanied by 1–5 subadults. Gosling survival to fledgling (74%) was comparable to other reported rates, leading the authors to conclude that the effect of gang brooding "is not significant to goose management programs."—Richard A. Lent.

**14. Factors affecting nest success in the Mallard and Tufted Duck.** D. A. Hill. 1984. Ornis Scand. 15:115–122.—The height of vegetation at the nest was one of the best predictors of nesting success of Mallards (*Anas platyrhynchos*) and Tufted Ducks (*Aythya fuligula*) in England. Compared with Tufted Ducks, Mallards nested earlier in the season when the vegetation was shorter and lost a higher proportion of nests to predators (59% vs. 41% for Tufted Ducks). However, Mallard ducklings from early nests hatched during the peak of the chironomid food supply and had higher survival than ducklings that hatched later. Young Tufted Ducks hatched after the chironomid peak and fed by diving for mollusks. The high rate of predation on early Mallard nests appeared offset by the ability of females to renest. Female Tufted Ducks laid a clutch that was heavy in relation to body weight (67% vs. 42% for female Mallards) and probably were unable to renest.—Jeffrey S. Marks.

## BEHAVIOR

**(see also 26, 41, 50, 56, 58, 59)**

**15. Associations and foraging behavior of titmice, wrens, and treecreepers during autumn and winter in Alpes Maritimes.** (Regroupements de mésanges, roitelets et grimpereux en automne-hiver dans les Alpes-Maritimes, et comportement de recherche alimentaire) J.-L. Laurent. 1984. Alauda 52:126–144. (French, English summary)—Titmice, wrens, and treecreepers forage together in mixed flocks in Alpes Maritimes, southern French Alps, during autumn and winter. This paper describes (1) the composition of these flocks (or guilds), and (2) the foraging sites and feeding behavior of guild species in larch, pine, and mixed spruce-fir woods near Valdeblore (elevations 1250–2250 m).

*Larch woods.*—At elevations below 1700 m, the flocks were large (20 or more birds) and included many species of titmice—Willow (*Parus montanus*), Coal (*P. ater*), Crested (*P. cristatus*), Blue (*P. caeruleus*), Great (*P. major*), and Long-tailed (*Aegithalos caudatus*) tits. Guilds were of three kinds at these low elevations, depending on whether they contained Blue Tits (9 such guilds observed), Long-tailed Tits (5 guilds), or both (22 guilds). Between 1700 and 1900 m, the guilds were smaller and most of the members were Crested and Willow tits. Above 1900 m, they consisted chiefly of Willow Tits and were smaller yet having no more than 10 individuals, and frequently only 1 or 2. Goldcrests (*Regulus regulus*) and treecreepers (*Certhia* spp.) were well represented in these flocks at all elevations.

*Pine and spruce-fir stands.*—In pine woods, guilds typically consisted of Crested, Coal, and Great tits, along with the ever-present Goldcrests and treecreepers. Large troupes of Coat Tits, accompanied by Crested Tits and Goldcrests, roamed the spruce-fir woods.

The species in these mixed flocks had different foraging sites in larch trees. Blue, Long-tailed, and Coal tits, and Goldcrests, congregated at the ends of fine branches; Willow Tits among the cones; Crested Tits on large limbs; and treecreepers on the trunks of the trees. This explains in part why Crested Tits, Goldcrests, and treecreepers were most often in the lower third of the tree, whereas Coal, Blue, and Willow tits were generally in the upper third of the tree. Coal and Great tits and Goldcrests preferred pines, but the other species had a penchant for larches.

Two lines of evidence suggest that Willow and Crested tits competed for food: (1) when in the same flocks, Crested Tits foraged on the limbs of larch trees and Willow Tits fed on larch seeds in cone-bearing areas of the trees, but (2) in areas where Crested Tits were absent (above 1900 m), Willow Tits relied less on larch seeds and foraged on the large branches of the trees. Treecreepers fed alongside both of these titmice, but did not compete with them since they prospected the underside of limbs, while the tits searched the upper surfaces. Blue and Long-tailed tits commonly foraged together, which suggests that their diets were similar and that competiton was absent (i.e., food was not a limiting factor).

Foraging behavior also differed among guild members. Blue and Long-tailed tits fed while suspended from the tips of branches. Coal Tits foraged while perched upright. Goldcrests did the same and also hunted on the wing.

Blue and Long-tailed tits were highly gregarious, moving and feeding together in compact, cohesive groups that formed the nucleus of mixed flocks. The Willow and Crested tits and treecreepers that accompanied them were less gregarious, less closely allied with the flock, and more widely dispersed in the forest while foraging. The author suggests that for highly gregarious species, a guild may increase foraging efficiency (aids birds in locating and exploiting food resources), but for less gregarious ones, guilds offer protection from predation.—Michael D. Kern.

**16. Vigilance and perception of flock size in foraging House Sparrows (*Passer domesticus*).** M. A. Elgar, P. J. Burren, and M. Posen. 1984. Behaviour 90:215–223.—Foraging individuals spend less time scanning for predators as flock size increases. However, the individual's vigilant behavior may depend on other individuals' behavior as well as flock size. The authors investigated whether the scanning rate of House Sparrows depended on the number of birds visible, the total number of birds in the flock, or the distance between individuals. Results showed that birds adjusted their inter-scan time by the number of birds visible to them while in the feeder rather than the total number in the flock. The distance between individuals also influenced the scanning behavior of sparrows. Only birds within one meter of each other were found to reduce their scanning time and increase their feeding time. To prevent birds from seeing one another while in the feeder, the authors placed a barrier in the middle of the feeder. The sound of birds on the other side of the feeder could not be controlled, thus birds could hear other House Sparrows and sounds may have affected the inter-scan times since they may have provided some flock information. The effects of natural barriers such as trees, tussocks, and rocky shorelines on the scanning rates of other birds as well as sparrows should be studied with regard to the assumptions of optimal foraging theory.—Lisa A. Mitchell.

**17. Dominance, predation, and optimal foraging in White-throated Sparrow flocks.** K. J. Schneider. 1984. Ecology 65:1820–1827.—Schneider reports the results of field experiments on fall and winter foraging behavior in a color-banded population of White-throated Sparrows (*Zonotrichia albicollis*). She found that food density alone did not determine where the sparrows foraged, but that proximity to cover (bushes) was also a critical factor in selection of foraging sites. Dominant sparrows fed at sites close to cover and abandoned them only after food densities became quite low. Subordinate birds thus could occupy sites that yielded higher rates of energy return than did sites retained by dominant sparrows, although presumably the risk of predation was higher at these food-rich sites. Given the preference of both dominant and solitary-feeding sparrows for foraging sites near to cover irrespective of the sometimes substantially lower food densities at these sites than at other less protected ones, it is then obvious that predation has been a strong selective force in the evolution of feeding behavior in White-throated Sparrows. The viewpoint that optimal foraging involves more than just maximizing the rate of energy return is reinforced by Schneider's results, and, in this case, the something more includes minimizing the risk of predation. Additional similar work with other species is desirable to determine the identity and frequency of importance of not only predation, but also other factors (see reviews, **26, 52**) in establishing the balance of selective forces that molds foraging behavior in the field.—A. John Gatz, Jr.

**18. Lek behavior in a parrot: the Kakapo *Strigops habroptilus* of New Zealand.** D. V. Merton, R. B. Morris, and I. A. E. Atkinson. 1984. Ibis 126:277–283.—The Kakapo of New Zealand, is a giant (males average 2.06 kg, females average 1.28 kg), flightless, nocturnal parrot belonging to an endemic genus. This work summarizes some features of the unusual courtship behavior of this rare and endangered species. Males excavate depressions in the ground which are grouped together and connected by a system of trails. The depressions are clumped and used by a number of different males for courtship purposes only and are unrelated to feeding or nesting. Within the depressions, males emit resonant booming sounds (assisted by their inflated air sacs) that can be heard for several kilometers. Females visit the depressions for only brief periods, during which time males display by posturing. Kakapos lack pronounced sexual dimorphism in plumage and display at night, when vocal displays would be more effective than visual displays. Based on the absence of a permanent pair bond, the temporally skewed sex ratio at the mating site, and the use of a site only for mating, the authors conclude that the Kakapo is a lek species.

As the authors note, this is possibly the only avian lek species to have evolved in an environment lacking mammalian predators. Unfortunately, the introduced mammalian predators now threaten this species.—J. M. Wunderle, Jr.

**19. Communal roosts of Sparrowhawk (*Accipiter nisus*), Merlin (Falco columbarius) and Hen Harrier (*Circus cyaneus*).** [Gemeensahappelijke slaapplaats van Sperwers *Accipter nisus,* Smellekens *Falco columbarius* en Blauwe Kiekendieven *Circus cyaneus.*] G. van Duin, F. Vogelzang, R. Sjouken, R. Stet, S. Schoevaart, and J. Buker. 1984. Limosa 57: 97–103. (Dutch, English summary).—Between 1978 and 1982 counts were made at a raptor communal roost in Holland. The area was covered mainly with reeds (*Phragmites*) and willows (*Salix*). All birds were non-residents in the area and maximum numbers were 25 Sparrowhawks, 10 Merlins, and 10 Hen Harriers. The Sparrowhawks and harriers arrived 12–15 min prior to sunset while Merlins arrived about 4 min after sunset. Times of arrival and numbers seemed to be correlated with weather conditions. Sex ratios were 1:1.7 (male to female) in the Sparrowhawks and Merlins and 1:10 (adult male to non-adult male/female) in the Harrier. The authors suggest the function of the roost corresponded best with the theory of "information centers" for food availability.—Clayton M. White.

**20. Site-related dominance in the Great Tit *Parus major major*.** J. DeLaet. 1984. Ornis Scand. 15:73–78.—During 4 consecutive winters, DeLaet mapped the home ranges of male Great Tits (we must assume that the birds were marked) and observed dominance interactions at a single feeder to assess the effect of feeder location on dominance rank. Adults with home ranges closest to the feeder (0–100 m) were the most dominant individuals at the feeder, winning 73.5–87.6% of their confrontations. The proximity of the feeder to the home ranges of "juveniles" had no affect on dominance rank, i.e., juveniles appeared to have an absolute hierarchical system.

Although the results appear to be straightforward, the methods by which they were gathered are confusing. Adults are defined as "resident males that bred in the study area during the previous breeding season" and juveniles as birds that "immigrate into the study area at the beginning of winter." Sample sizes are not provided for the number of sightings used to determine home ranges nor for the number of dominance interactions observed for each individual (except that $n \geq 5$). I *think* that the dominance relationships are based on adults vs. adults and juveniles vs. juveniles, but nowhere is this stated.

DeLaet states that a paper on the dominance relationships of these same birds at several different feeders will be forthcoming.—Jeffrey S. Marks.

**21. Pair-bonding by Black-headed Gulls.** (Protsess formirovaniia par u ozernykh chaek.) 1984. S. P. Kharitonov and V. A. Zubakin. Zool. Zh. 63:95–104. (Russian, English summary)—Pair-bonds of Black-headed Gulls (*Larus ridibundus*) nesting at Kiyova Lake (Moscow Distirct) do not last beyond the breeding season, and are formed anew each spring when the birds arrive at the colony. The process of forming a stable, enduring pair involves more than a female flying over males' territories and landing in one after another until she finds one in which to stay. Instead, a formed pair (one in which the 2 members have had several days of contact) can split up before nesting; both birds may form several short-term pairs with other partners before establishing a bond with that season's nesting partner.

When a male initiated the break-up of a pair, he did it by paying attention to females in addition to or other than the one staying on his territory, responding aggressively to friendly gestures (like the greeting ceremony) by his mate, and driving her away if necessary. When the female dissolved the pair she left the territory and sought another. Involvement of a third bird, a "rival," would lead to a "family conflict" between the members of a pair but not necessarily to a break-up.

The authors investigated changes in the size of males' territories and in their aggressive, comfort, and courting behavior in accord with formation and dissolution of pairs. The area of nesting territories, throughout the colony, greatly diminished over the course of the breeding season as more and more birds claimed part of the colony as their own. When a prospective female came into the territory of an unpaired male or when there was "family conflict" with the current female in a pair, the relative area of male's nesting territory grew, or perhaps more accurately, decreased less quickly than in the colony overall. When several days had passed since the female arrived, or since the "spat" was resolved, the relative area shrank more quickly than in the colony overall. This indicates that "marital discord" influences the rate at which territory diminishes, because when a male is making or breaking a pair-bond with a female, he acts more territorial.

Frequency of aggressive behavior increased slightly, though insignificantly, when a female arrived; it decreased significantly when a "family conflict" had been resolved. Changes in the frequency of comfort and courting behavior were insignificant during pair formation, although courting behavior fell off "sharply" after the ultimate pair was formed.

Only when a pair actually built a nest could it be considered stable. No pair under observation broke up after nest-building began, although occasional, temporary "infidelity" might occur. Presumably the male with whom a female built a nest was the father of her chicks, because although she might have copulated with several other males previously, she did so only with him for at least a week before egg-laying. Pairs generally lasted until the end of the season, but sometimes broke up 3 or 4 weeks after the chicks hatched, even if the chicks had not yet fledged: the female would be present less and less often, and act more and more oblivious to her mate and young.

Something more than the joining of 2 individuals physiologically ready to reproduce is occurring in this multiple pre-nesting pair formation, but the criteria for this complicated mate selection are unclear. Copulation with more than one partner, or with the mate even after chicks have hatched (no second clutches were laid), may, for this species, have an intra-specific, intra-sexual communicatory function in addition to the function of reproduction.—Elizabeth C. Anderson.

## ECOLOGY

**(see also 4, 11, 15, 17, 38, 45, 52, 54)**

**22. Nutrient deposition in cattail stands by communally roosting blackbirds and starlings.** J. P. Hayes and J. W. Caslick. 1984. Am. Midl. Nat. 112:320–331.—Excreta from roosting blackbirds and European Starlings (*Sturnus vulgaris*) in cattail stands of central New York may add as much as 28, 4.3, and 4.1 kg/ha/year of nitrogen, phosphorous, and potassium. Half of this paper is a tedious methods section and despite care devoted to procedures, the conclusion that birds may play a major role in nutrient cycling is not demonstrated. Nutrient levels of roost sites could have been compared to non-roosting areas, but were not. The authors' speculation that birds play a more important role than precipitation as a nutrient source was untested. The authors provide no information on how seasonal nutrient inputs from roosting blackbirds and starlings play a functional role in nutrient cycling.—Douglas B. McNair.

**23. On size ratios and sequences in ecological communities: Are there no rules?** J. A. Wiens. 1982. Ann. Zool. Fenn. 19:297–308.—Wiens describes an approach to size-ratio studies of sympatric species in a community. Developed by G. Evelyn Hutchinson, the size-ratio is calculated from measurements of morphological characteristics of sympatric species within a community. Hutchinson determined the standard size-ratio to be 1.3 through his analysis of several sympatric avian and mammalian species. The size-ratio gradually gained acceptance as a description of a species' relation to its community and as an arbitrary size spectrum along which different species could be spaced by size at regular intervals. The spacing suggested a mathematical relationship between sympatric species' size and competitive adaptations for similar resources within an ecosystem. However, determination of a relationship between the size-ratio and competition is complex, due to the number of variables within and between communities. Methodology of studies appearing to support Hutchinson's work did not control these variables, according to Wiens, and results, under closer review, provide less support and even contradict Hutchinson's results. Wiens discusses guidelines within which further size-ratio studies should be conducted. Through agreement on initial conditions, methodology, assumptions, logic, and hypotheses, Wiens aims for more reliable and possibly more uniform results by which the validity of Hutchinson's observations and theories can be tested. Wiens admits that the complexities and variables remain, but they are controlled in a manner that will make future studies more complete.—Ann Rabatsky.

**24. Residence and non-residence in passerines: dependence on the vegetation structure.** G. Bilcke. 1984. Ardea 72:223–227.—The author made counts of passerines in 9 different habitats in Belgium ranging from open heath to closed pine forests. He differentiated between resident species, Mediterranean migrants, and tropical migrants. Migrants were more abundant in open vegetation and residents in woodlands. Migration distance for the species decreased from open habitat to forests. By contrast, data from the New World showed that resident and migrant species were about equally abundant in open and forest habitats. To account for both the European and American data, the author proposed that the proportion of migrant species in their breeding area is determined by the occurrence and geographic distribution of different vegetation types in their winter quarters.—Clayton M. White.

**25. Seasonal and diurnal abundance of aquatic birds on the Drizzle Lake Reserve, Queen Charlotte Islands, British Columbia.** T. E. Reimchen and S. Douglas. 1984. Can. Field-Nat. 98:22–28.—From 1978 to 1982 Reimchen and Douglas noted numbers, general behavior, and movement of birds using Drizzle Lake, a 112 ha lake on the coastal plain. Thirty-six species were seen on the lake including the first breeding Green-winged Teal (*Anas crecca*) for the Queen Charlotte Islands and northernmost coastal records of Pied-billed Grebes (*Podilymbus podiceps*) and Ring-necked Ducks (*Aythya collaris*). Migrants, species that were recorded <5 times/year, account for half the species, but only 1% of the total individual sightings. Twelve species were resident, remained on the lake for a week to 3 months, but accounted for only 20% of the total individual sightings. Six species travelled to and from the ocean on a daily basis and accounted for 79% of the total individual sightings. They fed primarily in the nearshore marine waters and flew to the inland lake where they preened and drank in an area of relatively low predator density.—Edward H. Burtt, Jr.

**26. Peripheral foraging by territorial Rufous Hummingbirds: defense by exploitation.** D. C. Paton and F. L. Carpenter. 1984. Ecology 65:1808–1819.—Feeding on a defended feeding territory should provide an organism with a higher rate of energy return than non-territorial behavior, otherwise the defense of the territory is wasted energy. Rufous Hummingbirds (*Selasphorus rufus*) defended feeding territories during stopovers on their fall migration and are apparently under strong selection to maximize rate of fat accumulation during these stops (Carpenter et al., Proc. Natl. Acad. Sci. 80: 7259–7263, 1983). This paper presents a description of the foraging pattern used by the Rufous Hummingbirds and suggests how this pattern enhances the rate of energy gain on a per day basis. The hummingbirds foraged preferentially near the edges of their territories early in the day (0530–0830) and in the central part of their territories late in the day (1730–2030). No preferential pattern of use was seen at any other time of day. The peripheral foraging early in the day was accompanied by chasing of intruders and subsequent feeding on flowers in the same area as the intruders. Dual purposes were served: both interference and exploitative defense of the territory was achieved. Peripheral flowers, essentially the only ones visited by intruders, became less beneficial to the intruders while at the same time the territory holder was gaining energy. Late in the day, the territory holders foraged preferentially in the central portions of their territories where both flower densities and nectar contents were high. Paton and Carpenter compared the overall rate of energy return per day using the observed foraging pattern with that expected if hummingbirds foraged evenly across their territories throughout the day (the pattern that would maximize energy return per foraging bout). They found that the observed pattern was energetically superior due in large part to the fact intrusion rates are reduced by the peripheral foraging. Another case is documented in which simple models of optimal foraging do not apply (see also reviews **17, 52**).—A. John Gatz, Jr.

**27. An ecological comparison of oceanic seabird communities of the south Pacific Ocean.** D. G. Ainley and R. J. Boekelheide. 1983. Studies Avian Biol. 8:2–23.—The results of censuses from 5 Pacific cruises passing through Antarctic, subantarctic, subtropical, and tropical waters were used to characterize pelagic seabird communities. Avifaunal change appeared to be associated with the steepness of temperature and salinity gradients in the surface waters. Characteristics of the tropical marine avifauna include: (1) tropical and subtropical waters had the highest number of species; (2) a higher proportion of species was confined to tropical waters than to other marine regions; (3) multispecies flocks were most common in the tropics; (4) birds had greater aerial buoyancy (lower wing loading?) and fed more by plunging, dipping, and aerial pursuit in the tropics than elsewhere; and (5) both density and biomass were lower in the tropics than elsewhere. Also distinctive, the avifauna of the Antarctic pack ice was characterized by: (1) the lowest number of species; (2) the second highest proportion of species confined only to it; (3) pack ice and a narrow range in sea surface salinities accounting for a distinct assemblage in Arctic waters; (4) species tending to avoid one another and thus a negative tendency to associate in mixed species foraging flocks; and (5) the highest density and biomass of seabirds. Differences in pelagic avifaunas are probably associated with the abundance and patchiness of prey, the availability of wind as an energy source, and possibly the number of available habitats (defined in terms of temperature and salinity).—J. M. Wunderle, Jr.

**28. Nesting ecology of the Asiatic House Martin *Delichon dasypus* (Passeriformes, Hirundinidae) in the Khamar-Daban range (South Baikal Territory).** (Materialy k ekologii vostochnogo voronka—*Delichon dasypus* [Passeriformes, Hirundinidae] na Khamar-Dabane [Iuzhnoe Pribaikal'e].) 1983. Iu. A. Durnev, I. N. Sirokhin, and V. D. Sonin. Zool. Zh. 62:1541–1546. (Russian, English summary)—Ornithological research within the past 10 yrs has confirmed that the Asiatic House Martin nests high in misty, cedar-mantled Khamar-Daban mountains along the southern shore of Lake Baikal. In the location of its nesting colonies, the form of its nests, the phenology of its reproduction, and its feeding strategy, it differs enough from related forms that it is considered taxonomically independent.

The craggy crevices where nests are built are, as a rule, found over a waterfall or in the immediate vicinity of one. Nests are hidden from direct rays of the sun, water seeps from the rocky walls, and even on sunny days the air temperature does not exceed 12–15°C. The exceptional dampness of this nesting biotope, in the wettest place in Eastern Siberia (relative humidity in July is around 92%; annual precipitation is more than 1500 mm) means that nests do not last more than one breeding season.

There are basically three models of nest, one "open" and two "closed." The "open" nest is cup-shaped, open at the top, very much like a Barn Swallow's (*Hirundo rustica*) nest, but with the bottom more conical. The first "closed" model resembles other martins' nests: the walls are built up so that the nest resembles a sphere, with an opening left for the parents to enter. The other "closed" model is cup-shaped like an open nest, but built so closely under an overhanging rock that the rock makes a ceiling; the parents enter in the space between the nest rim and the rock. Nests are fashioned from damp earth, with broken plant matter mixed in. Nest cups are thickly lined mostly with dry, brown conifer needles; sometimes feathers of several species or green vegetation are added.

This species' breeding season is prolonged and probably much influenced by local weather conditions. Most of the spotless white eggs are laid in or by early July; by the end of the month most chicks have hatched. Any one colony may contain both eggs at various stages of incubation, and nestlings of various ages. A 4-egg clutch seems to be the norm.

Flies (Diptera), Hymenoptera, and beetles (Coleoptera) are the mainstay of the Asiatic House Martin's diet. Less commonly found items such as springtails (Collembola) suggest that the frequent, protracted rains sometimes make it easier for the martins to feed on the ground than in the air.—Elizabeth C. Anderson.

## WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

**(see also 13, 30, 32, 40, 42, 43, 51, 53)**

**29. Effects of tebuthiuron on Lesser Prairie-chicken habitat and foods.** T. B. Doerr and F. S. Guthery. 1983. J. Wildl. Manage. 47:1138–1139.—Tebuthiuron is an herbicide that kills Shinnery Oak (*Quercus havardii*). Because abundance of Lesser Prairie-chickens (*Tympanuchus pallidicinctus*) is negatively correlated with canopy cover of this plant, the authors designed an experiment to evaluate tebuthiuron as a means of controlling Shinnery Oak and thereby improving Lesser Prairie-chicken habitat in Texas. Herbicide was applied at rates of .2, .4, .6, .8, and 1.0 kg/ha to 2-ha plots. Species composition, structure, and profile of vegetation, seed production, and insect abundance and species composition were monitored on test and control plots through December 1979 following herbicide application in May 1978.

Treated plots provided greater cover and vertical screening by bunchgrasses, with large reductions in Shinnery Oak stem density and canopy cover. A rate of .4 kg tebuthiuron/ha effectively controlled oak while maintaining seed production and grass cover. Doerr and Guthery suggest that "tebuthiuron . . . improved nesting and wintering cover for Lesser Prairie-chickens." However, they also point out that monitoring of prairie-chicken populations is needed to assess their response to herbicide applications.—Richard A. Lent.

## CONSERVATION AND ENVIRONMENTAL QUALITY

**(see also 11, 47)**

**30. Gone with the trees.** D. S. Wilcove and R. F. Whitcomb. 1983. Nat. Hist. 92: 82–91.—Neotropical migrants have declined in numbers and variety in many areas where severe forest fragmentation has occurred. Wilcove and Whitcomb cite two long-term avian population studies to support their claim. Volunteers for the National Audubon Society have carried out annual bird censuses for the past 40 years. These demonstrate that neotropical migrants often occur in large forests, but appear only rarely in smaller forest tracts. Annual censuses begun in 1947 on Cabin John Island in the Potomac River showed population declines when a large section of nearby wooded riverbank was cleared for the construction of a parkway in 1958. The authors suggest 4 factors that may negatively affect neotropical migrants: (1) some birds use 2 or more habitat types during a season, and forest fragmentation may make the move between habitats impossible; (2) since the ratio of woodland edge to interior increases with fragmentation, forest birds probably suffer higher rates of nest predation and parasitism in small woodlots than in more extensive tracts; (3) disruptive human activity usually accompanies the breakup of forests; and (4) forests in Latin America have been disturbed. The isolated woodlots we are making of our forests are not functioning as viable reserves for forest-dwelling migratory birds. The protection of these birds requires the maintenance of large tracts of forest—a task Wilcove and Whitcomb concede is expensive and politically difficult, but we have large reserves in our national parks and forests which must remain intact. The article raises our awareness of how we affect the lives of birds and more broadly the planet's natural diversity.—Bruce R. Clash.

**31. Contaminants in Greater Snow Geese and their eggs.** J. R. Longcore, J. D. Heyland, A. Reed, and P. LaPorte. 1983. J. Wildl. Manage. 47:1105–1109.—Eggs (15) of Greater Snow Geese (*Anser caerulescens atlantica*) collected from northern Canada in 1971 and hunter-shot carcasses of 3 adults and 2 juveniles collected from Quebec in 1977 were analyzed for organochlorine pesticides, polychlorinated biphenyls, and mercury residues. All specimens showed uniformly low levels of contaminants, "mostly near the limit of detection, and below those levels experimentally shown to cause adverse reproductive effects in waterfowl." However, the authors warn that recent increased use of agricultural fields by Greater Snow Geese may increase the likelihood of exposure to agricultural chemicals.—Richard A. Lent.

**32. Response of American Black Ducks to dietary uranium: a proposed substitute for lead shot.** S. D. Haseltine and L. Sileo. 1983. J. Wildl. Manage. 47:1124–1129.—Ingestion of lead shot has been associated with mortality in waterfowl. Steel is the only currently approved substitute for lead in shot. Depleted uranium has desirable ballistic properties that could make it a potential alternative. However, the chemical toxicity of uranium to wildlife is a major concern. The authors experimentally fed powdered uranium to 40 captive American Black Ducks (*Anas rubripes*) at dosages of 0, 25, 100, 400, and 1600 ppm for 6 weeks. Daily observations, weekly weighings, and analysis of tissues and blood indicated that the dietary uranium "did little damage in Black Ducks fed a nutritionally sound diet." Haseltine and Sileo suggest that uranium be further evaluated as a substitute for lead in shot, while acknowledging that questions still remain regarding the toxicity of uranium in alloyed shot form.—Richard A. Lent.

**33. Secondary poisoning of Red-shouldered Hawks with carbofuran.** R. Balcomb. 1983. J. Wildl. Manage. 47:1129–1132.—Carbofuran (2,3-dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate) is a common insecticide that has been associated with acute mortality in birds. Balcomb submits "the first report of raptors poisoned when feeding on small birds or mammals that had been killed or immobilized by a carbamate insecticide." A male and a female Red-shouldered Hawk (*Buteo lineatus*) were found in a Maryland cornfield that had been treated with 10% carbofuran granules. Both showed symptoms of carbofuran poisoning. The female was near death and was sacrificed for pesticide analysis. The male recovered and was released the next day. Gut contents and gut tissues of the female were assayed for the pesticide, yielding 47 and 49.6 mg of carbofuran, respectively. After presenting additional evidence and data, the author concludes that "it is probable that the 2 . . . hawks were poisoned by carbofuran acquired from small vertebrate prey taken or scavenged from treated areas."—Richard A. Lent.

**34. Environmental contaminant hazard to Attwater's Greater Prairie-chickens.** E. L. Flickinger and D. M. Swineford. 1983. J. Wildl. Manage. 47:1132–1137.—Carcasses of 35 road-killed *Tympanuchus cupido attwateri* were analyzed for organochlorine pesticides, polychlorinated biphenyls, and heavy metal residues to determine contaminant hazards to this endangered species. As an indicator of local contaminant levels, 30 Bobwhite

(*Colinus virginianus*) were also collected in the study area, which included agricultural fields near Attwater Prairie Chicken National Wildlife Refuge (NWR), a sorghum field in Refugio County, and additional areas near Aransas NWR, Texas. Contaminant levels in all specimens were low, and were determined "not . . . to affect the endangered Attwater's Greater Prairie-chicken in Texas."—Richard A. Lent.

**35. Habitats and distribution of waders breeding on Scottish agricultural land.** H. Galbraith, R. W. Furness, and R. J. Fuller. 1984. Scot. Birds 13:98–107.—The Scottish Ornithologists[1] Club/Wader Study Group and Scottish Nature Conservancy Council sampled breeding populations of Lapwings (*Vanellus vanellus*), Oystercatchers (*Haematopus ostralegus*), Redshanks (*Tringa totanus*), Curlews (*Numenius arquata*), Snipes (*Gallinago gallinago*), Dunlins (*Calidris alpina*), and Ringed Plovers (*Charadrius hiaticula*) on 701 km$^2$ of Scottish farmland and Outer Hebridean coastal plain. Study sites were not uniformly distributed throughout Scotland nor was coverage within study sites standardized. However, the authors have made analytical adjustments for the non-random choice of sites by observers and the varied census techniques. The success of these adjustments cannot be gauged, but the vast data base provided by so many observers and the conservative analysis by the authors probably provide an accurate picture of population trends.

The highest densities of breeding birds were encountered on the Outer Hebridean coastal plain. High densities of Lapwings, Oystercatchers, Redshanks, Curlews, and Snipe occurred in damp, marginal farmland with low densities or no breeding birds occurring in prime farmland. Lapwings and Oystercatchers were the only species breeding or foraging in prime farmland to a significant extent. Even in these species the farmland populations may have depended on recruitment from the more populated marginal farmland and coastal plain. Thus proposed drainage and development of the latter habitats may seriously threaten Scottish populations of waders.—Edward H. Burtt, Jr.

## PARASITES AND DISEASES

(see 59)

## PHYSIOLOGY

(see also 12, 52)

**36. Postrenal modifications of urine in birds.** G. L. Anderson and E. J. Braun. 1985. Am. J. Physiol. 248 (Regulatory Integrative Comp. Physiol.) 17:R93–R98.—Previous studies on chickens have shown that some birds have the ability to move urine from the cloaca into the lower intestine, where the content of the urine is modified by absorption of water and salts. This mechanism may be particularly important for desert birds in seasons when water and/or salts need to be conserved. This study tests the abilities for post-renal modifications of urine in Gambel's Quail (*Lophortyx gambelii*). Approximately 47% of the water, 62% of the sodium, and 49% of the potassium in the combined urine-fecal mixture entering the lower intestine was absorbed. Additionally, about 68% of the total urate in the ureteral urine was broken down in the gut, allowing further reabsorption of bound ions. Therefore, the abilities of the cloaca and lower intestine to modify urine parallels the function of the distal nephron in mammals and allows birds to make fine adjustments in water and ionic reabsorption from the urine.—Cynthia Carey.

**37. Oxygen consumption, evaporative water loss, and temperature regulation of California Gull chicks (*Larus californicus*) in a desert rookery.** M. A. Chappell, D. L. Goldstein, and D. W. Winkler. 1984. Physiol. Zool. 57:204–214.—Various species of the genus *Larus* breed in very inhospitable environments, from cool coastal areas to hot deserts. Considerable effort has been expended over the past 20 years to determine if chicks of these groups have special physiological adaptations that enable them to survive challenges posed by the environment. Surprisingly, as reported in this paper, physiological capacities of gull chicks do not vary with environment; instead, successful breeding depends importantly on the behavior of the adults. This study evaluated physiological capacities of gull chicks on an island in Mono Lake, California. Heat stress caused by the sun was common, but adults were usually able to shade the chicks to prevent lethal rises in body temperature. However, if the adults were disturbed, even for relatively brief periods, considerable mortality resulted.—Cynthia Carey.

**38. Thermoregulation and oxygen consumption during terrestrial locomotion by White-crowned Sparrows *Zonotrichia leucophrys gambelii*.** F. V. Paladino and J. R. King. 1984. Physiol. Zool. 57:226–236.—Theories of optimal foraging require estimation of metabolic costs of various activities, such as flying, hopping, sitting, and maintenance. These costs are particularly hard to estimate at ambient temperatures below thermal neutrality, since the literature is contradictory concerning whether locomotory costs are additive to or can substitute for thermoregulatory costs. This elegant study on hopping White-crowned Sparrows suggests that the birds spend about the same energy at −10°C whether they are sitting and shivering or moving and foraging. Since it is probable that considerable interspecific variation exists in thermoregulatory patterns during locomotion, caution should be employed when using these results to construct optimal foraging models for other birds.—Cynthia Carey.

## MORPHOLOGY AND ANATOMY

**(see also 12, 23, 49)**

**39. Homology of the bird wing skeleton.** J. R. Hinchliffe and M. K. Hecht. 1984. Evol. Biol. 18:21–39.—There has been a long dispute between embryologists and paleontologists concerning the homology of digits in the avian wing. With respect to the primitive condition (the reptilian hand), embryologists have identified the three modern digits as numbers 2, 3, and 4. On the other hand, paleontologists, in part based on the skeletal remains of *Archaeopteryx*, have identified the same bones of the modern bird wing as homologous to the reptilian digits 1, 2, and 3. Hinchliffe and Hecht used a radioactive label and autoradiography to follow the appearance and development of centers of cartilage condensation in chicken embryos. Based on this new evidence, a strong case is presented that the remaining avian digits are indeed 2, 3, and 4. Digit 5 is present for a while in embryos, but eventually disappears; digit 1 does not get a chance to form because of an early wave of cell death that leads to the general reduction in phalange numbers. The results of this study indicate that avian digit reduction in the manus has been concordant with that in other amniotes.

The authors observed that a major skeletal component of the reptilian hand, the ulnare, forms during ontogeny in birds and subsequently disappears. Later a second bone condenses in nearly the same place. This latter bone has been misidentified by some authors as the ulnare. This suggests a general problem with reconstructing phylogenetic history using paleontological data: the determination of homology based strictly on topographic position will frequently be misleading if embryological processes are routinely as complex as those uncovered here.—George F. Barrowclough.

**40. Predicting fat content of geese from abdominal fat weight.** V. G. Thomas, S. K. Mainguy, and J. P. Prevett. 1983. J. Wildl. Manage. 47:1115–1119.—Lesser Snow Geese (*Anser caerulescens caerulescens*) and Giant Canada Geese (*Branta canadensis maxima*) were collected in Ontario, Canada to assess the accuracy of using weight of abdominal fat, which is easily dissected out under field conditions, to predict total body fat. Weight of abdominal fat was significantly and positively correlated with total body fat in both species. Regression equations are presented that can be used to predict total fat (an index of energy accumulation) from abdominal fat. Results can be applied to assessment of the condition of waterfowl populations for management purposes.—Richard A. Lent.

**41. Note concerning specific adaptations of the Black Woodpecker (*Dryocopus martius* (L.)) and its ecological niche in two habitats.** (Note sur certaines adaptations du Pic noir (*Dryocopus martius* (L.)) et sa niche écologique dans deux biocénoses) M. Cuisin. 1983. Oiseau Rev. Fr. Ornithol. 53:63–77. (French, English summary)—This 15-page "note" is a potpourri of information about the morphology and natural history of Black Woodpeckers at Les Riceys, Department of Aube, France. Topics include morphological adapations of the skull to absorb the repeated shocks of excavation, adaptations for climbing, descriptions of the habitats in which this woodpecker is found, and comments about its position in these communities.

On a typical spring day, Black Woodpeckers hammer 8000–12,000 times, not counting blows used in foraging and nest relief. Roughly 100,000 blows (about 5000/day) are required to excavate a nest. Add to this, 3500–7000 blows/day when the woodpeckers "drum" while communicating with mates or conspecifics. Several features of the head skeleton minimize the potentially damaging effects of these repeated jolts: a blunt, chisel-tipped bill that is highly cornified, a thick interorbital septum, heavy internasal and pre-maxillary areas of the skull, an elongated orbital process, a keel that reinforces the rhamphotheca of the upper bill, a ventrally placed occipital foramen, elastic connections between the skull proper and the bones of the bill, and a weakly curved culmen.

The bird's wide pelvis, short tibiotarsus, large melanin deposits in the tail feathers, and central rectices that are firmly anchored to the pygostyle adapt it for climbing. Curiously, its toes are not always held in a zygodactylous position when it clambers about on the trunk of a tree.

Black Woodpeckers inhabit two habitats in a large forest at Aube. One is a climax stand of oak and beech trees. The other is a woods that was cut in 1974 and is still in successional stages of development. Cuisin lists the members (invertebrates, birds, other vertebrates, and plants) of these communities in two, somewhat confusing tables along with suspected interrelationships among them. Both stands neighbor on vineyards, barley fields, and wooded fallow lands that are important foraging areas for the woodpecker. Unfortunately, more than 100 ha of fallow land have been converted to vineyards in the last 10 years.

Black Woodpeckers require mature healthy trees of substantial size (about 100 years old) for nest sites. Their nest cavities are frequently used by Stock Doves (*Columba oenas*) and Wood Pigeons (*C. palumbus*) and are apparently indispensible for the nesting success of these columbids. Woodpecker nests also harbor hornets and honeybees; and the organic debris in the bottom of them is fodder for larval dipterans.

Black Woodpeckers are probably sedentary in these woods, although no banding studies have been conducted to confirm that. They are insectivorous. They feed their chicks 100–1500 prey items daily. Such heavy cropping of insects reduces the effects of decomposers, such as cerambycids, on the forest, and diminishes the destruction caused by wood- and bark-eating insects such as termites and moss-eating molluscs such as clausiliids. It also protects some invertebrates by reducing the density of their predators, notably ants. Black Woodpeckers are themselves preyed on by martins (*Martes martes*) and perhaps Tawny Owls (*Strix aluco*).—Michael D. Kern.

## PLUMAGES AND MOLT

**(see also 49, 50)**

**42. Sex classification of juvenile Blue Grouse from wing characteristics.** R. W. Hoffman. 1983. J. Wildl. Manage. 47:1143–1147.—The author evaluates 3 techniques for sexing juvenile *Dendragapus obscurus*: (1) wing length, (2) plumage color, and (3) a discriminant function he developed from measurements of primaries 9 and 10. The test sample consisted of known-sex wings collected from hunter and volunteer check stations in Colorado. Color correctly classified 92% of 365 wings; length correctly classified 96% of 27 wings. Two "nearly identical" discriminant functions were derived from 2 different data sets. One equation was tested on an independent sample (n = 46 known-sex wings) and correctly classified 93% of the sample. Although juvenile Blue Grouse from Colorado can be accurately sexed by any of the 3 methods, Hoffman recommends the discriminant function (his equation 1) because it is more objective and has wider applicability.—Richard A. Lent.

**43. Classification of sex in young Blue Grouse.** M. T. Nietfeld and F. C. Zwickel. 1983. J. Wildl. Manage. 47:1147–1151.—A method for sexing Sooty Blue Grouse (*Dendragapus obscurus fuliginosus*) is described and tested, using color and pattern of post-juvenal upper tail coverts (illustrated by black-and-white photographs). Multiple captures and feather collections from individual birds allowed evaluation of reliability and consistency of the technique. Only 1.04% of 193 birds captured more than once at Hardwicke Island, British Columbia were assigned a different sex from 1 capture to another. Of 109 Vancouver Island birds assigned a sex by upper tail coverts and later sexed when recaptured or observed, 99.1% had been assigned the correct sex, as were 97.2% of 107 birds recaptured on Hardwicke Island. These data indicate that the sexing technique is "both consistent and accurate for juvenile Sooty Blue Grouse from about 6 weeks of age." Application of this technique to other races of Blue Grouse would require additional testing.—Richard A. Lent.

## ZOOGEOGRAPHY AND DISTRIBUTION

**(see also 3, 4, 6, 25, 27, 35, 49, 60)**

**44. Observations of species submitted for confirmation in France during 1981 and 1982.** (Les observations d'espèces soumises à homologation en France en 1981 et 1982). P. Dubois and the National Committee for Confirmation. 1984. Alauda 52:102–125. (French)—An official body, "le Comité d'Homologation National," was established in 1983 to validate sightings of birds that are uncommon or rare in France. The committee consists of 13 members, two of whom are replaced annually. This is its first annual report and covers 97 sightings in 1981 and 119 in 1982. The report includes descriptions of 49 validated species, information about another 8 that probably represent birds that escaped from captivity, and a list of unconfirmed sightings for 1981 (10 species) and 1982 (18 species).

Species accounts include, in this order, the bird's French and Latin name; the number of times it was observed in 1981 and 1982 (in parentheses, see below); where it was seen by year and department; information about the number, sex, and age of specimens that were seen; date(s) of observation; the identity of the observer(s); and comments, including its worldwide distribution. A typical entry is that for the Yellow-billed Loon:

Plongeon à bec blanc *Gavia adamsii* (1,0).

1981:

Seine-Maritime—Berneval-le-Grand, an old dead specimen found on the beach, 21 January (R. Bontil, J. Pourreau).

(Siberia, Alaska). The species has already been found three (possibly four) times in France, the last time from 18 February to 28 March 1979 (found dead on 30 March), also in Seine-Maritime, but at Antifer.

Validated species rarely seen in France (in addition to the above) include the American Wigeon (*Anas americana*), Rough-legged Hawk (*Buteo lagopus*), Saker Falcon (*Falco nordmanni*), Least Sandpiper (*Calidris minutilla*), Great Snipe (*Gallinago media*), Long-tailed Skua (*Stercorarius longicaudus*), and Stonechat (*Saxicola torquata*).—Michael D. Kern.

**45. Seabird colony distributions suggest competition for food supplies during the breeding season.** R. W. Furness and T. R. Birkhead. 1984. Nature 311:655–656.—The present paper is a contribution to recent indirect evidence from independent researchers that suggests that seabirds may deplete food supplies around colonies in a density dependent manner. The authors used a selected sampling of seabird (Northern Gannets *Morus bassanus,* Shags *Phalacrocorax aristotelis,* Black-legged Kittiwakes *Rissa tridactyla,* and Atlantic Puffins *Fratercula arctica*) colonies in "areas of relatively uniform oceanography" in Britain and Ireland to indirectly test the prey depletion hypothesis in terms of the spatial distributions and sizes of the colonies. They proposed that if the hypothesis holds for temperate regions (Ashmole's original notion was applied to tropical seabirds), then "in an area of uniform mean productivity" colony size should be negatively correlated with the number of competitors from other colonies of conspecifics that are feeding within the species typical foraging range around a colony. Their data support this contention (The axes on Fig. 1 should be labelled as the square root of the number of birds rather than simply the number of birds), and the highest negative correlations were obtained at distances around colonies that are in fairly close correspondence with species typical foraging ranges.

The inverse relationship between colony size and depletion effects is also supported by the interspecies comparisons depicted in Fig. 1, i.e., those species with the smallest colonies (shags, kittiwakes) show a weaker negative relationship between colony size and the number of potential competitors within foraging range. Regression statistics would have helped to show the degree of this trend, which is evident in the correlations presented.

Two important questions that remain to be assessed are: (1) how uniform is the mean productivity in the areas where the test colonies are located? (Some of the species under study probably depend on seasonal pulses of migratory fish stocks for successful reproduction; and (2) why were certain species chosen at the exclusion of others? Granted that letters in Nature are, by editorial design, little more than detailed abstracts and this design quite often leads to the omission of details that can leave a keenly interested reader hanging for an explanation. In this instance one cannot help but wonder why there are no reports of tests for Northern Fulmars (*Fulmarus glacialis*) and Common Murres (*Uria aalge*), species with which the authors are very familiar. Fulmars and murres also have longer foraging ranges than two and perhaps three of the species tested; in view of the authors' contention that "species with shorter foraging ranges are more likely to be influenced by local variations in marine productivity . . . ," the inclusion of shags, kittiwakes, and puffins and the exclusion of fulmars and murres leaves a question for interested marine ornithologists. Certainly these and other species will be used in future tests of the prey depletion hypothesis. The longer report generated from this study (Birkhead, T. R. & R. W. Furness, Symp. Br. Ecol. Soc., Blackwell, London, in press) may address these issues more fully. The findings are very interesting and attempts at answers to the foregoing questions will only make them more so.—W. A. Montevechi.

**46. Notes on Sooty Shearwaters and other avifauna of the Chilean offshore island of Guafo.** G. S. Clark, A. P. VonMeyer, J. W. Nelson, and J. N. Watt. 1984. Notornis 31:225–231.—Recent studies by M. Marin A. have shown that small numbers of Sooty Shearwaters (*Puffinus griseus*) breed as far north as Chiloé Island (Auk 101:192, 1984). The Totorore Expedition visited I. Guafo, only 39 km S, on 26 September–20 October 1983 and reported ca 200,000 birds nesting there. Very thick vegetation precluded detailed investigation. What seems most surprising, however, is that no Pink-footed Shearwaters (*P. creatopus*) were reported. Among other species reported was the Snowy Sheathbill (*Chionis alba*), one of the very few sightings on the west coast of South America.—J. R. Jehl, Jr.

**47. The distribution and numbers of Gannets (*Sula serrator*) in New Zealand.** K. Wodzicki, C. J. R. Robertson, and H. R. Alderton. 1984. Notornis 31:232–261.—There are few common species of birds whose population size is known with much precision. Using aerial photography the authors determined the 1980/1981 population of Australian Gannets (*Morus serrator*) in New Zealand to be 46,000 pairs, a 2.3% annual increase since 1946/1947. Most colonies increased, several new ones formed, none disappeared, and a few decreased. Exceptional growth at some areas resulted from immigration. Comparisons with other gannets indicate that only the New Zealand gannetries are currently increasing. Limitations and assumptions of aerial censusing are discussed.—J. R. Jehl, Jr.

## SYSTEMATICS AND PALEONTOLOGY

**(see also 28, 39)**

**48. Morphological and phylogenetic relations among the Darwin's finches.** D. Schluter. 1984. Evolution 38:921–930.—In a 1979 paper on quantitative evolution, Lande showed that the magnitude of selection coefficients necessary to cause a multivariate morphological change depends on the nature of the genetic variance-covariance matrix. That is, if two traits are genetically correlated, it will require a lot of selection to bring about their evolutionary disruption in a single population. On the other hand, it will require relatively little selection to cause a coordinated change in the two characteristics. In this paper, Schluter observes that if one had an estimate of the genetic variance-covariance matrix, then it would be possible to compute the total selective distance between pairs of species by simply multiplying the character differences between the species by the inverse of that matrix. Schluter takes the Galapagos finches (Geospizinae) as an example, and uses the resulting set of selective distances among the species to infer evolutionary trees. The results are loosely reminiscent of Lack's proposed tree for the group.

This is an impressive, original paper; however, the general utility of the method depends on the validity of two crucial assumptions. First, selective distances among species will only be a good index to relationship if all species are routinely subject to directional selection that is nearly constant over evolutionary time, i.e., is not episodic. Second, because an estimate of the genetic variance-covariance matrix is almost never available, the corresponding phenotypic matrix must be a reasonable approximation of the genetic matrix. Neither of these assumptions is inevitably true; further investigations are requisite to check their reasonableness.—George F. Barrowclough.

**49. Comparative study of four populations of Yellow-legged Herring Gulls from western Europe.** (Étude comparée de quatre populations de Goélands argentés à pattes jaunes d'Europe occidentale) A. Teyssedre. 1983. Oiseau Rev. Fr. Ornithol. 53:43–52. (French, English summary)—Teyssedre compared unstudied populations of Yellow-legged Herring Gulls (*Larus cachinnans*) that breed on Oléron Island (off the western coast of France) and along the coast of Spain (at Fuenterrabia in Basque Land) with better known populations of the same gull from two areas of western Europe: *L. c. michahellis* from the Mediterranean coast of southern France (Port-Saint-Louis in Camargue) and *L. c. atlantis* from the Azores, Madeira, and the Canary Islands. She describes the nesting behavior, vocalizations (sonagraphic analyses), laying dates, winter plumage, and morphology of primaries 1 and 2.

Birds in all populations had yellow legs, a steel gray coat, and a red eye-ring. They showed no differences in nesting behavior. The egg-laying dates of gulls on mainland France and Oléron Island were 20 days out of phase (1–15 April vs. late April–early May, respectively), but otherwise the populations were similar. Since this phase shift can be attributed to variations in weather conditions in the 2 areas and to the fact that birds on Oléron Island breed as isolated pairs, whereas those at Camargue breed in colonies, Teyssedre believes that both populations belong to the subspecies *L. c. michahellis.* In contrast, Yellow-legged Herring Gulls from the coast of Spain were completely different from the French birds in vocalizations, winter plumage (spotted, not white head and neck) and egg-laying period (1–15 May) and from gulls of the Azores in wing pattern. Hence, the Spanish group probably is an undescribed subspecies of *L. cachinnans.*

The author thinks it unlikely that these Spanish birds evolved from "white" Herring Gulls living along the Iberian Peninsula by acquiring pigmentation on the head and elsewhere, but are more likely an intermediate form between *L. c. michahellis* and related subspecies with spotted winter plumage (perhaps *L. c. atlantis* from the Azores). She suggests, however, that one parent stock gave rise to Mediterranean and Spanish groups of Yellow-legged Herring Gulls.

Although Yellow-legged Herring Gulls (1) are traditionally grouped together as *L. cachinnans,* and (2) do not hybridize (in areas of sympatry) with Lesser Black-backed Gulls (*L. fuscus graellsii*) on the Spanish coast or Pink-legged Herring Gulls (*L. argentatus argentatus*) on Oléron Island, they are nonetheless heterogeneous in morphology, behavior, and ecology, and therefore cannot justifiably be lumped into a single group solely on the basis of the color of their plumage and legs. Such lack of uniformity precludes division of the Herring Gull group into only three distinct species (*argentatus, fuscus,* and *cachinnans*).—Michael D. Kern.

## EVOLUTION AND GENETICS

**(see also 8, 48)**

**50. Adaptive significance of delayed plumage maturation in male Northern Orioles.** N. J. Flood. 1984. Evolution 38:267–279.—First-year males retain a female-like plumage in some sexually dichromatic species of birds; two proposals have been offered to explain such cases of delayed plumage maturation. The Sexual Selection Hypothesis postulates that breeding is so intensive and costly that inexperienced first-year males cannot effectively compete and so are spared unnecessary aggression and predation by possessing less noticeable female plumage and not attempting to breed. The Female Mimicry Hypothesis states that female coloration actually allows first-year males to breed by reducing aggression from adult males. This reduced aggression allows these young males to obtain good breeding territories adjacent to those of full adults.

Flood attempted to distinguish between the alternative hypotheses during a field study of breeding Northern Orioles (*Icterus galbula*). Her results were generally consistent with the expectations of the Female Mimicry Hypothesis. In fact, many of the first-year males did breed, a result at odds with the underlying reasoning of the Sexual Selection Hypothesis. The territories of young males were of equal quality to those of full adults; the yearlings that bred did not have significantly reduced success nor did they suffer increased mortality.

An assumption of both hypotheses is that males compete for a limiting resource; in this case the sex-ratio is skewed and that resource is females. It would be interesting to know how general Flood's result is; it seems plausible, for example, that in many cases high quality territories will be limiting.—George F. Barrowclough.

## FOOD AND FEEDING

**(see also 14, 15, 16, 17, 19, 28, 33, 41, 45)**

**51. Food of Red-winged Blackbirds, *Agelaius phoeniceus*, in sunflower fields and corn fields.** G. M. Linz, D. L. Vakoch, J. F. Cassel, and R. B. Carlson. 1984. Can. Field-Nat. 98:38–44.—Red-winged Blackbirds inflict serious losses on sunflower and corn crops with males consuming significantly more seeds than females. Damage from males is also more economically important because they forage directly on the ears of corn and heads of sunflowers whereas females forage on waste seed on the ground. In August almost 50% of the red-wing's diet consisted of insects, primarily noxious insects, and weed seeds. However, the proportion of insects dropped markedly in September as the birds increased their use of corn and sunflower seed. As these crops dried, use by red-wings declined. Although the study recommends economic analysis of crop loss vs. savings from removal of weed seeds and noxious insects, no such analysis was attempted in this paper.—Edward H. Burtt, Jr.

**52. Composition and energy contents of mature inshore spawning capelin (*Mallotus villosus*): implications for seabird predators.** W. A. Montevecchi and J. Piatt. 1984. Comp. Biochem. Physiol. 78A:15–20.—Capelin contain 13–14% protein and sufficient amino acids, with the exception of isoleucine, to meet avian minimum maintenance requirements. Sex and age groups have similar protein and amino acid content, except for ovid females which have a relatively high protein and low water content. Thus energy density (kJ/g) of ovid females is greater than that of males, non-ovid females, and immatures, although males contain more protein per fish because of their large size. The amino acid content of egg masses differs importantly from that of adult fish, but the authors do not make clear how this affects the amino acid content of ovid females.

Atlantic Puffins (*Fratercula arctica*) eat females almost exclusively and capture several prey before returning to the nest, whereas Common Murres (*Uria aalge*) take males, females, and immatures, but carry only single fish to the chick. Thus, in addition to ecological and behavioral differences in foraging of puffins and murres, energy density and amino acid differences among sex and age groups of capelin may account for the multiple loading of small, energy dense prey by puffins and the single loading of large prey with a high total energy content by murres. These results emphasize the importance of nutritional factors when considering optimal foraging strategies.—Edward H. Burtt, Jr.

**53. Feeding ecology of migrant Soras in southeastern Missouri.** W. D. Rundle and M. W. Sayre. 1983. J. Wildl. Manage. 47:1153–1159.—Esophageal and gizzard contents of 51 hunter-shot *Porzana carolina* were compared with food availability determined from 19 impoundment core samples taken at each bird collection site. In the fall, seeds of *Panicum, Digitaria,* and *Polygonum* were preferred by Sora (consumed more than expected based on availability in the environment). Invertebrates occurred more frequently in gut contents in spring vs. fall, possibly due "to nutritional requirements for reproduction." Management recommendations are discussed that include providing for seasonally-preferred invertebrate and plant foods.—Richard A. Lent.

**54. Feeding overlap in some tropical and temperate seabird communities.** A. W. Diamond. 1983. Studies Avian Biol. 8:24–46.—Overlap matrices were used to assess feeding relationships in tropical seabird communities (in the Indian Ocean) which suggest several interesting patterns. For instance, those species feeding far from land and taking a high proportion of squid had overlap values averaging over 90%. Such high overlap values cannot be argued as resulting from a superabundance of food (as done for some temperate zone seabirds). Certainly, the low clutch sizes, long nesting periods, and low fledging success of pelagic species suggest a limited food supply. Thus the author sees such high overlap values as a consequence of restricted diversity in prey regardless of the prey's abundance relative to the predator's requirements.

Inshore-feeding tropical seabirds take more diverse prey in terms of number of species and they overlap less than pelagic species. The reduced overlap is consistent with the suggestion that overlap between predators is dependent on the diversity of prey. Prey size was only weakly correlated with body size, particularly among the smaller seabirds (i.e., terns). The foraging behavior of a seabird appears to be as good a predictor of its prey size (relative to other seabirds in the community) as is its own body size. The major difficulty with this work as noted by the author is that at the time of the work there were no statistical methods for testing the significance of apparent differences between overlap values.—J. M. Wunderle, Jr.

## SONGS AND VOCALIZATIONS

**(see also 41, 49)**

**55. The structure of song and its geographical variation in the Scarlet Tanager (*Piranga olivacea*).** E. Shy. 1984. Am. Midl. Nat. 112:119–130.—Variations in figure types, frequency, and temporal characteristics of songs of Scarlet Tanagers from the north central United States were analyzed. Results suggest tanagers have no dialects. Inclusion of larger samples within each locality, more localities within each region, and a wider geographic range of localities may have strengthened this straightforward, incisive analysis of song structure of Scarlet Tanagers.—Douglas B. McNair.

**56. An investigation of individual recognition by voice in female Red-winged Blackbirds.** L. D. Beletsky. 1983. Anim. Behav. 31:355–362.—Vocal communication plays an important role in the behavior of birds. Female Red-winged Blackbirds (*Agelaius phoeniceus*) use 2 song types. Type 1 songs are brief and stereotyped whereas type 2 songs are long and of variable duration. Type 1 songs are sung mainly in the presence of a male and help maintain the pair bond; type 2 songs are territorial or aggressive and sung mainly to warn conspecific and interspecific females (based on behavioral responses to playback songs of other red-wings). The results showed that female red-wings interpret both types 1 and 2 songs as songs of other females intruding upon their territories, and that female red-wings react aggressively toward both song types, but did not individually recognize intruders or distinguish familiar from unfamiliar songs. Beletsky suggests that failure of female red-wings to individually recognize songs may be due to the placement of the playback speakers in the center of the experimental female's sub-territory. However, we need to know more about the behavioral reactions of female red-wings to the playback of recorded song.—Shaheem Abrahams.

**57. Differential responses to male song repertoires in female songbirds implanted with oestradiol.** C. K. Catchpole, J. Dittami, and B. Leisler. 1984. Nature 312:563–564. Captive female Sedge Warblers (*Acrocephalus schoenobaenus*) that were implanted with oestradial responded more (i.e., wing vibration bouts, horizontal crouches) when exposed to more complex conspecific repertoires. This responsiveness to song complexity was shown to be species specific in as much as the females responded more to conspecific songs than to more complex songs of the congeneric Reed Warbler (*A. scirpaceus*) or Blackbird

(*Turdus merula*). Experimentally-constructed song tapes controlled for effects of song speed delivery, which appeared to influence female responsiveness. Singing speed should provide an experimental variable for future investigations. The authors conclude that large repertoires enhance a male Sedge Warbler's chances of influencing female behavior and that via female choice, sexual selection has played a role in shaping song complexity. In view of other potential influences like singing speed, sexual selection is unlikely to favor ever-increasing song complexity.—W. A. Montevecchi.

## PHOTOGRAPHY AND RECORDINGS

(see 47)

## BOOKS AND MONOGRAPHS

**58. An annotated bibliography of avian communal roosting.** H. L. Allen and L. S. Young. 1982. Washington Department of Game. 177 p. (Available free from: Harriet Allen, 708 40th St. N.W., Marysville, WA 98270.)—Considering the large amount of material that has been published on communal roosting, this work is most welcome. The introduction includes a functional synthesis, that reviews the major hypotheses on the adaptive significance of avian communal roosting (i.e, predator avoidance, food information, energetics, population regulation, migration, and "other social functions"). Each of the 520 entries is indexed by taxonomy (order and family), geographic location, and functional reference. The literature search appears to have been exhaustive, including references from National Audubon Society research reports, progress reports from various state and federal agencies, and theses and dissertations. The annotations are well written, and the bibliography serves its purpose well as an introduction to the forms and functions of avian communal roosting.—Jeffrey S. Marks.

**59. Nest building and bird behavior.** N. E. Collias and E. C. Collias. 1984. Princeton Univ. Press, Princeton. 336 p. $45.00 (cloth), $16.50 (paper).—Nick and Elsie Collias, widely recognized authorities on birds' nests, have distilled their cumulative experience of 30 or so years into these 336 pages. They begin with a survey of nest types and major evolutionary trends in nest building and then in several chapters illustrate how nest building influences a species' natural history and mate selection, and how it is itself influenced by the physical environment, competitors, parasites, and predators. Four chapters are devoted to the process of nest building. Here the authors summarize their own research on weaverbirds and use these and other well-studied species (canaries, domestic fowl, doves) to show how hormones, mate, the behavior of the mate, and presence of a nest affect nest building. A final chapter concerns evolution of colonial nesting and compound nests. Each chapter has a complete and useful summary.

There are two appendices, one listing the type of nest and the sex that builds it for each family of birds; and a second giving sources of photographs of birds' nests and films about weaverbirds and their nests. There are also subject and author indices and a bibliography with more than 600 entries, some as recent as 1983. The text is abundantly illustrated with black-and-white drawings and photographs; some of the latter are too dark and lack detail. There are few typographical errors. For the most part, the writing is crisp and straightforward.

The Colliases emphasize "the relationship between nest building and other kinds of behavior" (p. xvii) and approach their subject from the point of view of natural history and evolution. They make heavy (but by no means exclusive) use of studies done by people at the University of California in Los Angeles, including those of Howell, Bartholomew, White, Carpenter, Walsberg, and Vleck. I was impressed with how well they tied widely scattered information about nests together. Even so, some chapters succeed better than others and in a few places the authors clearly depart from their theme or include much irrelevant material.

There is something in this book for everyone, even experts on nests: the evolutionary origins of domed nests, bowers, brood parasitism, and gregarious nesting; the role of the sexes in nest building, of helpers at the nest, and of predators in determining nest structure, location, and nest building behavior; ways in which birds minimize the effects of predators on nesting success; the symbolic use of nests and nest material in courtship; the taxonomic value of nests; the relationship between a bird's size and the composition of its nest; and advantages of colonial nesting, to mention just a few. Furthermore, the authors' insights about nests and nest-building behavior appear on nearly every page. Domed nests, for example, are common among tropical passerines, but not temperate ones. Compound nests are rare. Colonial nesting is common among species whose breeding and foraging areas are far apart, but solitary nesting is the rule when feeding and nesting areas are the same. If the male helps with incubation, he also usually helps build the nest. Species in which the female is the sole nest builder are those in which sexual dichromatism is pronounced. Birds (e.g., canaries) that construct relatively simple nests can do so without practice, but those that fabricate more complex ones (e.g., weaverbirds) cannot. Birds that build domed nests are more likely to evolve group nests than species that build open nests. At least 100 species of African birds do not build their own nests, but use those of other species. This may be the first step in the evolution of brood parasitism. The Colliases also illustrate similarities between birds' nests and primitive human dwellings and between the evolution of weaving techniques among birds and humans.

In a chapter devoted to bowerbirds (Ptilonorhynchidae), they suggest that bowers evolved from nests, perhaps because handling nest material sexually stimulates both sexes. The rich decor of some bowers (piles of stones, bones and snail shells; flower and fruit ornaments; painted bower walls) may be an evolutionary extension of courtship feeding. Indeed, it is possible (as suggested by Gilliard) that sexual selection has been transferred from the male bird to his bower in order to preserve his cryptic coloration, since species in which the male is spectacularly colored have simple bowers, whereas those with drab males have complex, colorful ones. Bower building itself may have evolved because bowerbirds are frugivorous, which permits the female to build the nest and rear the brood without a male's help.

One chapter describes the astonishing numbers of invertebrates that live in nests. For example, 529 arthropod species were found in nests of 56 species of Finnish birds. Those that attack birds sometimes survive 4–7 years between meals on a host. This likely explains why colonial species of birds shift their nesting sites from time to time, why some species keep the nest scrupulously clean, why some maintain several nests, and perhaps even why hawks bring green sprigs to their nests (to release a natural insecticide, hydrocyanic acid, as they wilt). Interesting inferences are drawn from information about nest parasites. For example, passeriforms have so many feather lice in common with coraciiforms and piciforms compared with other avian orders that "ancestral and early passerine birds . . . may have nested in holes in the ground or in holes in trees" (p. 138).

The book also focuses on the physical and adaptively valuable properties of nest materials. Silk threads, e.g., are strands of a crystalline protein, fibroin, surrounded by a sheath of sericin, and their strength is related to the packing of these strands. The cellulose in plant stems is not only a light and flexible polysaccharide that is water-insoluble, but its tensile strength exceeds that of steel, especially if it is wet. Saliva is sticky because it has mucoproteins with viscoelastic properties at low concentrations. Fine grasses, feathers, and hair trap large volumes of air and hence are excellent insulating materials.

Two chapters are devoted to the effects of the physical environment on the location of the nest and on nest-building behavior. These are standard fare, although some of the examples which the authors use are novel. That montane birds nests in caves, under canopies, and on the protected sides of trees are well known facts. Less well known is the fact that some birds make stone or mud platforms to elevate the nest above waterline in shallow lakes. That nests in cold habitats have thick warm liners, whereas those in xeric areas lack liners altogether is not new information, but the prevalence of domed nests among tropical passerines and the waterproofing function of the lichens and spiderwebs that ornament cup nests in rain forests are less well known.

I was disappointed that the Colliases included little *quantitative* information about nest insulation since several studies of this subject have appeared within the last 10 years. Even the classic one of Pontius and Margit Palmgren (done in 1939) is not mentioned. Nor is there much quantitative information about habitat requirements of nesting birds in spite of the glut of papers that have been published recently on this subject. I was also disappointed with the authors' treatment of the energetic costs of nest building. They claim that the cost-of-transport and the time-and-energy-budget methods both give reasonable estimates of building costs. That is only true if the cost of building a nest is negligible compared to the cost of flying while collecting nest materials. The Colliases do not provide data supporting their contention that the two approaches yield similar energetic costs for a single species. They do, however, show clearly that it is energetically and hence adaptively important for a bird to have sources of food and nest material near the nest site.

I take issue with the authors in a few places in the text. Two examples will illustrate the point. I disagree with the statement (p. 108) that since doves "sit closely over the eggs . . . the very loose and open construction of the flimsy nest facilitates evaporative cooling and the escape of moisture from the incubation patch." To begin with, doves' nests are not "flimsy" structures, as any collector knows; but more importantly, if the brood patch of the dove is closely applied to the clutch, it is difficult to see how any evaporative cooling could take place across it. On p. 132, the authors say that cowbirds are examples of parasitic species that obey Emery's rule (parasitic forms "generally originate from the closely related forms that serve them as hosts"). But, cowbirds parasitize birds of many different species.

These minor criticisms notwithstanding, **Nest Building and Bird Behavior** is a valuable compendium of information about birds' nests and we are fortunate, I think, that Nick and Elsie Collias took the time to record their thoughts and experiences.—Michael D. Kern.

**60. The birds of San Diego County.** P. Unitt. 1984. San Diego Society of Natural History Memoir 13. 276 p. Color plates by A. Brooks. $20.00 ($14.00 paper).—As the author correctly states in his introduction, "the avifauna of San Diego County is well known compared to many areas of the world." With a large variety of habitats that are generally well covered by a corps of capable observers, the amount of information on the birds of San Diego County probably surpasses that available in many states. The task of acquiring, organizing and summarizing this information into a monograph was formidable, but very successfully accomplished by the author.

The first introductory chapter briefly describes the history of San Diego County ornithology, sources of information, terms, nomenclature, and other background information. The second chapter is a concise summary of the geography, climate, and vegetative communities within the county. However, most of the text is devoted to accounts of all birds known to occur in San Diego County. Information on each species varies with its status. Accidental or casual vagrants have little more than brief citations of their few sightings. For migrants and winter visitors, the timing of migration, distribution, representative and maximum concentrations, and habitat preferences are all described. The author is not reluctant to admit where this information is incomplete. Summer residents receive the most thorough coverage. Half-page maps illustrate the breeding distribution of most species while the text summarizes habitat preferences and the timing of breeding activities. Where considerable information is available, these species accounts may be several pages in length although this information is condensed into a few paragraphs for most birds. For every sighting specifically mentioned in the text, the observer(s) or a literature reference is provided. The 12 watercolor plates by Allan Brooks provide a colorful addition to the abundant information in the text.

The only disconcerting feature of this book is the author's nomenclature. While common names generally conform with the most recent AOU checklist, taxonomic sequence and scientific names are derived from several sources and deviate from the accepted checklist. At a minimum, the author should have included the accepted scientific nomenclature in addition to the names he preferred. While present readers should experience little difficulty with this nomenclature, it could cause confusion in the future. A book such as this is not the proper forum for the introduction of a different taxonomic sequence and nomenclature.

Putting the nomenclature differences aside, this book is an excellent summarization of the status of birds in San Diego County. With its wealth of information, it will undoubtedly become one of the standard references on the avifauna of southern California.—Bruce G. Peterjohn.