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RECENT LITERATURE

Edited by Jerome A. Jackson

BANDING AND LONGEVITY

(see also 13, 25, 35)

1. Effects of colour bands on male competition and sexual attractiveness in Zebra Finches (*Poephila guttata*). L. M. Ratcliffe and P. T. Boag. 1987. Can. J. Zool. 65:333–338.—Ever since Burley's original report (Science 211:721–722, 1981), researchers have been interested in the possibility that the color of leg bands can influence male attractiveness. Ratcliffe and Boag used a carefully designed and well-controlled experimental protocol to investigate this possibility with both naive and experienced males. They found no association between leg band color (red vs. light green) and the ability of a male to obtain either a mate or a nest. Their results are not contradictory to those of Burley in that her experiments were designed to test female choice, whereas male-male competition (two males for every nest box or female) was investigated in the present study. What was associated with male success in this study was high aggressiveness (ratio of supplants to times supplanted) and, for experienced males, high number of courtship songs. Female preferences for red bands as shown by choice tests did not result in differential success by red-banded males in these one-week tests. Based on the premise that the experimental set-up used here is more nearly natural than that used in choice tests, Ratcliffe and Boag suggest that the introduction of biases in field studies by leg band color is minimal. Thus, although randomized color banding is still prudent for future field studies, the results of this study should be reassuring to many field-users of color bands.—A. John Gatz, Jr.

2. Sampling migratory birds and other observations on Providenciales Islands B.W.I. B. M. Aldridge. 1987. N. Am. Bird. Bander 12:13–18.—This article reports banding results and observations on the distribution of rare and uncommon species of birds in the British West Indies. Banding was conducted in Nov. of 1978 and from Oct. to May of subsequent years through 1986. With the exception of Yellow-billed (*Coccyzus americana*) and Mangrove (*Coccyzus minor*) cuckoos and Yellow-bellied Sapsuckers (*Sphyrapicus varius*) all birds were Passerines. A summary table of 615 individuals of 40 species is provided. Species listed with 20 or more individuals banded and the respective numbers of individuals are as follows: Cape May Warbler (*Dendroica tigrina*; 116), Indigo Bunting (*Passerina cyanea*; 103), Black-whiskered Vireo (*Vireo altiloquus*; 55), Ovenbird (*Seiurus aurocapillus*; 42), Northern Parula (*Parula americana*; 31), American Redstart (*Setophaga ruticilla*; 30), Gray Catbird (*Dumetella carolinensis*; 23), Black-and-white Warbler (*Mniotilta varia*; 22), Palm Warbler (*Dendroica palmarum*; 22), and Prairie Warbler (*Dendroica discolor*; 20). Species heard singing on the wintering grounds are: White-eyed Vireo (*Vireo griseus*), Prairie Warbler, Black-throated Green Warbler (*Dendroica virens*), Yellow Warbler (*Dendroica petechia*), Indigo Bunting, Common Yellowthroat (*Geothlypsis trichas*), and Northern Parula. Early-late dates are also given.—Richard J. Clark.

3. Additional recoveries of banded North American birds in Europe. J. V. Dennis. 1987. N. Am. Bird. Bander 12:11–12.—This brief article summarizes the recoveries of birds, excluding Brant (*Branta bernicla*) and birds banded in Greenland, banded in North America. Fifty recoveries were reported in an earlier article and are included in this summary. Only one species, the Black-legged Kittiwake (erroneously referred to as a Black-winged Kittiwake in this article) (*Rissa tridactyla*), represents a species not earlier reported on. Species and respective numbers of recoveries for each included in both articles are as follows: Northern Gannet (*Morus bassanus*; 2), American Green-winged Teal (*Anas crecca*; 3), Blue-winged Teal (*Anas discors*; 12), Northern Pintail (*Anas acuta*; 4), American Wigeon (*Anas americana*; 4), Red Knot (*Calidris canutus*; 6), Ring-billed Gull (*Larus delawarensis*; 5), and Sandwich Tern (*Thalasseus sandvicensis*; 2). The only new political area added was a Ring-billed Gull banded on an island in Lake Champlain, New York and recovered in County Donegal, Ireland. A summary of political areas and respective numbers of recoveries are as follows: Iceland (4), Shetland Islands (1), Scotland (2), England (8), Wales (2), Ireland (7),

Northern Ireland (1), West Germany (1), Denmark (2), Netherlands (1), France (10), Spain (11), Portugal (3), Morocco (1), and Azores (7).—Richard J. Clark.

4. Northern Harriers banded at Hawk Cliff: 1972–1985. B. W. Duncan. 1986. Ont. Bird Banding 18:27–32.—From 1972 to 1985, 615 Northern Harriers (*Circus cyaneus*) have been caught and banded at Hawk Cliff, Ontario. The earliest bird was caught on 22 Aug. and the latest 28 Dec. (perhaps a wintering bird?). The number within each age/sex class of birds banded with percentages in parentheses are as follows: male HY (hatching year) 382 (62.1), male AHY (after hatching year) 15 (2.5), female HY 205 (33.4) and female AHY 12 (2.0). A trend with adults migrating after immatures was noted.—Richard J. Clark.

5. Common Black-headed Gull from Holland. R. Schwartz. 1987. The Connecticut Warbler 7:21.—A *Larus ridibundus* picked up dead 22 Aug. 1985 on the beach at West Haven, Connecticut had been banded as a nestling on 20 Jun. 1967 in Drenthe Province, northeast Netherlands.—Jerome A. Jackson.

MIGRATION, ORIENTATION, AND HOMING

6. Fall migration of the Redstart (*Phoenicurus phoenicurus*) and the Black Redstart (*P. ochruros*) in the Alps. (La migration d'automne du Rougequeue à front blanc [*Phoenicurus phoenicurus*] et du Rougequeue noir [*P. ochruros*] dans les Alpes.) C. Frelin. 1986. Alauda 54:177–196. (French, English summary.)—This study is based on capture data for 880 Redstarts and 558 Black Redstarts at La Goleze and Bretolet (Department of Haute-Savoie), French Alps. Redstarts migrate through the French Alps and southern France in the fall en route to the south Sahara. Migrant Black Redstarts captured in the alps are short-distance migrants that overwinter on the Iberian Peninsula and Morocco.

Redstarts move through the Alps at night between 20 Aug. and 1 Oct., but particularly between mid-Aug. and early Sep. Young birds precede adults: only 19, 28, and 31% of captured birds were adults in Aug., Sep., and Oct., respectively. Fifty-eight percent of all captives were males. It appears that males and females of each age class migrate together.

Black Redstarts, in contrast, pass during the day in late Sep. and early Oct., but at night at the end of the migratory period. Only sedentary birds were captured at La Goleze and Bretolet between Aug. and Sep. and 90–95% of the birds at La Goleze were young of the year.

Redstarts captured in Aug. had moderate reserves of subcutaneous fat (0.4 g), but those taken in Oct. had considerably larger reserves (0.8 g). The birds exhibited pronounced daily variations in body mass which were correlated with concurrent changes in fat weight (birds lightest at dawn, increasing in weight to an afternoon maximum of 15 g; 45% of the increase was fat). They gained an average of 0.5 g on the day after their arrival and stayed at La Goleze an average of 1.8 d.

Black Redstarts captured in Aug.–Sep. were often still molting and had little fat (0.2 g), i.e., were not migrants. In contrast, those passing at the end of Sep. and in Oct. were heavier and had larger fat depots (0.4–0.7 g), i.e., were migrants. The latter exhibited more pronounced daily changes in weight than sedentary birds, but only 10% of the daily change represented fat deposition. Birds with high fat scores represented 7, 9, and 24% of captures in Aug., Sep., and Oct., respectively.

For Redstarts, average fat/bird rose from 0.39 g in Aug. to 0.84 g in Oct., representing theoretical flight times of 2.2 and 4.8 h, respectively. For Black Redstarts, however, average fat/bird was only 0.2 g between Aug. and Sep., up to 0.72 g in late Oct., representing 1.1 and 3.9 h of flight, respectively.

In Oct., the fat weight on migrant Black Redstarts was substantially less than that on migrant Redstarts (1.90 vs. 2.69 g, representing theoretical maximal flight times/distances of 10.4 h/520 km and 16 h/800 km, respectively). The author speculates that because Black Redstarts are diurnal migrants, they forage in transit and may migrate in small daily steps, whereas Redstarts, which are nocturnal migrants, must make longer moves and then stop for several days to refuel before continuing. However, the amount of fat that Redstarts generally accumulate while passing through the Alps is not enough to carry them across

the Sahara Desert (14 h of continuous flight). There must therefore be a progressive increase in fat accumulation between the time the birds leave the Alps and the time they arrive in north Africa.—Michael D. Kern.

7. Migratory status of Flammulated Owls in California, with recent records from the California Channel Islands. P. W. Collins, C. Drost, and G. M. Fellers. 1986. Western Birds 17:21–31.—Flammulated Owls (*Otus flammeolus*) are widespread inhabitants of the western mountains of North America from southern British Columbia into Mexico. While present evidence indicates most Flammulated Owls migrate south of the United States during the winter, their migratory habits are poorly understood. Despite its title, this article provides a summary of the present information on the migratory status of this species in California and the western United States. Arrival and departure dates are given with an emphasis on the late fall and early winter records from the United States which suggest the owls are incapable of surviving the harsh winter weather in their nesting habitats. In addition, the few extralimital records are also summarized. These records indicate Flammulated Owls are capable of crossing water barriers that are 61 to 120 km wide as well as wandering more than 1600 km from their known nesting range.—Bruce G. Peterjohn.

8. Altitude of diurnal broad front migration over Twente; a comparison of radar and visual observations in October 1984. [Hoogte van breedfronttrek overdag boven Twente; een vergelijkung van radar en visuele waarnemingen in October 1984.] L. S. Buurma, R. Lensink, and L. G. Linnartz. 1986. Limosa 59:169–182. (Dutch, English summary.)—Observers at two stations counted birds from 30 min before sunrise to 1400, at a third post observers counted until 30 min after sunset. Parallel to the visual observations a mobile X-band tracking radar (type Flycatcher) tracked birds up to 2500 m. A comparison of echo densities within counting windows at the radar screen and bird flocks/h over a 200-m front suggested that visual observers missed about 61% of the birds during peak hours of the peak of migration on 16 Oct. After 16 Oct. visual observers saw virtually all the birds. Limitations of the radar are discussed as was size of birds and height of the birds' passage.—Clayton M. White.

9. Homing pigeons subjected to section of the anterior commissure can build up two olfactory maps in the deflector lofts. A. Foa, P. Bagnoli, and F. Giongo. 1986. J. Comp. Physiol. 159:465–472.—The results of the experiments reported in this paper support the importance of olfactory cues in pigeon homing orientation. Experimental birds had the anterior commissure severed. At 3-d intervals the birds were switched between a CW deflector cage with their right nostrils plugged, and a CCW cage with their left nostrils plugged. Most of the test releases showed CW deflections in birds with the right nostril plugged and CCW deflections with the left nostril plugged. The amount of deflection in all cases was less than the expected 90°. Control experiments in an open loft on pigeons with the anterior commissure severed and one nostril plugged did not produce any difference in deflection between birds with the right vs. left nostril plugged. Both the treated and untreated birds of this series of experiments showed a 30–50 CCW deflection away from home. This deflection makes the results of the first experiments less dramatic, but still significant. While there is clearly an effect from the altered olfactory cues, the less-than-expected response is puzzling.—Robert C. Beason.

10. Attempts to reveal the nature of apparent residual homeward orientation in anosmic pigeons: application of magnetic fields. H. G. Wallraff, S. Benvenuti, and A. Foa. 1986. Monitore Zool. Ital. (N.S.) 20:401–423.—Previous work by these authors indicated a residual homeward orientation in anosmic pigeons which was assumed to be based on magnetic field information. The results from this study did not support the hypothesis. Because even the control birds in this study did not show the expected residual homeward orientation, the authors concluded that the previously reported residual orientation was the result of some biasing factor in the data. The results from most of their releases show a strong westward bias for both anosmic and control pigeons, regardless of their experimental treatment or release site. These experiments neither support nor refute whether the residual homeward orientation of inexperienced anosmic pigeons is based on magnetic field information or is an artifact.—Robert C. Beason.

11. Orientation behaviour of pigeons deprived of olfactory information during the outward journey and at the release site. W. Wiltschko, R. Wiltschko, A. Foa, and S. Benvenuti. 1986. Monitore Zool. Ital. (N.S.) 20:183–193.—This paper differs from most other work on olfactory pigeon navigation because the Wiltschkos usually deal with magnetic cues. For the experiment, treated pigeons were prevented from smelling during transport (their nostrils were plugged) and at the release site is local anaesthetic was applied to their nasal cavities). Birds from two Italian lofts were released at sites symmetrically arranged around their homes. The distribution of headings of the treated birds was significantly different from that of the controls, and the treated birds took longer to home. These results clearly support the importance of olfactory information for Italian pigeon homing.—Robert C. Beason.

12. Effects of an Earth-strength magnetic field on pineal melatonin synthesis in pigeons. S. Reuss and P. Semm. 1987. Naturwissenschaften 74:38–39.—In intact pigeons, exposure to an artificial magnetic field rotated 50° horizontally resulted in a 60% reduction ($P < 0.001$) of N-acetyltransferase (NAT), compared to unexposed controls. Blinded pigeons showed a 19% reduction in NAT activity, but the difference was not statistically significant. The differences result in a reduction of pineal melatonin synthesis in sighted pigeons. These results indicate the importance of the lateral eyes in mediating magnetic field effects on pineal melatonin synthesis in birds. Magnetic stimulation seems to mimic the inhibitory effects of light to the lateral eye on melatonin synthesis. The direct effect of the magnetic field on the pineal itself is unclear.—Robert C. Beason.

POPULATION DYNAMICS

(see also 42)

13. Field evidence for nomadism in Tengmalm's Owl *Aegolius funereus*. E. Korpimäki, M. Lagerström, and P. Saurola. 1987. Ornis Scand. 18:1–4.—The authors assessed natal and breeding dispersal in Tengmalm's (Boreal) Owls based on 148 breeding-season encounters with owls banded in Finland (lat. 61–63°N). The median distance between birth site and first breeding site was significantly farther for females (88 km; $n = 37$) than for males (21 km; $n = 13$). Females were also more mobile as experienced adults: 33% of the adult females moved >40 km between breeding sites ($n = 75$; max. = 580 km!), whereas no male moved >5 km between breeding sites ($n = 23$). A smaller sample of data from West Germany (lat. 50–52°N) suggested that Tengmalm's Owls are much more mobile in Finland than in central Europe.

Korpimäki has previously shown that female Tengmalm's Owls feed primarily on voles, whereas the smaller, more agile males are able to catch birds when the availability of voles is low. The harsh winters and cyclic vole populations in Finland may select for nomadism in vole-specialist females. Males, on the other hand, may benefit by remaining year-round in the breeding area to defend scarce tree cavities that are crucial for nesting. Vole populations are relatively stable in central Europe, which might explain why Tengmalm's Owls are less mobile there than in more northern latitudes.—Jeffrey S. Marks.

14. Population changes in the Stonechat (*Saxicola torquata*) during 1970–84. [Veranderingen in de stand van de Roodborsttspuit (*Saxicola torquata*) in 1970–1984.] F. Hustings. 1986. Limosa 59:153–162. (Dutch, English summary.)—During the early 1970s the Stonechat was a common breeder over most of the Netherlands, but by 1984 it had nearly vanished from the author's 7900-ha study area. This prompted an inquiry into the bird's status countrywide. During 1970–1984 there were no severe winters in the wintering quarters of the species. As much as 70% of the population breeding in agricultural areas was gone by the end of the 1970s. Overall, the Dutch population decreased from about 4100–5800 breeding pairs to 1600–2300 pairs. This decline was believed to be a result of changed farming practices and thus habitat changes: large-scale corn farming, destruction of hedges, burning of ditch banks, and cultivation of marginal lands.—Clayton M. White.

15. Territory dynamics and patterns of female recruitment in Red-winged Blackbirds (*Agelaius phoeniceus*). T. E. Dickinson and M. R. Lein. 1987. Can. J. Zool. 65:

465–471.—The territorial boundaries defended by male Red-winged Blackbirds in Alberta, Canada, change throughout the nesting and egg-laying period. The biggest changes occurred during the peak of female settlement, but further changes occurred after most females had arrived. Harems of two to five females were present, and dominant males altered their territory boundaries to include specific nesting sites chosen by newly arriving females. The shifting of territories reported here contrasts with the results later in the breeding season reported by Nero and Emlen (Condor 53:105–116, 1951) who found no such shifting of male territorial boundaries when they moved completed nests and eggs. As Dickinson and Lein point out, the implications of their findings are considerable relative to models of the evolution of mating systems.—A. John Gatz, Jr.

16. A 30 year change in the breeding time of the Common Eider in the Gulf of Finland. (Mitä pesinnän ajoittuminen kertoo haahkan menestymisestä Suomenlahdella.) M. Hario and K. Selin. 1986. Suomen Riista 33:19–25. (Finnish, English summary, table and figure captions.)—The Common Eider (*Somateria mollisima*) population in the Gulf of Finland, as illustrated by data from the Soderskar bird sanctuary, has undergone significant growth since 1954, from fewer than 300 nests/yr to more than 2400 nests/yr. Nesting now begins about 2 wks earlier than 30 yr ago, and clutch size averages significantly larger (4.44 ± 0.17 SD for 1953–1970; 4.74 ± 0.09 for 1971–1985). The earlier breeding was not related to the timing of ice disappearance, but the authors suggest that the population growth is related to growth of the food supply in the Baltic.—Jerome A. Jackson.

17. A new census method for penguins tested on Jackass Penguins (*Spheniscus demersus*). R. M. Randall, B. M. Randall, J. Cooper, and P. G. H. Frost. 1986. Ostrich. 57:211–215.—A population census method described for Jackass Penguins involves counting birds during their annual molt. Molt counts estimate the entire population, and unlike breeding season counts absenteeism is unlikely (a problem encountered in most other phases of the annual cycle), and are not affected by the diel activity of birds. Since molt counts are independent of the breeding cycle, they include non-breeding birds. The principle weaknesses of the molt count method are that it is laborious and breeders cannot be distinguished from pre-breeders. Because of variability in the molting phases of other penguin species, this method of population estimation may not be as applicable for other species as it is for Jackass Penguins.—D. J. Ingold.

NESTING AND REPRODUCTION

(see also 15, 16, 36, 38, 40, 44, 59, 62, 64, 70)

18. Description of the nest and eggs of two Guianese Antbirds *Formicariidae*, *Hylopezus macularius* and *Thamnophilus nigrocinereus*. (Description du nid et de la ponte de deux Formicariidés guyanais: *Hylopezus macularius* et *Thamnophilus nigrocinereus*.) O. Tostain. 1986. Alauda 54:170–176. (French, English abstract.)—This short paper contains the first descriptions of the nests and eggs of the Spotted Antpitta (*Hylopezus macularius*) and the Blackish-gray Antshrike (*Thamnophilus nigrocinereus*) from French Guiana, as well as new information about the habitat, breeding biology, and plumage characterstics of the antshrike.

Spotted Antpittas inhabit forests in the interior of French Guiana where they nest in open understory. A single nest was found by the author: 75 cm above ground on a horizontal limb of a palm *Astrocaryum paramaca*. The nest consisted of large, loosely assembled twigs garnished with dead leaves. It was strikingly porous, as much as 30 cm in outer diameter (but quite variable), with a cup diameter ≤7 cm, and depth of 15 mm. The clutch consisted of two green-tinted white eggs with many beige to red-brown spots, 5.7 g in mass on average, the largest 25.4 × 19.5 mm.

Blackish-gray Antshrikes inhabit the understory (<10 m above ground) of mangrove swamps at the mouth of the Kaw River in mixed stands of *Avicennia germinans* and *Rhizophora* sp. The female (but not the male), whose plumage is described in detail, cannot be confused with the two other species of antbirds indigenous to these mangrove swamps. The species was breeding at the end of the rainy season (end-Sep.) and the author easily found several nests at low heights in the underbrush. Both sexes built the nest, using materials

collected within 20–30 m of it. The liana *Rhabdadenia biflora* and spider webs were essential elements in these nests; one contained herbs. Nests were 1.2–1.5 m above ground in the terminal fork of a small tree, usually *Laguncularia racemosa*. Typical dimensions were 8–9 cm external diameter; 4.5–6.0 cm internal diameter, 6–9 cm height, and 4.5–5 cm cup depth. The clutch consisted of two cream colored, rosy, or pure white eggs with large angular brown-violet spots that were particularly numerous at the large pole of the egg. The dimensions of the largest and smallest egg were 25.1 × 15.9 and 23.1 × 17.4 mm, respectively.—Michael D. Kern.

19. Thunder Bay's nesting Merlins. N. G. Escott. 1986. Ontario Birds 4:97–101.—In eastern North America, breeding Merlins (*Falco columbarius*) are normally considered to be uncommon occupants of undisturbed boreal forest communities. Hence, the presence of a breeding population in urban Thunder Bay, Ontario, Canada, represents a radical departure from the traditional breeding habitat occupied by this species. This phenomenon is not recent, as Merlins have nested in Thunder Bay for at least four decades. The author describes the present size of the population and provides limited information on their breeding ecology, indicating most pairs nest in conifers at city parks, universities, and residential yards. Most pairs appear to successfully raise young. The relatively high density and nesting success of this Merlin population was attributed largely to the availability of House Sparrows (*Passer domesticus*) and other prey.—Bruce G. Peterjohn.

20. Selection for equitability in some aspects of reproductive investment in Herring Gulls *Larus argentatus*. J. Burger. 1987. Ornis Scand. 18:17–23.—Burger observed 14–15 pairs of Herring Gulls for 3 breeding seasons in New Jersey to assess the relationship between reproductive success (the number of young raised to 30 d of age) and equitability in parental effort at the nest. For all pairs combined, there were no differences between the sexes in the amount of time spent incubating or in the amount of nonincubating time near the nest. However, males were more aggressive near the nest and fed chicks more often than did females. Individual pairs that fledged 2 or 3 young had more even distributions of incubation time, nonincubation time on territory, feeding rate, and aggression rate than did pairs that fledged 0 or 1 young. Thus, for Herring Gulls, selection seems to favor a strategy of equal amounts of behavioral investment between pair members rather than one of each sex trying to minimize its investment in reproductive effort.—Jeffrey S. Marks.

21. Reproductive behaviour of *Circus cyaneus* in North America and Europe: a comparison. R. Simmons, P. Barnard, and P. C. Smith. 1987. Ornis Scand. 18:33–41.—Simmons et al. begin by stating that the Northern Harrier ". . . has recently been recognized as a monotypic species by the A.O.U. (1982), although authors have traditionally distinguished two subspecies (*cyaneus* in Europe, *hudsonius* in North America)." Next, they discuss why a comparison of the breeding behavior of *C. cyaneus* in Europe and North America would be useful in answering the question: "Are the two 'subspecies' similar enough to be considered as one?" Unfortunately, this introduction mars an otherwise sound paper, because the A.O.U. has not lumped the 2 subspecies of *cyaneus*, nor is the conspecific status of Eurasian and North American *cyaneus* a recent decision. Furthermore, because the behavioral patterns analyzed in this paper are very closely tied to environmental factors (which must be very different on the 2 continents), it is not apparent that such comparison would yield information useful in determining the taxonomic status of the 2 populations.

The information on breeding behavior of harriers in New Brunswick, Canada is interesting, as are the comparisons with Picozzi's data from Scotland. There is new information on male and female mate rejection, the role of courtship behavior in mate acquisition, nest-building behavior of males, and nestling starvation due to mate desertion. Simmons et al. conclude that behavioral differences between the populations are negligible, and that their conspecific status is "well founded." This paper should have skipped the taxonomic angle and focused on a behavioral comparison of 2 harrier populations.—Jeffrey S. Marks.

22. Breeding and other behaviour of the Lesser Jacana. W. R. Tarboten and C. H. Fry. 1986. Ostrich 57:233–243.—A brief study was made of the behavior of Lesser Jacanas (*Microparra capensis*) in southern Africa. Habitat, general and breeding behavior, density and social dispersion, plumages, nests, eggs, young, and vocalizations are described.

Hypotheses are presented to explain why Lesser Jacanas are monogamous while many other jacanids are polyandrous. The main hypothesis: smaller eggs, a result of smaller body size, require more constant incubation than a single parent can provide.—Malcolm F. Hodges, Jr.

23. Length of birds' breeding seasons. E. Wyndham. 1986. Am. Nat. 128:155–164.—The relationships between the length of the avian breeding season and various environmental variables were analyzed from published data taken from 35 world-wide locations. Wyndham wished to test the hypothesis that arid-zone birds of Australia have less-seasonal breeding seasons than birds of humid regions at the same latitude. Length of the breeding season was determined as the number of "equally good months" (EGM) calculated from the Shannon-Wiener index, $\exp(-\Sigma\, p_i \ln p_i)$, where p_i is the proportion of nests started in the *ith* month. There was a negative correlation between EGM and latitude for all localities, but data from southwestern Ecuador, which departed from this pattern, were excluded from further analysis. The Australian and Ethiopian regions have a larger EGM than other geographic regions at similar latitudes. No correlation was found between EGM and mean annual rainfall, or between EGM and altitude.

This study is a first step towards a more comprehensive theory of avian breeding seasons. We know that the length of the breeding season varies among biogeographic regions for a given latitude, but we do not know exactly why. Variation in climate or resources among continents may be analyzed in greater detail to reveal new patterns on a world-wide scale. Multivariate analysis of environmental variables, and taxonomic differences in breeding season length, should be profitable avenues for future study.—George Kulesza.

24. Brood reduction in the Chihuahuan Raven: an experimental study. J. Haydock and J. D. Ligon. 1986. Ecology 67:1194–1205.—The authors experimentally manipulated broods of the Chihuahuan Raven (*Corvus cryptoleucus*) in New Mexico in an attempt to test alternate hypotheses that might explain the significance of brood reduction. In experimental nests, young were transferred among nests to produce broods of similar-sized nestlings. This manipulation reduced the effects of brood reduction in contrast to the control nests. Patterns of nestling loss in control nests implicated starvation as the primary source of mortality. Fledging success was greater in the experimental nests than in control nests during one year of study, and was approximately equal in the two groups of nests in another year. The body masses of fledglings were significantly lower in the experimental nests.

These data tend to support Lack's "brood reduction hypothesis," especially the observed mortality in the control nests. It is possible that resource availability in any given year will strongly influence the difference in fledgling production between experimental and control nests.—George Kulesza.

25. Unusual Piping Plover nesting. D. Varza and R. Schwartz. 1987. Connecticut Warbler 7:18.—The authors report discovery of a pair of nesting Piping Plovers, both of which had been banded as nestlings the previous year. They had dispersed 50 and 70 km from their natal site and were nesting on a beach that was small and open relative to other Connecticut nests. All four eggs hatched; at least three young fledged.—Jerome A. Jackson.

26. Nesting chronology of the Sharp-shinned Hawk in Alabama. J. R. Parrish and G. S. Wise. III. 1986. Alabama Birdlife 33:3–11; **Nesting records for the Sharp-shinned Hawk (*Accipiter striatus*) in Alabama.** B. Summerour. 1986. Alabama Birdlife 33:11–18.—These two papers review nesting records for *Accipiter striatus* in Alabama. It appears that the species nests regularly in the state in suitable habitat. Both papers identify prey remains from nests observed by the authors.—Jerome A. Jackson.

BEHAVIOR

(see also 1, 15, 20, 21, 22)

27. Breeding displays and calls of the Banded Dotterel (*Charadrius bicinctus*). M. Bomford. 1986. Notornis 33:219–232.—The breeding displays of plovers are not well described. This paper extends observations by Phillips (Emu 80:177–197, 1980), confirming that the behavior of the Banded Dotterel is typical of other small *Charadrius* plovers. A

possible novelty, however, is the use of wing-clicking in the male's territorial flight display.—J. R. Jehl, Jr.

28. Behaviour and affinities of the Magellanic Cormorant. D. Siegel-Causey. 1986. Notornis 33:249–257.—The Magellanic Cormorant or Rock Shag (*Phalacrocorax magellanicus*) of southern South America is sometimes considered closely related to the blue-eyed shag complex of the Southern Hemisphere. Behavioral evidence and unpublished morphological studies by Siegel-Causey place it with the *Stictocarbo* group of cliff-nesting shags. Its closest relatives may be the Red-faced (*R. urile*) and Pelagic (*P. pelagicus*) cormorants of the North Pacific.—J. R. Jehl, Jr.

29. Daily movements of Starlings (*Sturnus vulgaris* L.) between urban roosts and rural pasturelands in the Liege region, Belgium. (Déplacements journaliers des Etourneaux (*Sturnus vulgaris* L.) entre les dortoirs urbains et les gagnages ruraux en région liégeoise.) M. Laguesse. 1986. Alauda 54:81–99. (French, English abstract.)—*Principal* flight lines of starlings around Liège were used by at least 500 birds and commonly by as many as 2000–60,000 in autumn–winter 1980–1981. They originated at roosts. *Secondary* flight lines were used by no more than 500 birds, were not necessarily used year-round, and rarely originated at a roost or exceeded 15 km in length.

Variations in the traffic on these flight lines were functions of weather and the availability of food. Cold fronts, for example, caused the birds to leave for their winter quarters in mass. The line between Verviers and Liège carried 60,000 Starlings in Oct., but only 4000 in Dec., and even fewer in Feb. Rain frequently delayed the departure of starlings from their roosts in the morning and produced earlier returns in the afternoon. Snow reduced the amount of pastureland where the birds could forage and as a result their movements were restricted to the immediate vicinity of Liège. Put simply, the number of starlings that traveled great distances to forage dropped considerably after it snowed. For example, 70% of birds that left urban roosts before the first snowfall were found 11 km away, but only 25% were there afterwards. Fog reduced foraging time if it persisted for several hours.

Starlings generally returned to their roosts 15 min before sunset and left 13 min before sunrise. These times depended primarily on the amount of light present; departure was earlier when it was lighter; returns were earlier when it was darker.—Michael D. Kern.

30. Are Red-eyed and Philadelphia vireos always interspecifically territorial? R. D. James and M. K. Peck. 1986. Ontario Birds 4:101–103.—Previous studies (Rice, Ecology 59:526–538, 1978) have indicated Philadelphia (*Vireo philadelphicus*) and Red-eyed (*V. olivaceus*) vireos occupy identical habitat in Ontario, but maintain mutually exclusive territories with neither species at a disadvantage in territorial disputes. However, casual observations by the authors suggested that interspecific territories may not always be maintained. In an area where Red-eyed Vireos are more numerous than Philadelphia Vireos, they cited two instances where both species occupied the same territory. In both cases, Philadelphia Vireos occupied the forest canopy while Red-eyed Vireos were found lower in the understory. Their observations raise questions concerning the relationship between population densities and territorial behavior, indicating the necessity for additional studies before the relationships of these sympatric species are understood.—Bruce G. Peterjohn.

31. Structure and vocalizations of display flights in the Broad-billed Sandpiper *Limicola falcinellus*. B. W. Svensson. 1987. Ornis Scand. 18:47–52.—Broad-billed Sandpipers belong to a monotypic genus in the Calidridinae. They breed in the northern Palaearctic, but little is known about their breeding behavior. This report is based on 60.5 h of observation at two locations in northern Sweden.

Display flights lasted from a few minutes to more than half an hour and were performed at heights of 15–20 m. A typical display flight consisted of repeated bouts of brief and rapid wing fluttering separated by a longer glide and a parachuting descent. A "rhythmically repeated call" was given during glides between flutters. The flight "song" was usually given during the parachuting descent and was often preceded by a short "chattering" call and followed by the "rhythmically repeated call" during the ascent. "Song" was also performed from the ground. Svensson also compares his observations with data for eight other species of calidridine sandpipers.—Jeffrey S. Marks.

32. Behavioural responses of Common Puffins to kleptoparasitism by Herring Gulls. J. Rice. 1987. Can. J. Zool. 65:339–347.—The general breeding biology of Common Puffins (*Fratercula arctica*) makes them suitable targets for kleptoparasites. They breed in large colonies, they bring large quantities of food to their burrows, and the food items are large, high quality, and visible to the gulls. In this paper, Rice reports what behavior puffins use to decrease the frequency of such attacks as well as variations in the behavior of Herring Gulls (*Larus argentatus*) to achieve success at kleptoparasitism. The work reported is a natural experiment—puffin and gull behavior are compared at three sites with different gull densities on one small island off Newfoundland. Rice found that puffins circled and massed before landing only where gull densities were high; this swamping meant that the per capita rate of attack did not vary among sites. At all gull densities, puffins entered their burrows more rapidly if they were provisioning young than otherwise. For their part, the Herring Gulls seemed to monitor the puffins quite closely; they attacked puffins more frequently on days when the puffins had higher rates of success in bringing back food than on days of poor foraging. Rice did not estimate what proportion of the diet of the gulls was obtained by kleptoparasitism at any of his sites, but suggests that the proportion involved obviously mattered to both species given the behavioral patterns he observed.—A. John Gatz, Jr.

33. Correlates and consequences of coloniality in Great Blue Herons. K. Simpson, J. N. M. Smith, and J. P. Kelsall. 1987. Can. J. Zool. 65:572–577.—Why do Great Blue Herons (*Ardea herodias*) nest colonially at Pender Harbour, British Columbia? Alternatives considered were (1) following one another to good feeding sites, (2) obtaining protection from predators, and (3) relocating a previous mate or finding a new mate. The authors banded 60% of the birds in the colony and observed them over a 3-yr-interval to gain insight into the question. The data they obtained do not allow them to definitively rule out any of the three alternatives, but are suggestive as to which factors appear to be most important. Neither neighboring herons in the breeding colony nor mates tended to feed at the same locations; thus, herons seemed not to be following close neighbors to good feeding sites, although they could have been following more distant members of the colony. Nesting success was higher in herons that fed close to the breeding colony rather than more distantly, so nesting colonially or otherwise near a good food supply is beneficial. Peripheral nests in the colony suffered the greatest predation in one year but not in another (the colony was deserted the third year); protection from predation by colonial nesting was only partial at best and no data exist for predation rates on non-colonial birds in the same general area. These herons did not pair with the same mate in successive years or use the same nest site, so ease in finding a new mate or a new nest site would be the only possible mate-finding benefits of colonial nesting. More work with more individually banded Great Blue Herons at several more breeding sites is needed before the benefits of colonial nesting in the species will be known.—A. John Gatz.

34. Imperfect information and the persistence of pretenders: male Prairie Warblers contesting for territory. R. Walton and V. Nolan, Jr. 1986. Am. Nat. 128:427–432.—When male Prairie Warblers (*Dendroica discolor*) return from their wintering grounds they will claim their former breeding territory if it is unoccupied, or they will challenge the earlier-arriving male for its occupation. Male warblers can be classified as being either the "owner" of a given territory the preceding year, or a "pretender" who has not previously occupied the contested territory. Likewise, any male can also be classified as a "resident" who first claimed the territory in the current year, or a "nonresident" who arrived after the "resident."

Classifying territorial males by these two criteria permits accurate predictions of the outcome of territory contests. For example, in contests between owner-nonresidents and pretender-residents, the former birds generally win quickly, but if the latter has initiated nesting, a prolonged contest will result until the owner finally wins. The degree of persistence of a "pretender" will depend on the probability that the rival male is actually the true "owner" of the territory, and the perception of each birds' role in the territory dispute. The frequency-dependent behavior of birds in territory disputes lends itself to suitable models of ESS's (evolutionarily stable strategies).

Although the sample size of observed territory contests was small in this study, the work is innovative and it will contribute to a more comprehensive model of territory occupancy in passerine birds.—George Kulesza.

35. Social rank in winter flocks of Willow Tits (*Parus montanus*). O. Hogstad. 1987. Ibis 129:1–9.—Dominance hierarchies are found in almost every bird flock, and have been studied particularly intensively in winter flocks of tits (*Parus* sp.). This study examines the social hierarchies within 10 winter flocks of Willow Tits (*P. montanus*) in Norway. The study involved color-banded individuals and their aggressive interactions at feeders and at natural feeding sites. The flocks were composed of one adult mated pair together with two juvenile males and two juvenile females. Juvenile males and juvenile females may have represented pairs. Both the flock composition and hierarchies remained stable during the study. The hierarchies were linear and unilateral as found in other *Parus* flocks. Adults of each sex dominated the juveniles of their own sex. Within similar age groups, the male dominated the female. In six flocks, the male dominated all the females, in one flock the adult female dominated both the juvenile males, but only one of them in three other flocks. Dominance rank was examined as a function of body weight, wing length, age, and sex. Body weight was the most important characteristic and explained 77% of the variation in dominance rank. The dominance rank of the male was also a function of his seniority, while the rank of a juvenile female was correlated with her mate's rank. The dominance hierarchy of Willow Tits is very similar to that of the Black-capped Chickadee (*P. atricapillus*).—J. M. Wunderle, Jr.

36. The pair bond and divorce among Oystercatchers (*Haematopus ostralegus*) on Skokholm Island, Wales. M. P. Harris, U. N. Safriel, M. De L. Brooke, and C. K. Britton. 1987. Ibis 129:45–57.—Generally monogamous bird species show mate fidelity between breeding individuals. Mate switching (i.e., divorce) is widespread, but tends to be uncommon. To study the causes of divorce as well as the costs and benefits of avian divorce requires long-term studies of large numbers of individually marked birds. This is one such study based on 15 yr of data on Oystercatcher (*Haematopus ostralegus*) breeding biology with 45 males and 51 females whose total reproductive life was known.

In 8% of the instances studied, the pair separated between breeding seasons. The probability of divorce was highest for birds aged 5 yr, the modal age of first breeding. When re-pairing following a divorce, the birds did not select an older or younger individual as a mate. The probability of divorce was increased by low hatching success. Did divorce improve the fitness of the divorcees? Apparently not, for divorce was not followed by significant changes in clutch-size, laying date, or nesting success (although females tended to be more successful). Following a divorce, the male usually retained his territory, while the female moved elsewhere. This study nicely demonstrates the value of long-term studies of marked individuals.—J. M. Wunderle, Jr.

37. A possible cleaning symbiosis between *Pica pica* and *Odocoileus hemionus*. S. W. Margulis. 1987. Southwest. Nat. 32:138–139.—Black-billed Magpies were observed feeding on ectoparasites of Rocky Mountain mule deer in the foothills west of Boulder, Colorado from Oct. 1983 through Dec. 1984. Magpies were seen perching on deer on 29 dates. A total of 91 separate perching bouts were recorded. No magpie cleaning was observed during the summer. Because the winter is occasionally stressful on deer, which could be compounded by ectoparasites, this relationship could be mutualistic. If, however, magpies are also feeding on insects that simply swarm around deer, the relationship would be commensal. Environmental factors, which affect the physical condition of both the mule deer and magpies, may ultimately dictate the nature of this relationship.—D. J. Ingold.

ECOLOGY

(see also 18, 19, 29, 30)

38. Notes on the biology of the Red-billed Quailfinch (*Ortygospiza gabonensis*) in Zambia. E. H. Penry. 1986. Ostrich 57:193–202.—Five nests (four with eggs) are described for the first time for the Red-billed Quailfinch. The species is compared with two

congeners: African Quailfinch (*O. atricollis*) and Locust Finch (*O. locustella*). Other aspects of Red-billed Quailfinch biology described are habitat, distribution, seasonality, breeding behavior, vocalizations, nest sites, and dates of egg-laying.—Malcolm F. Hodges, Jr.

39. On the display requirements of capercaillie in central Finland. (Metson soidinpaikkavaatimuksista Keski-Suomessa.) P. Valkeajärvi and L. Ijäs. 1986. Suomen Riista 33:5–18. (Finnish, English summary, table and figure captions.)—The purpose of this study was to define the habitat requirements of the Capercaillie (*Tetrao urogallus*) for its display grounds. This work was a prelude to experimental manipulation of the habitat through various types of forest management, the results of which are promised for a later paper. Observations reported here included five display grounds and 64 territories. Most territories were over 90% pine, although some included only 10–20% pine. The authors recommend retention of at least 30% pine. Dominance of mature forest was essential: 80% of the territories were in forests over 50 years old; 50% were in 70-year-old forests. Hills were a typical feature of many display grounds and visibility was important.—Jerome A. Jackson.

40. Habitat selection by breeding Belted Kingfishers (*Ceryle alcyon*). R. P. Brooks and W. J. Davis. 1987. Am. Midl. Nat. 117:63–71.—The availability of vertical earthen banks limits the nesting success of Belted Kingfishers. The authors quantified nesting and foraging habitat variables and fecundity for three Belted Kingfisher populations: two in north-central Pennsylvania and one in southwestern Ohio. Randomly selected unoccupied sites had equally abundant food resources as the three occupied sites, suggesting that food availability didn't explain the absence of kingfishers in unoccupied sites. Unoccupied banks consisted of a variable mixture of sand and clay, while occupied banks were all composed of more than 75% sand and less than 7% clay. Sandy banks allow for easy cavity excavation by kingfishers and provide superior drainage. Kingfishers showed a preference for agricultural areas where banks were covered by herbaceous vegetation, suggesting an avoidance of banks where tree roots may hinder excavation. Nests were located high in most banks, possibly to avoid annual flooding and predation. The availability of riffles as foraging sites was also important in nest-site selection. Kingfisher territories increased in areas where few ripples occurred. Differences in kingfisher fecundity and population size along streams in Pennsylvania and Ohio were more likely a reflection of the availability of suitable foraging habitat than suitable nesting habitat.—D. J. Ingold.

41. Seasonal variations of the avian community structure of the alpine meadow at the Haibei region. X. Zheng and H. Deng. 1986. Acta Zool. Sinica 32:180–188. (Chinese, English abstract, figure and table captions.)—This paper presents an analysis and discussion of variation in the number and distribution of bird species and in community organization in six alpine meadow habitats during the period Mar. 1980–Feb. 1982. Dominant species were the Horned Lark (*Eremophila alpestris*; 2.72 individuals/ha) and Lesser Skylark (*Alauda gulgula*; 1.22 individuals/ha). The number of species per habitat ranged from 2 (a Kobresia humilis meadow) to 14 (residential area/Kobresia meadow). The total number of species observed was 22 (11 residents, 8 summer residents, 2 winter residents, 1 transient). The average annual density of birds was highest in the residential area (51.84 individuals/ha) and ranged only from five to seven individuals/ha in the other habitats. The diversity index was lowest for the residential area (0.18) and for other habitats ranged from 0.46 to 0.93.

Mean adult weights are given for each species, but although sample sizes are often high (171 Lesser Skylarks; 173 Horned Larks; 106 Twite, *Carduelis flavirostris*), no ranges or standard deviations are provided. Finally, it is of interest that this paper draws heavily upon North American methods of study and interpretation of data (eight of 10 references cited are North American).—Jerome A. Jackson.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 8, 17, 39)

42. Size and dynamics of postbreeding dabbling duck populations in a wetland area in SE Finland. (Kesäaikaisten puolisukeltajakantojen koosta ja vaihtelusta Parikkalan

Siikalahdella.) H. Pöysä. 1986. Suomen Riista 33:39–43. (Finnish, English summary, table and figure captions.)—Data are presented for six species of *Anas* (Mallard, *A. platyrhynchos*; Green-winged Teal, *A. crecca*; Garganey, *A. querquedula*; Eurasian Wigeon, *A. penelope*; Northern Pintail, *A. acuta*; and Northern Shoveler, *A. clypeata*) from mid-Jun. to the beginning of the hunting season on 20 Aug. 1980. Wigeon were more numerous in Aug. than in May, whereas Garganey, pintail, and shoveler were less numerous in Aug. Changes were attributed to influx of birds from surrounding habitat. Hunting pressure on Mallards was considered such that the population could not survive without influx of birds from surrounding areas.—Jerome A. Jackson.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 14, 39, 53, 79)

43. Foods of feral cats *Felis catus* on Jarvis and Howland Islands, Central Pacific Ocean. R. D. Kirkpatrick and M. J. Rauzon. 1986. Biotropica 18:72–75.—Over 90% of the diet of feral house cats on these two islands is breeding seabirds (Sooty Tern, *Sterna fuscata*; Wedge-tailed Shearwater, *Puffinus pacificus*; Brown Noddy, *Anous stolidus*; and Red-tailed Tropicbird, *Phaethon rubricauda*). The Sooty Tern suffered the highest rates of predation: 91% volume on Jarvis and 44% on Howland. Masked Boobies (*Sula dactylatra*) could effectively defend themselves and their nests against the cats.—Robert C. Beason.

44. Common Loon productivity and nesting requirements on the Whitefish Chain of lakes in north-central Minnesota. P. J. Valley. 1987. Loon 59:3–11.—Nineteen breeding pairs of Common Loons (*Gavia immer*) were located on 10 lakes, comprising the Whitefish Chain (4657 ha), in Crow Wing Co., Minnesota. Breeding pair density equalled 0.43 pairs/km^2. Clutch initiation occurred from 7 May to 28 Jun. A total of 31 clutches resulted in an average clutch size of 1.7 eggs. Nineteen of the 31 clutches failed to hatch chicks (61% failure rate). Predation accounted for 47% of nest failures; 42% were caused by sudden water level increases, and 11% by human disturbances. Thirty-six percent of all eggs hatched. Hatching success in 2-egg clutches was significantly greater ($P < 0.05$) than in one-egg clutches. No significant correlation was found between hatching success and distances of nests to land. However, positive significant correlations were found between the number of breeding pairs and shore length ($r = 0.91$), breeding pairs and lake size ($r = 0.81$), and breeding pairs and lake depth ($r = 0.52$). Island-nesting loons had no apparent advantage over loons nesting in other areas due to extensive human development on most of the islands. The author calculated human disturbance ratios to access recreational pressure (Vermeer, Wilson Bull. 85:429–435, 1973a). Significant inverse correlations were found between loon hatching success and disturbance ratios ($r = -0.63$) and the number of breeding pairs and disturbance ratios ($r = -0.69$). Nest visibility did not appear to play an important role in nest location and success of these 19 pairs. This may reflect some loon habituation to recreational pressure in the area.—D. J. Ingold.

PARASITES AND DISEASES

45. Synchrony of Cliff Swallow nesting and development of the tick, *Ixodes baergi*. R. W. Larimore. 1987. Southwest. Nat. 32:121–126.—A colony of Cliff Swallows (*Hirundo pyrrhonota*) consisting of 150–200 nests in northwest Arkansas was examined to determine the ectoparasitic relationship of the tick *Ixodes baergi* with nesting swallows. Swallows arrived at the nest location in mid- to late Apr. and roosted on bluffs or in old nests while constructing nests. Egg laying began during the last week in May. Eggs of *I. baergi* were laid in crevices on a bluff below the swallow nests. By mid-May most larval ticks had hatched and began moving up the bluff to swallow nests. Swallow nests and birds lowest on the bluffs possessed the largest numbers of ticks, and numbers decreased progressively in the upper portions of the colony. Initial engorgements by larval ticks were on adult swallows or newly hatched nestlings. After engorging, larval ticks dropped off birds. A second engorgement by the nymph stage occurred on swallow nestlings. After nymphs molted to adults, a final engorgement occurred during the first 2 wks of Jul. Engorged

female ticks then moved out of the nest, mated, and retreated to the crevices in the lower bluffs to lay eggs. Concomitantly, swallow nestlings fledged and swallows formed large pre-migratory colonies. Eggs of *I. baergi* hatched in approximately 40 days, but larvae remained in the crevices until swallows returned the following May. Ticks are likely transferred among colonies by intercolonial mixing of swallows early in the nesting season.—D. J. Ingold.

PHYSIOLOGY

(see also 12)

46. Energy expenditure of free-ranging Wandering Albatrosses *Diomedea exulans*. N. J. Adams, C. R. Brown, and K. A. Nagy. 1986. Physiol. Zool. 59:583–591.—Field metabolic rates of Wandering Albatrosses, measured by means of doubly-labeled water, are the lowest yet recorded (1.83 × BMR) for a bird. Energy cost of flight was estimated to be 2.35 × BMR, also a very low rate relative to other species.—Charles R. Blem.

47. Metabolic heat production and evaporative heat loss in desert phasianids: Chukar and Sand Partridge. R. Franklin, B. Pinshow, and Y. Weinstein. 1986. Physiol. Zool. 59:592–605.—Sand Partridges thermoregulate better in heat than Chukars and, as a result, are found in extreme arid zones where Chukars are absent. Sand Partridges appeared to have no upper critical temperature in tests to 51 C and tolerated ambient temperatures up to 51 C. Chukars could not tolerate ambient temperatures above 43 C and had an upper critical temperature of 38.5 C.—Charles R. Blem.

48. Daily energy expenditure by adult Leach's Storm-Petrels during the nesting cycle. R. E. Ricklefs, D. D. Roby, and J. B. Williams. 1986. Physiol. Zool. 59:649–660.—The dynamics of energy delivery to the nest by adult seabirds is poorly known, particularly for procellariiform birds and other marine species seemingly limited to one chick per clutch. This paper fills in some gaps by presenting measurements of oxygen consumption, lipid reserve, and estimates of the daily energy expenditure for this species.—Charles R. Blem.

49. Winter fattening in the American Goldfinch and the possible role of temperature in its regulation. W. R. Dawson and R. C. Marsh. 1986. Physiol. Zool. 59:357–368.—A variety of multivariate analyses support the hypothesis that temperature conditions surrounding the day of capture have little to do with magnitude of fat depots in the American Goldfinch. Ambient temperature seems to be an ultimate, rather than a proximate, factor in winter fattening because lipid reserves are most highly correlated with long-term average temperatures.—Charles R. Blem.

50. A radiotelemetry system for analyzing heart rate responses during playback experiments in blackbirds (*Turdus merula*). P. Diehl, H.-W. Helb, U. T. Koch, and M. Lösch. 1986. Behav. Processes 13:311–325.—This paper contains schematic and design information on a light-weight (4–5 g) radiotelemetry unit which is capable of transmitting continuous heart rate information from a free-moving bird. The transmitter's range is about 3 m and has a battery life of about 72 h. This design should prove useful to other workers dealing with heart rate in behavioral and physiological studies of small birds.—Robert C. Beason.

MORPHOLOGY AND ANATOMY

(see 6, 60)

PLUMAGES AND MOLTS

(see also 6, 18)

51. Molt and fat deposition in Turtle Doves *Streptopelia turtur* on a scrubby steppe in northern Senegal, at Richard-Toll. (Mue et engraissement de la Tourterelle des bois *Streptopelia turtur* dans une steppe arbustive du Nord Sénégal, région de Richard-Toll.) M.-Y. Morel. 1986. Alauda 54:121–137. (French, English summary.)—Richard-

Toll, northern Senegal (16°95′ to 15°42′W latitude), is on the northern edge of the overwintering zone of two migratory races of Turtle Doves—the nominal one, *turtur,* from Europe and the near East, and *arenicola,* from North Africa.

The author examined monthly samples of doves (749 birds) for molt and weight between 1972 and 1985. The two races were generally lumped for analysis, although they were present in different proportions at Richard-Toll during the year. Adult *turtur* were much less numberous than *arenicola,* constituting 0–6% of the total population during autumnal migration (Aug.–Nov.), 6–10% during winter (Dec.–Mar.), 10–29% during vernal migration (Mar.–May), and 0% during summer (May–Aug.).

First-year (FY) birds, which do not appear at Richard-Toll until late Aug. and most of which depart by Dec., usually began to molt in Oct. Primaries were replaced between Sep. and Mar.; secondaries and rectrices concurrently between Oct. and Feb. However, molt of the secondaries was often arrested at S2 or S3. Some FY birds did not begin to molt until they reached Richard-Toll, but others did so earlier in their natal areas and arrived in Senegal with primary molt arrested at P1 or P2 (sometimes as late as P5). Although all FY doves were in full molt between Nov. and Jan., there were large individual differences in dates when molt began and ended.

In adult Turtle Doves, primary molt occurred between Jul. and the following Mar., and was often completed as early as the end of Jan. (11% of the population). Replacement of secondaries (Dec.–Feb.) and rectrices (Dec.–Jan.) was concurrent with primary molt. Secondary molt began with the shedding of P6 or P7. Body molt was protracted and ended between Feb. and Apr. (The author does not say when it began.) Primary molt was not synchronized among individual doves: some started replacing primaries as early as Aug. while still on the breeding grounds and arrived at Richard-Toll with primary molt arrested at P1 or P2 (sometimes at P3 or even P4).

Seasonal variations in body weight were clearly related to the migratory habits of these races of Turtle Doves, but were difficult to interpret at Richard-Toll because of the mixed nature of flocks there, slight differences in arrival and departure dates of *turtur* and *arenicola,* and the presence of birds which stayed over in the area. To illustrate, migrant *turtur* arrived in the second half of Aug., migrant *arenicola* in Sep. Both races were present between Dec. and May, but *arenicola* only dominated through mid-Mar. Thereafter, both races were equally represented. At any rate, there were neither sex- nor age-related differences in body weight. FY doves had minimal weight ($\bar{x}$ = 103 g) when they arrived at Richard-Toll in Aug. Their weight increased progressively to a maximum (161 g) the following Apr. Minimal and mean weight increased nearly 22% in Nov. shortly before most of them left the area. For adults, mean weight was also minimal (111 g) when they arrived in Sep./Oct., and maximal (175 g) when they left in Apr./May. Weight changed little during the summer (127–130 g) or winter (129–138 g) months. In mid-Mar., those adults of each race that were about to migrate weighed nearly twice as much as those that stayed behind for the summer (220 vs. 120 g).—Michael D. Kern.

52. Variation in the head pattern of male White-headed Ducks (*Oxyura leucocephala*). (Variation du dessin céphalique des mâles de l'Eristmature à tête blanche (*Oxyura leucocephala*). J. A. Torres Esquivias and J. M. Ayala Moreno. 1986. Alauda 54:197–206. (French, English abstract.)—At the two extremes, male White-headed Ducks have either completely black or completely white heads. All combinations of black and white exist between these extremes. Individual variation is considerable and probably reflects differences in nutrition and health, as well as age. Few males exhibit identical coloration and some have different patterns on the two sides of the head.

Two regions of the head undergo changes in plumage color: (1) the middorsum from forehead to nape, and (2) the cheeks. Black may decrease in one or both areas simultaneously. Changes in head color occur (contrary to previous published reports) only during pre- and postnuptial molts and are age-related, more white occurring on older than on younger ducks. There is no sexual dimorphism in head plumage of hatchlings. At the first juvenile molt (6 mo posthatch), the head of a male becomes totally black or black with two small cheek spots below each eye. At the first postnuptial molt (15 months posthatch) and subsequent molts, the areas of white enlarge. Subadult males have large white cheek patches; black covers the forehead and crown, surrounds the eyes, and includes a wedge that extends halfway up the

cheek from the nape. Dominant males have only small black crown spots (no eye ring) and a very short cheek bar. Old males have totally white heads.—Michael D. Kern.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 2, 3, 5, 7, 13, 23, 58, 63, 78)

53. An early account of some birds from Mauke, Cook Islands, and the origin of the "Mysterious Starling" *Aplonis mavarnata* Buller. S. L. Olson. 1986. Notornis 33: 197–208.—Studies by Olson and colleagues have repeatedly established that the Recent avifauna of many oceanic islands has been greatly diminished by the arrival of humans. A recently-discovered account by Andrew Bloxam, who visited the Cook Islands briefly in 1825, establishes that Mauke Island was no exception. It was the home of *Aplonis mavarnata,* known only from the type specimen, whose provenance had been puzzling, as well as a dove (*Ptilionopus rarotongensis* cf. *goodwini*). It also establishes that Mauke was already highly cultivated and inhabited by various domestic animals, including pigs, goats, and (?Norway) rats. Paleontological studies on Mauke, Olson believes, will likely provide further evidence of the original richness of island avifaunas and, unfortunately, the impact of these pests and their transporters.—J. R. Jehl, Jr.

54. Kermadec Islands expedition reports: European passerines in the Kermadec Group. D. Merton and C. R. Veitch. 1986. Notornis 33:209–218.—The Kermadec Islands lie 720–980 km northeast of New Zealand. By Jan. 1967, nine European passerines, all common on New Zealand, had become established by their own efforts. Preliminary results indicate that two species, *Turdus merula* and *Sturnus vulgaris,* show minor morphological differences from their New Zealand counterparts.—J. R. Jehl, Jr.

55. The breeding range of the Fieldfare (*Turdus pilaris*) in France during 1984–1985. (Le point sur le nidification de la Grive litorne (*Turdus pilaris*) en 1984–85 in France.) P. Isenmann. 1986. Alauda 54:100–105. (French, English summary.)—Fieldfares invaded France via the Jural M. in the early 1950s. They were confined to Franche-Comté and some parts of Alsace, Lorraine, Bourgogne, and Savoie in 1969, but had reached the valleys of the Moselle and Saône rivers to the west and of the Isère River to the south by 1976. Today they continue to spread west and south in France, but are still limited to the eastern half of the country (not including the Mediterranean coast). They prefer open or semi-open, moist, and cool habitats, often meadows or cultivated plots separated by rows of trees, plantations, or vineyards, near water.

Isenmann suggests that their recent range expansion in France and Europe occurred because Fieldfares exhibit little fidelity to their natal areas or in the case of adults to their nest sites, and are nomadic when not breeding. Their expansion in western Europe has been facilitated by the increasing fragmentation of closed forests. He predicts that Fieldfares will continue to extend their range in France.—Michael D. Kern.

56. The Collared Dove (*Streptopelia decaocto* Frivaldsky) on the Iberian Peninsula. (La Tourterelle turque (*Streptopelia decaocto* Frivaldsky) dans la péninsule Ibérique.) F. Barcena and J. Dominguez. 1986. Alauda 54:107–120. (French, English abstract.)—The expansion of Collared Doves in Europe began about 1930 and continues today. The phenomenon has been adequately described for various parts of Europe except Spain and Portugal. This article provides details about the distribution of Collared Doves in various provinces of the Iberian Peninsula through spring 1985.

Collared Doves were first reported on the Iberian Peninsula in 1960 and began to colonize it about 1966. They quickly spread west along the Cantabrian-Atlantic coast, reaching Asturias and Galacia in the early 1970s. Their progress then slowed and they did not appear in northern Pontevidra province until 1975, Marin and Vigo until 1977, and Lisbon (Portugal) until 1981. Small numbers simultaneously moved eastward to Vizcaya (1974) and Guipuzcoa (1976). Data collected between 1982 and 1985 indicate that the principal Spanish zone of distribution is still the Cantabrian-Atlantic coast, but that breeding populations (10 to more than 100 birds) now exist in central Spain and coastal areas of Cataluña. The total population was about 800 birds at the end of 1986.

Cantabrian populations are confined to the coast or to large river basins within 60 km of it. Major establishments are always in port cities where grain is stored, the largest being at Santander, La Coruna, and Vigo.—Michael D. Kern.

57. The owls of Utah. C. D. Marti. 1986. Utah Birds 2:81–94.—This article nicely summarizes the status and distribution of the 13 owl species known from Utah, one known only from a bird found dead in the state (Northern Hawk-Owl, *Surnia ulula*), and one that Marti feels should be found in the state (Boreal Owl, *Aegilius funereus*).—Jerome A. Jackson.

SYSTEMATICS AND PALEONTOLOGY

(see also 28, 30, 53)

58. The White Heron *Ardea monicae* of Banc d'Arguin. Its morphological affinities. Its history. (Le Héron blanc du Banc d'Arguin *Ardea monicae*. Ses affinités morpholoques. Son histoire.) C. Erard, J. J. Guillou, and N. Mayaud. 1986. Alauda 54:161–169. (French, English summary.)—A relict population (1000–2000 breeding pairs) of White Herons resembling *Ardea cinerea cinerea* lives on Arel and Kiaone Islands, Banc d'Arguin, Mauritania. This extremely pale and highly localized group differs morphologically form the darker *A. c. cinerea* which is widely distributed not only in the Old World, but also in tropical eastern and southern Africa. It is allopatric with pale races of *A. cinerea-jouyi* in Japan, Korea, and China, and *johannae* in Madagascar, and the Aldabra and Comoro islands. Its nesting areas are, however, surrounded by those of *A. c. cinerea,* and the two groups overwinter together in Mauritania.

Nonetheless, the authors provisionally accord the group from Banc d'Arguin the status of a separate species (*A. monicae*) because it does not hybridize with *A. cinerea* and because it is sufficiently different morphologically to be recognized from the latter. They suggest that *A. monicae* colonized extreme west Africa long ago and that its isolation from *A. cinerea,* to which it is closely allied, is a relatively recent event (perhaps as recent as 6000 BP).—Michael D. Kern.

59. Breeding season and subspecific variation in the Red-headed Quelea. P. A. Clancey. 1986. Ostrich 57:207–210.—The Red-headed Quelea (*Quelea erythrops*) is divided into two subspecies: *Q. e. erythrops* north of the equator and *Q. e. viniceps* south of the equator. The two are split according to differences in timing of breeding, as well as morphological differences.—Malcolm F. Hodges, Jr.

60. Systematic keys to the cranes of the world. T. Cheng and G. Archibald. 1986. Acta Zool. Sinica 32:189–193. (Chinese, English abstract.)—This paper provides a simple key to 15 crane species, incorporating not only external morphological characteristics, but also extent of tracheal coiling and characteristics of vocalizations.—Jerome A. Jackson.

EVOLUTION AND GENETICS

(see also 15, 20, 23)

61. The sexual dimorphism of Snares Cape Pigeons (*Daption capense australe*). P. M. Sagar. 1986. Notornis 33:259–263.—In Cape Pigeons and other fulmarine petrels, males are sufficiently larger than females that a combination of morphological characters can be used to sex birds in field conditions. Why this should be the case, however, is not clear to Sagar, who, lacking a better explanation, adopts Croxall's (Notornis 29:171–180, 1982) casually-advanced idea that divergence in size may promote vocal diversity, thereby enhancing sexual recognition. The implausibility of that argument is shown by the fact that many petrel species that court by night, and in which pair formation may take place in a dark tunnel (e.g., storm-petrels) where sexual differences in vocalization would be most useful, show little to no size dimorphism (Croxall 1982, table 5). On the other hand, many species that court by day and nest in the open—and in which size alone can effect sexual recognition (e.g., Giant Petrels, albatrosses)—have relatively great dimorphism. These observations are contrary to the predictions. Jehl and Murray (1986, Current Ornithol.) argued that the time for *ad hoc* explanations of sexual dimorphism has passed. The petrel literature makes their argument.—J. R. Jehl, Jr.

62. Why are there no viviparous birds? D. G. Blackburn and H. E. Evans. 1986. Am. Nat. 128:165–190.—Birds and agnathans are the only classes of vertebrates in which viviparous (live-bearing) species are unknown. Viviparity has evolved independently in numerous taxa, especially within the reptiles. The absence of viviparity in agnathans is hardly surprising, since they lack internal fertilization, but the absence of live-bearing birds is more difficult to explain.

Blackburn and Evans consider five structural features of birds that have been hypothesized to constrain the evolution of live-bearing habits: flight, female heterogamety, immunological incompatibility, lung development, and the cleidoic egg. They conclude that none of these features is incompatible with the viviparous production of small broods. Furthermore, birds do not show even moderate periods of egg retention and intrauterine development, which may be viewed as an intermediate evolutionary stage between egg-laying and viviparity.

Blackburn and Evans develop a theoretical model that describes the conditions under which egg retention and viviparity could increase the fitness of an "average" hypothetical bird species. They conclude that egg retention of up to 8% of the developmental period would not be favored by selection if that mode of reproduction required a decrease in clutch size by even a single egg.

Avian oviparity and minimal egg retention is viewed as the adaptive outcome to situations in which the evolutionary costs of viviparity exceeded the benefits. Benefits of viviparity would likely include greater protection of eggs from predators, but potential costs include the reduction of clutch size, increased female mortality, and reduced male parental care.

A paper is of limited scientific value if it merely invokes speculative evolutionary scenarios to "explain" why some feature has (or has not) evolved. Blackburn and Evans are to be commended for avoiding the pitfalls of "just so stories" and instead casting their argument in terms of falsifiable predictions.—George Kulesza.

63. Phylogeny and historical biogeography of steamer-ducks (Anatidae: *Tachyeres*). B. C. Livezey. 1986. Syst. Zool. 35:458–469.—After years of controversy, cladistics and vicariance biogeography have gained even ornithological acceptance, due in part to the peristence of their practitioners and in part to their clearer and more rigorous methodologies. Together with developments in biochemical systematics, some hope has emerged that we may actually come to some understanding of avian evolution. Now, in the adolescent years of these fields, it is not absolutely clear what has been accomplished. Unambiguous phylogenies remain rare. In an attempt to tease more and more out of what may, after all, be a fundamentally intractable situation, and with few statistical restraints, systematists have empoyed and tolerated increasingly dubious characters and analytic methods. One might be forgiven momentary yearnings for the days of sober anatomy and solid intuition.

Here, Livezey provides a phylogeny for the four species of steamer-ducks and an historical scenario of how they came to be. He believes that flightlessness evolved once and that the single flying species is the sister group of the three that are flightless. He suggests that sequential speciation events occurred while populations were restricted to refugia by glaciers or sea level changes.

For the phylogenetic analysis, he has used 20 morphological characters. Most of these show intraspecific variation so that character states have been assigned on the basis of "modalities." The rationale for this is not discussed nor are references indicated. Several more or less continuous mensural characters are included, some of which the author himself admits are questionable. Again, the rationale of coding is not discussed nor are references provided. Half of the characters are polarized using a member of the initial ingroup, resulting in a kind of ad hoc two-level analysis. It is not clear why the initial outgroup could not be applied to at least some of these characters (e.g., bill dichromatism). No characters are illustrated (cf., Raikow, 1985, British Columbia Prov. Mus. Occ. Pap. No. 25:113–121—"one should not fail to illustrate all of the important structural variations discussed in the text"). The assignment of character states in the character matrix does not match that in the cladogram. Several characters are coded as "present" vs. "obsolete," building a polarity assumption into the character definition. Unpublished genetic data (presumably starch gel electrophoresis of proteins) is used to corroborate that part of the cladogram with which it is said to agree. Its disagreement with another part is dismissed as due to the phenetic nature

of the genetic data. Although no derived characters could be found to define *T. patachonicus,* it is noted that this "species" may actually consist of three or more sibling species. The biogeographic discussion does not appear to generate testable predictions or discussion of alternative explanations.

Livezey may be absolutely correct in his conclusions. His characters are clearly described so that those with access to specimens may assess them. Even so, it would seem that important procedural questions persist within the cladistic and vicariant methodologies.—Peter F. Cannell.

64. DNA marker analysis detects multiple maternity and paternity in single broods of the Lesser Snow Goose. T. W. Quinn, J. S. Quinn, F. Cooke, and B. N. White. 1987. Nature 326:392–394.—Determinations of the genetic relationships of individual animals will provide the means to incisively test hypotheses in behavioral and population biology. In the present study, 17 DNA probes were developed to identify restriction fragment length polymorphisms (RFLPs), which are inherited as co-dominant Mendelian alleles, in order to analyze the paternity and maternity relationships of four broods of Lesser Snow Geese (*Anser caerulescens caerulescens*). Previous observations had suggested that these birds at times engage in extra-pair fertilization (EPF) and in intraspecific brood parasitism (IBP). The DNA markers were adequate to provide direct evidence for the mixed paternity and maternity of goslings within broods of this monogamously bonding species that could be attributed to IBPs or to EPFs. When further probes are developed for other variable restriction enzyme sites for this species, it should be possible to make unambiguous distinctions between IBPs and EPFs. A very new wave of research direction is just beginning to swell.—W. A. Montevecchi.

FOOD AND FEEDING

(see also 13, 26, 32, 37)

65. Squid beaks regurgitated by Gray-headed and Yellow-nosed albatrosses, *Diomedea chrysostoma* and *D. chlororhynchos* at the Prince Edward Islands. M. de L. Brooke and N. Klages. 1986. Ostrich 57:203–206.—Squid beaks were obtained by gathering recently disgorged pellets and collecting loose beaks from decomposed pellets in nesting colonies of Gray-headed and Yellow-nosed albatrosses. Two species of onychoteuthid squid found in cold Antarctic waters predominated; species composition and size of squid were similar in the pellets of the two species of albatross. Pellet composition was also similar to that found in studies of other albatrosses breeding in the Prince Edward Islands.—Malcolm F. Hodges, Jr.

66. Diet selection and optimization by Northwestern Crows feeding on Japanese littleneck clams. H. Richardson and N. A. M. Verbeek. 1986. Ecology 67:1219–1226.—Northwestern Crows (*Corvus caurinus*) frequently dug of clams (*Venerupis japonica*) on Mitlenatch Island, British Columbia, and carried them to rocky areas where they were dropped and opened. Richardson and Verbeek attempted to show that the selective feeding by crows on clams of a particular size range corresponded to the predictions of a model of maximal foraging efficiency. They estimated the size distribution of clams available to the crows, the size distribution of clams actually eaten, the search and handling times of clam-feeding crows, and the net prey profitability in terms of the time and energy expended by the crows.

Richardson and Verbeek calculated that the net energy gain per handling time increased for larger-sized clams. They also determined the mean rate of net energy gain per capture for hypothetical diets defined by the smallest size-limit of clams included in the diet. The optimal diet was obtained by feeding on clams greater than 28.5 mm in length. This agreed well with the observed preference of crows toward larger-sized clams. The crows did not show the precise all-or-none preference for a given size class of clams as predicted by some foraging models. This was attributed to errors in food choice, and to variation in the parameters used to determine optimal diet choice.

Richardson and Verbeek present a strong case for the hypothesis that the crows are selectively taking prey close to the maximum rate of net energy intake.—George Kulesza.

67. Interactions between hummingbirds and butterflies at a *Hamelia patens* bush. C. D. Thomas, P. M. Lackie, M. J. Brisco, and D. N. Hepper. 1986. Biotropica 18:161–165.—The response of a semiterritorial hummingbird, *Eupherusa eximia,* to competing butterflies depended upon the weather. In poor weather insect activity was low and the hummingbird guarded a *Hamelia patens* bush against the butterflies. In good weather when insect activity was high, the hummingbird abandonded the bush. The difference in defense appears to depend on the economics of defending a bush against a few butterflies in poor weather vs. defending it against many individuals in good weather.—Robert C. Beason.

68. Feeding rates and prey selection of Oystercatchers in the Pearl Islands of Panama. S. C. Levings, S. D. Garrity, and L. R. Ashkenas. 1986. Biotropica 18:62–71.—American Oystercatchers (*Haematopus palliatus*) of the Pearl Archipelago, on the Pacific side of Panama, showed feeding preferences on intertidal molluscs. At middle to high shore levels, oystercatchers fed primarily on two large-bodied species of herbivorous molluscs. Most other species were underrepresented in the diet, based on their availability. Regardless of the prey species taken, oystercatchers seem to prefer items with a shell length of 15–20 mm. This was the larger size-classes of some of the prey species. Such preferential selection by a predator could influence the species distribution and abundance of their intertidal prey.—Robert C. Beason.

69. Recent information about the Gull-billed Tern *Gelochelidon nilotica* and its diet in Morocco. (Nouvelles données sur *Gelochelidon nilotica* au Maroc et sur son régime alimentaire.) J. M. Cabo and J. M. Sanchez. 1986. Alauda 54:207–212. (French, English abstract.)—In May–Aug. 1983, Gull-billed Terns were present at two saline lakes in cultivated fields near Afso, southwest of Nador, Morocco. They numbered 10–44 adults and two to seven chicks.

Regurgitated pellets indicated that the terns' diet consisted of *Rana ridibunda* (49% of the prey), Coleoptera (41%), Orthoptera (10%), Dermaptera (0.5%), and *Grillotalpa* sp. (0.2%).

The trophic diversity and foraging niche of this Moroccan group were much smaller than those of conspecific groups in Denmark and France, but higher than those of a population in Spain. All classes of vertebrates occurred in the diet of northern (Danish and French) populations of this tern, but the only vertebrates in the diet of southern (Spanish and Moroccan) populations were amphibians. The diet of Gull-billed Terns is quite variable from region to region. In Morocco, it consists mostly of amphibians and beetles; in Spain, Orthopterans; in France, Orthoptera and beetles; and in Denmark, beetles and mammals. From these data, the authors conclude that Gull-billed Terns exploit the most abundant dietary resources available, but prefer Coleoptera.—Michael D. Kern.

70. Timing of breeding of Tengmalm's Owl *Aegolius funereus* in relation to vole dynamics in western Finland. E. Korpimaki. 1987. Ibis 129:58–68.—Tengmalm's Owl is one of the earliest breeders among Northern European birds. In Finland the owl breeds in early spring at a time when their principal food supply, voles, is low. In fact, the vole populations peak in autumn long after the owl nestling stage. Furthermore, highest clutch sizes and reproductive output occur in the earliest breeding pairs, and not in the latest pairs. The findings of this study (based on 13 yr of data) are consistent with the "food limitation hypothesis," which postulates that laying begins as soon as the female can accumulate the energy reserves for egg formation. The author argues that early breeding is adaptive, because young from early clutches probably have a higher chance of surviving during their first winter. Unfortunately, the author provides no data to support this idea and admits that fledgling survival data are required, but unavailable. The more likely explanation, for which he provides evidence, is that early breeding permits a pair to complete a second clutch during the breeding season. Also, early breeders may have more time to accumulate fat reserves and to molt before the arrival of winter.—J. M. Wunderle, Jr.

71. The diet of the Short-tailed Shearwater (*Puffinus tenuirostris*) during its breeding season. T. L. Montague, J. M. Cullen, and K. Fitzherbert. 1986. Emu 86:207–213.—The diet of Short-tailed Shearwaters was studied for two breeding seasons along the southeast coast of Australia. From 307 samples of stomach contents examined, it was

determined that fish comprised 46% of the total diet, crustaceans 45%, and cephalopods 9%. At least seven species of euphausiids were eaten, representing the most common group of crustaceans encountered. At least six fish species (mostly anchovies and leatherjackets). Two cephalopod species were eaten. In both years, shearwaters consumed almost entirely crustaceans before egg laying. After hatching, the diet included large amounts of fish and fewer crustaceans. This shift in diet is likely a result of reduced numbers of *Nyctiphanes australis* (the principle crustacean eaten) in the surface waters and increased numbers of post-larval fish. The mean weight of food brought ashore by birds was substantially larger after hatching in Jan. However, the mean weight of chick meals did not change significantly after Jan., during different stages of nestling development. The distribution of *N. australis,* a main Short-tailed Shearwater food item, suggests that birds are feeding largely in Bass Strait or along the Australian continental shelf.—D. J. Ingold.

SONGS AND VOCALIZATIONS

(see also 31, 38, 60)

72. Components of variation in nuptial calls of the Least Sandpiper (*Calidris minutilla*; Aves, Scolopacidae). E. H. Miller. 1986. Syst. Zool. 35:400–413.—The conspicuous aerial display of most *Calidris* sandpipers includes a loud simple call uttered in rhythmical bursts. Miller recorded 2250 of these calls from 80 male Least Sandpipers at 5 breeding locales across Canada. Employing elegant statistics, he describes in detail their nature, organization, and variability. Calls of individual males vary little. There are significant differences between males, particularly in temporal characteristics. Despite the extensive breeding range, there is no geographic correlation, except for frequency characters related to body size (here, culmen length). Since bird vocalizations that have been studied geographically have varied, this result surprises the author. Possible explanations are discussed without firm conclusions at this time except that vocal learning has probably been of minor significance. Without comparison to patterns of morphological variation, not mentioned here, it might be difficult to separate factors specifically influencing calls (e.g., species recognition) from broader demographic factors.—Peter F. Cannell.

73. Frequency discrimination in the Pigeon (*Columba livia*). R. Bräucker. 1986. Naturwissenschaften 73:563–564.—Pigeons showed better frequency resolution for modulated signals than for pure tones. Frequency discrimination is poorer at about 1 kHz than at higher or lower frequencies. Tones and modulated signals can be discriminated if they are 20–50 Hz different for the frequencies of 500 Hz and 2 kHz.—Robert C. Beason.

74. Bilateral syringeal coupling during phonation of a songbird. St. Nowicki and R. R. Capranica. 1986. J. Neurosci. 6:3593–3610.—Previous work on the avian syrinx indicates that the two sides can act independently. The results of this study show that they can also be coupled at times. The "chick-a-dee" call of the Black-capped Chickadee (*Parus atricapillus*) results from a cooperative interaction between the halves of its syrinx. Unilateral and bilateral denervation of the syringeal nerve shows that the frequency components are heterodyne frequencies which result from the cross-modulation between the sides of the syrinx. Unilaterally denervated birds were able to compensate within 10 d, suggesting that coupling may result from a physical interaction within the syrinx.—Robert C. Beason.

75. Interspecific comparisons of the size of neural song control regions and song complexity in duetting birds: evolutionary implications. E. A. Brenowitz and A. P. Arnold. 1986. J. Neurosci. 6:2875–2879.—This paper adds two species of tropical duetting wrens (Rufous-and-white Wren, *Thryothorus rufalbus,* and Bay Wren, *T. nigricapillus*) to the list of species whose song repertoire size is correlated to the volume of brain song control regions (HVc, RA, area X, and the hypoglossal motor nucleus). Males of the two species have similar repertoire sizes and show no differences in the volumes of the song control regions of the brain. Female Bay Wrens have over twice the song-repertoire size of Rufous-and-white Wrens, and significantly larger song control regions. It is significant that these differences occur between species rather than between individuals of the same species.—Robert C. Beason.

76. The sensitive period for auditory localization in Barn Owls is limited by age, not by experience. E. I. Knudsen and P. F. Knudsen. 1986. J. Neurosci. 6:1918–1924.—The ability of Common Barn-owls (*Tyto alba*) to localize sound depends on development during a sensitive period. This development ends when the bird's head reaches adult size at 8 wks. The research presented in this paper indicates that the end of the developmental period is regulated by age of the bird, not by its sensory experience. Birds which were subjected to monoaural occlusion early in life were able to compensate and localize sound normally. If the earplug was then switched to the opposite ear at 75–80 d of age, the birds were unable to localize sound. After the earplug was removed from one bird at 127 d, it learned to compensate within 30 d and could localize sound normally. The earplug was kept in a second bird until 250 d. This bird responded in a manner expected following removal of its original earplug and never learned to compensate. Birds that were subjected to alternating earplugs for 70–85 d followed by a chronic earplug for 100–125 d were able to localize sound normally following removal of their earplugs. These results support the model that development of sound localization occurs through neural connectivity within a sensitive period. During this period adjustments of the connectivity are made based on the animal's sensory experience.—Robert C. Beason.

BOOKS AND MONOGRAPHS

77. A dictionary of birds. 1985. B. Campbell and E. Lack, eds. Buteo Books, P.O. Box 481, Vermillion, South Dakota, 57069 USA. xxx + 670 p. $75.—In 1896 Professor Alfred Newton F.R.S., a founder of the British Ornithologists' Union, published *A Dictionary of Birds*. It was a compendium of ornithological knowledge and a standard reference work for many decades. To celebrate the centenary of the BOU, Sir Landsborough Thomson revised the Dictionary and in 1964 published *A New Dictionary of Birds*. Ornithological knowledge has exploded in the last twenty years and the dictionary edited by Dr. Bruce Campbell and Elizabeth Lack is a much needed up-date of the new dictionary. In the preface to the 1964 dictionary, R. E. Moreau, then president of the British Ornithologists' Union, described the new dictionary as a "comprehensive book of reference on birds on a world-wide basis," a description that applies extremely well to the 1985 edition.

The volume includes articles by 280 contributors. These range from long articles on general topics, e.g., comfort behavior, to short articles on specific topics, e.g., hot searching. Different kinds of birds are treated and illustrated by families. K. H. Voous has edited the volume for taxonomic consistency and has followed his List of Recent Holarctic Bird Species (Ibis 115:612–638, 1973; Ibis 119:223–250, 376–406, 1977) augumented where necessary by Morony, Bock, and Farrand's Reference List of the Birds of the World (Am. Mus. Natl. Hist., New York, 1975) with additions by Bock and Farrand (Am. Mus. Novit. 2073:1–29, 1980). Where possible the taxonomy concurs with the new AOU checklist, but the dictionary was in press when the checklist was published and revisions were not always possible.

Articles are arranged alphabetically and include cross-references so that the dictionary serves as its own index. Ornithological terminology is included in the dictionary and no attempt is made to provide a glossary of words that can be found in a standard dictionary. Scientific names are not used in the headings unless no anglicized name is available. Both British and American terminology are included and cross-referenced, e.g., blind—hide, banding—ringing. Nonetheless, the dictionary retains a distinctly British flavor, e.g., an article on heraldry and the use of British species names as first preference among alternates. The text is liberally illustrated with drawings and superb photographs that show some unusual behavior, e.g., heat dissipation in Ostriches (*Struthio camelus*), water carrying by the White-headed Plover (*Vanellus albiceps*), and regurgitation of indigestible material by a Marsh Sandpiper (*Tringa stagnatilis*).

The dictionary does not include biographical material on important ornithologists nor any mention of ornithological journals or societies. Perhaps these would add too much to the bulk of the dictionary and should receive separate treatment. I noticed a number of errors in spelling and in initials following articles. Some tables were not fully explained and consequently were difficult to understand. The editors are aware that such problems

will arise in any work of this magnitude and ask readers to let them know so that corrections can be made in future printings.

In summation I cannot do better than quote from the preface by Dr. Frances James, President of the American Ornithologists' Union: "We are particularly indebted to the editors and to all the other people involved in its production for the role the dictionary will play in fostering communication among nations. For students it will serve as an entrance to the present status of the field. For scientists it will serve as a research tool and a bridge between disciplines."—Edward H. Burtt, Jr.

78. Distributional checklist of North American birds. Volume 1: United States and Canada. 1986. D. DeSante and P. Pyle. Artemisia Press, Lee Vining, California, 93541 USA. xii + 442 p. $30.—This unusual book lists all avian species that occur in North America. The distributional status is listed for each species for the continent, then for Canada only, the contiguous United States only, then for each Canadian province and each U.S. state. A 16-page introduction details the threefold purpose of the list: (1) to provide "a compendium of state and province bird lists developed according to identical criteria applied uniformly to each state of the United States and each province of Canada . . . "; (2) "to provide a convenient means for birdwatchers to keep all of their North American state and province life lists in a single volume and in such a manner that they can be updated easily and indefinitely . . . "; and (3) "to provide complete, accurate, and up-to-date status and abundance classifications, . . . developed according to identical and uniformly applied criteria." The introduction also explains the format and gives detailed information on the meaning of the status codes. The rest of the book is devoted to the checklist, which uses the codes to provide the status of every species in every geographical region covered by the list. For each species, for each state, province, or larger area, there is space for the owner of the book to briefly note his or her own estimate of status for that region. The book has great potential for increasing our knowledge of avian zoogeography through the records of knowledgeable birdwatchers. It may secondarily increase interest in zoogeography among those who are now encouraged to compare what they see in different areas at different times.—Edward H. Burtt, Jr.

79. Bachman's Warbler: a species in peril. 1986. P. B. Hamel. Smithsonian Institution Press, Washington, D.C. xii + 110 p.—In this brief work Hamel summarizes what is known about the biology of Bachman's Warbler (*Vermivora bachmanii*). The text is organized into sections based on the categories used in the Zoological Record. In addition to summarizing and synthesizing previous reports, Hamel includes an exhaustive bibliography that is cross-referenced by subject.

The morphology of Bachman's Warbler suggests a close relationship to Blue-winged (*Vermivora pinus*) and Golden-winged (*V. chrysoptera*) warblers. The close relationship is further suggested by playback experiments (unfortunately these are unquantified) in which Blue-winged and Golden-winged warblers responded to Bachman's Warbler songs. Despite its close relationship, the consistent color patterns in all 300 specimens argue against Bachman's Warbler being a hybrid. Hamel concludes that Bachman's Warbler occupied secondary successional openings in swamp forest when on its breeding grounds. Here it may have competed with Orange-crowned Warblers (*V. celata*), however, the cause of its decline is unclear. Hamel suggests that the decline began with habitat constriction following the end of the Pleistocene glaciation. Thus the population was relatively small when settlement resulted in further habitat loss. In the 1930s repeated severe hurricanes in the warbler's winter quarters reduced the remaining small population below its ability to compete with its congeners.

The report is clearly written, but lacks quantitative data that could form the basis of sound management decisions for any Bachman's Warblers that may be left. The bibliography is exhaustive; 501 references are included and those that are unpublished have been placed in the R. M. Cooper Library at Clemson University where copies may be obtained from the reference librarian. Hamel has done a fine job of gathering and interpreting the scattered, vague, and often contradictory information on Bachman's Warbler.

The Smithsonian has not produced a publication worthy of the content. The text is camera-ready typescript with a ragged right margin, not at all pleasant to read. The tables

are readable, but not well delineated from the text. The figures are roughly drawn and the photographs fuzzy, probably because of the somewhat rough paper. *Bachman's Warbler: a species in peril* is a valuable reference that deserved better publication.—Edward H. Burtt, Jr.

80. A world of watchers. 1986. J. Kastner. Alfred A. Knopf, New York. x + 241 p. $25.—Kastner weaves fact and anecdote into a fascinating account of the individuals who described America's birds, who persuaded us to shoot less and watch more, and who shared the excitement, enjoyment, and fellowship of bird-watching. As an historical account of individuals, the book tends to follow a time line, but deviates from strict chronological order to focus whole chapters on the life and contributions of selected individuals (e.g., Elliott Coues, Frank Chapman, Margaret Nice), groups (e.g., Bronx County Bird Club), or events (e.g., the Great Sparrow War). Within this format Kastner makes no attempt at exhaustive detail, rather he emphasizes the personalities of individuals and their contributions to the development of North American ornithology.

The prose flows easily and the blend of adventure and gossip leaves the reader always eager for the next page. The little known bits are often intriguing. For example, in 1923 Nathan J. Leopold, a college student and promising ornithologist, a frequent contributor to the Wilson Bulletin and Bird Lore, pleaded guilty to the kidnapping and murder of fourteen-year-old Robert Franks whose body was stuffed in a culvert where Leopold had reported a flock of sandpipers. A brilliant defense by Clarence Darrow persuaded the judge to spare Leopold's life. Thirty-three years later, Leopold was paroled and went to Puerto Rico as administrator of a leper hospital. There he wrote a *Checklist of the Birds of Puerto Rico and the Virgin Islands* before his death in 1971.

Bird watchers played and continue to play an important role in establishing and supporting conservation movements. Watchers led the fight to remove birds from hats. The battle was waged in society's drawing rooms, the nations newspapers, and the halls of Congress. Warren G. Harding sent the editor of Bird Lore a telegram declaring himself in favor of protecting birds. The battles were not only verbal. Few of us appreciate the dangers faced by early wardens at Audubon sanctuaries, but a number of wardens were killed or disappeared while protecting egrets and their plumes form poachers.

Other individuals filled less dangerous, but equally important roles, educating children and adults to the wonders of birds. Althea Sherman of National, Iowa was a colorful and outspoken contributor to the Wilson Bulletin and Iowa newspapers. Elizabeth Dickens, born in 1878, kept a daily record of birds on her Block Island farm from 1908 until her death in 1965. Her knowledge was shared with the island's children and her reports filed with the Fish and Wildlife Service, which noted "that ornithology owed to Elizabeth Dickens 'practically all the knowledge we have' of the significant place the island holds as a stop-off in the Atlantic flyway." Fittingly her farm is now a sanctuary owned by the Nature Conservancy and Rhode Island Audubon Society.

An entire chapter is devoted to the art and life of Louis Agassiz Fuertes. Included in this chapter are several of Fuertes' paintings. These are excellently reproduced. Elsewhere chapters include lead-off sketches by Fuertes.

Over and over again the book describes persons who were awed by birds, who found peace in learning about the lives and habits of birds, often those visiting a particular area that the watcher came to know well. The book closes with an account of the listers, bird watchers who compete to see and identify the greatest possible number of species. Money is liberally spent on airplane trips to glimpse rare birds and the birds themselves are endangered by listers who destroy the habitat in an effort to flush the bird so that it can be added to the list. One has to wonder if the quiet awe in which birds were held by Gilbert White, Henry David Thoreau, and Elizabeth Dickens is not being lost amid the competition of today's watchers. The book closes on that thought-provoking question.—Edward H. Burtt, Jr.