RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

BANDING AND LONGEVITY

(see also 21, 44)

1. Backpack radio transmitter attachment success in Screech Owls (*Otus asio*). D. G. Smith and R. Gilbert. 1981. N. Am. Bird Bander 6:142–143.—Twelve owls (age and sex not specified) were fitted with radio transmitters that averaged 3–5% of body weight. Three attachment harnesses were tested (see review **21**). Harnesses of 2 materials, 2 mm braided nylon and teflon coated antenna wire, were tested. The criss-cross design harness with the straps crossed dorsally and ventrally and made of teflon coated antenna wire was found to be the most satisfactory. The criss-cross harness allowed the least shifting of the radio. A female fitted with this package wore it from 7 January to 23 July 1980. During that time she mated, laid eggs, and hatched them. Visual observations and monitoring of the birds' weights suggested that the backpack did "not unduly interfere with their behavior."—Richard J. Clark.

2. Recoveries of Ferruginous Hawks banded in Colorado. A. R. Harmata. 1981. N. Am. Bird Bander 6:144–147.—This study reports 9 recoveries that resulted from banding of 115 nestling *Buteo regalis*. The birds were banded between June 1973 and July 1976 in Weld and Logan counties, Colorado. The mean distance for the 6 direct recoveries was 1023 km (range 5 to 2197 km) and for the 3 indirect recoveries was 1108 km. Time elapsed for the 3 indirect recoveries was about 22, 55, and 57 months. All direct recoveries were east of the continental divide.—Richard J. Clark.

3. Age determination in birds by the color of the iris, the Dunnock *Prunella modularis* taken as an example. (Kotsenke metodiki opredeleniia vozrasta ptits po tsvetu raduzhiny glaza na primere lesnoi zavirushki *Prunella modularis*.) A. P. Shapoval. 1981. *Zool. zh.* 60:1866–1868. (In Russian, English summary.)—To the list of those passerines whose age is indicated by iris color is now added the Dunnock. By comparing eye color of birds trapped along the Baltic Sea in fall to degree of skull pneumatization, the author found that birds classified as juveniles had brown irides, and those classified as adults had brick-red irides. The investigators feel that iris color is at least as accurate a method of age determination as skull pneumatization, and much simpler.—Elizabeth C. Anderson.

MIGRATION, ORIENTATION, AND HOMING

4. Sunset and the orientation of a nocturnal bird migrant: A mirror experiment. F. Moore. 1982. Behav. Ecol. Sociobiol. 10:153–155.—Previous experiments by Moore demonstrated that a view of the setting sun greatly improved the migratory orientation of caged Savannah Sparrows (*Passerculus sandwichensis*). This result suggested the hypothesis that the setting sun was used as an orientation cue during migration of this species. In the critical follow-up experiment he used mirrors to displace the perceived position of the setting sun to see if caged Savannah Sparrows would show a corresponding displacement in their orientation. Birds exposed to the mirror-displaced sunset showed the predicted shift in orientation compared to controls. Savannah Sparrows can use the setting sun in selecting a migratory direction. This paper contributes to an increasing body of evidence emphasizing the importance of the setting sun for the orientation of night-migrating birds.—Verner P. Bingman.

5. Pied Flycatchers (*Ficedula hypoleuca*) orient with the help of magnetic fields in the absence of vision. (Trauerschnäpper (*Ficedula hypoleuca* PALLAS) orientieren sich nichtvisuell mit Hilfe des Magnetfeldes) W. Beck and W. Wiltschko. 1981. Vogelwarte 31: 168–174. (German, English summary.)—Using the standard experimental paradigm of testing birds in the earth's normal magnetic field and then in a shifted earth-strength field, in this case 180°, the authors were able to show that Pied Flycatchers, nocturnal European-transSaharan migrants, were able to orient by the earth's magnetic field. The important result from this paper, however, was not demonstrating use of the earth's

magnetism for orientation, but that Pied Flycatchers possess what is known as an inclination compass. Reversing the vertical component of the ambient magnetic field altered the birds' directional response. Pied Flycatchers, like European Robins (*Erithacus rubecula*), do not use magnetic field polarity, which would not be changed by inverting the vertical component, to define north, but apparently use the magnetic dip angle and its relation to some vertical reference. An additional control experiment would have helped (e.g., reversing both the vertical and horizontal components) as would an explanation for why the observed shift was considerably less, about 40°, than the expected 180°. However, these criticisms do not detract significantly from the importance of the results.

The ability to detect and respond to the earth's magnetic field has now been satisfactorily demonstrated in 7 species of Passerines as well as homing pigeons. The behavioral results can no longer be questioned and the time has come for researchers to focus on the importance of the earth's magnetism in relation to other known directional stimuli used by migrant birds.—Verner P. Bingman.

POPULATION DYNAMICS

(see also 8, 9)

6. Population dynamics and age structure of Starlings (*Sturnus vulgaris*) in New Zealand. J. E. C. Flux and M. M. Flux. 1981. N.Z. J. Ecol. 4:65–72.—Part of an interesting and exciting study of the evolutionary aspects of breeding biology in the species, this article reports the use of 500 nest boxes, the laying of 2050 clutches, and the color-marking of 750 breeding females, 60 males (they're harder to catch), and 4006 chicks. The article is a model of brevity, packing into a few well-chosen figures and pithy comments some of the results of their 10 yr study. Depending upon the year, between 3% and 60% of the females attempted a second clutch after a successful first brood. Average clutch size increased with age of the female until an age of 3 yr, then steadily declined. One of the most interesting aspects of the study is the 33% annual mortality rate of birds banded as nestlings in New Zealand, as opposed to 50–70% for populations elsewhere in the world. The authors ascribe this to the relatively mild winters. New Zealand, largely temperate in climate, generally lacks the really severe spells of cold weather characteristic of inland continental areas. This study and the composition of the article could well serve as a model of how to go about science.—C. J. Ralph.

NESTING AND REPRODUCTION

(see also 1, 16, 17, 23, 24, 49)

7. Experimental studies on nesting of the Bullfinch *Pyrrhula pyrrhula* (Linneaus, 1758) in aviaries. Z. Bochenski and T. Oles. 1981. Acta Zool. Cracov. 25:3–12.—Observations on nest building and brooding of Bullfinches were carried out in outdoor aviaries. Males and females were trapped in forest at Ojcow, Poland. Nest building was carried out exclusively by females which used twigs, animal hair, rootlets, and other materials. All brooding was exclusively done by the female. The presence of the male in close proximity to the female during nest building and brooding seemed necessary to complete the cycle.—R. W. Colburn.

8. Some effects of weather conditions on the breeding of the Spotted Flycatcher *Muscicapa striata* in Britain. R. J. O'Connor and R. A. Morgan. 1982. Bird Study 29:41–48.—The Spotted Flycatcher is one of the last of Britain's summer residents to arrive on the southern coast in spring. Analysis of 4681 nest records accumulated from 1961–1980 (134–352 cards/year) was conducted for the following variables: laying dates for first and last eggs, hatching dates for the first and last young, date of fledging for first and last young, clutch size, number of young hatched, and maximum number of fledglings possible. Mortality rates were calculated using a modified Mayfield method (Wilson Bull. 87: 456–466, 1975) for estimating nest success. The 3 weather variables used in the analysis were temperature, sunshine, and rainfall.

Laying date was correlated with temperature, explaining about 25% of the variation

in laying date, but was not correlated with rainfall or sunshine. Clutches laid in sunny Mays were larger than those laid in cloudy Mays. No other weather variables were significantly correlated with clutch size. Nesting success was significantly higher in warm sunny Junes than in cool cloudy Junes, although neither variable alone was significantly correlated with nesting success.

The correlation of laying date with temperature has been noted in previous studies of birds. O'Connor and Morgan suggest that either food availability is greater in warm Mays or that cold Mays may increase foraging costs, thereby causing a delay in laying. However, prey availability and temperature are 2 of many factors that may influence foraging cost. If food availability is the primary limiting factor influencing laying date and clutch size, then I find it intriguing that 2 different weather variables, temperature and sunshine, having like effects on prey availability, should be correlated independently with 2 different nesting parameters, laying date and clutch size, respectively. O'Connor and Morgan conclude that the data support Perrins' (Ibis 112:242–255, 1970) model for the timing of breeding by birds.—Stephen R. Patton.

9. The breeding biology of the Nightingale *Luscinia* [sic] *megarhynchos* in Britain. R. Morgan. 1982. Bird Study 29:67–72.—The British Trust for Ornithology's nest record card distribution for this species is not representative of this species' distribution in Britain and Ireland. A total of 294 cards have been reported, primarily from Surrey, Essex, Hampshire, and Berkshire. Most nesting is reported in lowland (46.2%) at 0–30 m above sea level. Nesting occurs in a range of habitats, all of which provide suitable ground cover for nest concealment. Most nests (88.6%) are placed within 30 cm of the ground. Nightingales (*Erithacus megarhynchos*) begin breeding shortly after their arrival from winter grounds; the peak of nest initiation occurs during 11–16 May. Nightingale mean clutch size is 4.75 (±SE .05) which is smaller than their cavity-nesting relatives. Nest success is estimated by the Mayfield method (Wilson Bull. 87:456–466, 1975) to be .69. Morgan suggests that the single-brooded Nightingale is as productive as some closely related double-brooded species (e.g., *Saxicola torquata* and *S. rubetra*) by virtue of its higher nest success.—Stephen R. Patton.

10. Breeding of the Peregrine Falcon in Victoria, Australia. S. G. Pruett-Jones, C. M. White, and W. R. Devine. 1981. Emu 80:253–269.—This article is contained in a 4-article supplement to the Emu that chronicles the Peregrine in Australia's smallest mainland state. Aside from being a model of research on the status and distribution of a species, it provides an interesting picture of a population of Peregrines that differs importantly from other populations in habitat requirements. The primary difference was in nest site selection. Although the commonest sites (65%) were on cliffs, the remainder were in hollows of trees or in stick nests of other birds. In other parts of the world, Peregrines use trees for nests much less commonly. This led the authors to say that "the use of tree sites has allowed Peregrines in Victoria and throughout Australia to colonize large inland areas lacking cliffs but apparently otherwise suitable." There is perhaps a lesson here for increasing the adaptability of North American Peregrines as the young from captive propagation work are introduced into the wild.—C. J. Ralph.

11. Adaptive significance of the use of margosa leaves in nests of House Sparrows *Passer domesticus*. S. Sengupta. 1981. Emu 81:114–115.—In the Calcutta region of India, the author found leaves of the plant *Azadirachta indica* in many House Sparrow nests. In one suburb with these trees, he inspected 120 nests in 2 km^2, finding margosa leaves in all. Many other trees were more common than margosa. In areas of Calcutta with few trees, he found relatively few leaves. The note is written like a detective story in the last few paragraphs of which we find that "from time immemorial the people of India . . . have protected their clothes from insects and their larvae by putting dry margosa leaves in them." The author cites evidence that application of an active component in the leaves prevents insect egg laying. The author speculates that the use of the leaves helps combat nest parasites. (He does suggest that the trait was passed along by genes, rather than as a learned behavior, as most would suggest.) If the author's data are confirmed, it will be an interesting piece of behavior indeed.—C. J. Ralph.

BEHAVIOR

(see also 7, 11, 37, 46, 50)

12. The cowbird: reflections on development from an unlikely source. M. J. West, A. P. King, and D. H. Eastzer. 1981. Am. Sci. 69:56–67.—Cowbirds (*Molothrus ater*), as brood parasites, have been assumed to possess a closed system of species recognition which is primarily genetically controlled and in which environmental influences play a minimal role. Communicative behavior such as male song may develop normally without species-typical stimulation, a necessity in a system wherein young may be raised by over 100 potential different species and 200 different subspecies. The authors conducted experiments rearing male and female cowbirds in isolation and demonstrated that naive female copulatory response to male song provided an unambiguous quantitative measure of the relative effectiveness (potency) of different males' songs. The authors found that songs of males reared in isolation from male conspecifics were twice as effective in releasing the copulatory response as were songs of normally-reared males. The authors investigated this seemingly anomalous finding, examining the acoustic, developmental, and social mechanisms which contribute to the effectiveness of the isolate song. Analysis of the acoustic structure of normal and isolate songs demonstrated inconclusively that isolate song had greater amplitude in the "interphrase unit" as well as several other structural differences from normal song. Songs with these characteristics were nearly twice as effective in releasing the female copulatory response as songs without them. The author maintained adult and juvenile cowbirds under 4 different experimental conditions of social, auditory, and visual deprivation to identify the effects of isolation. The bioassay of female copulatory response to playbacks of male song demonstrated highly effective songs under all conditions of isolation. Normal adult males placed in isolation significantly increased the potency of their songs, whereas those reared in isolation decreased in effectiveness when part of a group. The author suggested that males living in groups may learn to alter song potency with degree of interaction with adult males, to avoid attack. Additional data suggest that environmentally induced intraspecific identification may be provided by a "mid-song element" distinguishable in geographically separable populations. To examine the relationship between song potency and mating success, an experiment demonstrated a correlation between male dominance and song potency. Isolate males sing potent songs because they are dominant in that social context. The authors suggest that male cowbirds undergo intense competition and that song may be an important index of male fitness. Their data indicate that normal development of cowbird song derives from both genetics and experience through a series of maturational changes.—Lise A. Hanners.

13. Hoarding of carrion by Carrion Crow. R. Hewson. 1981. Br. Birds 74:509–512.—Carrion Crows (*Corvus corone*) hoard food while feeding from mammal carcasses. This experimental study demonstrated that most food caches are within 30 m of the carrion bait and that most hoarding occurred during longer feeding bouts. Recoveries of 9 caches verified that crows approach caches directly even when the cache sites were obscured by snow. There were no obvious differences between sexes in the methods or frequency of hoarding. These observations are interesting, but fail to adequately address the relevant questions or issues about food hoarding in general or among Corvidae in particular.—Patricia Adair Gowaty.

14. Warblers in mixed passerine flocks in summer. S. R. D. da Prato. 1981. Br. Birds 74:513–515.—Recent interest in winter flocking may have obscured the occurrence of warblers in mixed-species flocks in summer. This note reports a minimum estimate of mixed-species foraging flocks, comprising 20 species including 7 warblers and 4 tits, along hedgerows in southeast Scotland during July and August. Several explanations for summer flocking are briefly discussed. The summer flocking phenomenon would be an interesting case for further study.—Patricia Adair Gowaty.

15. Behavior of Black-winged Stilts. P. D. Goriup. 1982. Br. Birds 75:12–24.—This descriptive study of locomotor, feeding, maintenance, and social behavior of the Black-winged Stilt (*Himantopus himantopus*) in Portugal is elegantly and simply illustrated. The paper

comprises a partial ethogram based on the behavior of 3 pairs of breeding stilts. Despite its length the paper is clearly an anecdotal report with many of the shortcomings of typical partial ethograms, including assumptions about so-called aggressive behavior and the sex of individuals. Nevertheless, it should be a starting place for other serious students of the behavior of the Recurvirostridae.—Patricia Adair Gowaty.

16. Breeding habitat selection and home range of radio-marked Black Ducks (*Anas rubripes*) in Maine. J. K. Ringelman, J. R. Longcore, and R. B. Owen, Jr. 1982. Can. J. Zool. 60:241–248.—Thousands of hours of radio telemetry observations on 13 female and 7 male Black Ducks provide a good sense of habitat use by this species in the wetlands of Maine. Black Ducks preferred emergent wetlands to organic bottom ponds and deciduous forest or shrub areas to evergreen forest or shrub areas. Newly created beaver ponds are ideal breeding sites for the species. The preferences seem to be due to the presence of more food and cover in deciduous than evergreen sites. Home range size did not vary with stage of breeding, but did show individual variation in overall size from ca. 6 to 570 ha. The smallest home ranges were shown by wetland edge nesting birds, especially those that nested at large (>10 ha) ponds and never left the home pond to feed. The largest home ranges were for upland nesting birds; these birds not only nested >1.5 km from any pond but also might bypass as many as 10 nearby wetlands enroute to a feeding site. Males tended to have about twice as large home ranges as their mates, and both sexes had home ranges tending to be 2 to 3 times as long as they were wide. Limited evidence was presented for home range fidelity from one year to the next. Comparative figures on mean home range sizes in other dabbling ducks were presented briefly, but I was so impressed with the individual variability present in the Black Duck that I feel interspecific comparisons are premature.—A. John Gatz, Jr.

17. Sociobiological implications of unusual sexual behaviors of gulls: the genotype/behavioral phenotype problem. J. L. Hand. 1981. Ethol. Sociobiol. 2:135–146.—A major prediction of most models of mating systems is that flexibility in the face of environmental change will be a hallmark of reproductive patterns for individuals and species. Hand thoughtfully and thoroughly discusses the impressive social flexibility of reproductive patterns among gulls (e.g., monogamy, unisexual pair-bonding by males and females, female promiscuity, polygyny, adults mating with sub-adults, and incubation of objects other than eggs) in order to demonstrate that "heterosexual monogamy is not genetically 'wired-in' in either sex in any absolute sense (p. 136)." However, this review is not made in order to verify the assumptions of the previous models of mating systems, rather these observations are made to introduce a possible alternate explanation to the maximization of fitness (sociobiological) explanations for behavioral flexibility. "It is maximization-of-pleasure (and avoidance of pain), rather than maximization-of-fitness, that shapes the behavioral responses we observe (p. 139)." She asserts that although in an (theoretical) evolutionary sense animals behave as they do because they are following strategies that maximize fitness, in day-to-day reality their lives have been spent in maximizing positive reinforcements. Evolutionists, even many sociobiologists, recognize that selection eliminates (ultimate) genotypes through (proximate) phenotypes. Hand's belaboring of the obvious (to me) seems fitting given the frequent misunderstanding of these concepts.

After the review and discussion of gull breeding behavior, Hand's essay turns to sociobiological interpretations of variability in human social behavior. The tone and intent are obviously conciliatory. In her discussion she seeks avenues for resolution of the controversies between sociobiologists and their adversaries.

Above all, Hand is thoughtful: I found her review of social flexibility among gulls interesting and, in general, recommend this article to anyone interested in proximate and ultimate causation of odd mating or social systems among birds (or people). I think this article would be a useful teaching tool and a good subject for a seminar in sociobiology.—Patricia Adair Gowaty.

18. Agonistic behavior of Japanese White-eyes *Zosterops japonica* on Miyake Island. J. Kikkawa and R. Kakizawa. 1981. J. Yamashina Inst. Ornithol. 13:60–70. (In English, Japanese summary.)—This article compares the island race *Z. j. stejnegeri* and the mainland race *Z. j. japonica,* both wintering on the same island. The authors give rather

detailed descriptions of behavior at feeders and in territorial contexts. There is some evidence that mainland birds dominate island birds, but the data are hardly conclusive. This is the same species that has been introduced to Hawaii and is now the commonest introduced bird in the islands. A comparative study of the Hawaiian and Japanese populations would be a fruitful study of niche use.—C. J. Ralph.

19. Preferences for cousins in Japanese Quail. P. Bateson. 1982. Nature 295:236–237.—Japanese Quail (*Coturnix coturnix*) from 4 parental pairs were hatched and reared (till 30 days) in separate family groups. Birds were isolated from 30 to 60 days (sexual maturity) when each of 22 males and 13 females was tested for 30 min for time spent in front of (in a viewing apparatus) same-aged, opposite-sexed quails of varying degrees of relationship: novel and familiar siblings, novel first and third cousins, and novel unrelated birds. Birds spent most time near first cousins and this time was greater than that spent near sibs and unrelated individuals, though not different from time spent near third cousins. There was great variation among individuals (Bateson claims a "clear overall preference" for first cousins). On the basis of previous experiments that have shown that the time males spend near females is closely related to copulation preference and that birds show no consistent preferences for members of the same sex, findings are considered to reflect mating preferences (males courted females during testing). Implications suggest that by mating with one that is slightly different from immediate kin, individuals may strike an optimal balance between in- and outbreeding (see review **50**). The degree of relatedness of preferred mates may be tied to the extent of a population's outbreeding, and the author noted some ways in which natural circumstances are different from laboratory ones. The article ends with some interesting speculation about human mating preferences. Despite overstating the preference for first over third cousins, this paper is a very important one that should open new levels of genetic and sociobiological perspective on studies of attachment.—W. A. Montevecchi.

20. Early auditory experience modifies sound localization in Barn Owls. E. I. Knudsen, P. F. Knudsen, and S. D. Esterly. 1982. Nature 295:238–240.—Barn Owls (*Tyto alba*), nocturnal hunters, localize sounds with extreme accuracy, and like us use interaural intensity and time comparisons to do so. In order to study experimental effects on sound localization capabilities, 3 young owls had an auditory canal occluded at 4 weeks of age, another owl at 27 weeks, and another served as a control. Each of the 3 owls occluded at 4 weeks showed normal sound localization accuracy in tests at 16, 21, and 27.5 weeks of age, respectively. Following plug removal, all showed severe localization deficits, and the bird unplugged at 27.5 weeks had a greatly lengthened recovery time. Conversely, the owl occluded at 27 weeks showed no sign of adjustment over a 23-week period, after which its auditory plug was removed and sound localization accuracy returned immediately to normal. Similar results were obtained when the young owls that were unplugged at 16 and 21 weeks were replugged at 21 and 26 weeks, respectively, though they had learned to normalize localization abilities when plugged at an earlier age, later plugging prevented this.

It appears that during early development the owls were capable of adjusting their orienting behavior to altered auditory cues and that such adjustment slows with age and is lost when young attain adult size (~6–7 months), by which time it appears that neural mechanisms of sound localization have crystallized and are very resistant to modification.—W. A. Montevecchi.

21. Effects of radio-tagging on the behavior of Red-shouldered Hawks. M. D. McCrary. 1981. N. Am. Bird Bander 6:138–141.—The effects of radio-tagging *Buteo lineatus* were studied for about 28 months in San Diego Co., California. Five birds (2 ♂♂, 3 ♀♀) wore radio transmitters averaging 4% of body weight (see review **1**). All radio-tagged hawks successfully reproduced. Observed effects of the radio-taggings were; (a) immediate reductions in use of space, (b) increase in time spent preening, and (c) loss of feathers in small areas over the sternum and under the radio-package on the back. The first 2 behavioral changes virtually disappeared by the second day with the radio package on, while the last effect was continuous. The quick return to the use of large portions of their territory was somewhat different than other workers reported and was suggested to

result from the relatively light radio packages. The males returned to using most of the territory more rapidly than did the females, but this was neither mentioned nor discussed.—Richard J. Clark.

ECOLOGY

(see also 16, 18, 31)

22. Polymorphism in the White-throated Sparrow: habitat occupancy and nest-site selection. R. W. Knapton and J. B. Falls. 1982. Can. J. Zool. 60:452–459.—Color polymorphisms are far more frequent than our knowledge of what, if any, adaptive significance the different morphs might confer. In the present study, an attempt toward understanding one such polymorphism, the white-stripe vs. the tan-stripe in *Zonotrichia albicollis* was made by identifying correlates of stripe morph. Territories defended by male white-stripe forms tended to be concentrated in open habitat (high intertree distance, high light meter readings, and few shade-tolerant plant species present) whereas tan-stripe males were found having territories in all habitats from open to dense. No major differences were seen between nest sites selected by females of the different morphs. The occupancy of more dense habitats by tan-stripe males than white-stripe males makes sense in that tan-stripe males have flight related morphology that would make them more maneuverable in dense woods than their conspecifics. But why the tan stripe rather than a white one helps, if it helps, in this adaptation is still unresolved as is the reason the species shows negative assortative mating according to color morph. Clearly more interesting biology is yet to be learned from this species.—A. John Gatz, Jr.

23. Vegetative structure, concealment, and success at nests of two races of Spruce Grouse. G. W. Redmond, D. M. Keppie, and P. W. Herzog. 1982. Can. J. Zool. 60:670–675.—*Dendragapus canadensis canace* nests in spruce-jack pine forests and jack pine forests in New Brunswick, and *D. c. franklinii* nests in lodgepole pine forests in Alberta. Concealment of the nests tended to be higher in New Brunswick, primarily because of a higher density of stems <2.5 cm diameter there compared to stem density in lodgepole pine forests of Alberta. Nest success, i.e., having at least one egg hatch, was uniformly high (80–90%) for all nests of *D. c. canace* no matter what their particular concealment rating within these dense forests. Nest success for *D. c. franklinii* was poor (<20%) for poorly concealed nests and rose to only 60% for the best concealed nests within their more open forests. Adults of both subspecies had better concealed nests than yearlings and for *D. c. franklinii* this also meant greater nest success for adults than for yearlings. In spite of similarities in nest design and nest placement, then, substantial differences exist between these subspecies in how well concealed and how successful their nests are. Redmond et al. suggest that a difference in the major predator species (coyote in Alberta vs. red fox, bobcat, and weasels in New Brunswick) may explain some of the differences in importance of visual concealment of the nest to nest success as only the coyote is primarily a visual predator.—A. John Gatz, Jr.

24. Habitat selection and its effect on reproductive output in the Herring Gull in Newfoundland. R. Pierotti. 1982. Ecology 63:854–868.—When is it better not to reproduce in the preferred habitat, the habitat giving the most eggs hatched, heaviest eggs and chicks, and fastest growth? When the preferred habitat is crowded. This is the gist of both theoretical models and what Pierotti found while studying Herring Gulls (*Larus argentatus*) breeding on rocky marine terraces, grassy-hummocks on slopes, and grassy meadow habitats. With more than twice as many nests occurring in rocky areas as expected based on their percent of total island surface area, certainly a potential for crowding exists. That it actually occurs is suggested by this habitat showing the lowest internest distance and a high percentage of chick mortality attributable to intraspecific aggression. The net result is that despite the large size and fast growth of chicks in the preferred rocky habitat, the number of chicks fledged per egg laid was highest in the preferred habitat only once in 3 years and was, in fact, significantly lower than in the grassy-hummock slopes another year. Without measurements as to which fledglings show the highest survival over the critical first winter, one cannot say for sure which parents are the most fit evolutionarily.

Based on the present information, however, it looks like a toss-up between those breeding on the rock terraces and those on the grassy-hummocks. If true, it's curious that more than one quarter of the population nested in the worst habitat, grassy meadows, while the population as a whole actually showed some negative selection toward the sometimes optimal (= most young fledged per egg laid) grassy-hummocks on slopes. Either the whole picture is not yet in, or the selective forces measured here cannot be the norm for the species.—A. John Gatz, Jr.

25. Comparative use of four woodland habitats by birds. J. M. Emmerich and P. A. Vohs. 1982. J. Wildl. Manage. 46:43–49.—To study the importance to birds of the major woodland habitat types in eastern South Dakota (riparian woodlands, tree claims, multi-row shelterbelts, and single-row windbreaks) the authors measured bird species diversity, species richness, and bird population density in each woodland type. Riparian woodlands were at least 20 by 250 m and along a permanent stream. Tree claims were stands 2 ha or larger, of square or rectangular shape, planted a minimum of 47 yr ago but lacking an orderly row configuration of trees. Shelterbelts were multiple rows of trees and/or shrubs. Windbreaks were single rows of trees and/or shrubs at least 100 m long and 2 m high.

Birds were censused in 14 study plots within each habitat type during spring migration, breeding, and winter seasons using transect or total counts. Differences in mean plot size (2.9, 3.6, 1.0, and .5 ha for riparian woodlands, tree claims, shelterbelts, and windbreaks respectively) and relative amount of edge in each habitat confounded density estimates. Thus calculated density values are used only for relative comparisons between habitats.

Riparian woodlands supported the most species in each season. Shelterbelts or windbreaks had the highest population density, but fewer species. Bird species diversity was not significantly different between riparian woodlands and tree claims or between shelterbelts and windbreaks during any season. However, pooled bird species diversity for riparian woodlands and tree claims was always higher than that for shelterbelts and windbreaks.

The authors conclude that riparian woodlands are of primary importance for maintenance of bird species diversity, with tree claims of secondary value. Shelterbelts and windbreaks add to the avifauna but support larger numbers of fewer species. It is more important to maintain the structurally diverse riparian woodlands and tree claims than to try and supplement the avifauna by creation of shelterbelts and windbreaks.—Richard A. Lent.

26. Comparison of time-budgets for mainland and outer Chetwode Island populations of adult male South Island Robins. R. G. Powlesland. 1981. N.Z. J. Ecol. 4:98–105.—The author found that on an island off northern South Island *Petroica australis* spent more time foraging and involved in interspecific interactions than conspecifics in a river bottom forest some 150 km south. Although the results are open to many interpretations, the author suggests that birds attend to food requirements before other activities. The study would have benefited from comparison with more than a single mainland population, so that possible island : mainland comparisons could have truly been made.—C. J. Ralph.

27. Diets of pipits and Skylarks at Huiarua Station, Tokomaru Bay, North Island, New Zealand. A. S. Garrick. 1981. N.Z. J. Ecol. 4:106–114.—From gizzard contents of 57 native New Zealand Pipits (*Anthus novaeseelandiae*) and 64 introduced Skylarks (*Alauda arvensis*), the author concludes there is essentially no overlap in diet. The species are very similar in habits, but differ slightly in habitat used. This study provides an important cautionary lesson to those who would lump species into the same "guild" because of similarity of foraging habits.—C. J. Ralph.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY
(see also 10, 25, 31, 33)

28. Behavioral and genetic adaptation of laying hens to high-density environments. J. V. Craig. 1982. BioScience 32:32–37.—This paper reviews the methods used by

poultry breeders to increase production. Cannibalism, increased mortality, decreased egg production, loss of feathers, and injuries caused by the claws of other hens are some of the consequences of the high density environments commonly maintained by poultry breeders. The author reviews the methods used to cure these stress symptoms. These "cures" are designed to continue increasing productivity, an indication, the author suggests, of adaptation to these highly artificial environments. Craig states that few behavioral studies have investigated these abnormalities in laying hens and concludes that selection against these behavioral traits should be possible. It seems incredible that at the present level of sophistication of poultry science such a solution has not been investigated previously. The author's contribution to the problem seems obvious and this paper provides little insight into an old problem.—Lise A. Hanners.

29. Evaluating the sterile male method on Red-winged Blackbirds: clinical evaluation of thiotepa as a sterilant. N. Potvin, J.-M. Bergeron, M. Norman, and A. Cyr. 1982. Can. J. Zool. 60:460–465.—A small dose (4.32 mg/kg body weight) of thiotepa will cause temporary (≥1 mo) sterility in male Red-winged Blackbirds (*Agelaius phoeniceus*) due to inhibiting the normal seasonal hypertrophy of the testes. In fact, testes weight during the treatment year is only 10% that in the non-treated birds although in the next year no differences are seen in testes weight between previously treated and control birds. Field tests will follow to determine if thiotepa really will work as well as these initial results imply to provide local control of population size and hence of corn depredation by blackbirds.—A. John Gatz, Jr.

CONSERVATION AND ENVIRONMENTAL QUALITY

30. Mortality of Sparrowhawks and Kestrels. I. Newton, A. A. Bull, and I. Wyllie. 1982. Br. Birds 75:195–204.—Mortality of 341 Sparrowhawks *Accipiter nisus* and 616 Kestrels *Falco tinnunculus* was evaluated. For Sparrowhawks and Kestrels respectively, most deaths (48% and 23%) were attributed to shooting, 14% and 13% to hemorrhages, 9% and 29% to starvation, 4% and 11% to disease, and 14% and 20% to unknown causes. Poisoning was inferred in both species for those individuals that died of internal hemorrhages or from "unknown causes" if they had more than 10 ppm of HEOD from the insecticides aldrin or dieldrin or more than 100 ppm of DDE from DDT in their livers.—Patricia Adair Gowaty.

31. Influence of fire and logging on nonbreeding bird communities of ponderosa pine forests. J. G. Blake. 1982. J. Wildl. Manage. 46:404–415.—Studies of avifaunal response to habitat disturbance often focus on breeding populations. This paper is of interest because it compares nonbreeding bird communities of burned and unburned ponderosa pine (*Pinus ponderosa*) forest, and also examines the influence of logging on birds in Prescott National Forest, Arizona.

Parts of a 4800 ha burn were logged following the 1972 fire. Clear-cut, partially cut, and uncut 5 to 6 ha study sites were located on both burned and unburned forest. Birds were censused in October, February, and April–May using a point-count technique at 6 sample points on each of the 6 sites. Species were classified into 8 broad foraging guilds. Cluster analysis based on an index of ecological overlap was used to examine similarities among sites.

Vegetation data, seasonal bird community composition, and abundance of foraging guilds are tabulated. Forty-nine species of birds were recorded from all study sites: 28 from burned, 38 from unburned sites. Variation in species composition and abundance among sites was marked but no clear trends emerged. More species were restricted to unburned study plots over all seasons, and more species on unburned sites occurred on only 1 site. Clustering of sites by bird species abundance and presence/absence indicated that fire and logging may induce similar responses in the nonbreeding bird community. This makes sense since forest habitat disturbance creates patches of early successional vegetation; the author suggests that birds were selecting habitat on "degree of openness."

Differences in species composition among sites are explained in terms of season and foraging substrates available to various guilds. Patterns in nonbreeding species distribution and abundance and foraging guild composition often paralleled those observed in breed-

ing season communities of disturbed forests. The author concludes that "extent of habitat modification may be more influential than the precise type of alteration."—Richard A. Lent.

32. The size of the Sooty Shearwater population at the Snares Islands, New Zealand. J. Warham and G. J. Wilson. 1982. Notornis 29:23–30.—One of the most abundant species of seabirds is the Sooty Shearwater (*Puffinus griseus*). To landlubbers, the estimated size of its populations must seem fanciful; flocks at sea are often reported to exceed one million birds. It is hardly possible to monitor the stability of such an abundant and wide-ranging species via ship-based studies. Research in breeding areas is essential. The Snares Islands hold one of the largest breeding concentrations in the New Zealand region. By estimating the numbers of burrows in the 4 major vegetation types on the island, and assuming a 75% occupation rate, Warham and Wilson estimated 2.75 million pairs on the 2 major islands in an area of only 328 ha; in the best habitats densities of 2 burrows/m^2 were achieved. This is even more impressive when it is realized that there are large numbers of other species nesting in the same areas. The accuracy of such estimates depends on the success of estimating the number of occupied burrows. A good discussion of the pitfalls in such a procedure is included. By all appearances this colony is very healthy.—J. R. Jehl, Jr.

33. Vegetation dynamics in Dusky Seaside Sparrow habitat on Merritt Island National Wildlife Refuge. W. P. Leenhouts and J. L. Baker. 1982. Wildl. Soc. Bull. 10:127–132.—Habitat of the endangered Dusky Seaside Sparrow (*Ammodramus maritimus nigrescens*) along the Indian River of North Merritt Island, Florida, has deteriorated from construction of mosquito control impoundments completed in 1962. The authors describe vegetation changes which occurred between 1973 and 1980 as a result of Dusky Seaside Sparrow habitat management by the U.S. Fish and Wildlife Service.

To convert the impoundments back towards a natural salt marsh, the area was dewatered, burned periodically, and treated with 2,4-D during the 7 yr period. Vegetation measurements were made in 1973 and 1980 along 10 randomly located 30-m line transects. Habitat management induced 3 major changes: drying of the marsh, decline of fire intolerant plant species, and decline of broadleaf species. Total percent cover for all plant species and percent cover of spike grass (*Distichlis spicata*) and coastal dropseed (*Sporobolus virginicus*) increased significantly from 1973 to 1980; percent cover of cattail (*Typha* spp.) decreased significantly. Knot grass (*Paspalum distichum*) and sea-purslane (*Sesuvium portulacastrum*) changed significantly within transects. Cordgrass (*Spartina bakeri*), of greatest importance to the Dusky Seaside Sparrow, remained essentially unchanged because of its resistance to flooding. The net effect of these vegetation changes was to alter the salt marsh ecosystem towards preferred Dusky Seaside Sparrow habitat.

Birds from the then-viable St. Johns River basin population were to be transplanted into the restored Merritt Island habitat as part of the USFWS Dusky Seaside Sparrow recovery plan. Unfortunately the authors state that the St. Johns population has also declined such that only 1 bird existed in the wild as of 1980. Thus the success of habitat management "cannot be measured by a Dusky Seaside Sparrow population increase." Nonetheless the new habitat does resemble that described in the literature as favorable and probably would support some birds if only they were available.—Richard A. Lent.

PHYSIOLOGY

(see also 29)

34. Glucose and lactate kinetics and interrelations in an antarctic bird (Emperor Penguin). R. Groscolas and A. Rodriguez. 1982. Am. J. Physiol. 242:R458–R464.—Birds have a much higher blood glucose concentration than do mammals and they maintain it during starvation despite very small glycogen levels. Therefore, birds must have considerable gluconeogenic ability, but the substrate for the process has never been investigated. This study measured glucose and lactate turnover and interconversion in male penguins (*Aptenodytes forsteri*) tested after fasting for at least 5 weeks. Maximal conversion of lactate into glucose and glucose into lactate was 29 and 75%, respectively, indicating that lactate

is an effective gluconeogenic precursor in a fasting bird. These measurements probably reflect the first measurements of lactate turnover in birds.—Cynthia Carey.

35. Substrate metabolism in seasonally acclimatized American Goldfinches. R. L. Marsh and W. R. Dawson. 1982. Am. J. Physiol. 242:R563–R569.— American Goldfinches (*Carduelis tristis*) undergo a striking seasonal change in thermogenic capacity. Birds caught in summer are barely able to tolerate sub-freezing temperatures, yet winter birds can remain normothermic for up to 8 h below −60°C. This paper explains some of the seasonal differences in use of substrate which underlie this phenomenon. Activities of enzymes that contribute to catabolism of triglycerides increase by 50% in winter; this enables these birds to emphasize use of fatty acids during shiver and to "spare" glucose as an energy resource. The ability to conserve carbohydrate is an important component of winter acclimatization in this species.—Cynthia Carey.

36. Regulation of brain temperature in pigeons: effects of corneal convections. B. Pinshow, M. H. Bernstein, G. E. Lopez, and S. Kleinhaus. 1982. Am. J. Physiol. 242: R577–R581.—Birds maintain brain temperatures a measurable level below body core temperatures. This ability may represent a mechanism that permits body core temperature to rise to levels above the tolerable limit of the brain, thus storing more heat than would otherwise be possible. Such a mechanism would be especially important during flight, when core temperature can rise several degrees. This study determined that when the eyes were ventilated, the difference between the body and brain temperatures significantly increased. Therefore, passage of air over the eyes during flight may substantially contribute to cooling of the veins in the opthalmic rete, which serves as a heat sink for arterial blood flowing to the brain.—Cynthia Carey.

37. Temperature regulation in the Black Vulture. J. Larochelle, J. Delson, and K. Schmidt-Nielsen. 1982. Can. J. Zool. 60:491–494.—The authors suggest that keeping clean while feeding within the body cavity of a dead animal may not be the only reason for featherless patches existing on the necks of vultures. Here they show that Black Vultures (*Coragyps atratus*) vary the exposure of this bare-skinned patch according to ambient and body temperatures. At ambient temperatures of 15–25°C, the body temperature is 37.7°C and Black Vultures sit with their heads down and feathers cover all bare skin to prevent heat loss. By ambient temperatures of 35°C, the body temperature is up to 41°C and the head is raised to expose the maximum area of bare skin for heat loss. By ambient temperatures of 45°C, the body temperature is up to 42.9°C and the bare skin is again covered—this time to prevent heat gain. Only by vigorous panting is the body temperature kept below ambient at this high temperature.—A. John Gatz, Jr.

38. Observations on the temperature regulation and water economy of the Galah (*Cacatua* [sic] *roseicapilla*). W. R. Dawson and C. D. Fisher. 1982. Comp. Biochem. Physiol. 72A:1–10.—The Galah (*Eolophus roseicapillus*) is a small cockatoo which is common and widespread in the arid inland of Australia. The species is successful in hot environments because it can undergo controlled hyperthermia and can dissipate large amounts of heat at high ambient temperatures. The strong flying ability of the Galah allows it to visit watering points to replenish substantial evaporative water loss.—C. R. Blem.

39. Stress non-responsiveness in the newly-hatched fowl. B. M. Freeman. 1982. Comp. Biochem. Physiol. 72A;251–253.—Results presented here cast doubt on the claim that corticosterone might be concerned in the mediation of non-shivering thermogenesis in birds. Increased concentration of corticosterone in older chicks exposed to cold is part of a non-specific response to cold stress.—C. R. Blem.

40. The development of homeothermy in the American Goldfinch. L. Mayer, S. Lustick, and B. Battersby. 1982. Comp. Biochem. Physiol. 72A:421–424.—Development of homeothermy in *Carduelis tristis* is similar to that for avian species of similar size.—C. R. Blem.

41. Body temperature, metabolic rate, and insulation in winter and summer acclimatized Mute Swans (*Cygnus olor*). C. Bech. 1980. J. Comp. Physiol. 136:61–66.—The oxygen consumption and body temperature of Mute Swans were studied in both summer

and winter in Denmark. The birds were held in captivity and were not subjected to variation in ambient temperature of more than 15°C. The lowest temperature to which they were exposed in any season was −5°C. When tested below −10°C, body temperatures of summer birds were lower than those of winter birds. In view of what other research has discovered concerning the detrimental effects of captivity on thermogenic capacities of birds and the importance of exposure to natural variation in ambient temperature for eliciting maximal thermogenic responses (see review **35**), it is doubtful that the data in this paper reflect the full extent of the thermogenic capacities of these large birds.—Cynthia Carey.

42. Nonconformance of standard metabolic rate with body mass in Hawaiian Honeycreepers. R. E. MacMillen. 1981. Oecologia (Berl.) 49:340–343.—The significance of deviation of standard metabolic rate (SMR) of birds from values predicted by allometric equations has yet to be fully understood. Some authors have suggested that such deviation, particularly when the SMR falls below the predicted levels, could result in energetic advantages in certain habitats. This study suggests a benefit of low SMR for species exploiting unpredictable food resources. The SMR of 4 species of Hawaiian Honeycreepers were exceeded by predicted values by 14–62%. Additionally, the relation between SMR and body mass (over a 10-g range) was found to be positive rather than negative, as usually found. While the validity of the assertion that the reduced SMR of these birds relative to predicted values is energetically advantageous cannot be evaluated at this time, it is worthwhile remembering that allometric equations are regression lines calculated for data of SMR and body mass varying over several orders of magnitude. Since the original data varied from that line, variation must be expected in any new data to be compared with the equation, not only along the y-axis (SMR at a certain body mass) but also along the x-axis. Therefore, attempts to find significance in differences existing over only a 10-g range in body mass may not add meaning to what we already know about the relation of SMR to body mass.—Cynthia Carey.

MORPHOLOGY AND ANATOMY

(see also 3, 54)

43. Patterns of growth in Darwin's finches. P. R. Grant. 1981. Proc. R. Soc. Lond. B. Biol. Sci. 212:403–432.—Recently there has been renewed interest in ontogeny, phylogeny, and developmental processes because of the obvious relationship of these topics to the problem of macroevolutionary mechanisms, currently a "hot" field. Alberch et al. (Paleobiology 5:296–317, 1980) have suggested a methodology for reducing problems of macroevolutionary events to mechanisms of development through the analysis of growth of anatomical structures in terms of time of onset of growth, time of termination of growth, and rate of growth during this interval. Thus, the processes leading to anatomical differences can be described in terms of developmental events through the comparison of the ontogenies of sister groups of organisms. This makes studies of ontogeny, especially those following discrete anatomical structures that differ between closely related species, of interest to a wide variety of evolutionary biologists.

Grant reports on nestling growth in Galapagos finches, a particularly interesting group of birds from an evolutionary and morphological standpoint. External measurements of weight, and bill and limb dimensions were taken on 4 species during ontogeny from hatching to fledging. These species differ substantially in their adult dimensions, especially of bill proportions. Relative growth curves were prepared and compared. There were major differences in growth rates of bill proportions, but only small differences in those of leg and wing. Differential growth of the bill was shown to have occurred not only during the nestling period, but during the egg and post-fledging stages as well, and to have involved both rates and stopping times.

This paper suggests that the examination of developmental rates and timing events may be useful for analyzing mechanisms leading to differences between related species. More useful, but also much harder to obtain, would be studies of the growth of individual bones using histological staining techniques. Such studies are now underway in several laboratories.—George F. Barrowclough.

PLUMAGES AND MOLT

(see also 22)

44. Latitudinal variation in length of Barn Swallow tails in North America. R. M. Patterson. 1981. N. Am. Bird Bander 6:151–154.—Mean tail lengths (by sex) are given for live *Hirundo rustica* (N = 136 or 137, apparently 136 with an error in Table 3) mist-netted in Prince George's County, Maryland. Comparing results of sexing by presence of brood patches and cloacal protuberances with those obtained by using unsheathed outer rectrix (as suggested in North American Bird Banding Techniques, Vol. II) length yielded a 1.5% error with 2 females being missexed. Thus the latter technique is satisfactory for the latitude (*ca* 39°N) during the breeding season. Applying the tail measurement criterion to sexed museum skins produced the following: 2.1% of 142 skins of birds taken south of 42°N would be missexed (1 female, 2 males), while 7% of 101 skins of birds taken north of 42°N (7 females, 0 males) would be erroneously sexed. A clinal variation is suggested with tail lengthening with increasing latitude. Cooperators are invited to provide tail length data from known-sex birds so this phenomenon and its relationship to possible sexing error might be further studied. No mention is made of the report that breast color richness is usually less in females than in males (Dwight, N.Y. Acad. Sci., 1975 (reprint) or Bailey, Birds of New Mexico, New Mexico Dep. Fish and Game, 1928), although the author used this for separating out males for a part of the report. Nor is reference made to use of a color chart to reduce subjectivity. This is suggested because it is the females that are most frequently missexed by using tail measurements and perhaps a second criterion could be used in conjunction with this to further reduce error.—Richard J. Clark.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 2, 10, 32, 51, 52, 53)

45. Partridges in the city. (Seraya kuropatka v gorode). A. Kozulin and B. Yamskii. 1982. Okhota okhot. khoz. 1:20–21. (In Russian.)—The Common Partridge (*Perdix perdix*) evolved in the tropics, but its adaptability and high fecundity have enabled it to endure extreme cold, limited food, and deep snow, and so to establish itself as the most northern partridge species. It is frequently found around human settlements where it feeds in fields of winter crops, seeking areas where wind has blown the snow off or where hares have dug up food. Although green shoots are less caloric than the other usual winter food, (weed seeds), the partridges prefer them, even though they spend the entire day feeding on them, because they are a concentrated, abundant, and reliable food source and less effort is needed to obtain enough energy to survive the cold night. When snow becomes too deep or hard to reach the crops, the partridges are forced to eat weed seeds. Since the partridge beak can pick up seeds better than it can pluck them, the birds shake the weeds so that seeds are scattered on the snow.

This species now seems to have moved into a niche with good food sources and protection—the large city—and is becoming a common feature of the urban scene in winter fields on the outskirts of town, in orchards, vacant lots, and dumps, unperturbed by highrise apartments and busy streets and largely ignored by human passers-by. The birds have discovered that, over underground heating ducts, the snow is less or nil, and feed there on exposed plants. They have been seen moving at the end of a short winter day not to a roost, but to a section of such bare ground lit by street lights, which artificially prolong the day and therefore their feeding time.—Elizabeth C. Anderson.

46. Rediscovery of the Yellow-fronted Gardener Bowerbird. J. M. Diamond. 1982. Science 216:431–434.—The bowerbirds (family Ptilonorhynchidae) build the most elaborate structures of all birds. Their bowers are often decorated with colorful objects, often in neat piles on carefully laid out "lawns" and moss platforms. Some species even build structures including walled avenues, huts 1 to 2 m in diameter, and stick towers several meters high. The males use these bowers often in conjunction with their own displays to attract females. Diamond suggests that his observations on the bower and display of the Yellow-fronted Gardener Bowerbird (*Amblyornis flavifrons*) are "significant for understanding behavioral origins of bower building, color choice, ecological prerequisites of bower

building, relation between bower decoration and plumage, and the arena theory of bower evolution." The paper is based on one observation of a male displaying to a female (no evidence for copulation) and description of the bowers and their locations.

The Yellow-fronted Gardener Bowerbird's bower consists of a stick tower from 0.5 to 1.2 m high around the base of a sapling with a circular moss ring (1 m diameter) having a raised rim running around the bower. On the platform were found separate piles of green, yellow, and blue fruit. A displaying male picked up a blue (ripe) fruit, set against his golden crest and extended it to a female. Since the fruits are the sole colored decorations of the bower, and males hold their ripe fruit in the bill during the entire display, Diamond suggested that bower ornamentation was derived from ritual courtship feeding and a transfer of ornamentation from male plumage to the bower.—J. M. Wunderle, Jr.

47. Taxonomic status and history of formation of the range of *Hirundo rustica* in the Amur Territory. (Sistematicheskoe polozhenie i istoriia formirovaniia areala derevenskoi lastochki (*Hirundo rustica*) Priamur'ia.) S. M. Smirensky and A. L. Mishchenko. 1981. Zool. Zh. 60:1533–1541. (In Russian, English summary.)—The Barn Swallows of Amur Territory in the Soviet Far East are intermediate in size and color to the Asian subspecies *Hirundo rustica tytleri* (Transbaikalia), and *H. r. gutturalis* (southern Maritime Territory, and China). This polymorphism results from hybridization of these forms, which formerly were separated by territory without suitable nest sites. The appearance of swallows in Amur Territory and the hybridization coincided with occupation of this region by Russian immigrants in the 17th century, and were due to the introduction of buildings suitable for nest construction and of stock raising (the concomitant abundant flying insects being a ready food source). These subspecies of *Hirundo rustica* can be identified in the field by field marks and size differences. This differentiation is useful in determining whether a bird is a casual visitor, a local inhabitant, or a wintering bird, and in fixing the dynamics of subspecies ranges.—Elizabeth C. Anderson.

SYSTEMATICS AND PALEONTOLOGY

(see also 18, 44, 47)

48. A systematic study of *Anser albifrons* in California. B. D. Krogman. 1979. Pp. 22–43, in **Management and biology of Pacific flyway geese.** R. L. Jarvis and J. C. Bartonek (eds.). OSU Book Stores Inc., Corvallis, Oregon.—For a number of years there has been some doubt about the existence of a subspecies of the White-fronted Goose called the "Tule Goose." These concerns stemmed from several problems, including the rareness of the race, the fact that the breeding grounds are unknown, and a lack of quantitative criteria distinguishing the race from the more common White-fronted Goose. In this paper Krogman addresses these problems.

The procedure used to test for the existence of the "Tule" subspecies is innovative. Krogman made 16 measurements on each of 63 male and 49 female museum specimens collected on the California wintering grounds. These 2 data sets were analyzed using principal component analysis. The results of the analysis clearly indicated 2 discrete clusters of points in both the male and female data sets. The clusters were shown to correspond to the 2 subspecies as identified on the basis of qualitative examination of the specimens by previous taxonomists. Thus, this procedure yielded an independent, objective, and quantitative affirmation of the existence of distinct populations of wintering White-fronted Geese. That the clusters of points were discrete and not the 2 ends of a continuum suggests that this is not just clinal variation, but rather a reflection of 2 groups with their own genetic identity. Hence subspecific recognition does seem warranted.

This analysis, along with further discussions of ways to distinguish the birds and of aspects of their biology and plumage color, make this paper of interest to both waterfowl specialists and taxonomists.—George F. Barrowclough.

EVOLUTION AND GENETICS

(see also 12, 19, 22, 28, 43, 46)

49. The selective importance of heat stress in gull nest location. A. G. Salzman. 1982. Ecology 63:742–751.—Western Gulls (*Larus occidentalis*) nest at various sites on Santa

Barbara Island, California. In 1979, a one day heat wave—afternoon temperatures ca. 38°C and winds <.5 m/sec—caused severe chick mortality at some but not all nesting sites. Death rates varied from 0% to 90% and were not a function of chick age. Instead, assuming measurements taken in June 1980 reflect accurately the relative thermal regimes during the June 1979 heat wave, the high mortality sites had consistently higher peak air and ground temperatures and longer heat stress than the low mortality sites. Similarly, the thermal load on "taxidermic thin metal chick models" was highest in high mortality areas. Given this inequality of nest sites, one is left with the question why some 10–15% of the gull population nest in areas having potentially lethal thermal characteristics. Sulzman presents a nice analysis wherein she rules out habitat shortage, competitive inferiority of the gulls that nest there, the availability of greater food resources relative to cooler sites, and enhanced reproductive success in non-heat wave years as reasons that some gulls nest in the "high mortality" areas. Rather it seems, based on an analysis of 62 yr of weather records, that mortality causing heat waves have tended to be fairly rare and hence are not a part of the normal selective regime for the gulls. Salzman speculates that if such heat waves increase in frequency (another one occurred in 1981), changes in nesting patterns may well occur. Given the 10 yr this population has been studied and chicks banded, this is an excellent opportunity to document any such selection.—A. John Gatz, Jr.

FOOD AND FEEDING

(see 13, 27, 45)

SONGS AND VOCALIZATIONS

(see also 20)

50. Mating and song types in the Great Tit. P. K. McGregor and J. R. Krebs. 1982. Nature 297:60–61.—Female Great Tits (*Parus major*) (n = 17) in a banded population tended to be mated with males that had one song similar to (shared with) but slightly different from (unfamiliar) those of the females' fathers. Females seemed to avoid mating with males that sang rare songs (males likely to be immigrants from other populations). The rate of song sharing among males was negatively correlated with inter-territorial distances, so the authors also took female dispersal distance into account in song comparisons between mates and fathers. Avoidance of dissimilar repertoires was significant; avoidance of similar repertoires was not, though the authors contend that both types of activity contribute to the mechanism of female choice. In view of the tendency for breeding females to disperse from natal nesting sites and for male song repertoire similarity to decrease as inter-territory distance increases, perhaps avoidance of dissimilar males is sufficient to produce conditions whereby females would tend to mate with males that share one song with the females' fathers. Comparisons of song structure showed that females also mated with males whose song shared with the females' fathers was intermediate in similarity to the paternal songs. Findings are interpreted in terms of female preference for a balance between similarity and dissimilarity and parallel recent findings from imprinting experiments by Bateson on the preferences of Japanese Quail (*Coturnix coturnix,* see review **19**). As the authors indicate, female song preference is consistent with expectations from optimal outbreeding patterns, but 3 assumptions remain to be tested: (1) females learn paternal songs, (2) song types influence female choice, and (3) there is a cost of outbreeding among populations.—W. A. Montevecchi.

BOOKS AND MONOGRAPHS

51. The Birds of Nigeria. J. H. Elgood. 1982. British Ornithologists' Union, Checklist No. 4. 246 p. £ 14.—About 850 species are covered in this most recent volume of the BOU checklist series on birds of African countries. The work primarily represents the efforts of British ornithologists, since Nigerians have yet to make a substantive contribution to the knowledge of the avifauna of their country. Both the author and the series editor voice the hope that Nigerians will soon become more sensitive to the avian resources of their country and will take steps to preserve native habitats which are rapidly disap-

pearing with spreading industrialization. This book should contribute importantly toward this goal.

Nigeria, a country slightly larger than Texas, lies just north of the equator. It is bounded on the south by the Atlantic Ocean and is crossed by 3 rivers. Each river has an extensive flood plain that varies seasonally in water level. No major mountain ranges occur in Nigeria, but plateaus extend from the highlands in adjacent Cameroun and slope gently to the ocean. These plateaus afford appropriate conditions for mist forests and grasslands. Elsewhere in the country, vegetation varies from lush tropical forests to arid thorn scrub. Since temperature, daylength, and humidity fluctuate little seasonally, rainfall is the most pronounced variable of the physical environment. Average values vary from 628 mm to 4285 mm in the south and north, respectively.

Relatively little is known about the breeding habits or behavior of most species, other than the observations that most species breed in coordination with either the wet or dry season. Although more than 55,000 intra-African birds have been banded, not a single bird has been recovered away from the banding location. No collecting at all has been done in some large areas of the country. A high proportion of the birds are migrant; over 150 Palearctic species winter in Nigeria. Many other species move into Nigeria from other parts of Africa in response to the alternation of wet and dry seasons. One interesting question to emerge from the information now available is termed Moreau's Paradox: the majority of species wintering in west Africa stay in the savannahs which progressively dry out and become less productive during their 6 month visit—how do these species build up sufficient fat reserves for the trans-Sahara migration at a time when food supplies are so depleted? The author also points out several other areas which need research. First, the association of some species, particularly weavers, with other animals such as insects, is little understood. Further, cooperative breeding and brood-parasitism are widespread in tropical birds but the evolutionary significance of these breeding strategies has yet to be fully documented. This book should prove useful not only to systematists and biogeographers but also to evolutionary biologists who need key species to answer important questions in biology—Cynthia Carey.

52. A Guide to Bird Finding in Vermont. W. G. Ellison. Illustrations by N. L. Martin. 1981. Vermont Institute of Natural Science, Woodstock, Vermont. 134 p. $5.95.—The author divides the state into 7 physiographic regions, and then gives brief descriptions of the geology and forest composition as well as typical birds inhabiting each area. About 330 species of birds have been recorded in Vermont, and of that number about 250 species occur annually. Slightly fewer than 200 of these breed within the state.

Good descriptions are provided of 23 birding areas in the state, beginning in the southwestern corner and ending with Jay Peak, one of Vermont's highest peaks near the Canadian border. In addition to the recommended time to visit (e.g., the southern Green Mountains: 1 May–31 October; Jay Peak: 20 May–30 July), the author provides a key to the quality of birding in each area. Directions for reaching each birding area whether by car, foot or, in some cases, canoe are specific and sufficiently detailed so that the birder should have no difficulty in finding his way; and he is also warned about roads that are difficult in wet weather or used by timber trucks.

Few water birds are found in southern Vermont or the montane areas of central Vermont, but the Burlington area, especially Dead Creek Wildlife Management Area and its environs, "is the finest region for marsh birds, waterfowl and wintering raptors in Vermont." Perhaps the most distinctive bird found in Vermont is the Gray-Cheeked Bicknell's Thrush, which is found in greatest numbers on the high peaks of Mt. Mansfield and Camel's Hump.

A few pages are devoted to hawk watching in Vermont and some of the best known observation sites are given, with suggestions of how to reach them. At the end is an annotated list of the 254 birds recorded in the state by users of the **Vermont Daily Field Card** issued by the publishers of this book. It includes definitions of terms of abundance. The index is very complete. This guide for locating birds in the Green Mountain state is pleasant to read and should be useful for many years.—Thomas Foster.

53. Birds of Oak Hammock Marsh Wildlife Management Area. K. A. Gardner. 1981. K. A. Gardner, Stonewall, Manitoba. 172 p.—This book is concerned with listing

bird sightings (300 species) over 33 yr of observation on a 3400 ha marsh and upland preserve situated 50 km north of Winnipeg, Manitoba. Generally, the book is an expanded checklist that would best be used by visitors to the marsh and/or by southern Manitoba birdwatchers. Anecdotal dated accounts of numbers of each species take up the bulk of the text. Much of the material appeared in newspaper columns by the author. Familial headings introduce the information (status, numbers, nests, dates, and localities) on each species. A few well-reproduced color photographs are scattered throughout the species accounts.

The preserve underwent intensive construction for habitat improvement in the early 1970's, so "before" and "after" comparisons are made for many species. Results of several transect surveys are also described.—Richard M. Zammuto.

54. A Comparative Study of the Appendicular Musculature of Penguins (Aves: Sphenisciformes). D. O. Schreiweis. 1982. Smithson. Contrib. Zool. no. 341. 19 figures. 46 p.—This study consists largely of descriptions of limb muscles in a reference species, *Eudyptes pachyrhynchus.* These serve as a basis for comparison with 13 other species of the 6 living genera of this order. Myological data then are given numerical values that are treated by 2 methods previously employed by Hudson: cumulative scores of difference using weighted data and correlation coefficients using equally weighted characters. Unfortunately these data are not provided but are available from the author. An attempt is made to follow the current myological nomenclature of the **Nomina Anatomica Avium.** One muscle, *M. propatagialis* should read *M. tensor propatagialis.* Typically this muscle consists of 2 parts, *pars longa* and *pars brevis.* It is not clear which is present in penguins, presumably *pars longa.* No mention is then made of *pars brevis*; presumably it is absent. Other shortcomings include the quality of the illustrations which is adequate at best. Some muscles in the larger illustrations are cross-hatched, making muscle fiber direction impossible to ascertain. The actual myology of penguins, however, is quite interesting. For example, only 9 muscles distal to the shoulder have fleshy components and there is a potentially unique connection between the *external oblique* and *flexor cruris medialis* muscle. Other interesting myological features are neatly listed in an appendix. A phylogeny is proposed that supports the current classification. Nevertheless it is a rather ambiguous phylogenetic tree and for some reason it is lying on its side. Despite some errors this paper is likely to be a good source of myological information for a very interesting group of birds.—Gregory Dean Bentz.