RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

BANDING AND LONGEVITY

(see also 41, 43, 46, 52)

1. Factors affecting capture rate and biometrics of Storm Petrels on St. Kilda. R. W. Furness and S. R. Baille. 1981. Ringing & Migr. 3:137–148.—Furness and Baille present data on Storm Petrels (*Hydrobates pelagicus*) captured in mist nets during 6 nights in August 1978 and 14 nights in July and August 1980. Birds banded previously and recaptured by the authors had significantly longer wings, were significantly heavier, had significantly larger brood patches, and were significantly more likely to regurgitate food than unbanded birds. The authors suggest that these differences correspond to the difference between breeders (returns) and wanderers (unbanded birds). Furthermore, returns tended to occur earlier in the evening suggesting that they were breeding adults returning from sea to relieve their mates or feed their chicks. Although circumstantial, these data offer the first operational basis for distinguishing between breeding and wandering adults solely on the basis of large scale captures at mist nets.

The authors emphasize biases introduced by capture techniques. Taped calls were effective lures, but most birds were caught in sections of the net near the tape recorder and the proportion of wanderers (smaller, lighter, less developed brood patches than breeding adults) was significantly higher than when taped calls were not used. Thus population comparisons based on captures at mist nets must consider details of mist-netting procedures whether in different colonies or the same colony in different years.—Edward H. Burtt, Jr.

2. A contribution to the population ecology of the Little Owl (*Athene noctua*)—an analysis of band recoveries from Germany and the Netherlands. (Beitrag zur Populationsökologie des Steinkauzes (*Athene noctua*)—eine Analyse deutscher und niederländischer Ringfunde.) K.-M. Exo and R. Hennes. 1980. Vogelwarte 30:162–179. (In German, English summary.)—A total of 347 band recoveries up to 1974 was analyzed to determine mortality and dispersal. The annual mortality rate of adults was 35.8% ± 5.8%. Mortality in the first year of life was 70.1%, about 56% of this mortality occurred by the end of October. Peaks of monthly mortality occurred during the breeding season and during winter, two apparently stressful seasons. The most frequent known cause of death was by human contact, mainly death on the roads and railways.

Dispersal begins in late summer. The median recovery distance of birds from their birthplace to their first breeding area was 7.5 km; 9% settled at a distance of more than 100 km from their birthplace.—R. B. Payne.

MIGRATION, ORIENTATION, AND HOMING

(see also 53)

3. Migration and wintering of the Common Crane (*Grus grus*) in Spain. Results of the Crane Project. (La migración e invernada de la Grulla Común (*Grus grus*) en España. Resultados del Proyecto Grus (Crane Project).) M. Fernández-Cruz (ed.) 1981. Ardeola 26–27:5–164. (In Spanish, English summary.)—This paper reports the results of a coordinated study of the Common Crane on its wintering grounds in Spain, Portugal, and southwest France. Data from the literature, ornithological groups, and game wardens were supplemented by 6 general national censuses conducted by upwards of 150 observers. The wintering period in Spain is marked by considerable wandering, but it is possible to separate the birds' stay into 3 periods termed post-nuptial migration, intra-wintering movement and wintering, and pre-nuptial migration. The first period extends from the beginning of October until the end of November. During the wintering period, crane concentrations are very unstable and there is a general N–S or NE–SW movement between pseudo-wintering areas or between these and more permanent areas. Three general wintering areas are identified: (1) southwest France and northeast Spain; (2) between the eastern section of the province of Guadalajara and the area of Toledo, Cáceres, Badajoz, and Ciudad Real; and (3) south-central Spain between Badajoz/Córdoba and Cádiz.

During the winter of 1979–1980, six general censuses were made at a total of 357 census sites. The maximum number of cranes (14,721) was counted between 8–10 February and the minimum number (9167) on 17–18 November. A series of maps drawn from the censuses delimits principal wintering areas and corridors of movement. The westernmost area is the crane's principal wintering area and contains large, stable concentrations of birds in mid-winter. Eastern and southern wintering areas are of lesser importance. The authors present a review of all known Spanish wintering areas with information on feeding and roosting areas and conservation. Integration of the new data with results from previous studies indicates that, since 1957–1958, Gallocanta Lake has developed into the most important stopping place, with 80% of the Iberian winter population passing through.

Pre-nuptial migration is concentrated during the first 2 weeks of March and takes a more eastern path than in the fall, passing through Zaragoza and Huesca. Migrating groups are twice the size of those found in post-nuptial migration.

Wintering ecology and behavior are discussed in a separate chapter. Diet is analyzed through foraging observations and stomach contents. The wintering population contained 11.42% young birds; 47.65% of pairs had young, with single chicks being more common (82.38%) than twins (17.62%). Data on molt, captured and injured birds, and folklore are presented, and minimum conservation measures are suggested.—Robert B. Waide.

4. Investigation of nocturnal restlessness in young and adult as well as in hand-raised and trapped *Sylvia atricapilla*. (Untersuchung der Nachtunruhe diesjähriger und adulter sowie handaufgezogener und gefangener *Sylvia atricapilla.*) P. Berthold. 1980. Vogelwarte 30:255–259. (In German, English summary.)—Trapped young Blackcaps undergo nocturnal restlessness well in advance of their normal time of migration. They are also active in captive conditions at night in winter. The author names a number of kinds of restlessness and proposes different motivational origins for these. More simply the results illustrate caution in interpreting nocturnal restlessness in all caged migrant species as simulations of migration.—R. B. Payne.

POPULATION DYNAMICS

(see also 1, 2, 10, 41)

5. On the population dynamics of the Little Owl (*Athene noctua*). (Zur Populationsdynamik des Steinkauzes (*Athene noctua*).) B. Ullrich. 1980. Vogelwarte 30:179–198. (In German, English summary.)—A local population was investigated in the northern foothills of the Swabian Alb; pairs bred almost exclusively in nest boxes. Of 299 birds banded, 10 were found dead and 54 were recaptured, mainly in the nest boxes. Of birds banded as young, 20 were recovered in the breeding study area, with males 4 times more likely to breed locally than females. These data indicate a greater dispersal distance from birth site to breeding site in females than in males. The mean distance of birth site to breeding site in birds recovered was 5.8 km. Some nestlings were found up to 200 km from their birth site.

In the local study area (250 km^2) about a third of the breeding birds had been banded locally as nestlings. The others immigrated from outside the study area.

The combination of known dispersal distances of young to their breeding site and the known proportion of local breeding birds that were born in the area provides direct evidence that the local populations are not genetic isolates, and that considerable gene exchange occurs across generations.

Little Owls responded to changes in local density of their prey, *Microtus arvalis,* by laying earlier in years of high vole numbers and by increasing the clutch size.—R. B. Payne.

NESTING AND REPRODUCTION

(see also 23, 24, 26, 27, 29, 40, 73, 83, 84)

6. Breeding season time and energy budgets of the polyandrous Spotted Sandpiper. S. J. Maxson and L. W. Oring. 1980. Behaviour 74:200–263.—*Actitis macularia* females begin looking for a new mate after laying the third egg of a 4-egg clutch, and they may mate with up to 4 males in a breeding season. In this mammoth study of behavioral ecology, the authors characterize how the two sexes partition their available time and energy into various activities, and try to find all the major factors influencing those partitions. The idea that emerges from the data is that egg-laying is an incredible drain on the female, which devotes a large amount of time to foraging in preparation for laying. Incorporating a few assumptions, the authors calculate that a clutch of 4 eggs contain 1.7 times the body calcium of a female, although from where all this calcium comes is a mystery. The authors endorse the hypothesis of Emlen and Oring (Science 197:215–223, 1977) that males evolved the assumption of incubation duties to free their mates for foraging in order to be prepared for relaying if the clutch were destroyed by predation. Once so freed the female was able to move to another male if the first clutch survived and other males were available. But is (was) nest predation higher on Spotted Sandpipers than on the vast majority of avian species, which are either monogamous (about 90%) or polygynous (most of the rest)?—Jack P. Hailman.

7. Male quality and female choice of mate in the Red-winged Blackbird (*Agelaius phoeniceus*). K. Yasukawa. 1981. Ecology 62:922–929.—This is one of a series of papers on Yasukawa's work with Red-winged Blackbirds in Indiana (Behav. Biol. 23:446–459, 1978; Condor 81:258–264, 1979; Am. Nat. 117:343–348, 1981). The topic dealt with here is the role of the quality of the male in female choice of mates. This is a tricky subject in that one needs to measure male quality independently of the quality of the territory defended. The method used involved measuring the attractiveness to females of arbitrary bits of nesting habitat irrespective of what males held the areas as parts of their territories. What Yasukawa found was that the proportion of males returning from one year to the next to these arbitrary bits of habitat did make a difference in female pairing success, i.e., male quality did have an influence on female mate choice separable from territory quality. Correlation analysis indicated that females may cue on male body size and reproductive experience (just how in this latter case is not suggested) although not, apparently, on age per se or courtship intensity per se.

These results differ markedly from those obtained using similar techniques for the same species in Washington state. There male quality did not matter, only territory quality. Apparently, this difference stems from the fact that in Washington the males do not participate in feeding the nestlings at all whereas in Indiana they do. Hence females in Indiana are under selection to recognize which males will put forth the greatest feeding effort. Two correlates of male feeding effort were identified: courtship intensity and reproductive experience. Thus an explanation is offered for why reproductive experience should be the subject of female choice, but still no definitive suggestion is forthcoming as to just how such selection is to be made.

Two further points bear emphasis. First, neither Yasukawa nor I have intended to imply that the male quality/territory quality choice is an either/or matter. Females may well cue on both male quality and territory quality simultaneously. Second, in order to get fuller statistics and thus allow a more complete separation of features indicating male quality, a bigger (>22–28 males/year) and/or longer (>4 yr) study would be necessary so that territory quality could be controlled.—A. John Gatz, Jr.

8. Egg size variation within passerine clutches: effects of ambient temperature and laying sequence. M. Ojanen, M. Orell, and R. A. Väisänen. 1981. Ornis Fenn. 58:93–108.—The laying sequences of eggs were determined for clutches of 4 species of hole-nesting birds (Great Tit, *Parus major*; Redstart, *Phoenicurus phoenicurus*; Pied Flycatcher, *Ficedula hypoleuca*; and Starling, *Sturnus vulgaris*) in Finland. Analysis of variance indicated that 50–70% of the variation in egg dimensions was due to between-clutch (between-female) variation, 5% to laying sequence within the clutch, and 5–20% to statistical interaction of female and laying sequence. The proportion of variance due to temperature was small, only 1% for the overall results but as much as 10–20% for the last eggs in the laying sequence. The authors attribute the results (low statistical effect of temperature and sequence; high between-clutch variation) to a high individual heritability of egg dimensions and they state that the results "confirm" that the heritability of egg size is fairly high. As in previous reviews, I must point out that both experimental manipulation and kin analysis are necessary to test adequately the idea that heritability of such characters is high.

The authors attribute the variability in the size of the last egg (particularly in large clutches) to the effect of temperature on the insect availability to the female. The statistical relationship of last egg size and temperature was found in daily maximum temperatures, not daily minimum temperatures, suggesting that insects are more active on warmer days and on such days the females can find more food to convert to eggs.—R. B. Payne.

9. On the breeding of the Redpoll *Carduelis flammea* in NE Finland. E. Pulliainen and V. Peiponen. 1981. Ornis Fenn. 58:109–116.—Nesting Redpolls (332 nests) were studied from 1970 to 1980 to determine the preferred nest sites and the seasonal variation in clutch size and in the nesting season. The modal nesting sites were junipers and spruces; heights were mainly 1–4 m in spruce trees, but only 1 m in the low juniper shrubs. The onset and duration of the nesting season varied from year to year, but the ecological conditions were not determined. Redpolls took a wide variety of foods, seeds, and weeds in winter but mainly insects in summer, and they fed mainly insects to their young, but could rear their young entirely on a diet of seeds. Eggs were laid at intervals of a day; the modal clutch size each summer was 5; clutch size decreased with the season; the incubation period was 10–12 days; and the nestling period was 9–13 days.—R. B. Payne.

10. The breeding adaptation of the Jackdaw *Corvus monedula* L. in Finland. E. Antikainen. 1978. Savonia 2:1–45.—The breeding biology of Jackdaws was studied over several years in 36 localities in southwestern Finland and in 7 localities in northern Finland. The study was based on 275 nests and another 2000+ nest-sites. About equal numbers of Jackdaws nest in tree holes and nest boxes in woods, in old churches, and in chimneys in more modern buildings. Nesting success was greatest in the woods. Populations nesting in woods appeared to be sources, and sites in buildings, while producing young, were overall population sinks. Jackdaws were strongly attracted to ruins, traditional churches, and chimneys. The difference in nesting success is in part explained by the size of the holes which are smaller and hence better protected in the woods. The social structure of Jackdaw flocks involves a dominance hierarchy, and the more dominant birds appear to get the better nest sites in churches than do the less dominant birds nesting in the same churches. Nesting in chimneys is in part due to the birds being driven from old churches and castles when these are closed or fall in ruin.

The second part of the study is titled "Comparison of the breeding ecology and egg parameters of the Jackdaw in southern and northern populations in Finland." In northern colonies the loss of eggs was greater, breeding success was lower, and eggs were narrower in breadth and smaller in volume.

This study on population biology is an important complement to the classical ethological studies on Jackdaws by K. Lorenz.

Savonia is published by the Kuopio Naturalists' Society, Kuopio Museum, Kauppakatu 23, SF-70101 Kuopio 10, Finland.—R. B. Payne.

11. Weight variations of adult Marsh Warblers (*Acrocephalus palustris*) during the breeding cycle. F. Dowsett-Lemaire and P. Collette. 1980. Vogelwarte 30:209–214.—Females vary in weight with a peak at the beginning of laying, when the eggs are formed. Males vary little in weight. Both sexes are lightest at the fledgling stage.—R. B. Payne.

12. Differential begging and locomotory behaviour by early and late hatched nestlings affecting the distribution of food in asynchronously hatched broods of altricial birds. O. Ryden and H. Bengtsson. 1980. Z. Tierpsychol. 53:209–224.—Late hatching, and hence smaller, nestlings must beg more to receive equal food from the parents (species studied being the Great Tit, *Parus major*; Blackbird, *Turdus merula,* a European thrush; and Fieldfare, *T. pilaris*). The authors argue that asynchronous hatching reflects average conditions of food for the young, whereas selective feeding favors the older young in times of scarcity but ensures equitable distribution of food in times of plenty. A subsequent paper by Reed (Auk 98:828–831, 1981) suggests that the story may be more complicated than this.—Jack P. Hailman.

13. Adaptations of egg characteristics and breeding behaviour of Guillemots (*Uria aalge aalge* Pont.) to breeding on cliff-ledges. (Anpassungen der Eier und des Brutverhaltens von Trottellummen an das Brüten auf Felssimsen.) P. Ingold. 1980. Z. Tierpsychol. 53:341–388. (In German, English summary.)—Many comparisons are drawn with the Razorbill (*Alca torda*), which does not nest so close to dropoffs. The Guillemot eggs are more elongated, hence roll in a tighter circle. However, loss of Razorbill eggs given to Guillemots was no higher because of the redundant system of protection given eggs through choosing ledges where the substrate is not smooth and where the ledge is not steeply slanted near the edge. Furthermore, Guillemots very carefully change partners during incubation, rarely leave the egg uncovered, and always keep it with the blunt end facing the wall away from the edge of the ledge. This is a very nice, detailed study.—Jack P. Hailman.

BEHAVIOR

(see also 7, 12, 13, 34, 40, 42, 47, 50, 64, 65, 66, 67, 69, 71, 72, 75, 77, 79, 83, 84)

14. Ritualization and the evolution of movement signals. A. Zahavi. 1980. Behaviour 72:76–81.—Zahavi is slowly developing a total reinterpretation of how animal signals convey their information, and the present paper on display movements is an extension of his previous paper on display coloration patterns (New Sci. 80:182–184, 1978). If Zahavi's ideas prove to be correct, they will totally change our interpretation of animal communication.

Perhaps the prevailing idea is that displays of birds and other animals are like signal-flags of a ship: each kind carries a precise and different meaning. Therefore evolution sharpens these signals to insure they are not confused by the receiver, which process results in low variation of color patterns and display movements. Zahavi's alternative idea is that the real information is carried by small variations in the signals, evolution structuring signals so as to prevent cheating. As we have no well-studied examples among animals, Zahavi's idea may be illustrated with a human analogy. In a beauty pageant the contestants could appear in any sort of costume, but if the prize is meant for the contestant with the best figure, then those contestants with good figures will tend to show them off in bathing suits. All contestants, to be competitive, must then follow by wearing the same kind of outfit, for failing to do so would virtually eliminate their chances of winning. Hence standardized garb and movements that best show off the important characteristics will become the norm, but it is the variations revealed by this standardization that convey the real information.

The leap from beauty contests to animal signals is not as ludicrous as it might appear. I found it markedly difficult to interpret many avian signals, even when pointing out the usefulness of indexic properties such as head-striping and breast-spots (Hailman, **Optical Signals,** Indiana Univ. Press, Bloomington, Indiana, p. 251, fig. 8-1, 1977). Breast-marks, for example, are found in many unrelated species living in open areas, such as the Horned Lark (*Eremophila alpestris*), meadowlarks (*Sturnella*), Dickcissel (*Spiza americana*), White-collared Seedeater (*Sporophila torqueola*), Lark Sparrow (*Chondestes grammacus*), Sage Sparrow (*Amphispiza belli*), Tree Sparrow (*Spizella arborea*), and others. (Despite its name the last species does not live in trees.) How are such similar display marks in a host of unrelated species to be explained? Employing Zahavi's idea one could speculate that strong pectoral muscles are important in these birds, and the breast marks provide a standard in which variations in this important aspect of morphology are easily judged by potential mates searching for the fittest individual with which to pair.

Turning to movements, Zahavi notes that one may be able to predict whether someone will be a tolerable runner or not, merely from watching him or her walking on the street. However, to discriminate truly good runners from those who merely can run, one must compare the subjects in a standardized way. What we should, therefore, be attending to in avian displays are the subtle differences among individuals rather than the stereotypy within a species. The message of a male songbird to a potential mate is only trivially characterized as readiness to breed; the important information may be something like "I am more fit to become your mate than are other males—just compare our movements and you will see." Although I wish there were some empirical studies to bolster Zahavi's ideas, these ideas make a good deal of sense to anyone who has wrestled with the problems of animal communication, and I think these ideas should be seriously entertained.—Jack P. Hailman.

15. Display, timing and function of wing movements accompanying antiphonal duets of *Cichladusa guttata*. D. Todt and A. Fiebelkorn. 1980. Behaviour 72:82–106.—This is an African thrush whose unfortunate common name is Spotted Morning Warbler. Mates perched together sing an antiphonal duet, in which the male (and apparently less commonly, the female) may also perform a sort of wing-waving display. Massive quantification of the timing and sequence of communicative elements failed, insofar as I can tell, to reveal anything but imprecise correlations and vague generalizations. That wing-waving movements "improve directing, focusing and fixing attention on a social partner, and thereby, support the development and maintenance (sic) of pair bonds" (p. 102) hardly explains why this species must wave its wings when other dueting species do not. The further suggestion that the visual display "may help to avoid habituation" is surely grasping at straws.—Jack P. Hailman.

16. Communication strategies of Great Blue Herons and Great Egrets. D. W. Mock. 1980. Behaviour 72:156–170.—The heron (*Ardea herodias*) and egret (*Casmerodius albus*) are the 2 largest members of the Ardeidae in North America, and they have similar life histories and optical signals. Mock details differences in morphology employed in signaling, displays used, and context of display. The heron's displays are more variable in form, but the egret's signaling rates are higher and its sequences of displays more fixed. After the pairbond is formed the egrets virtually stop displaying whereas the heron mates continue to display actively.—Jack P. Hailman.

17. Weight changes in relation to social hierarchy in captive flocks of silver-eyes, *Zosterops lateralis*. J. Kikkawa. 1980. Behaviour 74:92–100.—A captive flock of 10 birds deprived of food one hour per day gained less weight on the average than a control flock not food-deprived. However, it should be noted that the mean weight of the 2 flocks did not differ significantly either before or after the experimental period, so is it reasonable to believe that food deprivation makes a difference? (I am not sure.) Analysis of encounters in the experimental group revealed a dominance hierarchy, in which the omega bird lost weight "whereas the two most aggressive birds gained considerably less weight than the others." This last fact is interpreted as a cost of aggression. However, inspection of the data shows that the 2 top birds also had the highest weight at the beginning of the experiment (actually the second-ranked bird was tied with number 5), so it is hardly surprising that their weight gain was moderate.—Jack P. Hailman.

18. Naive ducklings show different cardiac response to hawk than to goose models. H. C. Mueller and P. G. Parker. 1980. Behaviour 74:101–113.—Mallard ducklings (*Anas platyrhynchos*) 3 generations removed from the wild were kept under incompletely specified conditions and tested at an unspecified age. Heart rate was monitored by telemetry before, during, and after a model passed overhead. In one direction the model resembled a hawk, in the other direction a goose. "The 2.5 sec interval during which the model appeared was deleted from the analysis because it was too difficult to time the start of counts so that the model would appear at a set time during the interval." The *variance* in heart rate was computed before and after the model, and the *difference* between these variances was compared for hawk and goose models. In 14 of 20 birds this comparison revealed a greater difference in variance of heart rate for the hawk model. Mean heart rates are not reported, but heart-rate differences before and after model presentation were compared for the 2 models, with the *goose* model eliciting greater elevation of mean heart rate. The entire concept of taking means and variances in serially correlated data can be questioned; without any idea of the distribution of values, the appropriateness of these 2 statistical parameters can also be questioned. No account is taken of how variances are correlated with means, and coefficients of variation would provide a better parameter if the correlation is linear. There would have been plenty of room in the tables presented to give the actual means and variances, instead of merely their differences between the before- and after-model states, but the reader has no access to the real data. Perhaps if he had such access he would know whether or not to believe the final statement: "We conclude that variance in heart rate is an excellent measure of emotional response to a stimulus."—Jack P. Hailman.

19. Factors affecting flock size, mean and variance in a winter population of House Sparrows (*Passer domesticus* L.). C. J. Barnard. 1980. Behaviour 74:114–127.—There are no surprises. More food resulted in larger flocks because individuals spent longer feeding. Human disturbances decreased flock size, whereas warmer temperatures increased it. Fighting rate increased with more birds present, but decreased with warmer temperatures.—Jack P. Hailman.

20. Communication during monocular and binocular looking in European jays (*Garrulus g. glandarius*). I. Bossema and R. R. Burgler. 1980. Behaviour 74:274–283.—Interactions of captive, hand-reared jays, with the dominant of 2 birds at the feeder, were video-taped. The distance of the subordinate (long or short), the looking at it by the dominant (monocularly or binocularly), the reaction of the subordinate (look, eat, head away, hop back, turn head away, hop around feeder, or withdraw from feeder), and the presence or absence of attack by the dominant were recorded. As would be expected, attack was more likely if the subordinate was close and if the dominant was facing the subordinate. Attack probabilities also varied with the kind of response given by the subordinate. A great deal of behavior is semi-Markovian in nature (Hailman. **Optical Signals.** Indiana Univ. Press, Bloomington, Indiana, pp. 36–37, 1977), so to understand the responses of the subordinates to the dominant's signal, one needs to know what the subordinate was doing just before that signal; unfortunately, this behavior was not recorded. The titular emphasis on monocular and binocular suggests stress on the 2 areas of acute vision on the bird's retina, but this subject is never mentioned; in fact, "binocular" really means only that the dominant was facing the subordinate, so it is not surprising that such situations lead to attack.—Jack P. Hailman.

21. Communication by agonistic displays: a discussion. J. G. van Rhijn. 1980. Behaviour 74:284–293.—The discussion was stimulated by the paper of Bossema and Burgler (review no. **20**), and by the arm-chair theorizing of several different authors, principally John Maynard Smith and Richard Dawkins. A principal aim was to see if animals (most of the data from birds) were signaling "honestly" about their tendencies to attack and abilities to defend a resource, or alternatively were "bluffing" with signals. What van Rhijn succeeds in doing is to eliminate certain potential factors (such as whether the birds know one another individually) as critical differences among empirical studies with apparently conflicting results. He cannot, however, firmly answer the principal question of honesty vs. bluffing. The problem, in my view, is that empirical studies fail to record the crucial information (see review no. **20**) and fail to frame the results in logical terms of conditional probabilities so that the dyadic interactions can be thoroughly scrutinized.—Jack P. Hailman.

22. The preening invitation or head-down display of parasitic cowbirds: II. Experimental analysis and evidence for behavioural mimicry. S. I. Rothstein. 1980. Behaviour 75:148–184.—In 1961 Selander and LaRue (Auk 78:473–504) reported that the Brown-headed Cowbird (*Molothrus ater*), a nest-parasite, uses a head-bowed display that elicits preening from other species. Stephen Rothstein has shown in a series of experiments with caged birds that the display is basically threat given to individuals that are strange to the displayer or that show tendencies of "fear" or flight. As the display does sometimes elicit preening from other species (but not from conspecifics), it could function to reduce their aggressive tendencies and allow the displaying cowbird to remain in the vicinity unchastized. However, Rothstein argues that the display is used interspecifically in the non-breeding seasons and also that the species most frequently addressed are those unlikely to be parasitized. Furthermore, observations of cowbirds near host nests do not include reports of the display being used. Therefore, Rothstein does not believe the display to have been evolved specifically in conjunction with nest-parasitism. The field evidence, however, is largely anecdotal, and I think it remains an open question as to whether this display is regularly used by the cowbird to gain greater access to the vicinity of a host's nest.—Jack P. Hailman.

23. A functional analysis of courtship feeding in the Red-billed Gull, *Larus novaeahollandiae scopulinus*. C. R. Tasker and J. A. Mills. 1981. Behaviour 77:221–241.—Courtship feeding may have a purely behavioral function in the formation and/or maintenance of the pair bond or an important nutritional function for the female. Both possible functions were analyzed at a Red-billed Gull colony in New Zealand in 1967, 1968, and 1973. Twenty pairs of gulls were observed from a blind during the pre-incubation and incubation stages of the breeding season. Each bird was individually color marked, and sex was determined by bill measurements. All behavior related to courtship feeding, precopulatory displays, and copulation was recorded. The frequency of courtship feeding and copulation behavior were analyzed relative to the date of egg laying and success of copulation attempt. Quantities of food (euphausiids) delivered by the male to the female in feeding bouts was assessed visually and a feeding index was obtained. Feeding rate of the male and quantity of food provided to the female were examined relative to the proportion of time spent on territory by both members of the pair and the date of laying.

Tasker and Mills provide a clear verbal and pictorial description of courtship feedings, precopulatory displays, and copulation behavior. Their data show that the greater the quantity of food provided by the male, the greater the probability of cloacal contact during copulation attempts. Preliminary data suggest that the courtship feeding performance of the male may affect the future status of the pair bond.

The incidence of courtship feeding was low between 40 and 20 days before laying and peaked 10 days before. In the 5 days prior to laying, the female was absent from the territory 18% of the daylight hours, and the male provided a substantial proportion of her daily food intake. If courtship feeding took place away from the nest site as it does in other gulls, the figures presented for proportion of food provided by the male are underestimates. The authors do not mention the occurrence of other feeding sites, but such observations would provide further support for the data collected. Tasker and Mills suggest that the provisioning of extra food occurred during egg formation when the female needed it most. Females that were adequately fed by males did not have to spend as much time foraging for themselves, thereby channeling more energy toward egg production. The authors suggest that courtship feeding plays a dual role, acting as an inducement for successful copulation and being nutritionally important for the female.—Lise A. Hanners.

24. Ecology and behavior of the Gymnogene. T. L. Thurow and H. L. Black. 1981. Ostrich 52:25–35.—Also known as the African Harrier Hawk, *Polyboroides typus* is an extremely interesting hawk. Its small bare head, its double-jointed inter-tarsal joint, long tarsi, and small outer toes are all useful in extracting prey from crevices and recesses. In the authors' study area it fed largely upon reptiles and birds, but also mammals, insects, and amphibia. Most interesting, however, is the species' possible use of skin color in communication. Its bare head can change in color almost instantaneously from a pale yellow-white to a dark red. The authors document the occasions that they observed color changes and suggest that the red end of the spectrum is associated with apprehension and anticipation of being challenged by a dominant bird. Red then communicates appeasement, especially in various nest site contexts, such as nest relief. There are, however, several situations that the authors describe in which simple explanations of color change are not quite so satisfying. For instance, danger perceived at some distance evoked a very pale color. Flushing also apparently serves a thermoregulatory function. The head changes from a lemon yellow color on cool mornings to a light pink during the heat of the day. This is an interesting study of a bird which obviously deserves more intensive research.—C. J. Ralph.

25. An analysis of the displays of Lesser Sheathbills *Chionis minor*. A. E. Burger. 1980. Z. Tierpsychol. 52:381–396.—Sheathbills are a family of two species of Antarctic and Sub-Antarctic birds related to gulls, and the displays of the Lesser Sheathbill show many resemblances to the well-known displays of gulls. Descriptive ethological studies are regrettably not as common as they once were, but this paper is a happy exception.—Jack P. Hailman.

26. An unknown determinant of a sex-specific altruism. E. Curio. 1980. Z. Tierpsychol. 53:139–152.—The author's experiments show the male Great Tit (*Parus major*) to be more active in defense of the brood than the female. This is not nearly as rare a phenomenon as the paper leads one to believe, as it has been reported in many species besides the few cited. Curio argues that the sex-difference cannot be explained by kin-selection because both parents are equally related to the offspring, or else the female is more related (if one allows for cuckoldry). Nor can it be explained by differences in the number of offspring produced during a lifetime; for example, if males produced fewer than females, they would have a greater investment in a particular brood. In fact, male Great Tits live longer than females so presumably produce more young in a lifetime, hence should defend a particular brood less. Curio suggests 3 possibilities: (1) the female is less motile because of physiological costs of reproduction, and thus less likely to escape a predator; (2) the loss of the female would be devastating since only she broods; or (3) she performs one kind of nest-defense (the snake-display) that entails risk, so the male assumes risk with mammalian predators near the nest in a sort of division of labor. The author never considers or cites Zahavi's idea that males take on greater risks around predators to display their fitness, nor does he consider that this sex-difference might be simply the manifestation of more aggressive tendencies of the male in a territorial species.—Jack P. Hailman.

27. Reciprocal aid-giving in a communal bird. J. L. Brown and E. R. Brown. 1980. Z. Tierpsychol. 53:313–324.—The Mexican Jay (*Aphelocoma ultramarina*) nests in communal groups in which all breeding birds do at least some feeding of young from various nests. The only new data in this paper establish that this seemingly indiscriminate feeding begins before fledging. The study is based on 3 nests (another failed), from which the reputed fathers of 2 disappeared. All the *post hoc* arguments attempting to explain why parents feed young that are not their own rest on several unvoiced assumptions. Among these assumptions is that the male and female attending a nest are the genetic parents of the young therein. As far as I can tell from the papers on this species, no one has ever established that a female is always fertilized by her mate (vasectomies, such as done in other species, might be instructive). Nor does there seem to be any evidence that the eggs in a nest attended by a given female were even laid by her. The authors propose a "membership hypothesis" in which young cannot know who their parents are because they are fed by so many adults. Consequently when they become breeders they help everyone regardless of relationship because they do not know how closely anyone is related. This "hypothesis" is clearly circular, incomplete, and non-explanatory. The question is how this system could evolve: why any bird should feed offspring other than its own (the most related young birds), *if* the adult were certain of being the parent (which, as noted, has not been established). The other "hypothesis" is termed the helper-resource notion, which assumes that adults feed young other than their own so that the young will not know genetic relationships and thus later help them (or their genetic offspring). Again, this is simply muddled thinking because it does not explain why parents would not be better off feeding their own offspring, in which case they would not need the outside help. To unravel the Mexican Jay problem we need more data and less pseudo-explanation.—Jack P. Hailman.

28. Factors influencing learning to avoid unpalatable prey in birds: relearning, new alternative prey, and similarity or appearance of alternative prey. (Zum Meidenlernen ungeniessbarer Beute bei Vögeln: Der Einfluss der Faktoren Umlernen, neue Alternativbeute und Ahnlichkeit der Alternativbeute.) W. Schuler. 1980. Z. Tierpsychol. 54:105–143. (In German, English summary.)—The objective of this series of experiments was to clarify learning processes underlying the avoidance of unpalatable prey so that conditions favoring Batesian mimicry in prey such as insects can be better understood. Starlings (*Sturnus vulgaris*) were tested individually using a special insect feeder and 4 sorts of prey items: mealworm larvae, mealworm pupae marked in 2 different ways, and pupae of the wax moth. For a given experiment one type of food was made bitter and hence unpalatable. Starlings quickly learned to distinguish palatable from unpalatable prey in a simple choice test. If the formerly palatable prey was then made unpalatable, the relearning task was more difficult and proceeded more slowly. A second experiment introduced a new palatable prey in place of the first one, and this too inhibited relearning. If prey were similar in the initial learning, the discrimination was slow by comparison, and if the types were subsequently switched or a new palatable prey was introduced, the birds had great difficulty in the relearning process. When both switching and a new palatable prey were introduced, the birds were obviously confused, and 3 of 5 tested simply refused to respond. I think the take-home message is probably something such as this: in nature birds will learn an easy discrimination of prey readily, but if the problem is a difficult one they will merely avoid all prey of the general type and feed on quite different animals.—Jack P. Hailman.

29. Adoption of strange chicks by Herring Gulls, *Larus argentatus* L. Z. Tierpsychol. 54:267–278.—In 23 territories watched on the Isle of May in Scotland, there were 19 cases of chicks going to a new territory, 10 of these resulted in successful adoption, and 6 of the adopted chicks fledged. Younger chicks apparently invaded strange territories "spontaneously" whereas older ones were either brought to the new territory as "food" or else were driven off their natal territories by intruders. Chicks tended to stay near the nest in new territories and when they did so were only rarely attacked by the adults.—Jack P. Hailman.

ECOLOGY

(see also 39, 49, 61, 67, 83, 84)

30. Habitat selection of forest birds in the seasonal environment of Finland. R. V. Alatalo. 1981. Ann. Zool. Fenn. 18:103–114.—The data derive from year-round censuses in northern Finnish forests during 1934–1936 and 1975–1978. Habitat overlap and breadth were less among congeneric than noncongeneric passerines. Habitat breadth of foliage-gleaning passerines decreased with increasing numbers of coexisting foliage-gleaning species. Both results suggest the importance of interspecific competition, a conclusion also supported by the decreased overlap in resource use among over-wintering foliage-gleaners despite a tendency for all such species to forage in pine woods. Gallinaceous birds showed decreased habitat overlap during winter and increased overlap in summer, again suggesting that interspecific competition structures community interactions.

The analysis is difficult to follow as the equations used to measure habitat overlap and breadth are insufficiently explained for the mathematical amateur. Furthermore the different measures provide conflicting results, leading to a convoluted discussion that requires careful reading. However, the abstract provides a clear summation of the important conclusions. Despite the occasionally difficult text, the data emphasize the importance of interspecific competition in structuring avian communities, particularly communities of foliage-gleaners.—Edward H. Burtt, Jr.

31. Bird activity and seed dispersal of a montane forest tree (*Dunalia arborescens*) in Jamacia. A. Cruz. 1981. Biotropica 13 (Supplement):34–44.—This is a very thorough and careful study on the importance of birds as dispersal agents for insular tropical trees. Although the study focuses on the seed dispersal by birds of *Dunalia arborescens,* other trees were also included. *D. arborescens* is a common shrub of clearings and secondary thickets producing small fruits which ripen asynchronously. Sixteen species (from 8 families) feed on the fruit. The results are consistent with the hypothesis that trees and shrubs that occur in unpredictable habitat openings should be dispersed as widely as possible by the greatest variety of birds possible to insure their survival. The degree of frugivory ranged from near 100% (Stripe-headed Tanager (*Spindalis zena*) and Greater Antillean

Bullfinch (*Loxigilla violacea*)) to less than 30% (Greater Antillean Elaenia (*Elaenia fallax*) and White-eyed Thrush (*Turdus jamaicensis*)) for the 16 frugivorous species. Because the fruits ripened asynchronously, individuals could return daily to the same tree to forage. The amount of overlap of *D. arborescens* with other shrubs and trees for avian disperser species ranged from 37.5% to 88.8%.—Robert C. Beason.

32. Treefalls and the distribution of understory birds in a tropical forest. D. W. Schemske and N. Brokaw. 1981. Ecology 62:938–945.—Add another item—treefall induced gaps—to the growing list of features that can influence bird species diversity. Actually, the item is not new, since the gaps left by treefalls have as one of their principal features a different vegetational height profile than the surrounding forest. Still, Schemske and Brokaw present 9 mo worth of well-analyzed data that indicate more species show a significant preference to either gaps or forest than would be expected by chance alone. Further, Bray-Curtis ordination of the avifaunas mistnetted at the 16 sites indicates that the species compositions of the 8 forest and 8 gap sites are quite distinct. Overall, more bird species were netted in the gaps than in the forest, and the authors suggest this might be the result of both the edge effect of gaps bordering on forests and the high density of foliage at net level in gaps. In sum, treefall gaps lead to an increase in bird species diversity in the tropics; similar work in temperate forests has yet to be reported.—A. John Gatz, Jr.

33. Weight changes in Redheads and Canvasbacks during the winter. S. Kaminsky and R. A. Ryan. 1981. N. Y. Fish and Game J. 28:215–222.—The authors captured and weighed 3840 Redheads (*Aythya americana*) and 1272 Canvasbacks (*A. valisineria*) during January–March 1972–1976. Data are separated by year, date of capture, species, age, and sex. All sex and age classes of both species lost weight as the winter progressed in all years, but statistical significance ($P < .05$) was reached in only 60% of the cases. Limited sample size may have caused the insignificance in most of these. Adult males of both species lost weight more often as the winter progressed than did other sex/age groups. The data for Canvasbacks were much more variable than those for Redheads.—Richard M. Zammuto.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 36, 37, 38, 39, 40)

34. Movements and habitat use by depredating Red-winged Blackbirds in Simcoe County, Ontario. J. D. Somers, R. G. Gartshore, F. F. Gilbert, and R. J. Brooks. 1981. Can. J. Zool. 59:2206–2214.—Red-winged Blackbirds (*Agelaius phoeniceus*) cause depredation of cereal crops in southern Ontario and elsewhere. This report contains no estimates of the magnitudes of the losses involved, but rather describes patterns of movement of color-tagged blackbirds belonging to a roost of about 105,000 birds. During mid-July, most birds were sighted in either hay or oat fields; by late July and early August, birds had moved to either oat or corn fields; and in mid-August through early September the blackbirds were almost exclusively in corn fields. Winter wheat fields were virtually ignored; Red-wings were seen only in fields of wheat stubble, not wheat before harvest. Movements of hatching-year and after-hatching-year age classes and both sexes were similar and involved distances up to 13 km from the roost. Monitoring of radio-bearing individual males indicated that single birds moved frequently between individual fields. Although no specific management techniques were suggested, the patterns of movement reported were shown to be relevant to strategies for control of depredations.—A. John Gatz, Jr.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 68)

35. The co-operative breeding bird survey in Canada, 1980. E. Silieff and G. H. Finney. 1981. Can. Wildl. Serv. Prog. Note, No. 122.—This paper reports the number of breeding birds observed during 1980 on 244 roadside routes across Canada. The mean number of birds recorded per route was 751 for the Maritime provinces, 681 for central Ontario and central Quebec, 1199 for southern Ontario and southern Quebec, 975 for the southern prairie provinces, 727 for central prairie provinces, 680 for British Columbia, and 490 for Yukon Territory. The American Robin (*Turdus migratorius*), White-throated Sparrow (*Zonotrichia albicollis*), Red-winged Blackbird (*Agelaius phoeniceus*), and Swainson's Thrush (*Catharus ustulatus*), were the most abundant species in one or more of the 7 regions. Changes between 1979 and 1980 population counts are tabulated and discussed for most of 40 or more species for 6 of the regions.—Richard M. Zammuto.

36. Subdivision of nature reserves and the maintenance of species diversity. M. E. Gilpin and J. M. Diamond. 1980. Nature 285:567–568.—On the premise that nature reserves act as "habitat islands" in modern, modified environmental "seas," island biogeographic findings and theory may be applicable to their planning. Previous work has indicated that larger islands tend to hold more species, although about a doubling in size is needed to yield an approximate 25% increase in diversity. In a study of 13 New Hebrides islands, avian species totals were related to total area in each of 78 possible island pairings, and these data were compared with species-area regressions for individual islands. Paired island sets held 5–10% more species than single islands of the same total area. These findings are consistent with those of Higgs and Usher (review **37**). These papers lead to the general premise that subdivision of (or creating smaller) nature reserves may in some circumstances offer a useful tactic for diversifying species composition (but see review **39**). Gilpin and Diamond further suggest that whereas halving tends to increase diversity, finer partitioning (e.g., tenthing) does not. Species-specific space requirements will determine in large part which species will tend to be maintained by various splitting and lumping strategies. Species turnover rates owing to random colonization and extinction will maintain inter-island variance in species composition.

The extent to which this thought-provoking and stimulating paper may be used for more utilitarian purposes remains to be seen, but without doubt these ideas will help provide a conceptual basis for environmental planning strategies and stimulate new research in areas where the needs are great.—W. A. Montevecchi.

37. Should nature reserves be large or small? A. J. Higgs and M. B. Usher. 1980. Nature 285:568–569.—Concerned with conservation and land use planning issues, this paper addresses the pragmatic though perhaps artificially dichotomous question of whether efforts should be directed toward establishing a small number of large or more small reserves. As in the preceding article by Gilpin and Diamond (review **36**), Higgs and Usher conclude that smaller reserves maintain a more diverse species composition than a larger one of the same total area (but see review **39**). In a study of 3 quarry reserves with sample sites ranging from 2 to 5 ha, the number of higher plant species (not specified) was maximized by halving larger unit areas. This paper is well-designed, straight-forward and to the point. While recognizing that species-specific requirements, management goals, and practicalities will constrain all land use considerations, the authors, like Gilpin and Diamond, add another note of discord to the generalized theoretical position that biggest is always best.—W. A. Montevecchi.

38. Best shape for nature reserves. M. Game. 1980. Nature 287:630–632.—Criticising previous reports that optimal conservation strategy involves the design of large reserves situated as close together as possible and the acceptance of this idea by the IUCN (International Union for Conservation of Nature), Game goes on to conclude that Diamond's (Biol. Conserv. 7:129–146, 1975) contention that reserves should be as round as possible does not hold in certain cases. She argues logically that an island's immigration rate depends on its shape (i.e., linear extent relative to direction of travel) as well as its area and shows mathematically that shape may have little affect on extinction rate and a strong one on immigration rate. On this basis she concludes that in such cases circularity of reserve shape will not maximize the species equilibrium point and that optimal reserve shape, a function of the balance between extinction and immigration, will be other than circular whenever immigration rate has a greater dependence on shape than does extinction rate. That reserves should be as close together as possible is also inconsistent with the circularity of design concept: the former assumes that immigration is a more important consideration, the latter that it is not.

Criticism of recent ecological theory that has the potential to be uncritically used in management and land development schemes is needed and should be encouraged. The tendency of many ecological modellers and theorists to write in global generalities of species composition and reserve design (see reviews **36, 37**) while conceptually stimulating, leaves a funny taste of abstraction. It goes without saying that the needs of different species (faunal and floral) have to be focal considerations in real-world decisions (see review **39**).—W. A. Montevecchi.

39. Equilibrium biogeography and the size of nature preserves: an avian case study. G. S. Butcher, W. A. Niering, W. J. Barry, and R. H. Goodwin. 1981. Oecologia (Berl.) 49:29–37.—Important changes in avian populations are indicated by 7 breeding bird censuses conducted at the Bolleswood Natural Area in New London, Connecticut between 1953 and 1976. On the 6.5 ha of old field, species that prefer open shrub habitat (e.g., Field Sparrow, *Spizella pusilla*) became scarce or disappeared. Species associated with young forests (e.g., American Redstart, *Setophaga ruticilla*) colonized. Such population shifts are the expected outcome of successional changes in the vegetation.

Between 1953 and 1976 the density of trees and shrubs in the forest decreased while the size of the trees increased. Despite these vegetational changes, 5 species characteristic of mature forest disappeared and 2 declined markedly. Six species characteristic of suburban habitats colonized or increased in the forest. The local extinction of forest specialists appeared to result from the forest's increasing isolation from similar habitat and competition for suburban species (e.g., American Robin, *Turdus migratorius*). The authors conclude that the effort to preserve forest specialists will require several thousand hectares in a more or less continuous preserve (see reviews **36, 37, 38**). The authors also argue that measures of species turnover rate can mask important trends in local colonization or extinction, because the measure is greatly influenced by species that only occasionally breed in the habitat.

The data are laid out in admirable detail, allowing one to question the authors' assignment of breeding status in some species. However, categorization of breeding status seems to have been conservative, and analytical changes would only reinforce the trends already described. The need for regional conservation planning is abundantly clear from the conclusions of this paper.—Edward H. Burtt, Jr.

40. The Altai Snow Partridge (*Altaiskii ular*). L. Solin and D. Medvedev. 1981. Okhota okhot. khoz. 4:12–13. (In Russian.)—The Altai Snow Partridge (*Tetraogallus altaicus*) lives high (2000–3000 m) in the alpine regions of the Altai and Sayan Mountains in Soviet central Asia. It is patchily distributed through this area and numbers are few (unclear how many); it is listed in the USSR's Red Data Book. In winter the birds gather in flocks of up to 30 and migrate to peaks (where snow is not so deep, being blown or melted away). They also make vertical migrations (in concert with the snow line) in spring and fall. The winter flocks break up into pairs in spring, although the female alone incubates the 8–20 eggs and tends the young.

Wherever the snow partridge has been found, the Siberian mountain goat is too, so other partridge enclaves should be sought elsewhere in the goat's range (although the goat too is becoming rare). The goat and partridge live mutualistically: the goats can distinguish the alarm note from the many other calls of the sharp-eyed partridge, and the partridges feed with the goats in winter.

Pasturing of cattle in this region disturbs the partridges which are also vulnerable to summer frosts and snowfalls. Since partridges are readily tamed, prolific, hardy, not fastidious, and tasty, the authors suggest establishing partridge farms, both to preserve the species and increase meat supplies.—Elizabeth C. Anderson.

41. Movements and mortality of Isle of May Shags as shown by ringing recoveries. H. Galbraith, S. Russell, and R. W. Furness. 1981. Ringing & Migr. 3:181–189.—Galbraith et al. base their conclusions on 838 recoveries from among 7436 Shags (*Phalacrocorax aristotelis*) banded on the Isle of May, Firth of Forth between 1953 and 1979. First-year birds disperse farther and return to the Forth later than older birds, despite a tendency, unsupported by statistical analysis, for older birds to leave the colony earlier. Since the 1950s the dispersal distance of first-year birds has declined significantly, suggesting contraction of the winter range.

Mortality from human contact results from shooting, entanglement in fishing gear, and oiling. The importance of shooting, primarily of first-year birds, has declined sharply since the end of bounty hunting. First-year birds are the primary victims of fishing nets and the sole victims of lobster pots, suggesting that Shags learn to forage away from human contraptions. Furthermore mortality from fishing gear has declined in recent decades. The authors speculate that reduced inshore fishing accounts for the decline, but continuous selection against birds that forage near fishing gear is an unmentioned and interesting alternative. Shags of all ages are equally susceptible to oiling, which is a dramatically increased source of mortality. Because Shags are restricted to coastal waters, they are a particularly important index to pollution of the coastal, marine environment. Thus regional studies such as this provide important data on changes in environmental quality. The importance of regional studies is further underscored by differences in mortality and dispersal patterns of Shags from the Isle of May and those from northwest Scotland.—Edward H. Burtt, Jr.

PARASITES AND DISEASES

(see 22, 57)

PHYSIOLOGY

(see also 18, 47, 83)

42. Seasonal changes of sexual and territorial behaviour and plasma testosterone levels in male Lesser Sheathbills (*Chionis minor*). A. E. Burger and R. P. Millar. 1980. Z. Tierpsychol. 52:397–406.—Increase of testosterone in the blood taken from brachial veins of living males (or hearts of shot males) correlated seasonally with testis-mass, pairing displays, nest-building, and copulation. However, territorial aggression outside of the breeding season was not testosterone-correlated.—Jack P. Hailman.

MORPHOLOGY AND ANATOMY

(see also 11, 14, 33, 47)

43. Aging male Ring-necked Pheasants by bone histology. W. B. Stone and K. Morris. 1981. N. Y. Fish and Game J. 28:223–229.—This paper explains a method for determining age in dead male pheasants during fall. The tarsometatarsus and 3rd phalanx were sliced, mounted on slides, and observed under a light microscope. Rings in the bone separated adults from juveniles while the degree of bone porosity indicated late-hatched vs. early-hatched juveniles. The authors consider this technique the best available for aging male Ring-necked Pheasants (*Phasianus colchicus*). I feel this technique should be explored more fully for possible extension to other birds. Banded birds found dead may offer promising results.—Richard M. Zammuto.

44. Size variation in the Snow Petrel (*Pagodroma nivea*). A. N. Cowan. 1981. Notornis 28:169–188.—This paper makes an important contribution by pointing out (1) the vastness of the Antarctic Continent, and (2) the inadequacy of specimen data upon which our ideas of geographic variation in even the commonest Antarctic species are based. Cowan, Medical Officer at Casey (Australia), Antarctica, studied the Snow Petrel at the Windmill Islands (110°E), the only breeding station in 800 km of coast. The Snow Petrel is the only Antarctic species for which racial variation has been claimed. At the Windmill Islands, small and large birds occur in the same colonies and even mate. Cowan concludes that while individual variation is large, geographic variation is not demonstrable. I think the data hint that variation may be latitudinal, but too few specimens exist to allow any tests. If the variation is not geographic, what factors allow the persistence of extreme size variation in so severe a climate? The question is open, and invites a comparative study with another common Antarctic resident, *Thalassoica antarctica*.—J. R. Jehl, Jr.

45. Wing lengths and weights of a South German population of the Red-backed Shrike (*Lanius collurio*) in relation to sex-specific division of labor during the breeding season. [Flügellängen und Gewichte einer südwestdeutschen Population des Neuntöters (*Lanius collurio*) unter Berücksichtigung der geschlechtsspezifischen Arbeitsteilung während der Brutperiode.] H. Jakober and W. Stauber. 1980. Vogelwarte 30:198–208. (In German, English summary.)—Males are slightly larger (wing length mean 95.1 mm) than females (wing length mean 94.6 mm). First-year birds are slightly smaller than adults, and second-year birds are smaller than older birds, though not statistically shown in the sample. Weight changes through the breeding period. Males are more active and weigh less than females. Some birds gain weight at the end of nesting, but others leave the breeding ground with no sign of fat deposition.—R. B. Payne.

46. Ageing of Reed Warblers (*Acrocephalus scirpaceus*) by the color of the iris and the tongue spots. [Zungenfleckung und Irisfarbe als Alterskennzeichen beim Teichrohrsänger (*Acrocephalus scirpaceus*)]. H. Kuschert. 1980. Vogelwarte 30:214–218. (In German, English summary.)—Nestlings have a gray iris. Most adults have a brown iris, but a few birds older than 1–2 years have a gray iris. Birds with black tongue spots are first-year birds.—R. B. Payne.

PLUMAGES AND MOLT

47. The adaptiveness of animal colors. E. H. Burtt, Jr. 1981. BioScience 31:723–729.—Hypotheses about the colors and patterns of animals, including many examples from birds, are considered under 3 broad categories: physiological and structural hypotheses (such as thermoregulation), hypotheses concerning vision (such as eyelines as sighting guides), and hypotheses concerning appearance to others (such as conspicuousness to conspecifics or concealment from predators). Throughout this clear presentation, emphasis is laid on the multiple and sometimes opposing selection pressures that shape animal coloration, and the review ends on the hopeful note that "the bewildering variety of colors and patterns of color is beginning to yield to systematic study."—Jack P. Hailman.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 35, 36, 38, 39, 44, 56, 83)

48. Additions and corrections to the avifauna of Burundi. [Additions et corrections à l'avifaune du Burundi.] Y. Gaugris, A. Prigogine, and J.-P. Vande Weghe. 1981. Gerfaut 71:3–40. (In French.)—Recent field work by the authors has turned up 114 species and 13 subspecies for the list of birds in Burundi. Many of these records have previously been published; the present contribution summarizes all records noted since Schouteden's list of 1966. At present the list for Burundi includes 579 species.—R. B. Payne.

49. Sympatry of the Grey Woodpecker *Dendropicos goertae* and the Olive Woodpecker *Dendropicos griseocephalus* in Rwanda and Burundi. [Sympatrie du pic goertan, *Dendropicos goertae,* et du pic olive, *Dendropicos griseocephalus,* au Rwanda et au Burundi.] J.-P. Vande Weghe. 1981. Gerfaut 71:41–46. (In French.)—These 2 species, regarded as a superspecies, generally replace each other in habitat, with Grey Woodpeckers in acacia woodland and Olive Woodpeckers in riparian forests. The observations are similar to those in other parts of Africa.—R. B. Payne.

50. Notes on birds of the Weddel Sea, Antarctica. R. M. Zink. 1981. Gerfaut 71:59–74.—Observations of seabirds were made on a cruise in February 1979. Notes on local distribution, clumping, and feeding behavior are given.—R. B. Payne.

51. New charadriiform records from coastal Peru. G. R. Graves. 1981. Gerfaut 71:75–79.—Records over the past 20 years are summarized.—R. B. Payne.

52. Age ratios, wing length, and moult, as indicators of the population structure of Redshank wintering on British estuaries. R. W. Furness and S. R. Baille. 1981. Ringing & Migr. 3:123–132.—Adult Redshanks (*Tringa totanus*) arrive on the estuarine wintering sites ahead of first-year birds. However, the ratio of first-year birds to adults is stable from August through January although the ratio varies widely among different estuaries. The consistent age ratio at each estuary and the lack of birds banded at one site and captured at a different site suggests high site fidelity. The smaller median wing lengths of populations wintering in southern England suggest that the larger Icelandic subspecies (*T. t. robustus*) winters on the Scottish and northern English coasts whereas the smaller British subspecies (*T. t. britannica*) winters on the southern British coasts and farther south. Conclusions regarding the distribution of subspecies are tentative as differences in the sizes of males and females combined with abrasive wear of the primaries make size estimates based on wing length unreliable. Nonetheless the large-scale statistical analysis of banded birds offers insight into the winter distribution of subspecies.—Edward H. Burtt, Jr.

53. Wilson's Phalaropes (*Phalaropus tricolor*) in Europe and North Africa. [Wilsonwassertreter (*Phalaropus tricolor*) in Europe and Nordafrika.] H. Schiemann. 1980. Vogelwarte 30:260–268. (In German, English summary.)—During 1954–1978, 124 Wilson's Phalaropes were observed in Europe and North Africa. The seasonal distribution of records indicates a southward migration in Europe in autumn and a return migration in spring.—R. B. Payne.

SYSTEMATICS AND PALEONTOLOGY

(see also 52)

54. Feather protein as a source of avian taxonomic information. A. G. Knox. 1980. Comp. Biochem. Physiol. 65B:45–54.—Knox investigates the use of a protein extracted from feathers, keratin, for assessing taxonomic relationships. The complex feather structure is chemically reduced to small soluble subunits that are separated by electrophoresis with general protein staining. He finds negligible differences within individuals and species when homologous parts of the feather are used for comparison. Differences were found, however, among species and genera, and these could be quantified using Nei's genetic distance measure. For the species reported here, the results were consistent with current taxonomy.

This technique has been used in the past, principally by Alan Brush of the University of Connecticut, and may well prove a useful tool in systematics. A potential drawback is that a quite restricted number of characters is analyzed. The usefulness of the technique, as analyzed here, depends on the reliability of a molecular clock; that is, protein changes must occur at about the same rate in all lineages for similarity to index recency of evolutionary history. Because protein changes are a random (stochastic) process, the more characters that are used the better. This minimizes the among character sampling error. This drawback could be reduced by examining more proteins, as is now done in most electrophoretic surveys using tissues, or by analyzing the results in a different fashion, perhaps in a more phylogenetic way.—George F. Barrowclough.

55. The status of *Nectarinia afra prigoginei* (Macdonald). C. W. Benson and A. Prigogine. 1981. Gerfaut 71:47–57.—The double-collared sunbirds comprise a species complex that has recently been considered to include as many as 6 species in East Africa. The form *prigoginei*, from the Marungu highlands of southeastern Zaire, appears to include all the known specimens of double-collared sunbirds from this region. In measurements and color the birds are intermediate between *N. mediocris* and *N. stuhlmanni*, here regarded as members of the same superspecies. The birds are considered to be a distinct species, *N. prigoginei*, and the authors suggest that the species is of hybrid origin.

The study fails to test the species status beyond examination of museum specimens. A more rigorous test of the hypothesis of the species status of this form is in order before this case can be cited as a likely instance of speciation through hybridization. No behavioral details are available on this or on some other members of the species complex, though the songs of sunbirds should lend themselves to species-level systematics study.—R. B. Payne.

56. The New Caledonian Petrel. M. J. Imber and J. A. F. Jenkins. 1981. Notornis 28:149–160.—*Pterodroma leucoptera caledonica* is a well-marked and recently-described race of Gould's Petrel (*P. l. leucoptera*) that breeds in the mountains of New Caledonia. It disperses to the eastern tropical Pacific, as far as the Galapagos, in late March–April and returns in October–November. All observations of the species in New Zealand (December–April) are referable to *caledonica.* The authors provide a good review of the characters and point out similarities to *P. longirostris.* They also argue that the Collared Petrel (*P. leucoptera brevipes*) is a distinct species.—J. R. Jehl, Jr.

57. The phylogenetic relationships within the Galliformes indicated by their lice (Insecta: Mallophaga). P. R. Kettle. 1981. Notornis 28:161–167.—Evidence from bird lice has long been used to test ideas of avian relationships. This paper argues that the Megapodidae, Cracidae, Tetraonidae, Phasianidae, Numididae, and Meleagrididae "form a natural group of related hosts," which does not include the Opisthocomidae, Tinamidae, Turnicidae, and Pedionomidae (recently shown by Olson and Steadman to be a member of the Charadriiformes). Also, a close link between the Galliformes and Columbiformes is postulated. Perhaps only a specialized entomologist can review and evaluate the data. If ideas about the relatedness of louse genera (basic to the conclusions of this paper) are as tentative as our ideas of the relatedness of bird genera, the conclusions can only be used as a guide.—J. R. Jehl, Jr.

EVOLUTION AND GENETICS

(see also 5, 6, 8, 27, 54, 62, 63, 76, 80)

58. Effective population size in a songbird: Some possible implications. M. C. Baker. 1981. Heredity 46:209–218.—Using banding data from a long-term study of White-crowned Sparrows (*Zonotrichia leucophrys*) at the Pt. Reyes Bird Observatory, Baker models the genetic structure of the population and relates the results to his earlier work on dialects and electrophoresis in the same birds. The model used follows that of one developed by Sewall Wright, the pioneer in this field. The size of the genetic neighborhood or deme is calculated, and then corrected for such factors as overlapping generations and variance in reproductive success. The latter is an innovation here; previous workers in avian ecological genetics have been aware of the potential effect that might arise because not all pairs are equally successful, but this is the first study in which data on the magnitude of the effect were available. When Baker takes these factors into account, he obtains an estimate of effective population size of approximately 36.

This value seems too small on at least two counts. First, if N_e is typically of the order of 36 or so for White-crown populations, then Wright's theory suggests that the extent of differentiation, as measured by F-statistics, ought to be on the order of .10 when the coast of California as a whole is considered. Electrophoretic data for this area, however, yield an estimate of F_{st} of approximately .03 (Corbin unpubl.). These results are consistent with an N_e of about 100. Second, and more generally, if, as Baker suggests, many songbirds are characterized by such low effective population numbers, then there ought to be a general pattern of extensive genetic differentiation among avian populations and numerous chromosomally distinct species. However, the extent of genetic differentiation among conspecific populations of birds is small, and chromosomal data from some passerine birds are consistent with long-term effective population sizes on the order of 200–300.

There are several possible solutions to this dilemma. For example, a constant, strong selective regime could be invoked and one could argue that the electrophoretic data do not reflect the true extent of differentiation. Alternatively, it is conceivable that the dispersal distances used here are too small; some juveniles may have already dispersed before they were banded. Fortunately, Baker and others are continuing to investigate these very issues. The genetic structure of natural populations, long neglected, has now become a subject of interest to ornithologists concerned with microevolutionary processes. Studies such as this one are leading the way to a quantitative understanding of this important area.—George F. Barrowclough.

59. Optimal outbreeding and the development of sexual preferences in Japanese Quail. P. Bateson. 1980. Z. Tierpsychol. 53:231–244.—Bateson has proposed that the optimal mate should be genetically related to maintain balanced genotypes of offspring, but not so closely related that inbreeding problems occur. In the present experiments with *C. coturnix japonica,* chicks were reared with various numbers of offspring of the opposite sex, and their mate-choice later tested. In general, both males and females chose a familiar bird over a stranger, with the important exception of when the rearing group contained several members of the opposite sex. Males reared with 2 females chose the novel bird, as did females reared with 3 males. The author's interpretation is that a bird reared with limited companions sees any novel individual as unacceptably strange, but when reared with several members of the opposite sex they gain some basis for generalization of similarity. Then when a novel bird from the same lab stock is introduced, the chooser realizes that this novel bird is similar to his or her "family," so shows a greater tendency toward outbreeding. It is an ingenious theory, and one not without merit, but the present experiments do not secure it as proven.—Jack P. Hailman.

FOOD AND FEEDING

(see also 9, 23, 28, 31, 79)

60. Dwarf sumac as winter bird food. J. W. Graber and P. M. Powers. 1981. Am. Midl. Nat. 105:410–412.—When given a choice in the field, birds consistently preferred the fruits of dwarf sumac (*Rhus copallina*) rather than those of smooth sumac (*R. glabra*) in the winter. The authors used a bomb calorimeter to measure the caloric value of the fruit and found that dwarf sumac drupes had both a higher caloric value (5301 versus 5152 cal/g) and larger size than those of smooth sumac.

Although the authors attribute the avian preference for dwarf sumac to its higher caloric content alone, it may be prudent to consider other possible minerals or nutrients. Do we really know that winter fruit-eating birds are attempting to maximize caloric intake?—J. M. Wunderle, Jr.

61. Food habits and bioenergetics of a pair of Barn Owls and owlets. K. L. Hamilton and R. L. Neill. 1981. Am. Midl. Nat. 106:1–9.—The food habits of a pair of Barn Owls (*Tyto alba*) and their offspring were monitored for 19 months in Texas. The analysis was based upon 594 pellets which were examined to determine prey species and numbers. Biomass consumption of prey individuals was estimated by use of a log-log regression of right mandible length against body weight of prey individuals. The prey species consisted of 8 mammal species and 2 bird species. The most common prey item was the hispid cotton rat (*Sigmodon hispidus*).

The authors estimated that adult owls consumed 51.8 g/day during the prenesting season, 84.3 g/day during the nesting seasons, and 17.0 g/day during the postnesting period. The owlets consumed between 64.8–69.9% of the total estimated consumed biomass for the 2 years.

Prey availability was monitored throughout the year by systematically live-trapping a nearby site (something that is too rarely done in most food habit studies). The authors did cite a limitation of their findings for the posthatching period by suggesting that they were probably unable to recover all the pellets at this time because the adults may have moved to alternate roosting sites. With this limitation in mind, this is a reasonably good feeding study which might have been strengthened only by the inclusion of owlet growth rate data.—J. M. Wunderle, Jr.

62. Tropical frugivorus birds and their food plants: a world survey. D. W. Snow. 1981. Biotropica 13:1–14.—The paper is a taxonomic (by family) overview of plants that are adapted to dispersal by birds and of birds that are frugivorous. Snow distinguishes between obligatory and facultative fruit eating. Birds that are specialized fruit eaters eat fruit which is large and have a few large seeds. The pericarp of these fruits is highly nutritious and rich in fats and proteins. The seeds are regurgitated or pass quickly through the digestive system. The fruit of species that are eaten by opportunistic frugivores tends to have many small seeds and a pericarp containing mostly carbohydrates. The specialized frugivorous avifauna in Africa is very small, possibly because the flora has few species which depend on specialized frugivores for dispersal. The tables of the paper summarize the data on the relationship between frugivorus birds and their food types. As Snow points out, there is a dearth of data for many relationships. This survey should be the basis for future studies by botanists as well as ornithologists on the coevolution of frugivory in birds.—Robert C. Beason.

63. Frugivory in some migrant tropical forest wood warblers. R. Greenburg. 1981. Biotropica 13:215–223.—The Bay-breasted (*Dendroica castanea*), Chestnut-sided (*D. pensylvanica*), and Tennessee (*Vermivora peregrina*) warblers eat fruit during their non-breeding period on Barro Colorado Island (BCI) in the Canal Zone. They are found in disproportionately large numbers on *Miconia* and *Lindackeria,* eating fruits and, in the case of the Bay-breasted Warbler, preening. These trees are not used by the resident species on BCI and Greenburg concludes that the migratory warblers are the primary dispersers for these trees. His reasoning is 3-fold: (1) Only a few resident species are as small as the warblers and would feed on the small fruits of these trees. While this may be true for BCI, it is not necessarily true for the mainland areas. BCI has had a number of species go extinct (Willis, Ecol. Monogr. 44:153–169, 1974) and species in the 8–11 g range may be less numerous on BCI than elsewhere. (2) The warblers (especially Bay-breasted) tend to remain in the vicinity of fruiting trees, especially *Miconia.* As a result, most of the seeds eaten by the warblers would end up near the parent tree. This type of behavior is not indicative of an efficient dispersal agent. (3) Migrant warblers are more intraspecifically gregarious than similar-sized residents. As a result, large numbers tend to aggregate on an individual fruiting tree. If the birds spent most of their time in the vicinity of the tree, they would still be inefficient dispersers. Greenburg assumes that because resident species make little use of these fruit species, that the trees are adapted for dispersal by migrants, and migrants are specialized for exploiting these fruits. What is not addressed in the paper is the nutritional value of the fruits. Resident frugivores take fruit that has a nutritious (proteins and fat) pericarp and avoid less nutritious fruit (mainly carbohydrates). If the fruits of *Lindackeria* and *Miconia* are less nutritious, they are probably avoided by the residents in favor of better food, leaving the poorer quality food for the migrants. Resident species tend to be better adapted for exploiting the more nutritious fruits (see review **62**). The limited number of observations (32 h in 11 mo on trees away from the lab clearing), the lack of comparable data from the mainland, and the absence of data on the nutritional value of the fruits are major limitations to the conclusions of the paper.—Robert C. Beason.

64. Exploitation of a new food source by the Great Skua in Shetland. R. W. Furness, P. Monaghan, and C. Sheddon. 1981. Bird Study 28:49–52.—For the first time in the Shetland Islands, Great Skuas (*Stercorarius skua*) were recorded feeding at refuse dumps. Although skuas located and began eating refuse more rapidly than gulls, competition with Herring Gulls (*Larus argentatus*) and Great Black-backed Gulls (*L. marinus*) may limit the skua's widespread adoption of foraging at refuse dumps.—Edward H. Burtt, Jr.

65. The importance of manna, honeydew and lerp in the diets of honeyeaters. D. C. Paton. 1980. Emu 80:213–226.—The honeyeaters (Meliphagidae) are an abundant, widely distributed group of birds and have been thought to have a fairly wide foraging niche in Australia. This includes feeding at flowers, gleaning foliage, probing bark, and flycatching for insects. However, Paton demonstrates that, besides nectar, honeyeaters feed on manna (a sugary exudate from damaged eucalypts), honeydew (secretions of some nymphal insects), and lerp (which he defines as the protective carbohydrate covering over many psillid insects). Manna was extremely important to some species, often taking up more than half of the birds' feeding time, especially in the spring. It made up a considerable fraction of their energy intake. Honeydew, especially of psillids, is also important, as evidenced by (1) birds driving off potential competitors from psillid concentrations, (2) feeding motions that indicated the birds were taking honeydew secretions and not insects, and (3) greater accumulation of honeydew at sites where birds were excluded. At times lerp constituted the main food of some species. When the birds fed on lerp, the psyllid nymph was often left behind to produce more lerp. The energy content of lerp was usually many times that of the nymph.

This excellent study shows convincingly that Paton's honeyeaters are rarely, if ever, entirely insectivorous and that the adaptive radiation of the group is not as wide as some have thought. Thus the foliage gleaning and bark probing were for the energy and nutritional byproducts of plants and small insects, sources of food very similar to nectar. Paton suggests that the success of the family is probably related in part to the concomitant success of the eucalypt-eating insects and nectar producing plants, rather than occupying an otherwise relatively underexploited foraging niche. This is an excellent and closely argued study.—C. J. Ralph.

66. Birds can overcome the cardenolide defence of monarch butterflies in Mexico. L. S. Fink and L. P. Brower. 1981. Nature 291:67–70.—Aposematically-colored monarch butterflies contain bitter poisons, derived from cardenolides in the milkweed plants they eat, poisons that lead to rejection by avian predators. Yet Black-headed Grosbeaks (*Pheucticus melanocephalus*) and Black-backed Orioles (*Icterus galbula abeilli*) were found to prey heavily on these insects in their Mexican wintering grounds. Because high levels of avian predation have not been found elsewhere, the investigators sought to unravel the circumstances responsible for its occurrence in Mexico. Fewer individuals in the Mexican monarch population (10%) were found to contain more than one emetic unit (i.e., dosage at which there is a 50% chance that a Blue Jay, *Cyanocitta cristata,* will vomit) of cardenolide compared to 46 and 49% of the Massachusetts and California populations sampled. Therefore the probability of an emetic effect in Mexico is less than in other areas. Individual butterflies in the Mexican population, like those in other populations, vary widely in cardenolide content, and it was hypothesized that the birds released emetic ones and ate the others. However, the cardenolide concentrations of samples of butterflies rejected by each predator species and of controls did not differ, implying that the birds selected insects randomly with respect to cardenolide level. The question that is not addressed here, is why predators released so many prey (77% or 75 of 98 released by orioles, 71% or 65 of 92 by grosbeaks). At the end of the paper the authors raise the possibility that some rejected insects may have contained other toxins, though no data were brought to bear on this speculation. Often the predators only partially consumed prey. Orioles were found to eat fewer butterflies with higher cardenolide concentrations and more of those with lower levels, whereas the grosbeaks showed no such tendency. Therefore orioles were selective with regard to cardenolide content following prey killing, but grosbeaks both killed *and* consumed prey randomly with regard to cardenolide level. In forced feeding experiments involving powdered California monarchs, orioles showed emetic effects (vomited), grosbeaks did not.

Therefore the monarch's chemical defense is ineffective against these avian predators, and the insects' grouping tendencies may be a major anti-predator adaptation on the wintering grounds. The high predation rates and high percentage of non-emetic butterflies at the Mexican study site could be the result of (a) winter decreases in cardenolides, (b) regional differences in composition of milkweed used by allopatric monarch populations wintering in different areas in Mexico, or (c) ingestion of milkweed containing low potency cardenolides. The extent to which these circumstances may be related to changes in the relative abundances of different milkweed species in eastern North America is a matter for speculation. This interesting, informative study raises many questions for future research.—W. A. Montevecchi.

67. Feeding ecology of Rooks (*Corvus frugilegus*) on the Heretaunga Plains, Hawke's Bay, New Zealand. T. P. G. Purchas. 1980. N. Z. J. Zool. 7:557–578.—An exhaustive 2-year study of this introduced bird quantifies the available food and substrates, method of feeding, types of food actually taken, percent of time spent on different substrates, flock dynamics, and the energy requirements and expenditures of the species. Much of this research was done on individually-marked birds. One of the more interesting habits described is food caching. The author concludes that an individual bird stores food in a "common ground" and is not territorial. He states that it seemed not to be critical for the food to be recovered by the individual that put it there. As he says, "clearly there is scope for cheating," and suggests further research. Altogether a thorough paper.—C. J. Ralph.

68. The distribution of arthropods overwintering in reeds (*Phragmites*) in the western Lake Constance region and its significance for birds. [Die Verbreitung im Schilf überwinternder arthropoden im westlichen Bodenseegebiet und ihre Bedeutung für Vögel.] R. Frömel. 1980. Vogelwarte 30:218–254. (In German, English summary.)—Insects in reeds were sampled during one winter and the feeding behavior of birds in the reeds was observed. Blue Tits (*Parus caeruleus*) picked open about 20% of all shoots occupied by insects and ate 50% of the mass of insects in the shoots sampled. Wintering insects are concluded to be important both to overwintering birds and to migrants, and reed habitats should be conserved.—R. B. Payne.

69. Recovery of cached seeds by a captive *Nucifraga caryocatactes*. R. P. Balda. 1980. Z. Tierpsychol. 52:331–346.—A captive Eurasian Nutcracker buried seeds in the sand floor of an aviary a little smaller than 2 × 7 m, and probed for the caches with fairly high accuracy after being removed from the cage for 7 d (2 trials) or 18 d (1 trial). In the 7-d trials the caches were removed so that probing was not due to seeing or smelling the seeds. Nutcrackers tend to both hide and look for caches in characteristic places (along the edges of objects) and in a set sequence of nearest-neighbor places, so that recovery of caches probably involves a high level of spatio-sequential memory.—Jack P. Hailman.

SONGS AND VOCALIZATIONS

(see also 15, 58)

70. Variation in the songs of Vesper Sparrows *Pooecetes gramineus*. G. Ritchison. 1981. Am. Midl. Nat. 106:392–398.—Songs of 25 males from 7 Minnesota locations were analyzed. By use of a similarity index, the author found that there was no significant difference in the degree of syllable-sharing within locations compared with that between locations. Generally, individual male Vesper Sparrows possessed unique song patterns with individuals sharing only 19% of their song syllables with other males. Thus no evidence could be found for dialects as was found in an earlier study in Oregon.

Unfortunately the author gives no details on the exact recording locations, geography, distance between localities, and whether males recorded at one locality had neighboring territories. Such information is essential for understanding patterns of song variation. For example, the author mentions that 3 different pairs of male sparrows, each pair with adjacent territories, shared 43.3%, 69.3%, and 72.7% of the syllables respectively. How many recorded males within each locality were neighbors? Could it be that the proper level of song variation analysis is at the neighboring male level and not just within or between locations? We must assume that the author did not overlook this possibility for the necessary information is absent.—J. M. Wunderle, Jr.

71. Posthatching effects of repeated prehatching stimulation with an alien sound. M. A. Vince and F. M. Toosey. 1980. Behaviour 72:63–76.—Vocalizations of the guinea pig, which are supposed to suppress activity of domestic chicks (*G. gallus*) after hatching, were played to embryos. The sounds suppressed bill-clapping in the egg. After hatching, the sounds were played to the experimental group that had received prehatching sounds and to a control group. Eye-opening was unaffected (both groups) and bill-clapping was only slightly affected. The sounds affected vocalization in the experimental group but not in the controls. I fail to understand why it is said that this particular "alien sound [is] found to suppress post-hatching activity" when it had almost no effect on the control group (see review **75**).—Jack P. Hailman.

72. An investigation of song-based species recognition in the Red-winged Blackbird (*Agelaius phoeniceus*). L. D. Beletsky, S. Chao, and D. G. Smith. 1980. Behaviour 73:189–203.—The authors played back the full "conk-a-ree" song or portions of it to territorial males and noted their responses. Scrambling the 3 syllables caused only minor depression of response, and the first or second syllable alone or together elicited little response. However, the final trill alone evoked full response, with diminishing response as the trill was shortened. The results are not quite as clear-cut as suggested by the authors' summary, but the outcome as summarized above is believable. What seems curious is the interpretation that the experiment deals with "species recognition." Nothing about separation of species was tested for; the reactions of females were not noted; and only territorial responses of males were noted.—Jack P. Hailman.

73. Sexual selection and the evolution of complex songs among European warblers of the genus *Acrocephalus*. C. K. Catchpole. 1980. Behaviour 74:149–166.—If a varied repertoire were of advantage in securing mates, one would expect males having the highest diversity of syllables to secure mates first; and this is what was found in the Sedge Warbler (*A. schoenobaenus*). Contrary to the author's expectation, however, polygynous species have smaller repertoires than monogamous species.—Jack P. Hailman.

74. Species identification of song by Indigo Buntings as determined by responses to computer generated sounds. K. A. Shiovitz and R. E. Lemon. 1980. Behaviour 74:167–199.—Various synthetic songs were played to *Passerina cyanea* and their reactions noted. The paper claims 12 response variables were measured, but actually there were only 5 (perch-changes, vocalizations, approaches, displays, and flights); all the other "variables" were actually values of these variables. The results delimit how much bunting "song" can depart from the natural one and still be recognized, and it is clear that many aspects of the songs are used to recognize them.—Jack P. Hailman.

75. The posthatching consequences of prehatching stimulation: changes with amount of prehatching and posthatching exposure. M. A. Vince. 1980. Behaviour 75:36–53.—The take-home message is that adult alarm calls played to domestic chicks (*Gallus gallus*) while still in the egg depress posthatching responses to the same call (see review **71**).—Jack P. Hailman.

76. Chaffinch song types: their frequencies in the population and distribution between repertoires of different individuals. P. J. B. Slater, S. A. Ince, and P. W. Colgan. 1980. Behaviour 75:207–218.—Songs of *Fringilla coelebs* were recorded in 2 locations (in 2 different years) and classified into types by ear. "Sonograms were prepared in all cases of doubt." Using an unexplained model of population genetics taken from a paper published nearly a decade ago, the authors simulated the distribution of repertoires as if they were neutral alleles having a fixed mutation rate—and by an unexplained statistical test taken from the fourth appendix in the previously cited paper, it was determined that the data did not differ significantly from the computer simulation. The study then goes on to compare the frequency histograms of song repertoires with models such as a zero-truncated Poisson. The general picture painted is that the size and composition of a repertoire is "random," with new types arising both by copy-errors and immigration by birds from other dialects. The birds were not marked, but were "identified unambiguously" according to their locations and "the song types which they had in their repertoires."—Jack P. Hailman.

77. Pseudo warning call in titmice. S. Matsuoka. 1980. Tori Bull. Ornithol. Soc. Jpn. 29:87–90. (In English, Japanese summary.)—This interesting note anecdotally documents the use of alarm calls by Willow (*Parus montanus*), Marsh (*P. palustris*), and Great (*P. major*) tits. These calls were used to displace 6 species of fringillids from food tables. This behavior was observed as often as 7 times an hour. The author noted that conspecifics, jays, and woodpeckers, as well as tits of other species, usually did not respond. If this study is confirmed, it opens up some interesting questions concerning how conspecifics know when there is a *real* emergency? The author felt that frequent visits by actual predators kept the intended recipients of the calls from learning the difference between a true and "pseudo" alarm note.—C. J. Ralph.

78. Song types in the Zebra Finch *Poephila guttata castanotis*. R. Sossinka and J. Böhner. 1980. Z. Tierpsychol. 53:123–132.—Males sing with their heads directed toward females (so-called courtship song) and when motionless in a difficult-to-define context (so-called undirected song). It was formerly unclear whether the songs themselves were different, but the authors show that courtship song has more introductory elements, a greater number of "motifs" per "strophe," more stereotypy in sequence of elements, and is faster. The courtship song seems functional in ways reported for many passerine species, but the function of the undirected song remains elusive, especially considering evidence that it has nothing to do with territoriality or aggressiveness.—Jack P. Hailman.

79. A minicomputer system for the synthesis of animal vocalizations. S. Zoloth, R. J. Dooling, R. Miller, and S. Peters. 1980. Z. Tierpsychol. 54:151–162.—Illustrated with songs of the Swamp (*Melospiza georgiana*) and Song (*M. melodia*) sparrows.—Jack P. Hailman.

80. Influence of the food supply on the song of the male Yellow-bellied Sunbird (*Nectarinia venusta*). [Zur Abhängigkeit des Gesangs vom Nahrungsangebot beim Gelbbauchnektarvogel.] K. Wilhelm, H. Comtesse, and W. Pflumm. 1980. Z. Tierpsychol. 54:185–202. (In German, English summary.)—The extraordinary results of these experiments are worthy of the attention of anyone interested in territoriality relative to food supply. Sunbirds are Afro-Asian nectar feeders that take insects (and occasional fruits). The caged birds tested did not sing when given a diet of sucrose solution only, regardless of the concentration; but when *Drosophila* flies were added to the diet, the males did sing, and furthermore aspects of singing varied with the sucrose received. Increasing concentrations of *ad lib.* sucrose yielded full song phrases and eventually subsong appeared at higher concentrations, which then increased in duration with further increases in concentration. When the total amount of sugar was held constant, but offered in increasing concentrations, the duration of singing increased, but the number of full song phrases decreased; the same effect was obtained by holding the concentration constant but increasing the total amount of sucrose offered. Among other interesting results were changes in the response to sucrose variables when the birds were molting. The view that emerges is that (except during molt) scarcity of food promotes full song, which may indicate greater territorial defense.—Jack P. Hailman.

81. Song dialects in the Corn Bunting (*Emberiza calandra*). P. K. McGregor. 1980. Z. Tierpsychol. 54:285–297.—Males in the study area each had 2 song-types and within an area of about one or a few square miles all males sing the same 2 types. The differences between local dialect-songs are not striking, but apparently they are very consistent. The dialect boundaries remained constant over 3 years, probably due mainly to the fact that Corn Buntings are long-lived and place-faithful so that the birds themselves were mainly the same individuals in successive years. The author rejects the prevalent idea suggested for other species that dialect formation is selected to maintain inbreeding in a locally adapted population. (That hypothesis strikes me as unconvincing even in other species where dialect populations are much larger than the 30–100 males characterizing Corn Bunting dialects.) McGregor thinks that agricultural procedures tend to fragment Corn Bunting populations, which then more or less accidentally develop distinct dialects, although the dialects may result in some measure of reproductive isolation when replanting creates new habitat into which several dialect-populations expand and meet.—Jack P. Hailman.

MISCELLANEOUS

82. Why is the Kiwi so called? R. Colbourne. 1981. Notornis 28:216–217.—The name probably derives from "kivi," the Cook Islanders' name for the Bristle-thighed Curlew (*Numenius tahitiensis*). When the Maoris colonized New Zealand they applied the traditional name for that long-billed shorebird to the local equivalent.—J. R. Jehl, Jr.

BOOKS AND MONOGRAPHS

83. Behavior of marine animals, current perspectives in research. Vol. 4: Marine birds. J. Burger, B. L. Olla, and H. E. Winn, eds. 1980. Plenum Press, New York. 515 p. $45.—This is not a treatise on the biology of marine birds, but a series of reviews in which the editors have allowed the authors considerable leeway to expound upon their own research.

Seabirds as marine animals by R. G. B. Brown is an excellent introduction to the biology of birds at sea and to the oceanographic conditions that affect their distribution. Brown provides many specific examples including a good discussion of the distribution of Red Phalaropes (*Phalaropus fulicarius*). He also points out the virtual impossibility of obtaining absolute indices of abundance at sea.

Chemoreception in seabirds by B. M. Wenzel incorporates behavioral, anatomical, and physiological evidence and the results of her own careful field experiments to provide a review that will be read with profit by all ornithologists.

Drawing upon their own studies of terns and gulls, F. and P. Buckley consider *Habitat selection and marine birds,* providing a solid synthesis of the many factors that affect nest site preferences. Their concluding remarks emphasize the need for habitat protection, otherwise "additional habitat selection research will be too late."

In *Mate selection and mating systems in seabirds* G. L. Hunt is concerned mainly "with the assessment of mate quality." While his chapter is thorough, it introduces interpretations that require reexamination. For example, Hunt notes that "males of most sphenisciform, procellariform (sic) and pelicaniform species establish a nesting territory before attracting a mate," which gives the female "an opportunity to assess the quality of the territory." Although many writers have speculated that territorial quality forms a basis for mate choice, it is hard to see how that may apply to an Adelie Penguin (*Pygoscelis adeliae*) or Masked Booby (*Sula dactylatra*) colony, where all territories are virtually identical. With regard to courtship feeding, a common behavior in taxa in which the clutch represents a large fraction of body weight, Hunt argues that its prime function is to provide energy to the female. This may be true of gulls, but does not explain the situation in sandpipers or alcids. The question that emerges is why gulls are unusual among the Charadriiformes. Hunt also argues that courtship feeding influences egg size. But his data from studies of homosexual Western Gulls (*Larus occidentalis*) support no such conclusion, which must be based on the relative egg and body weights of the females involved, not on egg volume alone. Furthermore, egg size varies with age, and because neither the weight nor age of the gulls is given, no conclusions are possible. In another section Hunt seems puzzled that murrelets, with large eggs and a clutch of 2, practice egg-neglect rather than courtship feeding, and theorizes that patchiness of food may prevent the male from bringing sufficient food to the female. However, since murrelet chicks are precocial and must leave the nest within two days of hatching, it would be impossible for the birds to synchronize the hatching of eggs laid a week apart if incubation began with the first egg. Moreover, adult murrelets are easy prey for gulls during the day. Thus, for 2 reasons courtship feeding would be selected against instantly. So much for theory.

In *The influence of age on the breeding biology of colonial nesting seabirds* J. Ryder eschews theory but concisely synthesizes abundant data showing that breeding experience is a major factor in reproductive success.

The communication behavior of gulls and other seabirds by C. Beer is largely a discussion of problems arising from the interpretation of behavior. Though interesting, it seems more suited as a keynote address to an annual meeting of behaviorists. The chapter deals almost exclusively with Beer's own work on gulls and pays little attention to the vast repertoire of displays in other seabirds.

M. Gochfeld's *Mechanisms and adaptive value of reproductive synchrony in colonial seabirds* is a definitive examination of the "Darling Effect." Gochfeld shows that colonial nesting has many advantages. An unanswered question is why subcolonies form. Do birds have some means of assessing that, if they are sufficiently out of synchrony, they will fare better by starting a new group?

Development of behavior in seabirds: an ecological perspective by R. M. Evans represents a functional approach to the analysis of behavior. This review is especially welcome because so much of the "classic" behavioral literature has been based on the studies of larids and other seabirds.

Parental investments by seabirds at the breeding area with emphasis on Northern Gannets, Morus bassanus, by W. A. Montevecchi and W. A. Porter is the only chapter that deals, even briefly, with parental care. Most of the essay concerns the breeding biology of gannets. The finding of major differences in incubation and parental roles between gannets in Newfoundland and Scotland makes me wonder how many studies which purport to represent the "parental investment" of a species are premature.

In *The transition to independence and postfledging parental care* J. Burger develops a subject that is not often discussed. For each family she analyzes factors that affect the duration and intensity of postfledging care and offers new interpretations.

Comparative distribution and orientation of North American gulls by W. E. Southern is a hybrid of 2 topics with no common basis. In the first section Southern takes 10 pages to review the breeding distribution of 8 species, making no attempt to update information already available in the AOU Check-list. He follows it with an analysis of annual distribution patterns in species for which over 1000 banding recoveries are available. Those data are useful but are undercut by looseness in writing. Twice in 4 sentences on p. 461 the Laughing Gull (*L. atricilla*) is noted as the only "North American gull that characteristically breeds in the southern United States," (do non-North American species nest there?). On p. 459 we read that the California Gull (*L. californicus*) "seasonally . . . occurs sympatrically with the Glaucous-winged and Western Gull . . . ." True enough, but it also occurs sympatrically with at least 10 species. Southern's synopsis of his own work on the orientation system of Ring-billed Gulls (*L. delawarensis*) is more important, documenting that multiple sensory systems are involved in orientation, with magnetic and visual cues being paramount.

The book has several shortcomings: First, by allowing the authors to write to their own broad areas of interest the editors have created the setting for occasional redundancy. For example, the influence of age on mating success, treated successfully by Ryder, is mentioned by Hunt and the Buckleys. Second, it is understandable that most authors have confined their remarks to seabirds. But for some topics (mate selection, orientation) the lack of a comparative approach greatly diminishes the review's value. Third, nomenclature, both common and scientific, is unpredictable and sometimes archaic. Thus, we can find "noddy" and "noddie," "Sandwich" and "Sandwitch" tern, "Leache's" Petrel, and "pelecaniforme"; the Homing Pigeon is called a species, and the name of the Dovekie (*Alle alle*) is given as *Plotus*(=*Plautus*) *alle*. In Chapter 10, the number of species in a taxon may vary from page to page, and the number of species of albatrosses and penguins is consistently wrong. Fourth, although 3 persons claim to have edited the volume, there is evidence to the contrary. Scientific writing, above all, depends upon clarity, and a Humpty Dumpty attitude of letting words mean anything the authors think they mean does not foster successful communication. For example, "decimate" should not be used to mean "greatly deplete" or "nearly exterminate"; it means to reduce by *one in ten*. Considering that mortality in most first-year birds may exceed 80%, decimation seems a wonderful fate. "Intrigue" means to scheme or cheat, and to use it as a synonym for "fascinating," "interesting," "puzzling," or "evoking curiosity" (none of which are synonyms) insures that confusion will result. The use of landfills is not a "foraging strategy" but merely exploitation of a food source. I cannot understand the "phenology of the postbreeding range." "Unique enough" and "intuitive evidence" (a strange construction anywhere, especially in a scientific paper), and the confusion of "further" vs. "farther" and "allude" vs. "elude" are simply inexcusable.

Finally, a problem common to all books of this type is that the chapters may receive less rigorous peer review than they would from a refereed journal. As a result, authors may advance ungerminated ideas, more suitable for open discussion at a scientific meeting, which then take on the appearance of established fact and which may escape criticism, except cursorily by reviewers of the entire volume.

Despite these problems, "Marine Birds" is a very useful book containing much information of interest to marine biologists, and several chapters (Brown, Wenzel, Gochfeld) deserve the attention of a much wider audience.—J. R. Jehl, Jr.

84. Annual variation of daily energy expenditure by the Black-billed Magpie: A study of thermal and behavioral energetics. J. N. Mugaas and J. R. King. 1981. Studies in Avian Biology No. 5. Allen Press, Lawrence, KS. vii + 78 p. $8.00.—Mugaas and King have applied standard ideas and techniques to the study of energy and time budgets of free-ranging Black-billed Magpies (*Pica pica*), but the completeness of their study make this a landmark. They have dealt with the behavior and energetics throughout the year in a population of magpies residing on the Pullman campus of Washington State University. Their behavioral categories are all encompassing, yet mutually exclusive, and allow the authors to estimate the energy expenditure associated with each behavioral category. Their data allow them to construct behavioral time budgets for selected days throughout the year and thereby arrive at an annual energy budget that clearly demonstrates the interplay of climate, behavior, and physiology in the survival of the Black-billed Magpie.

The results call into question many of our assumptions about avian energetics. The calculated energy requirements during molt and incubation suggest that the birds were not maximizing foraging efficiency, but may have been managing resources for long term gain. The underlying assumptions of optimal foraging theory are rendered untenable at least in this species at these times. Nesting coincided with a ground temperature that allowed the bird to forage in sun or shade without encountering heat stress. Later in the season the temperature of sunlit ground severely limited the time a bird could forage in this microhabitat regardless of prey availability. The importance of these and other conclusions, is that Mugaas and King are providing the energetic basis behind the often observed phenology and behavior of reproduction. We are treated to glimpses, not only of how time and energy are managed, but also of the limits within which chronological and energetic adaptations occur.

Despite my high regard for the theoretical and quantitative approach of this monograph, it is not without its drawbacks. All symbols used in the text are listed and defined on pages vi and vii. They are also defined as they appear in the text. Both steps help the reader to remember the large number of symbols used. However, standardization of symbols throughout the literature on biological thermodynamics would be an even greater assistance to the symbol-beleaguered reader. Bligh and Johnson (J. Applied Physiol. 35:941–961, 1973) have taken such a step, but Mugaas and King have not followed the abbreviations suggested therein. Approximation of a magpie with a prolate spheroid may be essential to thermodynamic modelling, but ignores the documented importance of the head, bill, and legs as heat sinks (Calder and King, in **Avian Biology,** Farner and King (eds.), Academic Press, 1974; Hill et al., Physiol. Zool. 53:305–321, 1980). This is merely one of a veritable plague of assumptions that fall into 2 categories: those that simplify the calculations and those that substitute for data. The prolate spheroid is an example of the former, as is the assumption that the equivalent blackbody temperature (T_e) is 1°C above ambient. Both assumptions involve errors that could be as high as 20–30%. Perching and standing metabolism are examples of assumptions that take the place of data and probably introduce less error than the simplifying assumptions. The assumptions weaken the precision of the study and may affect one or more of its conclusions. However, they are essential to the study's execution and by carefully articulating each assumption, Mugaas and King have not only provided a detailed account of how time and energy budgets should be studied, they have also indicated what gaps in our knowledge need filling. Perhaps in the long run the monograph's greatest contribution will be as a standard for the study of time and energy budgets and a stimulation to further research.—Edward H. Burtt, Jr.