RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

NEW JOURNAL

1. **The Living Bird Quarterly.** 1982. 1:1–23. Laboratory of Ornithology at Cornell University, 159 Sapsucker Woods Rd., Ithaca, NY 14850. $25.—The Living Bird Quarterly combines elegant photographs with informative articles on topics that range from a discussion of factors that determine reproductive rates, to conservation efforts with cranes and Atlantic Puffins (*Fratercula arctica*), to the story behind Fuertes' statue of a gorilla. In addition to feature articles, shorter articles are contained in a section entitled Research and Review with still shorter notes under News and Notes. Some of the articles are written by the persons responsible for the research whereas others are written by journalists. Nonetheless the articles are impressively accurate and informative. Furthermore the editorial board encourages ornithologists to suggest articles and I would hope that eventually all articles could be written by the persons conducting the research or directing the conservation programs. The gulf between professional and amateur ornithologists has widened of late. Here is a laudable attempt to bridge the gulf. Let us hope that both groups will generously support The Living Bird Quarterly.—Edward H. Burtt, Jr.

BANDING AND LONGEVITY

(see also 52, 57)

2. **Dynamics of Coal Tit (*Parus ater*) movement in the alps—an example of a pitfall in using capture-recapture data.** C. Frelin. 1980. Vogelwarte 30:297–301.—During the 1972 invasion in the Alps, birds were sampled by daily captures at two alpine stations and by recoveries at one station of birds ringed at the other. Although the data should have given similar results, they did not. Daily capture data indicated that 40% of the birds left on any given day. Assuming that birds all moved from one station to the other (based on Frelin's earlier observation of movements), the daily captures at the two stations should not peak on the same days, but they did. Frelin suggests that capture and ringing causes the birds to temporarily reduce their migratory tendency.—Robert B. Payne.

3. **Analysis of ringing data of White Storks (*Ciconia ciconia*) from Central Europe west of the migratory divide: migration, winter quarters, and summer distribution of immatures.** (Analyse der Ringfunde von Weissstörchen (*Ciconia ciconia*) aus Mitteleuropa westlich der Zugscheide: Zug, Winterquartier, Sommerverbreitung vor der Brutreife.) F. Barlein. 1981. Vogelwarte 31:33–44. (German, English summary)—The "Zugscheide" refers to the split in Europe between southwestward Gibraltar-bearing birds and southeastward-bearing migrants. Birds from the Rhine westwards migrate SW and SSW and migrate south of the Sahara mainly from Senegal to the Upper Niger River area; some older birds from the same source have been recovered in northeastern Nigeria. In the following spring some birds remain in West Africa south of the Sahara, and a few birds remain there in later years. Other birds return to west-central Europe when one, two, or three years of age, with the numbers increasing from year-to-year.—Robert B. Payne.

4. **Notes on Red-cockaded Woodpecker study techniques.** S. A. Nesbitt, B. A. Harris, R. W. Repenning, and C. B. Brownsmith. 1982. Wildl. Soc. Bull. 10:160–163.—The authors summarize experience with field techniques used in several studies of the endangered Red-cockaded Woodpecker (*Picoides borealis*) in Florida. The birds are territorial and respond aggressively to conspecifics in their territories. Nesbitt et al. used playback of tape-recorded vocalizations to "illicit" (sic) aggressive responses from birds within territories. Woodpeckers responded to this technique within 10 min, moving in close (2–3 m) to the recorder from distances of up to 0.5 km. The authors suggest that taped calls could be used to supplement traditional transect survey methods. Recordings were also used to lure woodpeckers into mist nets by playing calls from either or both sides of the nets. Nineteen birds were captured in 11 days using this technique. In 1 case 4 members

of a 5 bird clan were caught in 15 min. A wooden decoy did not elicit a greater response than recordings alone.

Also described are refinements in radio-tracking techniques. Attaching the transmitter with glue or a harness made of narrow surgical tubing and cotton thread resulted in no significant weight loss or feather wear in 3 individuals fitted with transmitters for up to 36 days. A major improvement is the use of pliable fishing leader wire for an antenna that curled above the bird's back. They observed no instances of the antenna becoming lodged in tree bark as outfitted birds backed down trees, a problem in previous studies. A figure illustrates attachment of the transmitter and antenna. The authors conclude that information gained from use of radio-tracking of color-marked Red-cockaded Woodpeckers through dense habitat outweighs risk of mortality or injury, which their technique seems to minimize.—Richard A. Lent.

MIGRATION, ORIENTATION, AND HOMING

(see also 2, 3, 13, 24, 25, 61)

5. Methods of bird migration discovery and estimation. (Metody obnaruzheniya i ucheta migratsii ptits). V. R. Dolnik (ed.). 1981. Proc. Zool. Inst. (Trudy Zoologicheskogo instituta) 104:1–151. (Russian, English summaries)—In the autumn of 1977 an experiment to improve the detection and prediction of avian migration was conducted in the vicinity of the Kurishe Nehrung, a peninsula in the Baltic Sea. The purpose of the experiment was to minimize hazards to aviation. The experiment resulted from cooperation by the Academies of Science of the USSR and of the Latvian and Lithuanian Republics, Soviet aviation authorities, and Leningrad University.

Migration was observed simultaneously by the unaided eye, through binoculars and telescopes, by radar, by listening for calls of migrants, and by trapping. These activities were conducted both at day and at night. The aims of the program were: (1) to determine numbers and species of migrants at day and night, under all weather conditions, at all altitudes; (2) to estimate the relation of the flow of migrant birds to the geography of the area; (3) to compare the density and regularity of nocturnal and diurnal migration; (4) to reconstruct the total picture of migration at all altitudes, day and night; (5) to determine whether migration does indeed occur in waves or if this is merely an impression resulting from deficiencies in one or another observation method; (6) to evaluate the methods used in this research both each in comparison to the others and in comparison to the overall picture; (7) to find the minimum combination of methods for an effective objective estimate of migration; and (8) to devise and test a model for predicting migration.

This issue of the Proceedings of the Zoological Institute of the USSR's Academy of Sciences contains 12 papers relating the findings of the different observation methods to each of the eight aims, plus one discourse on energy reserves represented by fat in trapped specimens, and an introductory article. The researchers concluded that visual and radar observations in the first 4 h after sunrise yield up to 80% of the birds recorded throughout the daylight period. They felt no one method alone provided an accurate count of migrants, although visual methods yielded the highest counts both day and night. Migratory waves were very evident.

The suggested migration model has four kinds of controlling factors: (1) physiological readiness for migration; (2) factors impeding feeding; (3) meteorological conditions auspicious for migration; (4) and social factors stimulating birds to join passers-by of their own kind. The model correctly predicted 9 out of 10 waves of migrants.

The reports are profusely illustrated with tables and graphs. Each has an abstract in Russian and rather awkward English.—Elizabeth C. Anderson.

6. The moon: a neglected factor in studies on collisions of nocturnal birds with tall lighted structures and with aircraft. F. J. Verheijen. 1980. Vogelwarte 30:305–320.—A review of bird collisions with structures in the USA shows that collisions tended to occur around the time of the new moon. The author suggests that moonlight provides a bright light source in one part of the sky and this tends to reduce the disturbance to birds of an artificial light source on the structures.—Robert B. Payne.

7. On the influence of simulated weather conditions on the endogenous time program for migration in the Garden Warbler *Sylvia borin*. (Über den Einfluss simulierter Wetterbedingungen auf das endogene Zugzeitprogramm der Gartengrasmücke *Sylvia borin*.) J. Schindler, P. Berthold, and F. Bairlein. 1981. Vogelwarte 31:14–32. (German, English summary)—Berthold's laboratory studies have shown that the timing of migration in European warblers is largely explained by an endogenous rhythm. What happens when experimental birds undergo the equivalent of bad flight conditions? Do they compensate by extending their period of migratory restlessness? Hand-raised warblers were tested with "bad weather," high humidity up to drizzle from afternoon onward, and by complete darkness at night. In these conditions, the warblers almost completely ceased their migratory restlessness. By alternating bad and good weather conditions the authors tested whether the warblers compensated for nights of bad weather with increased migratory activity on nights of good weather: they did not; the activity of experimental and control birds was the same on these nights.

The authors conclude that Garden Warblers probably reach their wintering quarters in Africa solely by endogenous timing programs. Other factors may be involved after the first-year migration. The conclusion does not necessarily follow from the experimental results; the authors never say what results might have falsified their view of endogenous programs of migration.—Robert B. Payne.

8. The magnetic field as a reference system for genetically encoded migratory direction in Pied Flycatchers (*Ficedula hypoleuca* Pallas). W. Beck and W. Wiltschko. 1982. Z. Tierpsychol. 60:41–46.—This is the second of a series of papers examining the magnetic field orientation of Pied Flycatchers. Hand-rearing birds to restrict their early experience, the authors were able to demonstrate that first-year Pied Flycatchers can orient with respect to the earth's magnetic field independent of any experience with known visual orientation cues (e.g., stars, sun). The authors suggest that a young bird's response to the magnetic field serves as a reference defining its preferred direction during the first migration.—Verner P. Bingman.

POPULATION DYNAMICS

(see also 11, 15, 23, 30)

9. Age-structure and survival of a wintering population of Oystercatchers. J. D. Goss-Custard, S. E. A. Le V. dit Durell, H. P. Sitters, and R. Swinfen. 1982. Bird Study 29:83–98.—Few studies have attempted long-term surveillance of individually marked birds on the wintering grounds. This interesting paper described the age-structure and survival rates of Oystercatchers (*Haematopus ostralegus*) wintering on the Exe estuary in South Devon during the period from July 1976 to June 1981. Goss-Custard et al. marked 1466 Oystercatchers; 466 were individually color-marked and 1000 were banded with BTO rings alone. All Oystercatchers were aged and counted during multiple searches made on all feeding grounds at low water on spring tides, once or twice a month. In winter, searches were made for banded birds (alive or dead) on the coast and on the feeding grounds. The authors attempted to maximize accuracy of counts and were convincing that every effort had been made to standardize their observations.

During the summer only a few hundred juveniles and immatures were present on the estuary. After breeding most adults returned to the estuary. Peak abundance, about 3000 Oystercatchers, occurred in September. Numbers of adults decreased after mid-February and most departed by early April. Goss-Custard et al. observed a return of almost 90% of the adult population to the Exe each year. Average adult winter mortality was about 1.5%; juveniles experienced mortality of 10% in autumn and 6% in winter. Second-year birds had a similar autumn mortality (13%), but a higher (14%) late winter-early spring mortality. Inexperience at feeding, low social status, and poor competitive ability with adults at mussel beds may contribute to juvenile and immature mortality when adults are abundant. Goss-Custard et al. suggested that mortality may be higher in severe winters, but this probably has little long-term effect on the population dynamics of this species.—Lise A. Hanners.

10. Demographic study of a population of Village Weavers, *Ploceus cucullatus*, in Chad. (Étude démographique d'une population de Tisserin gendarme, *Ploceus cucullatus*, au Tchad.) M. Da Camara-Smeets. 1981. Gerfaut 71:195–208. (French)—Mean values are given for clutch size, nesting success, and relative age (based on skull pneumatization) for a population near Ndjamena. The data are of limited value because individual birds were not banded, renestings and second broods were not determined, and the absolute age (apparently all under a year) of birds with incompletely pneumatized skulls was not determined. Derived data such as mortality (assumed to balance natality) are therefore not determinable with any confidence.—Robert B. Payne.

NESTING AND REPRODUCTION

(see also 10, 17, 20, 21, 30, 37, 41, 42, 48, 49, 51)

11. Clutch size, nest size, and hatching asynchrony in birds: experiments with the Fieldfare (*Turdus pilaris*). T. Slagsvold. 1982. Ecology 63:1389–1399.—Few hypotheses have spawned so much research as Lack's proposal that clutch size corresponds to the maximum number of young that the parents can feed in an average year. Here, Slagsvold investigates the proposition using a colonial, open-nesting species as opposed to the territorial, hole-nesting birds often used previously. In his experiments he varies not only clutch size but also brood size at hatching, nest size (using artificial large nests), and degree of synchrony of hatching. He follows the nests through 8 days post-hatching. His results do not support Lack's hypothesis. Percent of eggs hatching, nestling size, and level of predation were independent of clutch size with a single exception: hatching success in artificial, large nests was 13–18% lower than in natural nests. However, large artificial nests alleviated crowding problems once the eggs hatched so that brood size at 8 days tended to be larger for large artificial nests than small natural nests. Slagsvold speculates that the area the parent can successfully protect from the weather in order to incubate the eggs puts an upper limit on nest size, and that nest size in turn then limits the number of nestlings due to crowding. The scenario certainly fits the data, but one final bit of discussion provided by Slagsvold reminds the reader that there is still room for doubt. Slagsvold notes that postfledging mortality, something he did not measure, varies directly with clutch size in some species and may be another selective factor that keeps clutch size down. If this force is strong enough, size of the nest may be of secondary importance.—A. John Gatz, Jr.

12. Relation of egg and clutch mass, production, and productive energy of female passerines to their body mass. (Zavisimosti massy yaitsa, kladki, produktsii i produktivnoi energii samok vorob'inykh ptits ot massy ikh tela). T. B. Dolnik and V. R. Dolnik. 1981. Ekologiya 5:45–51. (Russian)—Equations were calculated describing the relation of egg mass, clutch mass, clutch size, egg and clutch ("caloricity") production, and average and maximum productive energy of a female bird during egg synthesis, to the female's weight. The formulae describe a "statistically average" bird: useful in measuring energy flow in communities, but producing a certain degree of error in studies of adaptive changes in clutch size or production by a species or a population. Egg synthesis and production are related, through weight, to the female's basal metabolism and capability to assimilate food energy.—Elizabeth C. Anderson.

13. Increase of the Melodious Warbler in the Geneva area. I. Observations on habitats, reproduction, and annual cycle. (La progression de l'Hypolaïs polyglotte dans le Pays de Genève. I. Observations sur les biotopes, la reproduction et le cycle annuel.) D. Landenbergue and F. Turrian. 1982. Nos Oiseaux 36:245–262. (French, English and German summaries)—Since 1977, when breeding *Hippolais polyglotta* were first discovered in the Geneva canton, the population has grown to at least 22 pairs in 1981. Landenbergue and Turrian present an account of their painstaking observations of the breeding of these birds, including spring arrival, territory and associated species, nest site, and growth of young. They document the first known case of a pair raising two broods. Additional notes on food and foraging are included, as is a review of published information, supplemented by the authors' own data, on migration and wintering. The most important aspect of the paper lies in the authors' hypotheses of the habitat requirements of the birds in the Geneva area. Four factors appear essential: (a) an open canopy ca. 5 m tall, and covering no more than 40% of the area, for song posts; (b) a shrub layer (30-70% coverage) with some dense thickets, such as *Rubus* spp. tangles, for nesting and foraging; (c) an herbaceous layer, for foraging; and (d) an open, sunny, hot and dry aspect, such as a southern exposure, with or without water. Recently abandoned gravel pits are important habitats for these birds in the Geneva area.—Paul B. Hamel.

14. Differences between old and newly established Goldeneye *Bucephala clangula* populations. M. O. G. Eriksson. 1982. Ornis Fenn. 59:13–19.—Goldeneyes nesting in an area where nest boxes were recently erected were compared with birds nesting in an older nest-box population, both in SW Sweden. The populations were similar in their breeding biology, but mean clutch size was smaller in the new population, perhaps because these were mainly first-time breeders, or younger birds, though neither factor was determined. A comparison of the densities of Goldeneye populations in Sweden and Finland show all 6 sample areas to have an average of 0.3–0.5 pairs per km shoreline. The author suggests that the amount of shoreline is critical, given that many more nest boxes are available than are occupied, and that even those lakes not used for breeding are important resources as they are often used for feeding.—Robert B. Payne.

15. Breeding success of Finnish birds in the bad summer of 1981. O. Hilden, A. Järvinen, L. Lehtonen, and M. Soikkeli. 1982. Ornis Fenn. 59:20–31.—Summer in Finland was cold and rainy in 1981. The authors have compiled their anecdotal observations with those of other ornithologists who responded to a published request to get a feel for the effect of the bad weather. Gull and tern populations were the best sampled with data from several other years; some other species are much less well documented. Breeding success was particularly low in some gulls, terns, eiders, and grebes and also in some populations of hole-nesting passerines, though success varied with the style of nest box for these birds. Flooding, chilling, and a decreased supply of food were involved to various degrees in the different species.—Robert B. Payne.

16. On the start of laying and the clutch size of the Pied Flycatcher (*Ficedula hypoleuca*) in relation to locality. (Über Legebeginn und Gelegestärke des Trauerschnäppers (*Ficedula hypoleuca*) in Beziehung zur geographischen Lage des Brutortes.) R. Berndt, W. Winkel, and H. Zang. 1981. Vogelwarte 31:101–110. (German, English summary)—Within Germany (50°–55°N), clutch size varied directly with latitude when corrected for date of laying: more northern birds laid later, and later nests had smaller clutches. The paper is interesting in qualitatively relating the interaction of laying date and latitude.—Robert B. Payne.

BEHAVIOR

(see also 8, 25, 37, 43)

17. Promiscuity in the Shag as shown by time-lapse photography. M. P. Harris. 1982. Bird Study 29:149–154.—Harris demonstrates the use of time-lapse photography for determining time budgets of incubating Shags (*Phalacrocorax aristotelis*). For 10 days a Kodak Analyst Super-8 Surveillance Camera took pictures every 105 sec of a pair of individually marked shags on the nest. Film analysis revealed that each member of the pair was away from the colony (or nest?) a maximum of 15–16% of the 10-day period. During this time one male had relations with at least 4 females, 2 of which laid unsuccessful clutches. Harris found that photography provided an inexpensive permanent record of events at the nest. I suggest that while such photography is useful for time budgets and similar quantitative analyses, it is limited in its information content for analysis of complex social behavior such as promiscuity, as described herein. Follow-up observations from a blind would be necessary to reveal the subtleties of behavior involved in such a relationship. Furthermore, as Harris indicates, time-lapse photography may miss entirely brief events such as matings which may be significant in interpretation of the film record.—Lise A. Hanners.

18. Effects of temperature on foraging behaviour of small forest birds wintering in northern Finland. R. V. Alatalo. 1982. Ornis Fenn. 59:1–12.—Tits (*Parus* spp.), Goldcrest (*Regulus regulus*), and Tree-creepers (*Certhia familiaris*) were observed in winter near Oulu, Finland. Four microhabitat sites and 5 feeding postures were sampled, and the microhabitat sites were compounded into a niche-breadth index. No general, statistically valid trends were observed across species, but there was a tendency for each species to specialize more and overlap less in site use with decreasing temperature. The author offers two after-the-fact explanations: in warmer weather birds may save their best sites for colder weather, and in cold weather birds do not fight much intraspecifically so tend to occupy the same places. There are no supporting observations for either idea. I suspect that the results are not generally applicable as they would vary with species mixes and their food requirements as well as with temperature, conditon of the birds, and other factors of behavior.—Robert B. Payne.

19. Spatial learning as an adaptation in hummingbirds. S. Cole, F. R. Hainsworth, A. C. Kamil, T. Mercier, and L. L. Wolf. 1982. Science 217:655–657.—Behavioral ecologists attempting to use the learning literature to understand the behavioral mechanisms underlying feeding behavior will frequently be frustrated. Much of the recent learning literature has concentrated upon the biological "constraints" on learning which focus upon apparent anomalies in arbitrary learning situations. Few papers have taken an ecological approach to learning by concentrating upon the problems faced by animals in their natural environments. This is one such paper, which examines the role of spatial learning in hummingbirds.

The authors hypothesized that once a hummingbird was reinforced for visiting a flower at one location, it would more easily learn to visit other such flowers at *different* locations during subsequent feeding bouts rather than returning to the same initial location. The hypothesis follows from the simple observation that a hummingbird returning to a recently emptied flower would have a lower rate of net energy gain than birds going to another flower containing nectar.

To test their hypothesis, hummingbirds of three species were presented with two training regimes, which varied only in the location of the food reward following the initial reward in an artificial flower. "Stay learning" required a return to the position where the bird first fed. "Shift learning" required going to the opposite position to obtain food. The shift task was learned in a shorter time than the stay task regardless of the order of presentation of the two tasks.

The results of these experiments are not predicted by the traditional views of the effects of reinforcement on behavior. Although the authors' suggestion "that the ecology of food resource distribution in space and time generates important evolutionary influences on learning" seems trite (at least to an evolutionary biologist), it may be important for learning psychologists.—J. M. Wunderle, Jr.

20. On mate fidelity in Great, Blue, and Coal tits (*Parus major, P. caeruleus,* and *P. ater*. (Zum Paarzusammenhalt bei Kohl-, Blau- und Tannenmeise (*Parus major, P. caeruleus* und *P. ater*.) W. Winkel and D. Winkel. Vogelwarte 30:325–333. (German)—In birds breeding more than once in a breeding season, most pairs remained together for both breedings. A change of partners was seen in 11 of 101 pairs of Great Tits, 2 of 56 Coal Tit pairs, and 1 of 18 pairs of Blue Tits. In cases where both members of a previous year's pair were known survivors, old pairs usually reformed. One pair of Coal Tits and one pair of Blue Tits each nested together for 4 years.—Robert B. Payne.

21. Behavior of *Larus argentatus cachinnans* at late stages of the reproductive cycle. (Povedeniye khokhotun'i (*Larus argentatus cachinnans*) na pozdnikh stadiyakh reproduktivnogo tsikla). E. N. Panov and L. Yu. Zykova. 1981. Zool. zh. 60:1658–1669. (Russian, English summary)—The social behavior of adult Herring Gulls nesting at Lake Tenghiz (Kazakhstan, USSR) was observed. Late in the nesting season there are no prolonged behavior sequences; rather, the birds exhibit unpredictable brief aggression and isolated, out-of-context acts from their repetoire of courtship, nesting, or parental behavior.

Gull chicks may congregate in "nurseries" of 4–17 chicks ("enrollment" is not constant). One or two guardians tend the nursery; several would-be parents often stay nearby and engage in aggressive encounters with the guardians. One reason for competition for guardianship of the nursery is the presence in the colony of birds that have lost their own clutches or broods. Chicks may become victims of adults whose parental behavior turns into a burst of aggression. It is not evident that nurseries increase chick survivability.—Elizabeth C. Anderson.

ECOLOGY

(see also 9, 12, 13, 18, 19, 32, 38, 43, 46, 54)

22. Bird species distributions in the Galápagos and other archipelagoes: competition or chance? R. V. Alatalo. 1982. Ecology 63:881–887.—The rejection of a hypothesis is a critical step in the hypothetico-deductive method of science. In order for useful information to be gained, however, the right hypothesis needs to be tested. Alatalo's major point is that many of the random models used to test whether or not competition affects the distribution of birds (and bats) on islands have not been suitable for this purpose. For example, when Alatalo reanalyses (cf. Connor and Simberloff, Ecology 60:1132–1140, 1979) the distribution of Galápagos finches using his own random models, he concludes that *Geospiza* but not *Camarhynchus* show a significantly non-random distribution. Island size and limits to the number of islands each species inhabits cannot alone explain the distribution of *Geospiza,* nor can limits on habitat availability or geographic isolation. Alternatively, analysis of bill-size ratios shows a non-randomness like that expected given a predominant effect of competition. A similar case exists for the birds of the West Indies. Connor and Simberloff reported that the number of exclusive pairs of species was not greatly different than the expected based on a random model, 12757 vs. 12448 respectively. Alatalo found a closer fit between observed and expected was obtained for a model that includes the provision that each species of bird is excluded by one other species and an even closer fit if each species is excluded by an average of three other species. He found similar results for the bats of the West Indies, but not for the birds of the New Hebrides. Alatalo's point is that failure to reject hypotheses of weak discriminatory power, such as those generated by some random models, does not mean that all of the random conditions of the model must be true. Other sets of conditions, including the existence of competition, may be at least as likely as the purely random case. Moreover, because competition can lead to a myriad of outcomes other than exclusive distribution, e.g., extinction, character displacement, etc., no hypothesis dealing with distributions alone is a very good way to decide the overall importance of competition in island distribution. Alatalo makes good points and makes them well.—A. John Gatz, Jr.

23. Drought-induced changes in avian community structure along a montane sere. K. G. Smith. 1982. Ecology 63:952–961.—Smith's paper is of interest because it clearly points out how little has been published on year-to-year variations in bird populations. Her dissertation involved a 3-yr study of resource partitioning among the birds in a subalpine sere: meadow-aspen-fir-spruce. Smith gathered data on the number of breeding species and breeding densities of birds for all 3 yr as well as information on temperature, snow-pack, insect and spider abundances, and flowering phenology. As luck would have it, in the second year of the study, a severe drought occurred. This serendipitous event led her to analyze local extinctions due to loss of food resources and to compare the magnitude of effects in the different habitat types. Apparent reductions in diversity of breeding birds as a result of the drought seem great in at least two habitat types, and reductions in densities of breeding birds seem even more severe. But how can one really know? Smith's own study spans too few years to provide background information on "normal" annual fluctuations, plus only a single plot of each type was studied. Furthermore, it seems apparent from the literature cited that virtually no long-term studies of stability in bird communities exist. Such studies are needed not only to be able to better assess the magnitude of "ecological crunches" such as this drought, but also—as Smith points out—to compare the relative importance of competition and "crunches."—A. John Gatz, Jr.

24. Seed and patch selection by Galápagos ground finches: relation to foraging efficiency and food supply. D. Schluter. 1982. Ecology 63:1106–1120.—A principle prediction of nearly all theories of optimal foraging is that predators should specialize when food is abundant and generalize when food is scarce. Universal expectation or not, Smith et al. (Ecology 59:1137–1150, 1978) did not find this to be true for *Geospiza* and Schluter here reinvestigates the question on Isla Pinta, Galápagos, using data from *G. fuliginosa* primarily, but also *G. fortis* and *G. magnirostris*. Schluter measured bird abundances, sizes and profitabilities of seeds and fruits, and patch use. For the most part, his data were consistent with foraging theory predictions of eating those foods for which the predator had highest handling efficiency and eating in patches of the highest profitability. If there was a conflict between these expectations, patches seemed to be the unit of selection; dense clumps of seeds of low individual profitability were preferred to less dense clumps of valuable seeds. When it came to comparing diets between wet and dry season, i.e., abundance vs. scarcity, the expected increase in generalization did not occur. Of the several possible explanations for this constancy of degree of generalization which Schluter discusses, the one which he seems to support the most is one of "adequate foraging." Schluter suggests that birds may not be feeding optimally, just adequately, during periods of abundance. Hence the specialization predicted would not be seen during times of excess and no demonstrable shift away from specialization to generalization would be seen during the dry season. Although attractive both for its simplicity and reasonableness, further work seems necessary. In particular, the interaction between levels of interspecific and intraspecific competition, patch selection, and item selection within patches of the sort done with sunfishes (Werner and Hall, Ecology 60:256–264, 1979) seems crucial before a final resolution is apt to result.—A. John Gatz, Jr.

25. Resource use, competition, and resource availability in Hawaiian honeycreepers. S. L. Pimm and J. W. Pimm. 1982. Ecology 63:1468–1480.—One way of studying competition is to examine how foraging behavior in one species is affected by the presence of additional species. Differences from optimal foraging expectations can be taken as the effects of competition. Pimm and Pimm used this approach in their study of three drepanidid nectivores in Hawaii: *Vestiaria coccinea,* a large and physically dominant species, and two subordinates *Himatione sanguinea* and *Loxops virens.* All three species feed primarily on the blooms of *Sophora chrysophylla* which has its blooming peak in December–January and *Metrosideros collina* which peaks in June–July. A 5-mo study allowed observations to be made as resource abundances changed by several orders of magnitude. All data were consistent with theoretical predictions for competing species. The dominant *Vestiaria* always specialized on whichever species of tree had the most blooms and excluded both competing species from these, the best resources. When flowers were scarce, the two subordinate species specialized each on a different species of tree (*Himatione* on *Metrosideros* and *Loxops* on *Sophora*). While this last result is predicted by both optimal foraging and competition theory, Pimm and Pimm present further analyses of patterns of resource use which they feel argue for the predominant role of competition. In an interesting final commentary, Pimm and Pimm suggest that recent extinctions of Hawaiian nectivores are dependent upon the size and behavior of the species. The "large, showy, and aggressive species" are not only most vulnerable to being hunted, but also are least able to exploit reduced resources following habitat destruction. It's somewhat numbing to think how poor the interaction is between ecological dominants and humans.—A. John Gatz, Jr.

26. Distributions of Galápagos ground finches along an altitudinal gradient: the importance of food supply. D. Schluter. 1982. Ecology 63:1504–1517.—Schluter investigated the relative importance of three factors: (1) habitat structure, (2) food supply, and (3) present interspecific competition, in determining the distribution of five species of *Geospiza* (*G. difficilis, G. fortis, G. fuliginosa, G. magnirostris,* and *G. scandens*) along an altitudinal gradient on Isla Pinta, Galápagos. During six visits over a 2-yr period, he estimated avian densities from mist net, transect, and territory data, studied diets by observing feeding, and characterized food supplies and habitats from measurements in quadrats at each of six elevations. The tables and figures which result show seasonal changes in both distribution and diet of some of the bird species. Specifically, only *G. difficilis* showed any correlation between abundance and a habitat feature—a positive correlation between number of finches and volume of leaf litter. In contrast, all species (including *G. difficilis* since food supply of litter invertebrates correlates with volume of litter) show a correlation between density of birds and food available in at least one season. For two species, *G. difficilis* and *G. fuliginosa,* this latter correlation occurred in three of the four seasonal samples taken. Only in the early wet season was such a correlation universally lacking, and that was when all finches were breeding and not eating many seeds anyway. Analysis of the density data did not indicate ongoing interspecific competition. When one species was abundant, so too were its potential competitors; inverse density relationships predicted by competition did not exist.

Other results further substantiate the current importance of food supply in the altitudinal distribution of *Geospiza* on Pinta. Most species seasonally alter their altitudinal position in spite of an absence of corresponding seasonal changes in habitat structure at the various altitudes. Overall abundances of finches decline in parallel to the seasonal decline in overall food supply. Equally wide dietary breadths are retained at all seasons rather than there being variations according to intensity of competition (see review **22**). Schluter's conclusions seem well-founded. Further, he appropriately disclaims generality to his results by suggesting that the pattern he found may well be island specific. Restricted result or not, here is a case in which a pattern of distribution that superficially resembles what is expected based on competition is seen to have a different cause when closely studied.—A. John Gatz, Jr.

27. Niche separation in Central European Reed warblers (*Acrocephalus,* Sylviinae). I. Habitat separation. (Die ökologische Einnischung der mitteleuropäischen Rohrsänger (*Acrocephalus,* Sylviinae). I. Habitattrennung.) B. Leisler. 1981. Vogelwarte 31:45–74. (German, English legends for figures and tables, English summary)—The habitat associations of western palearctic *Acrocephalus* species in central Europe were studied by measuring six aspects of the vegetation of the territories at four study sites (Hortobágy in Hungary, Lake Neusiedl in Austria, Lake Constance in Germany, and the Camargue in France. Species involved were the Great Reed Warbler *A. arundinaceus,* Reed Warbler *A. scirpaceus,* Marsh Warbler *A. palustris,* Moustached Warbler *A. melanopogon,* Sedge Warbler *A. schoenobaenus,* and Aquatic Warbler *A. paludicola.* Each territory (total 270) was scored and the species were compared with principal components and discriminant function analyses. The results showed a surprisingly clear separation among the six species, though Moustached Warbler and Sedge Warbler both considerably overlapped Aquatic Warbler (and to a lesser extent overlapped each other). The main component separating the species appeared to be related to water depth and moisture, though different components separated species considered two at a time. No evidence for ecological character displacement in habitat selection was found in any of the species pairs. The study is a detailed and thorough comparison of habitat requirements, and is the most successful study that I have seen using multivariate analysis to compare the ecology of a closely related group of species.—Robert B. Payne.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 4, 39)

28. Variability of waterfowl aerial surveys: observer and air-ground comparisons—A preliminary report. J-P. L. Savard. 1982. Can. Wildl. Serv. Prog. Notes, No. 127, 6 p.—This report compares numbers of waterfowl counted on ground versus aerial surveys in British Columbian waters. Back-to-back aerial surveys over the same flight paths showed significant differences in numbers of waterfowl. Twice as many birds and four times as many species were observed in ground surveys as in aerial surveys.—Richard M. Zammuto.

29. Status reports on twelve raptors. D. L. Evans. 1982. U.S. Fish & Wildl. Serv. Spec. Sci. Rep. Wildl. No. 238, 68 p.—This report discusses in detail literature on the original taxonomic description, background, geographic distribution, habitat, food, reproduction, pathology, predators, population status, and management of 12 raptors. Species considered are: Osprey (*Pandion haliaetus*), Bald Eagle (*Haliaeetus leucocephalus*), Northern Harrier (*Circus cyaneus*), Sharp-shinned Hawk (*Accipiter striatus*), Cooper's Hawk (*A. coop-

erii), Ferruginous Hawk (*Buteo regalis*), Crested Caracara (*Polyborus plancus*), Merlin (*Falco columbarius*), Aplomado Falcon (*F. femoralis*), Peregrine (*F. peregrinus*), Prairie Falcon (*F. mexicanus*), and Burrowing Owl (*Speotyto cunicularia*). An extensive bibliography follows treatment of each species.—Richard M. Zammuto.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 1, 6, 14, 25, 56)

30. Population, reproductive success, and analysis of contaminants in Razorbills (*Alca torda*) in the estuary and Gulf of St. Lawrence, Quebec. G. Chapdelaine and P. Laporte. 1982. Can. Wildl. Serv. Prog. Notes, No. 129, 10 p.—This paper reports population size, nesting activity, egg organochlorine compounds, and eggshell thickness for Razorbills (*Alca torda*) in the Gulf of St. Lawrence. The population numbered ±6700, decreasing by 67% since 1965. Hatching and fledging success for ±100 nests were 70% and 87% respectively.

DDT and PCB levels in eggs were similar to those found in the population in the early 1970's and lower than those found in Razorbills in the Baltic Sea. Concentrations of DDT and DDE were not correlated to eggshell thickness.

Figures display the distribution of Razorbill colonies and the numbers observed in 3 colonies during 11 surveys over 53 years. The possibility that the population cannot be maintained under present conditions of survival and reproduction is suggested.—Richard M. Zammuto.

31. A population of diurnal raptors in central Italy. A. Petretti and F. Petretti. 1981. Gerfaut 71:143–156.—Population censuses were carried our for eight years in an area whose location is undisclosed to protect its nesting raptors. All five sites for Egyptian Vultures (*Neophron percnopterus*) were deserted over this period; the species barely has a toehold in Italy, but nests in Sicily. Red Kites (*Milvus milvus*) are at a critically low level due mainly to winter shooting. Montagu's Harriers (*Circus pygargus*), which numbered one or two pairs, nest in wheat fields and may be affected by the destruction of nests during harvesting. Lanner Falcons (*Falco biarmicus*) are scarce; their density is about one pair per 425–850 km^2, lower than in the desert zones of Morocco. Species with stable populations are Black Kite (*Milvus migrans*), Short-toed Eagle (*Circaetus gallicus*), Buzzard (*Buteo buteo*), Sparrowhawk (*Accipiter nisus*), Kestrel (*Falco tinnunculus*), and Hobby (*F. subbuteo*), the last with a density of one pair per 14.1 km^2 of wooded area. The only species increasing in numbers is the Honey Buzzard (*Pernis apivorus*). The densities and the critical factors in the ecology of each species are compared with those of other European populations, and the authors make several suggestions for conservation of the breeding birds of prey.—Robert B. Payne.

32. Avian communities on partially reclaimed mine spoils in south central Wyoming. D. G. Krementz and J. R. Sauer. 1982. J. Wildl. Manage. 46:761–765.—Differences in avian community structure between a 2–3-year-old strip mine reclamation attempt and a native desert shrub-steppe habitat are described. Breeding birds were censused in 1978–1979 on a "native" site and a "reclaimed" site using transects (1250 by 80 m). At the time of censusing the reclamation had not produced vegetation similar to the native site.

Twelve species in 6 guilds used the reclaimed site; 37 species in 11 guilds used the native site. The reclaimed community was dominated by Horned Larks (*Eremophila alpestris*), the only species that nested on the reclaimed site. The overall pattern was low evenness and species richness and high dominance on the reclaimed site; high evenness and species richness with low dominance on the native site.

The authors discuss differences in species composition, abundance, and diversity between the sites and "probably due to between-site variation in habitat structure." Unfortunately no quantitative habitat measurements were made; it would have been interesting to re-measure vegetation structure on the reclaimed site as it regenerated and became more similar in vertical heterogeneity to the native site. No details are given on the specific reclamation treatments or the areas of each site, but the reclaimed site was dominated by a "weedy annual," common halogeton (*Halogeton glomeratus*), whereas the native site had both vertical and horizontal diversity due to presence of sagebrush (*Artemisia* spp.), wheatgrass (*Agropyron* spp.), saltbush (*Atriplex* spp.), and black greasewood (*Sarcobatus vermiculatus*). The authors point out that the lack of vertical structure on the reclaimed site probably restricted available nesting habitat, and recommend planting of sagebrush and other species if reclamation objectives are to include re-establishment of a "premining avifauna."—Richard A. Lent.

33. Captive reproduction of Cinereous Vultures, *Aegypius monachus.* (Une reproduction en captivité du Vautour moine, *A. m.*) E. Meier. 1982. Nos Oiseaux 36:233–239. (French, with English and German summaries)—A pair of Cinereous Vultures, brought as juveniles to Zoo La Garenne in Le Vaud, Switzerland, in 1969, produced a single young in 1981. Meier presents details of the nesting and of the specially constructed aviary in which the breeding took place. Paul Geroudet appended a short note ("Réflexions sur le Vautour moine," pp. 239–240) on the critical status of the species in Europe.—Paul B. Hamel.

34. Investigation of the Golden Eagle, *Aquila chrysaetos,* in Gran Paradiso National Park. (Enquête sur l'Aigle royal, *A. c.*, dans le Parc national du Grand-Paradis.) F. Framarin. 1982. Nos Oiseaux 36:263–273. (French, with English, German, and Italian summaries)—Eleven pairs of Golden Eagles nest in a 1000 km^2 area in and surrounding this national park in the Graian Alps in northwestern Italy. Framarin presents notes on territory size, distribution of aeries, reproduction, and protection of the population in the park.—Paul B. Hamel.

35. Effects of the installation of silos on Whinchats, *Saxicola rubetra,* nesting in the Enhaut area. (L'installation de silos à herbe et ses répercussions sur un échantillonage de Traquets tariers, *S. r.*, nicheurs au Pays d'Enhaut.) F. Manuel and P. Beaud. 1982. Nos Oiseaux 36:277–281. (French, English and German summaries)—Numbers of Whinchats on a 16-ha area in the upper Sarine valley in Switzerland decreased 50% following an intensification of agricultural practices related to haymaking 1976–1980. Earliest haying dates now occur while Whinchats still have eggs or young in nests in the hayfields. Manuel and Beaud discuss this and an unrelated decline in Whinchat numbers in Belgium.—Paul B. Hamel.

36. List of environments in France to protect within the framework of the Directive of the Council of the European Community on the Conservation of Wild Birds. (Liste des milieux à protéger en France dans le cadre de la Directive du Conseil de la C. E. E. sur la Conservation des oiseaux sauvages.) L. Marion. 1982. Penn Bed (Brest) 13: 97–121. (In French)—Marion presents an analysis of the criteria established in April 1979 by the Council of the European Community concerning the conservation of wild birds. The goal of the council was to provide a framework within which environments essential to the survival of the European avifauna could be identified and preserved. One-hundred-twenty-three qualifying sites are listed, along with those species identified in the Appendix to the Directive as in need of preservation. Two tables show the proportion of French breeding and wintering populations of these species that would be protected were all the sites preserved. The proportions range from negligible in certain cases to the entire populations of other species. Marion indicates that the Directive, by emphasizing status across Europe, did not entirely reflect status of species within France, and thus did not provide sufficient emphasis on certain species, particularly those in the Mediterranean area. He also notes that few passerine species were considered.—Paul B. Hamel.

37. Use of dead cavity trees by Red-cockaded Woodpeckers. R. G. Hooper. 1982. Wildl. Soc. Bull. 10:163–164.—Red-cockaded Woodpeckers (*Picoides borealis*) in South Carolina roosted for up to 8 months and in some cases nested in dead pines that did not exude resin around the cavity entrance. Resin has been shown to be important to the woodpeckers because it repels rat snakes (*Elaphe obsoleta*), a major predator. Some individuals roosted in dead trees for more than 2 years. This disproves a long-held opinion that Red-cockaded Woodpeckers abandon cavities if resin stops flowing. Protection of dead, as well as living, cavity trees is suggested as an additional factor in habitat management for this endangered species.—Richard A. Lent.

38. Ecological and zoogeographical aspects of the effect of fires on forest birds and mammals. (Ekologicheskie i zoogeograficheskie aspekty vozdeystviya pozharov na lesnykh ptits i mlekopitayushchikh). L. V. Kuleshova. 1981. Zool. zh. 60:1542–1552. (Russian, English summary)—Communities in burned forests differ from the initial ones in species composition, dominants, ratio of layer groups, and trophic structure. Where burns are found over much of a large area, many mammalian and avian species are redistributed. Fires change zoogeographic ratios in faunas of different regions and, in particular, favor expansion of European fauna and limit distribution of Siberian elements. Changes in the fauna subsequent to burns used to be cyclic, but widespread felling of forests has severely upset the natural cycles.—Elizabeth C. Anderson.

PARASITES AND DISEASES

39. Newcastle disease in a White Stork (*Ciconia ciconia* L., 1758). (Newcastle-Disease bei einem Weißtorch (*Ciconia ciconia* L., 1758)). E. F. Kaleta, R. Löhmer, N. Kummerfeld, H.-J. Marschall, B. Stiburek, and G. Glünder. 1981. Vogelwarte 31:1–6. (German, English summary)—Newcastle disease virus was isolated from a White Stork found sick in Germany. A diagnostic pathology report is given. The virus was virulent in chickens. The authors discuss virus and antibody assays but not control measures.—Robert B. Payne.

PHYSIOLOGY

(see also 7, 12, 65)

40. Thermal and electromyographic correlates of shivering thermogenesis in the pigeon. E. Hohtola. 1982. Comp. Biochem. Physiol. 73A:159–166.—Since West and Hart's work in the mid-1960's, little attention seems to have been given this subject. This may be unfortunate, for, as the author points out, the technique has promise for use in a variety of studies of physiological relevance. Students of thermoregulation should examine the paper in its entirety.—C. R. Blem.

41. The development of effective homeothermy and endothermy by nestling Starlings. L. Clark. 1982. Comp. Biochem. Physiol. 73A:253–260.—When this paper is assembled with the relatively recent series of studies of homeothermy in broods of passerine nestlings (e.g., see Dunn, Wilson Bull. 88:478–482, 1976; Dunn, Wilson Bull. 91:455–456, 1979; Clark and Balda, Auk 98:615–619, 1981; Hill and Beaver, Physiol. Zool. 55:250–266, 1982), a comprehensive review of the subject results. The consensus of these papers is that: (1) effective homeothermy and endothermy do not necessarily coincide, and (2) homeothermy and metabolic rate vary with brood size. Experimental detail varies among these papers and there is a small amount of interspecific variation.—C. R. Blem.

42. Energy expenditure of an incubating tropical hummingbird under laboratory conditions. K.-L. Schuchmann and H. Jakob. 1981. Gerfaut 71:227–233.—Food intake, incubation behavior, time spent in other activities, and body temperature were measured for a breeding female Black-billed Streamertail (*Trochilus polytmus*). A net energy gain was observed through the day. The body temperature measured at the brood patch dropped from 39.9°C to an average of 32.2°C from the time the bird returned to the nest to the time the bird was settled on the eggs. The cloacal temperature measured at night was 2.4°C higher than the brood patch temperature. The incubating female took in less food than a nonbreeding bird, but remained in positive energy balance by reducing its body temperature while incubating, and to a lesser extent by a small reduction in perching, hovering, and forward flight.—Robert B. Payne.

43. Coefficients for calculating energy expenditure by wild-living birds based on activity timing. (Koeffitsienty dlya rascheta raskhoda energii svobodnozhivushchimi ptitsami po dannym khronometrirovaniya ikh aktivnosti.) V. R. Dolnik. 1980. Ornitologiya 15:63–72. (Russian)—Coefficients for deriving a bird's energy budget from its observed time budget are useful in researching bioenergetics and in evaluating the effectiveness of adaptive behavior. Drawing on studies by others and adding his own calculations, the author presents coefficients for seven categories of activity based on the amount of energy needed for basal metabolism as 1 BMR. Coefficients range from 1 (sleeping) up to 16 (ascending flight, hovering). Multiplication of the appropriate coefficient by the time spent in each form of behavior, and addition of the results, gives the bird's daily energy budget in BMRs. This aggregate is then multiplied by the BMR (in kilocalories per hour) for the species, yielding the daily energy expenditure. When the surrounding temperature is beyond the bird's thermoneutral range, Rubner's compensation rule (that heat produced by flying and while cooling down after flying can be used for warmth) must be remembered. Energy-conserving behavior (e.g., hypothermia or group roosting in cold weather, water bathing in warm) must also be considered. The energy budget can be adjusted by multiplying the bird's heat conduction by the difference between the thermoneutral range and the actual environmental temperature.—Elizabeth C. Anderson.

44. Do phasianid birds really have functional salt glands? Absence of nasal salt secretion in salt-loaded Sand Partridges and Chukars *Ammoperdix hevi* and *Alectoris chukar sinaica*. D. H. Thomas, A. A. Degen, and B. Pinshow. 1982. Physiol. Zool. 55: 323–326.—This paper refutes a widely reported occurrence of salt-gland secretion in phasianids (Schmidt-Nielsen et al., Science 142:1300–1301, 1963), and contends that phasianid birds are not likely to possess nasal salt glands.—C. R. Blem.

45. Inertial thermostability and thermoregulation in broods of Redwing Blackbirds. R. W. Hill and D. L. Beaver. 1982. Physiol. Zool. 55:250–266.—This study presents an excellent analysis of variations in body temperature and metabolism in relation to brood size (see review **41**). It points out once again that broods have very different thermoregulatory controls than single nestlings, but does it in the most comprehensive fashion I have seen. My only "picky" complaint: why the misspelling of the common name?—C. R. Blem.

46. Diving depths and energy requirements of King Penguins. G. L. Kooyman, R. W. Davis, J. P. Croxall, and D. P. Costa. 1982. Science. 217:726–727.—Depth histogram recorders were attached to three King Penguins (*Aptenodytes patagonica*) to determine their diving depths while at sea during 4–8-d periods. Half of their dives were more than 50 m and two dives exceeded 240 m (Emperor Penguins, *A. forsteri,* dive to at least 265 m). The metabolic rate at sea was calculated from the turnover of tritiated water and was 2.8 times the standard metabolic rate. This metabolic rate requires about 2.5 kg of squid per day. The authors estimated that 10% or less of the dives may result in prey capture.—J. M. Wunderle, Jr.

47. Seasonal variation in plasma levels of luteinizing hormone and steroid hormones in the European Blackbird *Turdus merula*. H. Schwabl, J. C. Wingfield, and D. S. Farner. 1980. Vogelwarte 30:283–294.—Seasonal changes of hormones were sampled in a population of *T. merula* in southwest Germany. In males the levels of LH and testosterone increase before the breeding season and decrease during the incubation period. Juvenile males have lower LH levels during the breeding season as in adults, but testosterone levels are the same as in adults. LH in females is elevated during the breeding season; testosterone in females shows no marked seasonal trend. Corticosterone changes occur but are not closely timed to the time of partial migration. The study is of interest in showing similar cycles of plasma hormone levels in a European species as in birds studied by Wingfield and Farner in North America.—Robert B. Payne.

48. Interspecific differences in water permeability of egg shells in small passeriformes, as determined by means of a hygrometer. (Vidovye razlichiya vodopronitsaemosti skorlupy yaits mel'kikh vorob'inykh ptits, opredelyaemye pri pomoshchi gigrometra). A. V. Grazhdankin. 1981. Zool. zh. 60:1704–1711. (Russian, English summary)—A hygrometer with a chamber volume of 68.5 ml was used to measure air humidity of small volumes, with only a 0.44 mg/l error, by recording air temperature and dew point. Egg shells of eight passerine species were tested for permeability to water vapor, and were found to vary greatly depending on the species. The method allows comparison of permeability of egg shells in the same clutch under field conditions, and disturbance of the nesting bird and of the developing embryo is minimal.—Elizabeth C. Anderson.

MORPHOLOGY AND ANATOMY

49. Microscopic examination of the surface of avian eggshells. (Examen microscopique de la surface des coquilles d'oeufs d'oiseaux.) J. Perrin de Brichambaut. 1982. Alauda 50:1–15. (French, English summary)—Perrin de Brichambaut conducted a well-organized scanning electron microscopic study of eggshell surfaces of 60 species of breeding birds in France. The study was designed to determine the usefulness of characters of the shell surface in specific identification. Little taxonomic significance can be placed upon the shell surface, for variation on different parts of an individual shell may exceed interspecific differences. However, surface features of specimens from the same region of the egg are sufficiently constant within a species to use the surface structure as an aid to identification in conjunction with other features of a shell. The paper unfortunately fails to cite any recent work on the physiology of the pores of shells (e.g., Ar et al., Condor 76:153–158, 1974; Baccetti, Monitore Zool. Ital. 10:25–91, 1976), which has shown clear association of the number, size, and distribution of pores with the nest environment. Nevertheless, the work is a useful example of a well-designed study that produced negative results; it is illustrated with 40 fine micrographs.—Paul B. Hamel.

50. The leg muscles of the American Coot (*Fulica americana* Gmelin). Benjamin W. C. Rosser, D. M. Secoy, and P. W. Riegert. 1982. Can. J. Zool. 60:1236–1256.—This is a descriptive study of the hindlimb myology of the American Coot. Muscles of the forelimb were described in an earlier paper. Significant findings include, but are not limited to: the presence of *M. iliotrochantericus medius, M. gastrocnemius pars intermedia,* and *M. extensor hallucis longus pars distalis.* Also, *patellae* are absent. Perhaps unique to *Fulica americana* relative to other gruiforms is a superficial longitudinal division of *M. gastrocnemius pars medialis.* Whether or not this condition is in any way similar to that reported for some passerines is not clear. Illustrations were made by photographing the dissections and then tracing around the muscle outlines on the photographs. The photographic image is then dissolved away leaving the ink drawings. Unfortunately the final artistic rendering of those drawings is almost unacceptable. In addition to these elementary illustrations there is such strict adherence to the nomenclature of the *Nomina Anatomica Avium* that much of the readability is destroyed. Overall this remains a technically thorough myological study. What is really needed, however, is a comprehensive study of gruiform myology.—Gregory Dean Bentz.

51. Variability of body weight and wing length in the Greenfinch (*Carduelis chloris*) in Berlin. (Zur Variabilität von Körpergewicht und Flügellänge des Grünlings (*Carduelis chloris* in Berlin.) D. Westphal. 1981. Vogelwarte 31:94–101. (German, English summary)—Both sexes have the lowest body weights at the end of the breeding season and increase through molt until December. Wing length increases slightly with age from first-year to older birds in both sexes. Wing length of the species increases in size from south to north within the European breeding range.—Robert B. Payne.

PLUMAGES AND MOLT

(see also 74)

52. Variation in the wing-tip pattern of the Herring Gull in Britain. J. C. Coulson, P. Monaghan, J. Butterfield, N. Duncan, C. S. Thomas, and H. Wright. 1982. Bird Study 29:111–120.—Coulson et al. investigated regional variation of wing-tip pattern in Herring Gulls (*Larus argentatus*) in Scotland and northern England. They captured, measured, and sexed (by measurements or dissection) gulls, recorded the color of the mantle, and classified wing-tip pattern based on the number of black primaries and the extent of white on the 10th primary.

Results indicated no evidence of differences in wing-tip pattern between male and female Herring Gulls. Some variation with age was determined so analysis was restricted to full adults. The proportion of birds with black primaries was significantly lower on the west coast of England and Scotland than on the east, as was the proportion of birds with a white 10th primary ($P < .01$). There was also a suggestion of a north-south gradient along the east coast, based on the amount of white in the 10th primary.

Coulson et al. suggested that the differences in wing-tip pattern may be inherited and may reflect differences in genetic makeup of east and west populations of Herring Gulls. Furthermore, their results tentatively suggested north–south pattern differences although they require more data. The authors suggested that their technique for identifying wing-tip patterns may be used to interpret the movements of gulls without having to rely entirely on banding recoveries. Such a technique would be an asset to other studies if the method can be used reliably by other researchers.—L. A. Hanners.

53. The plumages of the Blue-backed Tanager, *Cyanicterus cyanicterus*. J. Ingels. 1981. Gerfaut 71:157–162.—This tanager from northern South America is poorly represented in scientific collections. In a study of specimens in two European museums, the author found a juvenile female, which is for the first time described here. The other plumages were described earlier by Parkes. Details are added on the color of the legs, bill, and iris.—Robert B. Payne.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 22, 26, 29, 31, 52)

54. Birds in isolated bogs in central Michigan. D. Ewert. 1982. Am. Midl. Nat. 108:41–50.—In central Michigan, bogs occur as islands of northern vegetation surrounded by hardwood forests or cultivated land. Some of these bogs contain breeding boreal bird species. Ewert examined the breeding avifauna of three different types of bog in central Michigan—black spruce-tamarack (n = 1), white cedar-tamarack (n = 1), and open bog (n = 2). Only the black spruce-tamarack bog had boreal species of breeding birds: Purple Finch, *Carpodacus purpureus*; White-throated Sparrow, *Zonotrichia albicollis*; Lincoln's Sparrow, *Melospiza lincolnii*; and Nashville Warbler, *Vermivora ruficapilla.* No boreal species were found in the white cedar-tamarack bog or in the open bog. Early successional species (Common Yellowthroat, *Geothlypis trichas*; Song Sparrow, *Melospiza melodia*) were found in all three bog types. The white cedar-tamarack bog had no particular species associated with it. The author suggests that both structure and plant species composition may determine which boreal bird species breed in these bogs. However, because only one black spruce-tamarack bog and one white cedar-tamarack bog were sampled the conclusions should be viewed as tentative.—J. M. Wunderle, Jr.

55. Additions to the avifauna of Rwanda. (Additions à l'avifaune de Rwanda.) J. P. Vande Weghe. 1981. Gerfaut 71:175–184. (French)—The author adds 23 species to the list for Rwanda, including some that had earlier been listed by Schouteden but that were rejected by the author. *Dryoscopus cubla* is found in the eastern savannas and approaches the range of *D. gambensis,* though the two have not been found in local sympatry. Other noteworthy species were *Lanius souzae* and *Anthreptes orientalis,* both in *Pericopsis* woodland in southeastern Rwanda.—Robert B. Payne.

56. Seasonal variation in group size and dispersion in a population of Great White Pelicans. A. Guillet and T. M. Crowe. 1981. Gerfaut 71:185–194.—The local distribution of *Pelecanus onocrotalus* in the southwestern Cape region, South Africa, indicates that the birds are in large groups in a few localities in the dry summer, but move in small groups to many smaller bodies of water in the wet winter and spring. These irregularly visited bodies of water are important for the conservation of pelican populations insofar as most of the population uses these sites for most of the year.—Robert B. Payne.

57. The seabirds of the Moçâmedes Province, Angola. R. K. Brooke. 1981. Gerfaut 71:209–225.—Historical records, museum specimens, correspondence, and ringing recovery records were brought together to describe the seabirds of southern Angola. Most of the paper consists of detailed species accounts. Of the 37 species, 14 are recorded from Angola for the first time. *Halietor africanus* is the only breeding species, 11 species are nonbreeding visitors from the northern hemisphere, and 21 are from areas to the south. Cape Gannets (*Morus capensis*) were recovered from several ringing sites in South Africa, Sandwich Terns (*Sterna sandvicensis*) from Germany, the Netherlands, and Scotland, Common Terns (*S. hirundo*) from Germany, and Arctic Terns (*S. paradisaea*) from Sweden and Estonia.—Robert B. Payne.

58. Observation of the Northern Giant Petrel, *Macronectes halli* Mathews, in the Falkland Islands. T. Chater, A. Guillemont, and J.-F. Voisin. 1981. Gerfaut 71:249–250.—The first published record of *M. halli* from the Falkland Islands is supported by a description and a comparison of the bird with several individual Falkland Islands Giant Petrels *M. giganteus solanderi* observed following the ship at the same time.—Robert B. Payne.

59. Patterns of variation and dispersal in the Buff-banded Rail (*Gallirallus* [sic] *philippensis*) in the south-west Pacific, with description of a new subspecies. R. Schodde and R. de Naurois. 1982. Notornis 29:131–142. The Buff-banded Rail (*Rallus philippensis*) has colonized islands throughout the southwestern Pacific after dispersing from two main areas, New Guinea and Australia. Some populations are also nomadic and wander to exploit seabird colonies. The pattern of geographic variation in this species is complicated. The authors argue that multiple invasions of islands are regular and, as a result, new immigrants may interbreed with previously differentiated isolates, thereby retarding the rates of divergence. But if the species wanders so commonly, one wonders how the isolates were able to diverge so greatly in the first place. This seems a wonderful species for detailed genetic analysis.—J. R. Jehl, Jr.

60. Leach's Storm Petrels (*Oceanodroma leucorhoa*) prospecting for nest sites on the Chatham Islands. M. J. Imber and T. G. Lovegrove. 1982. Notornis 29:101–108.—Storm-petrels are known for appearing in nesting colonies far from their own, but the present case is unprecedented. Two Leach's Storm-Petrels, a species hardly known below the tropics in the southern hemisphere, were captured, photographed, and measured on Rabbit Island of the Chatham Island group in November 1980. No proof of breeding could be obtained, although one was pulled from a burrow. The birds seem typical of the nominate race. Neither was molting and therefore they were out of synchrony with northern hemisphere migrants but in synchrony with other species nesting in the southern hemisphere. This is tantalizing, because it hints at the establishment of an austral population.—J. R. Jehl, Jr.

61. Migration and wintering of gulls, terns, and skuas on the High-lake of Neuchâtel. (Le passage et l'hivernage des Laridés sur le Haut'lac de Neuchâtel.) E. Sermet and J.-C. Muriset. 1982. Nos Oiseaux 36:197–232. (French, English and German summaries)—Sermet and Muriset summarize 39 years of observations (1942–1979) into narrative accounts of 24 species of gull-like birds (4 *Stercorarius* spp., 10 *Larus* spp., *Rissa tridactyla, Geochelidon nilotica,* 5 *Sterna* spp., and 3 *Chlidonias* spp.) that occur in winter or on migration in the southwestern end of the High-lake of Neuchâtel near Yverdon, Switzerland. The authors present diagrams of the daily or weekly abundance of several migrants during the fall and winter seasons. They note that the southwestern end of the lake is more populous during the fall, while the northeastern end of the lake (near Fanel) is more populous during spring migration. The histogram of numbers of the Black Tern (*Chlidonias nigra*) bears out their contention dramatically. Whether the birds congregate at the windward end of the lake or choose the end closest to their migratory destination is uncertain; the phenomenon is nonetheless interesting.—Paul B. Hamel.

SYSTEMATICS AND PALEONTOLOGY

(see also 49, 70)

62. The phylogeny and relationships of the ratite birds as indicated by DNA-DNA hybridization. C. G. Sibley and J. E. Ahlquist. 1981. Pp. 301–335, *in* **Evolution today, Proc. 2nd Int. Congr. Syst. Evol.,** G. G. E. Scudder and J. L. Reveal (eds.). Hunt Inst., Pittsburgh, PA.—Sibley and Ahlquist use DNA-DNA hybridization to investigate the phylogeny and relationships of the ratites. The technique involves a biochemical method for combining radioactively labeled single strands of DNA from one species with unlabeled strands from a second species. Because the species have separate evolutionary histories, their DNAs will differ to some extent. The degree of difference is found by heating the DNA hybrid until it melts. The melting temperature indexes the degree of differentiation and can be quantified and replicated. This method has now been used by Sibley and his colleagues on a large number of species and in many important questions in avian systematics. This paper describes the methodology in detail. For the ratites, the results are summarized in a phenogram in which tinamous branch first, then rheas plus Ostrich (*Struthio camelus*), then kiwis, leaving cassowaries and the emus as sister taxa.—George F. Barrowclough.

63. On the cladogenesis and evolution of *Anser fabalis fabalis* and *Anser fabalis rossicus*. (Sur la cladogenèse et l'évolution d'*Anser fabalis fabalis* et d'*Anser fabalis rossicus.*) J. Van Impe. 1981. Gerfaut 71:163–174. (French)—The westernmost taiga and tundra populations of the Bean Goose are interpreted in light of palaeogeographic data as having differentiated in the Würm I glaciation, not the last interglacial, as there was no tundra vegetation during the interglacial. The author argues that there is no important intermediate population now, because he noted no birds intermediate in morphology or behavior in wintering areas in the Netherlands. However there are no data in the present paper on morphology or behavior, and the author has done no field work in the USSR where the two forms approach each other, nor does he discuss any examination of museum specimens. He argues that the two should be considered distinct species, but he does not present any critical evidence bearing on that question.—Robert B. Payne.

64. What species did Gmelin describe under the name *Procellaria gigantea*? (Quelle espèce Gmelin a-t-il décrite sous le nom de *Procellaria gigantea*?) J.-F. Voisin. 1981. Gerfaut 71:251–255. (French, English summary)—The painting by S. Parkinson that is the type specimen of *P. gigantea* was reexamined in the library of the British Museum in London. The bird portrayed is a juvenile. It cannot be referred unambiguously to either of the two species of giant petrels, which are currently known as *Macronectes giganteus* and *M. halli,* because the two species are alike in plumage as juveniles. The verbal descriptions of new giant petrels by Gmelin (1788) and by Latham (1785) do not agree with the painting and evidently were not based directly on the painting; the verbal descriptions are of adult-plumaged *M. halli* as currently recognized. Voisin proposes to retain the current use of the names as they are applied to the two species today. This seems reasonable advice, given the current understanding indicating that two species of giant petrels are involved and agreement about other aspects of their nomenclature as well as widespread current usage. If the species were not so well known, however, the problem could be resolved by indicating the name used for a species which cannot be allocated to the population from which it was taken by its description with any certainty over another species, as a *nomen dubium,* and using the next available name that applies to the species. Voisin did not discuss this possibility in the paper, but the route has been used as necessary in some other recent ornithological literature (Univ. Michigan Museum of Zoology Misc. Publ. 162, 1982).—Robert B. Payne.

65. Evolution of mitochondrial malate dehydrogenase in birds. N. Kuroda, R. Kakizawa, H. Hori, Y. Osaka, N. Usuda, and S. Utida. 1982. J. Yamashina Inst. Ornithol. 14:1–15.—The authors investigate the pattern of electrophoretic mobility of one enzyme, mitochondrial malate dehydrogenase, across 185 species of birds (57 families, 22 orders). This enzyme was found to be quite conservative. There was no variation within species or genera, but several families and orders shared derived mobility states. The authors present a very preliminary phylogenetic tree for birds. From studies such as this, it would appear that electrophoresis and specific isozyme staining may yet shed some light on higher level systematics. The problem will be in finding a sufficient number of relatively conservative enzymes.—George F. Barrowclough.

66. The relationship of the New Zealand Wrens (*Acanthisittidae*) as indicated by DNA-DNA hybridization. C. G. Sibley, G. R. Williams, and J. E. Ahlquist. 1982. Notornis 29:113–130.—The four species of Acanthisittidae are endemic to New Zealand. Their taxonomic history, fully reviewed in this paper, has been a mess, and morphological characters have failed to provide convincing evidence for any position. The DNA data indicate that they are suboscines with no close living relatives and represent the only survivors of an ancient lineage that may date to the Cretaceous. They are the oldest living group of the New Zealand endemics. A new outline of evolution in the Passeriformes and a partial classification, are included. An important paper.—J. R. Jehl, Jr.

67. Avian mtDNA: structure, organization and evolution. K. R. Glaus, H. P. Zassenhaus, N. S. Fechheimer, and P. S. Perlman. 1980. Pp. 131–135, *in* **The organization and expression of the mitochondrial genome,** A. M. Kroon and C. Saccone (eds.). North Holland Biomedical Press, Amsterdam.—This is the first comparative study to use gene cloning techniques in birds. The authors have isolated the DNA from the mitochondria of several species of Galliform birds and used restriction enzymes to cut the DNA into fragments. Because restriction enzymes require very specific conditions before they will cleave DNA (they only operate when a particular sequence of DNA base pairs occurs), the presence or absence of a restriction site can be interpreted as a character state. Shared states may be found through appropriate interspecific comparisons.

Using 13 of these endonucleases, the authors found 43 restriction sites in the chicken (*Gallus gallus*). Substantial homology was found among five common laboratory Galliform birds; this allowed the computation of mitochondrial DNA distances among the taxa. Thus, this technique shows promise as a systematic tool at the generic and familial levels. Some intraspecific polymorphism was noted within a couple of the species.—George F. Barrowclough.

68. The relationships of the Yellow-breasted Chat (*Icteria virens*) and the alleged slowdown in the rate of macromolecular evolution in birds. C. G. Sibley and J. E. Ahlquist. 1982. Postilla 187:1–19.—If the Yellow-breasted Chat is a wood warbler, it is an aberrant one, with several unique behavioral and morphological characteristics. If it is not a parulid, what is it? The results of DNA hybridization (see review **62**) indicate the chat is closer to the wood warblers than to tanagers, blackbirds, finches, vireos, or mimids.

DNA-DNA hybridization represents an important advance in higher level systematics because it is quantitative and replicable, and obviates subjective evaluation of character state transitions and polarity. The two variables that are potential problems are the question of what specific comparisons ought to be made, and how to best analyze the resulting data. Both issues are important. For example, in this paper only the chat is labeled. Thus, while the distances from *Icteria* to *Geothlypis* and *Dendroica* are reported, we are not informed of the distances between the traditional parulids, *Geothlypis* and *Dendroica.* This leaves no way to know if *Icteria* lies in the midst of the parulid clade, or by itself as a sister group to all wood warblers. More labels are needed to answer such questions. The question of analysis also deserves consideration. The validity of the method employed in all these DNA papers (see bibliography of this paper for a list), a phenetic clustering technique, rests on the underlying assumption that average rates of genetic change are the same in all lineages. This may well be the case; nevertheless, it is an empirical issue that needs to be addressed. Studies aimed at this question are underway.—George F. Barrowclough.

69. Fossil birds from the Hawaiian Islands: evidence for wholesale extinction by man before western contact. S. L. Olson and H. F. James. 1982. Science. 217:633–635.—As emphasized in a recent paper (Pregill and Olson, Annu. Rev. Ecol. Syst. 12:75–98, 1981) biogeographic inferences about natural processes based on recent taxa may be misleading or incorrect. Olson and James continue that theme by comparing the fossil record with the present endemic species of birds on the Hawaiian islands. The paper reports on 39 species of land birds whose extinction preceded western contact. The number of species of endemic land birds known for the main islands has been more than doubled by these new fossil findings. Many of these fossil endemics are contemporaneous with Polynesian culture. The authors suggest that the loss of species was due to predation and destruction of lowland habitats by humans before the arrival of Europeans.

These findings have important implications for the equilibrium theory of island biogeography as was applied to the historically known avifauna of the Hawaiian islands (which produced results consistent with the theory). The authors note that the fossil record shows these earlier results to be spurious. They warn that we cannot assume that the historically known biotas of prehistorically inhabited islands represent the full complement of species in a state of equilibrium. Obviously an historical perspective is essential for understanding present-day ecological relationships.—J. M. Wunderle, Jr.

EVOLUTION AND GENETICS

(see also 59, 62, 63, 65)

70. The origin of Darwin's finches (Fringillidae, Passeriformes). D. W. Steadman. 1982. Trans. San Diego Soc. Nat. Hist. 19:279–296.—Steadman reviews the history of opinion concerning the possible mainland (or Caribbean) relatives of the well-known finches of the Galapagos Archipelago and Cocos Island. He reanalyzes the plumage and morphological characters both of these island endemics and of the various potential neotropical ancestors. This is done through a well-described qualitative analysis of the character states in all taxa. The author concludes that the Blue-black Grassquit (*Volatinia jacarina*) is the closest relative, and was the independent progenitor of both the Galapagos and Cocos finches.

A methodological problem with this important paper is that the author did not explicitly analyze the characters in terms of primitive vs. derived states (i.e., in a cladistic fashion). Thus, there is no way to be certain whether the similarities found between *Volatinia* and the Darwin's finches are due either to a common phylogenetic history, or to retained primitive characters once common to all emberizines.—George F. Barrowclough.

FOOD AND FEEDING

(see also 13, 24, 25)

71. Juniper berries as an exclusive winter forage for Townsend's Solitaires. S. Poddar and R. J. Lederer. 1982. Am. Midl. Nat. 108:34–40.—Dependence on a single fruit for food during a short time period is rare for birds, yet juniper (*Juniperus occidentalis*) berries constitute the sole diet of wintering Townsend's Solitaires (*Myadestes townsendi*). The ripe berries contained an average of 46% carbohydrate, 16% lipid, 4% protein, and 34% fiber and ash by dry weight. These values are similar to other temperate zone berry-like fruits, but because of the low water content they offer a higher caloric value per weight (5 kcal/g). Whether or not the berries contain sufficient protein is unknown. It is possible that the solitaires build-up protein reserves during the summer which allow them to cope with subsequent amino acid imbalances during the winter.—J. M. Wunderle, Jr.

MISCELLANEOUS

72. List of publications, 1979–1981, by the "Rybachy" Biological Station of the USSR Academy of Sciences' Zoological Institute. (Publikatsii biologicheskoi stantsii ZIN AN SSSR "Rybachy" za 1979–1981 gody). Anonymous. No date. 12 pp. (Russian, partial English translation)—In 1979–1981 workers at the Rybachy Biological Station on the Baltic Sea produced 70 papers. Some were presented at conferences, others were published (3 in English-language journals, and 8, on migration, as a volume of the proceedings of the Zoological Institute). The papers deal primarily with migration (endocrine regulation, prediction, counting passing migrants), bird navigation, bioenergetics, demographics, and territoriality.—Elizabeth C. Anderson.

BOOKS AND MONOGRAPHS

73. The birds of The Serengeti National Park Tanzania. D. Schmidt. 1982. British Ornithologists' Union, Check-list No. 5. 132 p. Price unavailable.—This contribution is the first of the BOU Check-lists to deal with the avifauna of a small geographical area rather than of an entire country. This book describes the birds of the largest and best-known national park of Tanzania, the Serengeti. First designated as a game refuge in 1929, it now encompasses about 13,250 km^2 on the high East African plateau. Considerable world-wide attention has focused on the Serengeti primarily because of the 2.5

million large game animals, including 30 species of ungulates and 13 species of large carnivores. However the park contains a rich avifuana. This check-list incorporates the few published studies on birds and the results of 9 months of first-hand observations by the author.

Altogether 496 species have been identified on this short and long grass plain that is dotted with thorn-tree and open deciduous woodlands and evergreen forests. Many birds are permanent residents; others are seasonal intra-Africa or Palearctic migrants. Firm documentation of breeding is available for only 170 species. Since rainfall stimulates growth of grasses, insects, and other food, breeding of most species is related to the rainfall patterns. The breeding of insectivorous species shows two peaks that lag 1–2 months behind the peaks in monthly rainfall, whereas birds of prey reproduce most frequently toward the end of the rainy season and during the dry season when small mammals are most available for food.

This little book should be most helpful for biogeographers, ecologists, and others interested in African avifauna. Both the author and the Serengeti Research Institute hope that this publication will stimulate further research within the park.—Cynthia Carey.

74. The Naturalist's Color Guide: Part III. F. B. Smithe. 1981. New York, The American Museum of Natural History. 96 color swatches on 17 pp.; pp. i + 37. $9.00—Smithe developed the color guide to provide a standard less cumbersome and less subject to fading than Ridgway's 1912 edition of **Color Standards and Color Nomenclature.** Part I is a compact looseleaf binder with a pocket containing a neutral gray card with cut-outs for isolating color swatches. Part II is a paperbound supplement with descriptive and comparative data on the colors shown in Part I. Smithe bases his colors on Ridgway's work, thus largely maintaining traditional color nomenclature. However, each of his numbered colors receives a Munsell notation obtained from computerized spectrophotometric data. The notation allows each color to be defined by its hue (spectral color), value (degree of lightness or darkness), and chroma (intensity or saturation). Although the guide provided a compact color standard, useable in the field, it was severely criticized (Pratt and O'Neill, Auk 93:404–406, 1976) for omissions, for excessive gaps in some series of colors, and for poor correlations between some color swatches and their names. Part III seeks to solve these problems through the addition of new colors, new numbers, new names, several dilution series, and details of spectrophotometric measurement.

Addition of 96 colors to the original 86 has not greatly increased the guide's bulk, but has greatly improved the gradations of color available. Because Part I was contained in a looseleaf notebook, the new pages can be inserted into the same notebook. Where new colors have been added, numbers are assigned to colors in numerical order from Color 87 (where Part I left off) to Color 94. Where new colors are shades of colors already present in Part I, identification numbers are created by using the number from Part I and adding 100, 200, and so forth. For example, ruby is color 10 in Part I and the two new shades of ruby are 110 and 210. Thus the new color chips are integrated with the original series.

In addition to 96 new color swatches, Part III includes a booklet of notes on the derivation of each color, its name, Munsell notation of similar colors in the guide, or other color systems (e.g., Ridgway's). The appendix to Part III lists all 182 colors contained in the guide with their Munsell notations, tristimulus values, and chromaticity coordinates. The latter two systems, adopted by the American Optical Society, define colors quantitatively and graphically. Such definitions allow detailed comparisons of colors as well as rigorous definitions that will enhance communication among scientists interested in color.

Smithe is to be congratulated, not only for his ability to respond constructively to earlier criticism (Pratt and O'Neill, ibid; Swinebroad, Bird-Banding 47:292–294, 1976), but also for explaining and promoting the use of Munsell notations, tristimulus values, and chromaticity coordinates. Part III is more than just a collection of colors that fill the gaps noted in parts I and II, its advocacy of a quantitative approach carries Smithe's guide another step closer to becoming the standard for color nomenclature in the zoological and botanical literature.—Edward H. Burtt, Jr.