RECENT LITERATURE

Edited by Bertram G. Murray, Jr.

BANDING AND LONGEVITY

(See also 28, 38, 42)

1. **Recovery round-up.** Anon. 1975. *Austral. Bird Bander,* **13**(1): 16-18; 1974, **12**(4): 82-84; 1974, **12**(3): 65-67.—As is usual in this regular feature of *Australian Bird Bander* some recoveries are stated to be the oldest known birds of their species. Many of these records are older than any given in the most recent lists of wild bird longevities compiled by W. Rydzewski in the *Ring,* and records for other species have never appeared in Rydzewski's lists. Some other longevities for yet other species are greater than those in the *Ring* lists or concern species not in those lists. I list below the elapsed time in years, months, and days between banding and recovery for those species appearing in the recovery round-up compilations cited above and that are apparently the oldest known individuals of these species: Galah (*Kakatoe roseicapilla*), 7-8-7; Varied Lorikeet (*Psitteuteles versicolor*), 6-1-1; Chestnut Quail-Thrush (*Cinclosoma castanotum*), 6-9-23; White-browed Babbler (*Pomatostomus superciliosus*), 9-4-4; Chestnut-crowned Babbler (*Pomatostomus ruficeps*), 7-1-27; Yellow-tailed Thornbill (*Acanthiza chrysorrhoa*), 8-9-11; White-browed Scrub-wren (*Sericornis frontalis*); 10-11-5; Large-billed Scrub-wren (*Sericornis magnirostris*), 10-8-15; Yellow-throated Scrub-wren (*Sericornis lathami*), 7-8-19; Eastern Shrike-tit (*Falcunculus frontatus*), 11-11-6; Rufous Shrike-thrush (*Colluricincla megarhyncha*), 7-7-28; Eastern Silver-eye, (*Zosterops lateralis*), 9-11-21; Yellow-faced Honeyeater (*Meliphaga chrysops*), 12-10-1; White-plumed Honeyeater (*Meliphaga pencillata*), 7-11-22; White-cheeked Honeyeater (*Meliornis niger* [= *Phylidonyris nigra*]), 7-8-?; Pied Currawong (*Strepera graculina*), 11-0-4; Regent Bowerbird (*Sericulus chrysocephalus*), 7-11-24; Little Raven (*Corvus mellori* [= *C. coronoides*]), 7-0-22.—Roger B. Clapp.

2. **Range extremes for Ring-billed Gulls from the Great Lakes Region.** W. E. Southern and F. R. Moore. 1974. *Inland Bird Banding News,* **46**(3): 83-87.—The authors report 47 recoveries of *Larus delawarensis* that are extralimital to the usual range of the species. A very high proportion (93.6%) of these wandering birds were juveniles and subadults (birds one to two years old). The 47 straggling birds were comprised of 55.3% juveniles, 34.0% one-year-olds, 4.3% two-year-olds, and 6.4% adults (birds three years old or older). Most of the records were from North America or the Caribbean. Eight extralimital records were from the United States: North Dakota (1), Colorado (1), Oregon (1), California (1), Texas (3), and the Texas-Mexico border (1). Eleven records were from Canada: Newfoundland (1), Quebec (6), Ontario (1), Saskatchewan (1), British Columbia (1), and the Yukon (1). Slightly more than one half (24) of the recoveries came from the Caribbean: Bahamas (1), Cuba (11), Jamaica (4), Haiti (2), Dominican Republic (3), Puerto Rico (1), Antigua (1), and Guadeloupe (1). The remaining four recoveries came from Central America (Honduras, Panama), South America (Colombia), and Europe (Spain).—Roger B. Clapp.

3. **Aging Swamp Sparrows by plumage.** J. and H. Riggins. 1974. *Inland Bird Banding News,* **46**:(1): 5-9—The authors examined 109 *Melospiza georgiana* near Nashville, Tennessee, during the fall of 1972 and determined age of all birds by skull ossification. For each of these birds the color of the superciliary line was assessed to three categories: completely clear gray, completely buffy yellow, and intermediate. All (17) birds with completely gray lines were adults, and all (78) with completely buffy-yellow lines were young-of-the-year. The authors note that an additional 11 birds banded in the spring of 1973 had completely gray eye lines, thus reinforcing their suggestion that this plumage character may be of considerable value. This relationship of superciliary color has been noted before but apparently not in such detail as reported here.

The USNM collection has too few Swamp Sparrows with data on skull ossification to evaluate properly this aging character. However, I examined about 10 specimens bearing such data (all nominate *georgiana*). All had incompletely ossified skulls and all had buffy or partially buffy eyelines with completely buffy eyelines predominating. Further studies like that conducted by the Rigginses are clearly needed to determine the extent to which this character is valid in different areas of the country.—Roger B. Clapp.

MIGRATION, ORIENTATION, AND HOMING

(See also 36, 39, 42)

4. Correlation between coastal and inland migratory movements. J. Rabol. 1974. *Dansk Orn. Foren. Tidsskr.*, **68**: 5-14.—Visible and radar observations of bird migration were made in the center of Zealand (Sjaelland), Denmark, in the spring of 1971, while simultaneous visible observations were made at Gilleleje and Niva on the north and east coasts of Zealand. The inland radar and visible migration observations were made during the first four morning hours on 50 days. The purpose of the study was to compare and correlate inland and coastal migratory movements in terms of the intensity and direction of migration. In addition, the correlation between the coastal migratory direction and the wind direction was examined.

Rabol found that coastal movements were maximal when the mean direction of the low altitude inland movements formed a small angle to the deflecting coastline, and the mean direction of the high altitude inland flights formed a much greater angle (near 90°) to the coastline. He combined these findings in a single model showing the optimal migratory pattern for a large coastal migration. In his model high altitude birds heading in the "standard direction" are drifted by the wind in a track direction that is perpendicular to the deflecting coastline. When approaching the coast these birds lower their altitude, and their flight path bends approximately 90° into the wind so that eventually the birds are following the coastline and showing, to some extent, a head wind movement. One problem with this study is that the radar Rabol used is located in southern Zealand, and the area where radar and inland visual counts were made is approximately 70 km to the north at Hvalso. The two coastal stations where direct visual studies were conducted were about 100 to 125 km north of the radar station. These locations are well beyond the point where smaller birds in flocks could be detected. —Sidney A. Gauthreaux, Jr.

POPULATION DYNAMICS

(See 5, 38, 40)

NESTING AND REPRODUCTION

(See also 11, 18, 28, 29, 36, 38, 40, 42, 43)

5. Egg weight and its effect on mortality of young Snow Geese on Wrangel Island. (Ves yaits i evo vliyanie na smertnost ptentsov Belykh Gusei, *Chen caerulescens,* na Ostrove Vrangelya.) E. Syroechkovskii. 1975. *Z. Zhurn.*, **54**(3): 408-412. (In Russian with English summary.)—In 384 clutches studied in recent years, individual eggs weighed from 82 to 150 grams (average, 111), whereas the average weight of eggs within clutches ranged from 94.5 to 141.5 g. Dwarf eggs of 30 to 40 g occurred but never hatched. The span between the lightest and heaviest eggs in 163 clutches examined ranged from 1.2 g to 32 g (average, 5.3). Weight rank and laying sequence in clutches were correlated. Generally, the earlier eggs laid were heavier than those laid later. As a rule the weight relationships in a clutch persisted throughout incubation. The weight of young at hatching ranged from 65 to 95 g. Hatching sequence usually followed the laying sequence but not always. The start of incubation after the first egg was also irregular, which the author attributed to the lack of a brood patch, noting that the incubation temperature is 25° C or less. Post-hatching mortality was high, particularly for those hatched late. In general the more viable young came from eggs first deposited in the clutch.—Leon Kelso.

6. Notes on the reproduction of the Lesser Kestrel *Falco naumanni* in Provence. (Notes sur la reproduction du Faucon Crécerellette *Falco naumanni* en Provence.) C. Hovette. 1971. *Nos Oiseaux,* **377**(31/4): 82-90. (In French.)—Hovette studied the breeding biology of seven pairs of Lesser Kestrels in Provence, France, in 1970. His strongest data relate to courtship feeding of the females by the males and to nest placement. Additional data are presented on egg laying, incubation, and development of the young in one of the nests. An interesting feature of the paper is the description of interactions between Lesser Kestrels and Jackdaws (*Corvus monedula*) inhabiting the same cliffs. Breeding in the two species is apparently timed so that the Jackdaws steal food primarily during kestrel courtship and to a lesser extent during nesting, whereas the kestrels benefit from the Jackdaws' mobbing potential predators. This interesting symbiosis needs further quantification.—Paul B. Hamel.

7. Prolonged incubation period for an Eastern Bluebird. B. C. Pinkowski. 1974. *Inland Bird Banding News,* **46**(1): 15-19—An Eastern Bluebird (*Sialia sialis*) observed in 1973 in Washington, Macomb County, Michigan, had an incubation period of 21 days, considerably longer than is usual in this species.

Pinkowski also suggests that there may be clinal variation in incubation with more northern populations having longer incubation periods. Evidence for this is unconvincing as data in papers cited by Pinkowski (not including two additional reports on incubation periods from Ohio and Virgina) give the incubation as usually 13 to 15 days (with 13 most frequent) in some areas (Tennessee, New York) and 14 most frequent in other places (Ohio, Florida, Arkansas). Only Pinkowski has reported predominantly 15-day incubation periods; his sample is small (8 nests), and these occurred during the season when the 21-day incubation period was found.

What may be true, however, is that there is a tendency, perhaps mediated by climatic conditions, for more northern populations occasionally to exhibit protracted incubation periods. Whether such occurrences are frequent enough to demonstrate significantly longer incubation periods in the north requires much more extensive and detailed information than is presently available.—Roger B. Clapp.

BEHAVIOR

(See 29, 36, 38, 40, 41)

ECOLOGY

(See also 5, 8, 28, 36, 38, 40, 42)

8. Coexistence of sparrows: a test of community theory. H. R. Pulliam. 1975. *Science,* **189:** 474-476.—This theory of the composition of equilibrium communities was developed by Levins and others. In this paper it is applied to the relation between grass seed abundance and size and mixed populations of (emberizine) sparrows in winter in southeastern Arizona. The trenchant character of the sparrows is culmen length. For nine species there is high correlation between culmen length and size of chief seeds eaten. The author shows that the mathematics will predict which species (one or more) will prevail in a given habitat.—C. H. Blake.

9. Bird problems of a poplar plantation. (Nemesnyarasok, *Populeto cultum,* Ornitologiai Probelimi.) A. Legany, 1973. *Aquila,* **77:** 65-72. (In Hungarian with English summary.)—Continuous surveillance of a poplar grove from 1969 to 1972 found only 15 breeding species out of 22 species recorded. Of the former, 40% were foliage foragers and insectivores. The remainder were variously herbivorous or omnivorous. The author charges the sparseness of species and individuals (numbers not stated) to a lack of nesting sites. Provision of artificial nest boxes increased the number of Tree Sparrows (*Passer montanus*) but little else.—Leon Kelso.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(See also 11, 40)

10. The Nutcrackers' beneficial role in timber pest outbreaks. (O poleznoi roli kedrovki v ochagakh razmnozheniya stolovykh vreditelei.) L. Ivlev, D. Kononov, and V. Nechaev. 1974. *Ekologiya*, **5**(4): 90-91. (In Russian.)—The Siberian Nutcracker, also referred to as the Slender-billed Nutcracker (*Nucifraga caryocatactes macrorhynchos*), is a common breeder in coniferous woods of Siberia and the Far East. Because of its secretive behavior during the summer, little is known of its life history, especially in relation to its food habits while rearing young and immediately following brood dispersal, when conifer seeds have not yet matured. In late July and early August 1972, a year when almost no conifer seeds were produced, intensive field observations were conducted in a lumbering area in Khabarovsk. Nutcracker flocks of 9 to 20 birds frequented a 40 hectare plot, which was censused also for insect abundance. In this mixed scotch pine-larch timberland, Nutcrackers fed almost entirely on insects. About 40 species of what are commonly called woodborers, bark beetles, and weevils were identified in the birds' prey. Tenebrionids, longicorns, buprestids, and curculionids were most frequently taken. The larger species were seized in flight. Only a few moths, locusts, and dragonflies were taken. The authors considered that most of the prey items are significant forest pests.—Leon Kelso.

CONSERVATION AND ENVIRONMENTAL QUALITY

11. The Brown Pelican and certain environmental pollutants in Louisiana. L. Blus, T. Joanen, A. Belisle, and R. Prouty. 1975. *Bull. Env. Contam. Toxicol.*, **13**(6): 646-655.—The elimination of *Pelecanus occidentalis carolinensis* as a breeder in Louisiana "came about with little publicity and the process was complete by the early 1960's. . . . Pelicans have been exposed to hurricanes and diseases throughout their existence, but the addition of adverse effects induced by pesticides or other pollutants may have been enough to push them into extinction in Louisiana." Here are summarized details of an experimental population transplant, which was not very successful, and of chemical analyses of eggshell thickness, and of organochlorine content. The authors suggest that other avenues of research need to be explored, for example, metallic waste, island habitat loss, and food shortage.—Leon Kelso.

12. Dieldrin-^{14}C residues on feathers of birds with surgically removed uropygial glands. Y. and A. Greichus. 1974. *Bull. Env. Contam. Toxicol.*, **12**(4): 413-416.—It is commonly assumed that oils on bird feathers derive primarily if not entirely from the uropygial or preen gland and are distributed over the plumage by preening. This study's purposes were to find whether significant amounts of insecticide residue on the feathers come from within the bird and to determine the pathways of these compounds. Results: they do not come from within the preen gland. They emerge by some route, not unanimously agreed upon, along the feather surface. The entire uropygial glands of "23 chickens, 3 ducks, and 2 cormorants" were surgically removed. The Cormorant (*Phalacrocorax auritus*) had the most radioactive tracer residue on feathers of the head whether or not the uropygial gland had been removed. The average percentage of lipids on chicken feathers with or without the preen gland was 1.50 and 1.32, respectively. These results suggest a mechanism for the distribution of dieldrin-^{14}C onto feathers other than by way of the uropygial gland.—Leon Kelso.

PHYSIOLOGY

(See also 12, 36, 37, 38, 40, 41, 45)

13. Minireview: Urate excretion by the avian kidney. R. A. McNabb and F. M. A. McNabb. 1975. *Comp. Biochem. Physiol.,* **51A:** 253-258.—This brief review, based largely though not entirely on the previously published work of the authors, effectively queries the conventional explanation of uric acid and urate excretion in birds as an adaptation reducing water requirements during nitrogen excretion. Alternative explanations suggested are that uric acid contributes to the economic elimination of cations through their precipitation in the uric acid complex, or that it aids the control of electrolyte concentration in the developing embryo, by their precipitation in the allantois. The McNabbs also point out that the presence of precipitated cations in the urine can invalidate the use of the conventional urine/plasma ratios as a measure of renal concentrating abilities, by introducing 10-20-fold errors!—Raymond J. O'Connor.

14. The acid-base balance of Abdim's Stork (*Sphenorhynchus abdimii*) during thermal panting. J. Marder and Z. Arad. 1975. *Comp. Biochem. Physiol.,* **51A:** 887-889.—Hand-reared individuals of these desert storks exposed to 8 to 10 hours of heat stress (40-45°C) increased their body temperatures by approximately 1°C but their respiration rate 10-fold. Despite this their blood pH remained constant and the small (8%) drop in carbon dioxide tension was offset by a 4% reduction in plasma bicarbonate concentration. Marder and Arad contrast this efficiency in regulating acid-base metabolism with that of non-desert species and suggest the possibility that hyperventilation currents are shunted away from gas-exchange surfaces to pass over purely evaporative sites.—Raymond J. O'Connor.

15. Metabolic thermoregulatory responses in eggs and chicks of Willow Ptarmigan (*Lagopus lagopus*). A. Aulie and P. Moen. 1975. *Comp. Biochem. Physiol.,* **51A:** 605-609.—Thermoregulatory ability in Willow Ptarmigan embryos improved with age during incubation. Newly hatched chicks, on the other hand, were essentially poikilothermic because of their damp plumage and did not exhibit thermoregulatory powers until their down had dried; improvement with age was steady thereafter. When exposed to low temperatures (19°C) one-day-old chicks showed signs of panic and ran about the chamber, presumably seeking a warmer ambient, but with older chicks some (if 2- or 3-day old) or all (if 5 days or older) stood quietly and elevated their metabolic rate by shivering. A 2-day old chick using this mechanism showed generally better thermal response (lower energy expenditure, higher body temperature) at low temperatures than did a 3-day-old chick which did not shiver but ran about the apparatus.

These results suggest that the current concept of a chemical thermogenesis in neonate precocial birds - a concept whose mechanism has never been successfully demonstrated - is incorrect. Aulie and Moen assert instead that the elevated metabolism observed in such birds at low ambients is simply a correlate of muscular activity as the chicks seek out the hen and the warmth she can provide by brooding. An interesting observation reported in the text but not commented on in discussion was that one-day-old chicks exposed to low temperatures became hypothermic to the point where they could no longer maintain their balance nor move, yet could call continuously, a feature clearly adaptive in a species breeding at temperatures close to freezing point. Two other points noted without comment, which I feel could be significant in respect of the development of thermoregulation in these chicks, were the relatively low thermoneutral point (34°C) of day-old chicks (which entered hyperthermia at, and tried to escape from, an ambient of 39°C) and a surface-volume effect in the weight-specific metabolism of older chicks. This is altogether a thought-provoking paper.—Raymond J. O'Connor.

16. Acclimatization to temperature in Pheasants (*Phasianus colchicus*) and Partridge (*Perdix perdix*). T. M. Delane and J. S. Hayward. 1975. *Comp. Biochem. Physiol.,* **51A:** 531-536.—Oxygen metabolism was measured in male and female Pheasants and Partridges acclimatized in outdoor pens in Alberta, experiments being conducted in each of the four seasons. The pheasants were hooded to reduce activity, the partridges not so. Measurements were made by day and with the chambers apparently illuminated. No differences in weight-specific metabolism were found between the sexes, and the two groups were therefore pooled within each species for further analysis. No seasonal differences in thermal conductance (strictly, the metabolism-temperature slope) nor in thermoneutral metabolism could be demonstrated in pheasants, but in partridges the winter thermoneutral rate was significantly higher than that at other seasons. The authors conclude that both species acclimatize to cold temperatures by behavioral means.

I found myself somewhat uneasy about the results described in this paper. The authors calculated their "conductance" values as regression slopes for data taken below 20°C ambients except for summer partridges, for which extrapolation of the regression equation yielded an unrealistically high 63.2°C for estimated body temperature; they therefore used only ambients of below 0°C for calculations for this group. This choice of 20°C for all seasons is arbitrary but acceptable if the data fit it as a turning point. My reservation here is that to my eye neither the summer pheasant nor the fall partridge data fit this model, the former being particularly bad since 15 of the 20 data points lie below the line and only 3 above it! The second point of unease relates to the authors conclusion that thermoregulation costs twice as much in energy (kcal/bird-day) in winter as in summer. I was unable to find any statement about seasonal change in photoperiod and diurnal temperature cycle, about diurnal variation in metabolic rate, or about the pattern of diurnal fat deposition in these species, factors that must be ecologically significant to this type of energetics calculation. The conclusions may well be all right but the underlying assumptions have not, to my mind, been adequately spelled out.—Raymond J. O'Connor.

17. The sequential feeding of growing chickens. R. M. Gous and J. J. Du Preez. 1975. *Br. J. Nutr.*, **34**: 113-118.—This study tested the idea that growing birds need all essential amino acids to be present together in their diet. Male chickens were fed through their second week on isonitrogenous, isoenergetic diets differing in the source of protein (and therefore in amino acid composition), using either fish meal, sunflower meal, or a 40:60 (w/w) mixture. Birds were fed on various regimes, e.g., fish meal only, fish and sunflower diets fed alternately every 6 hours or alternately every 12 hours, and so on; in addition some regimes were *ad lib.*, others interspersed with 6-hour or 12-hour fasts. The results showed that weight gain was greatest when both sources of amino acid were present simultaneously, and was greater with a 6-hour alternation than with a 12-hour alternation; single source diets were poorer still. When fasting periods were present weight gains were reduced but the efficiency of protein utilization rose. These results suggest that the different amino acids complement each other during growth and that some temporary storage of amino acids can occur in the body of a growing chicken.

The authors do not state explicitly that their experiments were conducted in continuous illumination. One must assume this was so if their interpretations are valid. The paper, however, raises all sorts of nice possibilities with respect to growth in the wild. Titmice (Paridae) occasionally bring their young spiders in place of the usual caterpillars. Is this because spiders contain a missing amino acid? To what extent are slow-growing species monophagous and fast-growing species omnivorous? To what extent does the enforced nocturnal fast of Temperate Zone young increase their growth efficiency *vis-a-vis* Arctic young? Gous and Du Preez do not consider these questions but their paper is worth reflection along these lines.—Raymond J. O'Connor.

18. Photoacceleration of avian embryogenesis. J. K. Lauber. 1975. *Comp. Biochem. Physiol.*, **51A**: 903-907.—Chick embryos illuminated by light pipes inserted into the egg developed faster than non-illuminated embryos. The effects of wave length changes were complex. Could this be the reason Pied Flycatchers abandon nest-boxes which darken with age (Blagoskonov, *Byull. Moskovskogo Obschsh Priorody, Otdel Biol.*, **75**: 45-47, 1970)?—Raymond J. O'Connor.

19. Blood flow in the reproductive tracts of the domestic hen. J. B. Moynihan and N. A. Edwards. 1975. *Comp. Biochem. Physiol.*, **51A**: 745-748.—Cardiac output and blood flow through the reproductive organs of laying hens were essentially constant over the laying cycle. However, blood flow through the magnum was greatest half an hour after oviposition, correlated with the start of albumen secretion, and blood flow through the uterus was maximal between 8 and 24 hours after oviposition, i.e., during shell formation. Surprisingly, blood flow at individual follicles was unrelated to their size over a range from 0.4 to 16.5 g.—Raymond J. O'Connor.

20. Changes in pCO_2 and pH in blood samples from *Gallus domesticus* held at ambient temperature. T. E. Nightingale, M. R. Fedde, and W. D. Kuhlmann. 1975. *Comp. Biochem. Physiol.*, **51A**: 821-822.—Delays in processing whole blood samples held at 24 to 27°C result in linear increases in pCO_2 of 0.044 torr min^{-1} and in decreases in pH of 0.00049 units min^{-1} over 80 minutes following withdrawal. These changes were independent of the initial values of the samples and corrections to the observed values can therefore be made when long processing delays are unavoidable.—Raymond J. O'Connor.

21. Effect of temperature alterations on liver and cardiac glycogen in the chick embryo. R. C. Clawson. 1975. *Comp. Biochem. Physiol.*, **51A**: 769-776.—The main points in this paper of interest to ornithologists are (1) that both liver and cardiac glycogen levels undergo short-term cyclic rhythms in chick embryos and (2) that 14-day-old embryos are sufficiently mature to respond to temperature increase by metabolizing liver glycogen. Coupling these results with some older work by Brenner (*Amer. Midl. Nat.*, **79**: 289-310, 1968) on Red-winged Blackbirds makes me wonder whether energy allocation in altricial species may not be cyclic also? If so, the work on nestling energy budgets (see review **23**) needs to take the effect into account.—Raymond J. O'Connor.

22. Salt gland secretion produced by the gull, *Larus glaucescens*, in response to stomach loads of different sodium and potassium concentration. M. R. Hughes. 1975. *Comp. Biochem. Physiol.*, **51A**: 909-913. —Sodium ions in the diet can cross the gut membrane and are subsequently eliminated by the salt gland but potassium ions are blocked at the gut membrane and eliminated cloacally.—Raymond J. O'Connor.

23. The energy budget of the nestling Starling *Sturnus vulgaris*, a field study. K. Westerterp. 1973. *Ardea*, **61**: 137-158.—Energy intake by the nestlings was assessed from automatic recording of feeding visits coupled with feed samples taken by the collar method, fecel loss by direct observations for rate and analysis of pellets for energy content, respiration by laboratory measurements on young of four ages, and production by weighing and by analysis of sample nestlings. Energy content per feed rose throughout the nestling period but the feeding rate plateaued between 10 and 18 days from hatching and dropped sharply over the last 48 hours in the nest. The weight and energy content of fecal pellets rose throughout the nestling period but their frequency leveled off after 7 days. Nestling growth followed the usual sigmoid pattern but energy content per unit weight rose throughout on both a wet-weight and a dry-weight basis; moisture content (percent wet weight) declined steadily. Respiration rates followed the usual passerine pattern.

The budget itself showed for a brood size of four that the energy lost in rejecta increased from 20% of the energy intake at day 4 to 40% at days 10 through 16, production (growth energy) declined from 41% to 11% of the metabolizable energy over the same period, and energy costs for thermoneutral maintenance remained constant at 55% ME. The other elements assessed were temperature regulation, which rose from 2 to 8% in this period, and nestling activity, the component assumed to account for all outstanding energy costs, and thus changing from 3% to 26% over the same interval. These data allow some interesting comparisons with the growth energetics models recently suggested by Ricklefs (*Publ. Nuttall Ornithol. Club*, No. 15, p. 152-292, 1974). Westerterp's data show, for example, a constant proportion of energy devoted to maintenance where Ricklefs suggests a non-linear increase with age; again, Westerterp shows a steady decrease in growth energy from day 4 whereas the model

Starling has its maximum energy at about 60% of adult weight. These discrepancies, and in general the interplay of Westerterp's type of empirical approach to growth budgets with Ricklefs' more intuitive deductions, will no doubt stimulate further studies of this type. In this respect I feel Westerterp can perhaps be criticized for his rather poor treatment of the literature.

This study left a number of unanswered questions in my mind. Westerterp used a brood of four nestlings, this being the commonest brood size in the study area, yet their overall growth was poor in comparison with that of a brood of three and to that reported in other studies. Why was this, and what effect did this poor growth have on the final budget? Again, Westerterp's respirometry gave rather low values for his brood of four measured at 16°C at night when one compares the results of Ricklefs' (loc. cit.) measurements at 33-37°C. As Westerterp used a diaferometer and nest box one wonders whether his experiment was also subject to the back diffusion from the nest box noted by Ricklefs. This, of course, also has repercussions for his estimates of thermoregulatory costs in the absence of brooding. Finally, Westerterp concludes that the maximum energy saving possible, had the nestlings been brooded continuously on day 5, was only 2% of the total metabolizable energy, a figure so low that, if correct, it really demands measurements on very much younger nestlings to provide a realistic energy budget for field conditions.—Raymond J. O'Connor.

24. Use of legs as dissipators of heat in flying passerines. P. G. H. Frost and W. R. Siegfried. 1975. *Zoologica Africana* **10**(1): 101-102.—Eight species are listed that were observed in Cape Province flying with their legs extended during November days when the ambient temperature averaged 37°C. The same eight species flew with their legs retracted when the ambient temperature averaged 30°C. The authors made 160 observations of *Hirundo cucullata* and 81 observations of *H. albigularis* and found that both species more frequently extend their legs during periods of slightly cooler ambient temperature. The authors believe that, although leg extension creates extra drag during flight, the behavior facilitates a lowering of body temperature in heat stressed birds. Their data on the swallows reveal more than differences in temperatures should be considered because the data on the swallows does not agree with their findings on the other six species. Duration of flight (the length of the stress), the morphology (weight, size, etc.), and physiological condition (reproduction, molt, etc.) of the species were not mentioned.—M. Ralph Browning.

MORPHOLOGY AND ANATOMY

(See also 37, 40)

25. Seasonal variation in foot papillae of Wood Pigeon, Pheasant, and House Sparrow. I. Lennerstedt. 1975. *Comp. Biochem. Physiol.*, **51A:** 511-520.—The foot papillae of birds have three components, with an outer horny layer overlying a germinative layer whose basal surface is convoluted into a series of basal secondary dermal papillae penetrated by papillary capillaries. In Swedish samples all three components varied seasonally in size, being longest in winter. Statistical analysis showed that the secondary papillae varied independently of the other two components but not vice versa, and the size of the papillae was correlated with the fall and winter air temperatures. In addition the shape of the papillae was more conical in winter, thus reducing the area of contact between foot and frozen ground. Lennerstedt interprets these results as indicative of adaptation to the low environmental temperatures of the area.—Raymond J. O'Connor.

26. Footprint measurements of Canadian cranes. F. S. Guthery. 1975. *J. Wildl. Manage.*, **39**:(2) 447-448.—Impressions of the feet of freshly collected specimens of *Grus canadensis* were made in moist soil and then measured. The length of the footprints were found to be significantly correlated ($P < 0.01$) with the length of the middle toe, the latter a measurement obtainable from museum specimens. Measurements of adult males were found to be similar to that of adult females. The author concludes that live birds leaving footprints may be identified to either the Canadian race, *rowani*, or to the race *tabida*. It is suggested, however, that this method be used with caution. M. Ralph Browning.

PLUMAGES AND MOLTS

(See also 3, 38, 42)

27. Molt of the Chaffinch. (Linka zyablika, *Fringilla coelebs*.) G. Noskov. 1975. *Z. Zhurn.*, **54**(3): 413-424. (In Russian with English summary.)—Data on molt from 3,400 museum or live-trapped specimens from Leningrad, 190 from Belgorod, and 350 from the Crimea are presented in detail. Postjuvenal molt is preceded by growth of down and contour feathers on areas bare during the nestling stage. Individual adult molt spans 65 days, and juvenal molt, 45 days, north of 60° N. In the Crimean populations to the south these periods are 70 to 80 days for adults and 50 days for juveniles. For the population, the molting period spans 75 to 80 days in the north and 100 days in the south. In the north molt begins between 10 and 15 July, but in the south it begins in late June.—Leon Kelso.

ZOOGEOGRAPHY AND DISTRIBUTION

(See also 2, 40, 42)

28. The seabird island series. P. Fullager and T. Murray. 1973. *Austral. Bird Bander*, **11**(1): 12-13.

Seabird Islands. No. 1. Bird Island, New South Wales. S. G. Lane. 1973. *Austral. Bird Bander*, **11**(1): 14-15.

Seabird Islands. No. 2. Montagu Island, New South Wales. P. J. Fullagar. 1973. *Austral. Bird Bander*, **11**(2): 36-39.

Seabird Islands. No. 3. Belowla Island, New South Wales. S. G. Lane. 1973. *Austral. Bird Bander*, **11**(3): 61.

Seabird Islands. No. 4. Albatross Island, Tasmania. R. H. Green. 1973. *Austral. Bird Bander*, **11**(4): 81-83.

Seabird Islands. No. 5. Cook Island, New South Wales. S. G. Lane. 1973. *Austral. Bird Bander*, **11**(4): 84.

Seabird Islands. No. 6. North Solitary Island, New South Wales. S. G. Lane. 1974. *Austral. Bird Bander*, **12**(1): 14-15.

Seabird Islands. No. 7. Moon Island, New South Wales. D. F. Gray and A. J. Gwynne. 1974. *Austral. Bird Bander*, **12**(2): 36-37.

Seabird Islands. No. 8. Brush Island, New South Wales. A. K. Morris. 1974. *Austral. Bird Bander*, **12**(3): 62-64.

Seabird Islands. No. 9 Split Solitary Island, New South Wales. S. G. Lane. 1974. *Austral. Bird Bander*, **12**(4): 79.

Seabird Islands. No. 10 South-West Solitary Island, New South Wales. S. G. Lane. 1975. *Austral. Bird Bander*, **13**(1): 14-15—I call attention to these perhaps little known notes because they may be of considerable interest to those interested in the distribution and breeding of seabirds of Australian waters. The main objective of this series, according to Fullagar and Murray, "is to produce an account of every Australian Island on which seabirds breed" and to serve as a source of information that will stimulate further research on the seabirds of these and other islands.

The accounts, while short, adhere to a rigid format and present a considerable amount of information in concise fashion. Each account presents detailed coordinates for each island and includes a map that, for most islands, delimits the breeding areas of the various species of seabirds. The status of the island is briefly mentioned (all considered so far are Nature or State Reserves or Wildlife Sanctuaries) and alternative names for the island, if such exist, are noted.

A brief description follows, giving area (except for No. 4, 6, and 9), general nature of the topography, and to a greater or lesser extent some comment on the island's vegetative cover. Most favorable landings are noted, and a section on ornithological history briefly summarizes visits and studies. In the following section are listed the breeding seabirds and their status including data on populations and annual cycle. Some of these accounts add new breeding localities not listed by Serventy, Serventy, and Warham ("Handbook of Australian Sea birds", A. H. & A. Reed, Sydney, 1971). Also mentioned are factors that may affect or have affected the status of the avifauna. These usually consist of the effects of other vertebrates (including man), but in one instance (for Albatross Island) mortality due to ectoparasite infestation is recorded. A list is given of other seabirds recorded from the island. Data on banding activities are given usually consisting of species totals banded with notes on significant recoveries. For many of these sections information is given that is subsequent to the most recently published data. The accounts conclude with a bibliography, which, taken in conjunction with the additional information in the present accounts, should usually enable an ornithologist to familarize himself rapidly with the literature concerning the island. One particularly useful feature of these notes is that the date the information was compiled is always listed, making subsequent literature searches considerably easier.

One failing of these reports is that the treatment is somewhat uneven,in some instances because little is known about an island, in others because the author has not presented the data in adequate detail. The banding account for Bird Island, for example, merely lists the numbers of adults and young that have been banded (presumably through 1971) and mentions the number of recoveries that have been obtained on the island and elsewhere. The same account for Montagu Island, admittedly far more intensively studied, stipulates the period through which banding is summarized, notes a number of recoveries in detail, and cites papers giving additional information on recoveries. In still another account, that for Albatross Island, details of all known recoveries are presented in tabular form.

Several other descrepancies or inadequacies were noted in these accounts. In the Montagu Island account the author notes that both a Fairy Prion (*Pachyptila turtur*) and an Australian Gannet (*Morus serrator*) had been recovered there but failed to include these species in the list of seabirds recorded from the island. Another similar omission is the occurrence of the White-faced Storm Petrel (*Pelagodroma marina*) on Cook Island (Hindwood, *Emu*, **48**(1): 75, 1948). Also particularly poor is the historical account for Moon Island. All that is given is a statement that "Little had been reported until the discovery of breeding Dominican Gulls by Gwynne and Gray in 1958, and subsequent involvement since 1959 in Silver Gull studies."

Perhaps the most valuable note in the series is that for Belowla Island, because it is apparently the only known ornithological report from that island.

I list below the species that have been recorded breeding on the various islands (indicated by number) and note the approximate total number of breeding pairs known from those islands. These figures are only rough approximations because many of the estimates are excessively variable or are inadequate in other ways: Little Penguin (*Eudyptula minor*), No. 1-4, 7, 8, ca. 4,300 to 14,500; White-capped Albatross (*Diomedea cauta*), No. 4, ca., 1,500; Fairy Prion, No. 4, "many hundreds"; Wedge-tailed Shearwater (*Puffinus pacificus*), No. 1-3, 5-10, >8,300 to 10,000; Sooty Shearwater (*Puffinus griseus*), No. 1, 2, ca.200; Short-tailed Shearwater (*Puffinus tenuirostris*), No. 1, 2, 4, 8, > 13,500 to 15,500; White-faced Storm Petrel, No. 1, 3, 4, > 1,500; Reef Heron (*Egretta sacra*), No. 1, 1; Sooty Oystercatcher (*Haematopus fuliginosus*), No. 2, 3, 6-8, 7 to 12; Pacific Gull (*Larus pacificus*), possibly a few pairs on No. 4; Dominican or Kelp Gull (*Larus dominicanus*), No. 7, 2; Silver Gull (*Larus novaehollandiae*), No. 2, 4, 6, 7, > 6,000 to 10,000 (Serventy, Serventy, and Warham, op. cit., list this species as also breeding on No. 5, Cook Island, but I have been unable to verify these data); Crested Tern (*Sterna bergii*), No. 2, 4-7, 8,700 to 9,700.—Roger B. Clapp.

29. Reproduction of the teal, *Anas crecca* L., in the Geneva district. (Reproduction de la Sarcelle d'hiver—*Anas crecca* L.—dans le canton de Geneve.) C. Vaucher. 1971. *Nos Oiseaux,* **337**(31/4): 73-81. (In French.)—Vaucher reviews the few nesting records of this species from northwest Switzerland and records nesting of the species in a marsh near Geneva. His 1971 discovery is the first recorded nest of this species in the Geneva district. Brief data are presented on courtship, the nest, egg laying (10 to 13 days), incubation (21 days), young, and behavior of adults toward predators. A comment by P. Geroudet, President of the Genevese Association for the Protection of Nature, notes that the area has been set aside by the Swiss government as a natural reserve.—Paul B. Hamel.

SYSTEMATICS AND PALEONTOLOGY

(See also 40, 42)

30. A critical list of type specimens of the birds in the Moore Laboratory of Zoology at Occidental College. J. W. Hardy and T. Webber. 1975. *Nat. Hist. Mus. Los Angeles Co. Contrib. Sci.* no. 273. 25 p.-Seventy-four taxa are treated that are based on specimens from the collection of Robert T. Moore. The collection includes the type specimens of 70 subspecies and four species. The name of a genus is said to be treated also although I failed to discover it. Sixty-eight of the type specimens were collected in Mexico, one from Nevada, two from Honduras, and three from Ecuador. Holotypes, paratypes, and topotypes in the MLZ collection are listed with the citations of the names and the type localities. Comments on the taxonomy of many of the forms are made by the authors based on their examination of critical specimens and from the literature. Of the 74 taxa, 41 are considered by the authors to be recognizable. 6 are equivocal, 3 are doubtful, 18 are invalid, and 6 are not decided. This is a useful contribution because Moore's collection was virtually inaccessible until about 1960.—M. Ralph Browning.

31. Smirnov taxonomic analysis as a mode of natural systems' investigation. (Taksonomicheskie analiz T. S. Smirnova kak sredstvo izucheniya estestvennoi sistemy.) V. Kovalev, P. Tamarin, and A. Shatalkin. 1974. *Zhurn. Obshchei Biol.*, **35**(2): 251-262. (In Russian with English summary.)—In defining specific and higher taxonomic categories this method weights each characteristic being considered. The quantitative evaluation of occurence of fewer rare and trenchant features produces more "phylogenetically correlated" intragroup affinities than other analyses. This, as elaborated by Smirnov, conforms with and provides further justification of the traditional methods of systematics in everyday practice.—Leon Kelso.

32. Experimental data on the taxonomical value of an electrophoretical protein component from the eye-lens of birds. H. Gysels. 1974. *Experientia*, **30**: 1253-1254.—This paper deals primarily with criticisms made by others on the use of agar-gel electrophoresis. Gysels believes that further study of the behavior of agar lens patterns should be considered as important in the study of the relationships of higher avian taxa. Readers may recall an earlier paper by Sibley and Brush (*Auk*, **84**(2): 203-219, 1967), who used starch-gel in their eye-protein study. These authors concluded that their method is unreliable for making taxonomic decisions. Gysels points out (as did Sibley and Brush) that the molecular sieving properties of agar-gel are not comparable with that of starch-gel. The data presented by Gysels reveal similar patterns in Passeriformes, Gruiformes, and Strigiformes. The author suggests that it is likely that "the requirements for an eye lens protein, e. g. transparency and elasticity, can be met in a number of ways. Those substitutions which maintained the functional criteria were tolerated and those which decreased any one of them were eliminated." There seems to be little demonstration of any appreciable differences between the various avian taxa because the avian eye probably functions similarly in all birds. This writer cannot see the usefulness of eye protein as a taxonomic tool.—M. Ralph Browning.

33. Taxonomy of *Larus argentatus* and *Larus fuscus* in north-western Europe. E. K. Barth. 1975. *Ornis Scand.*, **6**(1): 49-63.—This paper summarizes four earlier papers (listed in Barth's literature cited) dealing with the morphology and eggs of *Larus argentatus* and *L. fuscus* in addition to new information on the two species. Northwestern Europe is considered to include Finland, northernmost Norway, Iceland, the British Isles, and the Netherlands. The mantle color and standard measurements of several populations of the two species are analysed. Nomenclatural and taxonomic suggestions are presented. As suggested in an earlier paper (Barth, *Nytt Mag. Zool.*. **15,** suppl. 1: 1-50, 1968), the North American race of *Larus argentatus,* named *smithsonianus,* has doubtful validity because of its similarity to the nominate race of the Old World.—M. Ralph Browning.

FOOD AND FEEDING

(See also 10, 17, 38, 40, 42)

34. Black Vultures feeding on iguana eggs in Panama. O. Sexton. 1975. *Amer. Midl. Nat.,* **93**(2): 463-468.—The breeding habits of *Iguana iguana* at Barro Colorado Island are described in detail. The concentration of egg burial resulted in a surplus of eggs being pushed into the open. These were opportunely eaten by *Coragyps atratus.* The population densities of both reptile and vulture were high. "Vultures eat iguana eggs very inefficiently, losing much of the contents. The egg is punctured with a rapid downward peck of the beak; the yolk splatters everywhere, on the bird, on other vultures, on nearby iguanas, and on the soil. . . . In one case a vulture nibbled some yolk from the back of a splattered iguana." An example of allocleaning, instead of allopreening.—Leon Kelso.

35. Results of pellet analyses of Barn Owls from the south Thuringian Massif. (Ergebnisse von Gewollanalysen der Schleiereule (*Tyto alba*) in sudthuringischen Grabfeld.) M. Görner. 1973. *Hercynia,* **10**(2): 127-142. (In German.)—Pellet remains gathered from an area of 355 km^2 contained 4,420 individual mammals of 17 species. Voles, chiefly *Microtus arvalis* (2,344 skulls), and various shrews predominated, 54% and 22% respectively. Miscellaneous other mammals comprised about 24%, presumably, as no other prey were recorded.—Leon Kelso.

BOOKS AND MONOGRAPHS

36. Avian Energetics. Raymond A. Paynter, Jr. (editor). 1974. *Publ. Nuttall Ornithol. Club,* no. 15. 334 p. $17.00—This monograph is the published version of the Symposium on Avian Energetics held in October 1973 by the Nuttall Ornithological Club in observance of the Club's Centennial. It comprises the four papers presented at the meeting by, respectively, J. R. King, W. A. Calder III, R. E. Ricklefs, and V. A. Tucker, together with the formal discussion of these papers by G. A. Bartholomew, S. C. Kendeigh, and E. P. Odum; there is also an Introduction and Appendix (of conversion factors) by W. R. Dawson as Chairman.

Professor King's paper—"Seasonal allocation of time and energy resources in birds"—begins with a review of the diversity of the annual cycle in terms of migration, molt, and reproductive activities, continues with an examination of the physical and biological factors affecting energy budgets and with a discussion of methods available for assessing such budgets, and concludes with a summary of existing knowledge in this area. Within the discussion of the annual cycle only the time patterning of molt is fully discussed, the section on reproductive activity being curtailed in the light of Ricklefs' contribution to the volume, and the time and energy aspects of migration being barely touched upon in the single page devoted to the topic. The remaining sections are, however, more thoroughly developed and form the heart of the paper. King presents a strongly argued case for the abandonment of air temperature as a hold-all index of avian environment, advocating the value of measurements of thermal radiation, wind velocity, and humidity as essential parameters of the true "climate space" for birds. His review of the methodology of energy budgets is painstaking, if somewhat swingeing, and concludes that the use of doubly labelled water provides the most accurate technique applicable to free-living birds. King's exposition of the pitfalls of the weight-loss method—the calculation of metabolic rate from the weight loss suffered by the bird over a known time—is salutary. King makes several interesting points in discussing the biotic factors affecting energy budgets, including the suggestion that resident species have, generally speaking, better developed powers of thermoregulatory acclimatization than have migrants, the latter in effect evading the corresponding selective pressures by their movement. He also draws attention to the anomaly of premigratory fat typically reaching levels greatly in excess of the maxima for overnight reserves in the same species in mid-winter, even when winter food supplies are ample for fat synthesis: why has selection not exploited the extra physiological capacity in winter? King concludes by reviewing the existing data on energy budgets and attempts some cautious generalizations, the most useful being that daily existence energy and body weight are allometrically related: the function parallels the BMR-weight regression at levels approximately 3.5 times BMR.

King's paper is essentially a critical and competent "summary of the fragmentary information that reflects the present 'state of the art' . . ." and, as such, should be read by anyone interested in energy budget work, though the comments by Professor Kendeigh in the discussion following the paper are germane. The review infuriates, however, in its constant assumption that the reader has also read the references cited: one has to look up each unfamiliar citation to see fully what King is getting at in the review. The other point at which I cavil is the rather superficial treatment of time as an independent resource rather than as a concomitant of energy intake. In this section King slips in describing non-foraging time as the reciprocal (instead of the complement) of foraging time, i.e., time devoted to energy intake, and he also fails to pursue the implications of pure time budgeting for the quality (as against quantity) of energy available to a bird. The review is otherwise a complete and stimulating synthesis of the available information.

The second paper in the monograph is by Calder and has the title "Consequences of body size for avian energetics." This paper is sub-divided into two, the first part being a wide-ranging review of allometric relationships entering the consideration of energy costs, the second an examination of how small size constrains the life style of hummingbirds. Calder starts from the Lasiewski-Dawson equation and traces through the effects of changing size on oxygen supply and its components (respiratory rate, tidal volume, oxygen concentrations), on fuel supply and feeding and digestion and thence to foraging range, and on thermoregulation and its relationship to Bergmann's Rule. The analysis of hummingbird biology is similarly broken down, the major areas discussed being the efficiency of energy extraction when feeding, the nature of time budgeting, and the mechanisms for energy conservation (principally regulated hypothermic torpor and selection of favorable microhabitats). Calder's work here is imaginative (for an extreme example see his Fig. 6 converting a graph to a bird in place of the more usual transition in the opposite direction) but is presented in a rather dry style which failed to stimulate this reviewer's interest. I suspect the value of this paper lies in the summary it provides of existing knowledge rather than as a signpost to future work. His emphasis on the rigorous use of correct units throughout may additionally prove a key corrective to their past misuse.

Vance Tucker's paper in this volume "Energetics of natural avian flight" is a relatively short (30 p.) review of his subject, drawing together much of his own and of Pennycuick's earlier work into a coherent summary of the effects of altitude and windspeed on the power requirements of avian flight. The paper is oriented towards the non-mathematical biologist, coupling a succinct account of the underlying theory with a largely discursive account of the experimental errors involved in measuring free flight costs in wind tunnels. The supporting mathematics are tidily relegated to an appendix. The equations presented allow estimates of power requirements—and therefore of range—for long distance flights but for local movements the frequent accelerations and decelerations preclude precise estimates of energy cost. In this respect I must confess to wondering whether Tucker's approach, for all its elegance, can ever do more than provide order of magnitude estimates of range in the wild? As Tucker himself points out in his paper, winds commonly double their velocity for altitude changes of a few thousand meters and often change their direction as well, in which situation a bird's energy expenditure is far more seriously affected by whether or not it has found a tail wind or the best approximation thereto than by its optimization of airspeed. But then, who would have known even this much without Tucker's work? His paper will undoubtedly be widely cited.

Nearly one half the entire monograph is devoted to a massive review by Robert Ricklefs on "Energetics of reproduction in birds," a review which could easily have stood publication as a monograph in its own right. Ricklefs describes the aims of his paper as fourfold: "(a) to summarize major patterns of energy use during the reproductive cycle, (b) to provide a framework for organizing information on reproductive energetics, (c) to suggest directions for future study, and (d) to indicate some of the relationships that must eventually be incorporated into any synthetic view of reproduction." My own assessment of this paper is that he achieves the first three aims brilliantly but that his views in the fourth area are poorly developed in the paper.

Ricklefs begins his review with a summary of known data on the energy equivalents of foods, of respiration and, of birds and their constituents. He then reviews adult metabolism and the pathways for energy expenditure to provide the background for assessment of reproductive costs. I note here that Ricklefs opts for the inapplicability of Rubner's "principle of compensation," a view that differs from the more recent review of this field by Calder and King (1974), who draw on alternative evidence for their conclusion. Ricklefs goes on to discuss reproductive energetics proper in temporal sequence, dealing with, first, gonad and egg formation, then incubation, then growth and, finally, adult foraging. Gonadal growth is energetically cheap at 2 to 13% BMR but egg costs are several times greater and rather complicatedly related to clutch size and laying interval; the paper provides a useful compilation of known data in this field. Various methods of estimating the energy costs of incubation are available but the few studies conducted to date give a wide spread of costs when expressed as percentage of BMR, with a maximum of about 150% BMR. The sources of error in each method are discussed thoroughly, except that eggs are apparently expected to be spherical in shape (p. 202-3) and the possibility of changes in specific heat during incubation is neglected (p. 203). Ricklefs correctly notes that the role of nest structure in setting levels of incubation costs has been poorly studied, but he could usefully have cited here some of the Russian work in the field. He distinguishes in this section between two possible mechanisms limiting incubation expenditure: if foraging rate determines the energy available for incubation, then the long-term temperature gradient (averaged over some days) should be critical; if, on the other hand, the rate of mobilization of energy limits heat production, then short-term maximum gradients could be critical. As far as I am aware, this distinction has not been pointed out before and deserves consideration alongside the more recent behaviorally-oriented study by White and Kinney (*Science,* **186:** 107-115, 1974). Ricklefs himself reviews briefly the behavior of adults during incubation and here a major surprise was to find him contending that courtship feeding has no energetic significance in most groups; this view was fairly well demolished some time ago by Royama in a paper (*Bird Study,* **13:** 116-129, 1966) which Ricklefs does not cite.

As might be expected Ricklefs devotes much space to the energetics of growth and thermoregulatory development and provides too much information for summary here. He repeats, however, an error from an earlier paper of his, that nestling capacity for avoiding heat stress may decline with age "as conductance and evaporative surface area of the mouth relative to body weight both decrease" (p. 227). This is incorrect because in a warm ambient (T_a above T_b) the reduced conductance of older nestlings hinders, not enhances, the flow of heat from environment to bird, thereby restricting the rate at which heat shed by evaporation is replaced and thus improving the capacity of the nestling to thermoregulate. However, this is a minor slip. The only other error I noted in this section was a statement on p. 231 that "the normal range of nestling body temperatures increases and becomes more narrowly regulated as the young grow," a sentence which is at best self-contradictory and at worst wrong.

The discussion of nestling energy content and metabolic levels is similarly a highly competent affair about which I have only minor comments. Firstly, nestling lipids are not necessarily of constant composition throughout the growth period and this might affect the energy values estimated by Ricklefs. Secondly, the diurnal pattern of metabolism in young could significantly alter the shape of some of the graphs of growth and maintenance energy provided in the paper because this pattern certainly changes with age. Similarly, some of the estimates may be affected by different values of the caloric equivalent of oxygen consumption in adults and in growing young (Krebs and Kornberg, *Ergebn. Physiol.,* **49:** 212-298, 1957). These points are ignored by Ricklefs although they may be matters of detail peripheral to his main arguments here.

Ricklefs concludes his factual review by discussing fat storage and hypothermia as adaptations against food shortage, and follows this with brief accounts of fledgling and adult foraging energetics and of adult weight changes during reproduction. In a brief discussion section he outlines his views as to how the energetics of reproduction relate to equations for fitness, and it is in this area that I find myself with reservations. Ricklefs suggests that "time and energy must be thought of as being equivalent" and therefore capable of being related by a suitable conversion factor. This is a misleading view, for it builds into his argument the assumption of limitation by energy availability and precludes constraint by rate-limited processes. In other words, if birds need time rather than energy at some stages of their breeding cycle, as they do, the time-energy equivalence principle stated by Ricklefs is violated. My view here is shared also by King elsewhere in the volume (p. 5): "Energy and time are basically separate resources even though inter-related in complex ways." Broadly speaking, however, Ricklefs writes at the speculative level here, attempting primarily to indicate one or two directions in which the broad sweep of research might progress so one should perhaps allow for some imprecision as to detail.

Taken as a whole Ricklefs' paper provides a basic framework for research on avian energetics over the next decade. I predict it will prove to be one of the key papers in avian biology in the 1970's.

The monograph as a whole is an invaluable addition to the energetics literature. Its quality is well up to the standards of its predecessors in the series and is remarkably free of typographical errors. It would have benefited from an index in view of the overlap in coverage between papers, and it is also regrettable that the editor did not insist on uniform use of SI units throughout the four papers, although the final Appendix of conversion units does help here. Beyond this, one can only be lavish with praise for this publication. The Nuttall Ornithological Club has celebrated its centennial in style.—Raymond J. O'Connor.

37. Avian Biology. Vol. IV. D. S. Farner and J. R. King (eds). 1974. New York, Academic Press. 504 p. $37.00.—This is the fourth volume in the series edited by Farner and King which form an exciting statement regarding the current status of avian biology. Its implications are potentially world-wide in scope, and the series will serve both as a standard for current work and a baseline for all subsequent investigations in the areas covered. The series has demonstrated not only the vitality of research using birds but has identified a number of perceptive thinkers and lucid writers. The influence of the chapters in these volumes will be felt in the laboratory, museum and field, all traditional aspects of ornithological research. The material content, organization, and presentation of this series are destined to have broad effects on teaching and research, yet it is accessible to the informed "lay" reader.

The unique characters of the volume at hand are many. Emphasis is on the availability of new techniques, derivation of new theoretical models, and the resultant interpretive aspects of a relatively mature area of avian science. But it is also apparent that the progress of the past two decades is substantial both in data gathering and subsequent analysis, that new experimental approaches are being widely used, that new insights have invited the formation and evolution of new hypotheses, and that many of our classical explanations have undergone re-evaluation.

This volume consists of only five chapters as opposed to the average of nine in the three preceding volumes. This means several authors have had the opportunity to expand mightily on their subjects. As was the case with the previous volumes, the chapters are scholarly, well edited, and meaningfully organized. The technical quality is high and graphics flawless. These physical aspects plus the actual content justify the relatively high cost.

The first chapter on "The Peripheral and Autonomic Nervous Systems" places a great emphasis on functional analysis through recent advances in histochemical and cytochemical techniques. Little information on the structural aspects of the nervous system is presented, but great detail is presented on the physiological and biochemical nature of interactions within the nervous system and between the nervous system and relevant peripheral elements. In keeping with the editors' wishes, little is included on development and regeneration. Definitions are stated carefully, but elements such as the single figure are distracting. Bennett makes good use of referring to previous volumes in the series and this is a major factor providing integration and continuity to this chapter. In addition to the information on the peripheral and autonomic nervous systems, the neurobiology of effector tissues is also discussed. This is a relatively fresh approach and helps the reader visualize the design and functional limitations of both the tissues themselves and their relation to the nervous system. The chapter is thoroughly documented, but lacks a summary. A basic knowledge of neurochemistry and an adequate library are absolute necessities for using the information in this chapter fully.

The second chapter on "The Avian Pineal Organ" by Menaker and Oksche is the shortest in the volume. However, because of the current controversy surrounding the function of this enigmatic gland, its value is great. The authors have carefully filtered a diverse and difficult body of literature and presented a clear statement of our current knowledge of the cellular organization and function of the pineal. Their functional analysis presents three hypothetical roles for the pineal. The roles are not mutually exclusive, and therein lies the key. Menaker and Oksche then marshall, and analyze critically, the experimental evidence which both supports or disproves each idea. This is followed by a careful, comparative analysis of structure of the pineal. In spite of the rather considerable interspecific differences in histochemistry and cytology they are able to conclude that the primary role of the pineal in birds is integrative. It has input to the processes of photoreception, reproduction, and circadian rhythmicity. Equally important are the statements throughout the chapter on what needs to be done. A number of rather specific experiments are suggested which could resolve much of the confusion that surrounds the role of the pineal.

The chapter by W. Bock on "The Avian Skeletomuscular System" is the longest in the book and constitutes a major statement on the study of this system. I believe it is without precedent in the avian literature. The approach is especially cogent as the morphological aspects of this system have been so basic to avian classification. But Bock introduces to the descriptive aspects the added dimension of functional morphological analysis. This is integrated with a searching, in-depth analysis of both the adaptations in the skeletomuscular system and its role in systematics. Comparative morphology is given new relevance as Bock discusses problems of functional interrelations of organs and organ systems on several levels. His blending of the principles and analytical methods of diverse descriptions is especially fruitful. The chapter is relevant not only to traditional morphologists and taxonomists, but ecologists, physiologists, and all evolutionarily oriented biologists.

The last two chapters are basically physiological in focus. The chapter on "Thermal and Caloric Relations of Birds" by Calder and King is a direct intellectual descendant of the King and Farner chapter in Marshall. Like its predecessor, it will be influential. The authors present an updated model of heat exchange in birds and discuss the critical parameters of metabolic rate, body temperature, and allometric relations in light of the almost explosive growth in this field in the past decade. Both authors have made significant contributions to this field and this chapter complements their review articles in the recent "Avian Energetics" volume of the Nuttall Club. (see review **36**) The introductory portions are followed by a discussion of the process of heat transfer. Calder and King keep the reader aware of the continual interaction among the processes involved and point out the difficulty of a complete, quantitative description. The second, larger portion of the chapter considers the responses to temperature change, hypothermia and both long- and short-term regulatory processes involved in energy balance. The final portion is then dedicated to the evolutionary aspects of thermoregulation. This is by far the most accurate and comprehensive review of this material now available.

The last chapter "Physiology and Energetics of Flight" treats one of the most significant functional aspects of birds. The physiological approach complements nicely the recent treatment of energetics by Tucker (Nuttall Publication # 15). The latter was concerned with theoretical interpretation and projected data from wind tunnel experiments to natural flight. Berger and Hart discuss each of the important physiological systems of flight—respiration, circulation, temperature regulation, water loss, and energetics. Their work integrates information from previous chapters on these systems into the immense and complex process of flight. Their treatment consists of an excellent theoretical analysis and provides both new data and new thinking on these problems. Coverage of the avian material is superb and a number of comparative studies are also included. Berger and Hart are uncompromising in their standards and thorough in the details of their analysis. The chapter provides many new insights into a variety of functional relationships associated with flight and makes important comparisons between avian and mammalian systems.

In much the same manner as the preceding volumes, and in several unique ways, this volume is an important contribution to contemporary studies in the biology of birds. Its contributions are broad, stimulating, and do not avoid controversy. The work should be accessible to every serious student of birds. —Alan H. Brush.

38. The Red-tailed Tropicbird on Kure Atoll. R. R. Fleet. 1974. *Ornithol. Monogr.*, no. 16: 64 p. $5.50.—My first perusal of this paper transported me back to pleasant months spent on Kure Atoll as a member of the Pacific Ocean Biological Survey Program (POBSP) in 1966. However, on detailed reading I find many aspects of this publication disturbing. This consternation is caused not only by features of the paper itself (see below) but because it tarnishes an ideal. I view the A. O. U. Monograph series as a pace-setter, which other publications should emulate. Thus, published works should thoroughly cover the chosen subject matter and add substantially to ornithological theory. This paper falls far short of my ideal. In fact, if one wishes to understand tropicbirds on Kure Atoll, he must also have P. W. Woodward's thorough study "The Natural History of Kure Atoll, Northwestern Hawaiian Islands" (*Atoll Res. Bull.* no. 164: 318 p, 1972) that includes 12 pages on tropicbirds as well as extensive data on climatological conditions on the atoll. Woodward summarized POBSP data for the years from 1963 to 1969, including treatment of such subjects as band recoveries and movements, which Fleet ignores. Fleet apparently presents only his own 1964–1965 data, although for some unknown reason, the two papers cover the same material. Whether this is due to a problem in the organization of the POBSP, to a lack of communication between researchers, or to delay time in publication, I do not know. It detracts from this monograph significantly.

Fleet briefly describes the physical characteristics of Kure Island and reviews the literature on *Phaethon.* The bulk of the paper is divided into Breeding Cycle and Nesting Success sections. The former includes information on population dynamics, aerial display, molt, courtship, nest site selection and nest construction, territory, eggs, incubation, hatching, growth and development of nestlings, fledging, and renesting. For Nesting Success information we are referred to another paper (Fleet, *Auk,* **89**: 651-659, 1970), but nest site attachment, pair bond maintenance, and successive breeding cycles are discussed here.

I will mention only a few examples of what I consider the extensive shortcomings of this paper. On page 21 the author states that "the tail plumes are used in nuptial display and seem to require more time to grow to full length than does the rest of the plumage." Courtship, as related to plumage and molt, is not really discussed in the paper, and we are not told how long feather replacement does take. It seems logical that since the central rectrices are at least three times as long as the other rectrices, they should take longer to grow. Certainly with the many banded birds available and the extended period of the study on the island, more data on molt should have been garnered. In at least one instance data repeated in the paper change in the 31 intervening pages: in a discussion of nonbreeders, 22 birds were noted as recorded 49 times the subsequent year (p. 20), yet on page 51 in a discussion of nest site attachment, these 22 birds were noted as recorded 41 times. Or are they the same birds? I thus am skeptical of other specific statements.

The series of photographs showing an adult feeding a chick (Fig. 32) is especially illustrative, but the other photos contribute little.

The data on attendance by adults at the first nest and at renesting (Fig. 22) are extremely useful and important. It is unfortunate that additional information on banded individuals, especially for successive years, was not included and that these data were discussed so superficially. I know the data on successive years exist because I recorded encounters from birds in the study plot in 1966.

The strongest section of this paper deals with growth of nestlings. However, a lack of discussion and comparisons with other tropicbirds and Pelecaniformes detracts from the data presented. I find the lack of reference to Ricklefs' recent extensive summaries on growth inexcusable. In addition, the execution of Figures 24 through 29 is inconsistent: even allowing for reduction for publication, they are drawn on different scales with different size data points, almost as if two different artists did not consult each other. Figures 30 and 31 are ineffective because of improper exposure, variable position of the birds, and illegibility of the measuring device (sometimes inches, sometimes mm).

Under a brief discussion (p. 50) of renesting late in the season the author suggests that the major disadvantage of this behavior is that "the chick will hatch too late to fledge." Another possibility that comes to mind is that the proximate stimulus for nesting does not then influence the adults and they simply do not relay. The author sheds no new light on the problem of controls on breeding.

I am bothered throughout this paper by the extensive use of terms such as "*probably* young individuals" (p. 16), "*appear* to be nonbreeders" (p. 16), "*seems* that nonbreeders" (p. 16), "*apparently* on the ground" (p. 17), "*might* have obscured" (p. 18), "*may be* physiological" (p. 20), "*almost* exponentially" (p. 44). Certainly a long term study such as this of banded individuals could give us more definite answers. Even more bothersome is the use of the terms "nonbreeder (possibly too young to breed)" (p. 15), "nonbreeding (=unoccupied)" (p. 19), and "prospecting (=prebreeding)" (p. 20) for what I presume are similar age classes or similar activities. The author does not explain these terms, and I believe a study of this nature should consider these questions rather than add to the confusion. Although I agree that a good research program should pose as many questions as it answers, this report simply contains too many suppositions where it should provide data. These examples illustrate the extensive problems throughout the monograph.

The discussion seems to center on energetic considerations, yet the author has presented no data to support or refute statements such as "Many birds are energetically unable to breed in successive seasons" (p. 60). The author adheres to Ashmole's (*Ibis*, **103b**: 458-473, 1963) suggestions regarding availability of food as limiting breeding seasons but again presents no data on the subject. Scientific studies should test hypotheses and not merely repeat them.

Much of the discussion centers on a comparison of the breeding season on Kure Atoll, at 28° 25′ N (and based on two years of data), and the seasonality on Christmas Island, at 2°N latitude. I am not convinced this comparison is valid because Kure is in a reasonably seasonal environment as regards wind and temperature and certainly is in a seasonal day length regime. I found this discussion particularly unchallenging and unrewarding, especially since our earlier work (Schreiber and Ashmole, *Ibis*, **112**: 363-394, 1970) on Christmas Island is cited in six of the first eight paragraphs. I had hoped for a fresh viewpoint rather than a repeat of our conclusions.

This paper is remarkably free of typographical errors. Ironically, the only one I found occurs in the last sentence of the discussion. The literature cited section omits C. B. Kepler's major paper on the Blue-faced Booby on Kure Atoll (*Publ. Nuttall Ornithol. Club*, no. 8, 1969).

Through a press error, the Table of Contents is incorrect in issues not returned to Allen Press for reprinting. I cannot find the date the manuscript was submitted and accepted!

In summary, even though this paper and the data in Woodward present much information on the Red-tailed Tropicbirds on Kure Atoll, the last word on this species on the atoll or in the Central Pacific has not been written. I despair of the bulk of the POBSP data ever being published and synthesized. In addition to the many problems suggested above, this paper fails for not summarizing everything known to date about the species on Kure Atoll so that its title could truly be "*The* Red-Tailed Tropicbird on Kure Atoll."—Ralph W. Schreiber.

39. Autumn Hawk Flights. Donald S. Heintzelman. 1975. New Brunswick, N. J., Rutgers University Press, 398 p. $30.00.—In retrospect, it is hard to believe that as recently as the mid-1950's large numbers of migrating hawks were being shot from Bake Oven Knob and other ridges in eastern Pennsylvania. Were not we in an age of enlightenment by then? Clearly not, as attested by the photograph (p. 85) of some hawks slaughtered in 1956, including a Peregrine Falcon and an Osprey. Thankfully, large-scale shooting no longer poses a threat to the hawks. They survive to face the subtler but equally deadly forces of pesticides and habitat destruction. As appalling as the senseless shooting of hawks seems to us now, to my mind it is little different than the trophy hunting that is currently driving many of our most spectacular animals toward extinction or the tax-supported killing on our federal and state "wildlife" lands.

Today people gather at obscure places with names such as Cheat Mountain, Raccoon Ridge, Catfish Fire Tower, or The Pulpit not to shoot hawks but to marvel at their migrations and attempt to learn more about their biology. This book is a nontechnical account of autumn hawk migration in the Americas with additional information about hawk migration in general. It is apparently intended for the layman or beginning observer (familiar terms such as thermal, kettle, leading line and wind drift are defined in footnotes when first used), and the serious student of hawk migration will find little new information. Unfortunately, the price of the book will discourage many of those for whom it is best suited and presumably intended.

The introductory section of the book describes the equipment and techniques employed in hawk observations. Some sporadic and relatively unsuccessful attempts to study hawk migration from planes, gliders, and blimps are included. Radar obviously holds considerably more promise and could be profitably employed to answer a number of persistent questions about hawk migration (W. J. Richardson, *Proc. North Amer. Hawk Migration Conf.*, p. 47-58, 1975, reported some recent observations). As one who has not been actively involved in hawk watching for a number of years, I was surprised to learn that owl decoys are routinely employed to lure hawks (especially accipiters) closer to the observers. Photographs in the book attest to the effectiveness of the technique, and the author's statement (p. 14) that the decoys "assure more complete hawk counts by bringing into view some birds which otherwise might be unseen" is undoubtedly true. However, decoys could also introduce an additional serious bias into the counts of hawks that are laboriously made at most regular lookouts. A 20-page section on identification of hawk species contains little not found in standard field guides and the recent publication by Brett and Nagy ("Feathers in the Wind," Hawk Mountain Assoc., 1973).

The longest section of the book (133 p.) is devoted to a description of major and minor fall hawk observation points. In my opinion, this material could have been reduced to tabular form without loss of information and the length (and cost) of the book reduced accordingly. In addition, the 22 plates of hawk lookouts have a notable sameness and add little to the book.

The section on raptor morphology is a good introduction, with a discussion of the aerodynamics of hawk flight taken largely from Hartman (*Smithson. Misc. Coll.*, **143**: 1-91, 1961) and Cone (*Amer. Sci.*, **50**: 180-209, 1962).

The analysis of weather and topography influences on hawk movements rely heavily on data from Bake Oven Knob and other lookouts on the Kittatinny Ridge. It has been recognized for many years that large flights along the ridges tend to be associated with low pressure over New England and the passage of cold fronts over the ridges. Heintzelman chronicles series of days during the falls of 1967 and 1968, detailing the broad-scale weather patterns and associated hawk movements. In general, the data fit the prediction, but there are a number of exceptions. We cannot be sure whether these exceptions reflect incorrect understanding of the relationship between the migrations and weather or are the result of local effects. The prevalence of location biases becomes all too clear as one reads the pages of this book. For example, on 13 September 1967 Bake Oven Knob recorded the season's peak Broad-wing flight whereas Hawk Mountain, only 16 mi. southwest on the same ridge, recorded relatively few birds. Broad coverage with radar would help answer these kinds of questions. The same problem plagues analysis of correlations with local weather variables. One never knows whether he is measuring the factors associated with large migrations or simply those which bring birds close to the observation stations. Between pages 188 and 193, the author presents scatter diagrams purporting to show correlations between hawk flight magnitude and wind speed and air temperature. In fact, none of the figures illustrates a significant relationship. In general, those interested in migration-weather relations will be better served by referring to Haugh's fine paper (*Search,* 2: 1-60, 1972).

The two longest distance hawk migrants (Broad-winged and Swainson's hawks) are also the two that are most dependent on thermals, which have probably acted as selective forces in the evolution of migration timing and route patterns. This relates to the final chapter in the book, which reviews the distribution of the six related forms of the Broad-winged Hawk in the West Indies. The puzzle is how the ancestors of these forms reached the islands because the species is notoriously reluctant to cross large bodies of water. I am not sure it is such a puzzle. Thousands of Broad-wings have been observed departing southward from Key West and many more could pass over at high altitude. Is it unlikely that some of these birds could reach Cuba? The species may also cross the Bay of Fundy regularly. What Heintzelman has overlooked, I believe, is that birds have navigational ability, and they need not behave the same way with respect to topographic features at all points in their migration.

Data for several species from Bake Oven Knob are presented to document the occurrence of the so-called noon lull in birds observed. Based on logic and circumstantial evidence, the author believes that the lulls occur because the hawks ascend to altitudes beyond the visibility of observers. Lulls occur in flights of Broad-wings which use thermals, but also in Sharp-shin and Red-tail flights. Direct data are needed to answer the question, but Heintzelman's guess is a good one and has much anecdotal evidence in its support.

The section on migration routes and geography emphasizes again the importance of local effects dependent upon wind conditions and the vagaries of topography. The resulting variability in numbers of hawks passing any one point suggests considerable caution should be excercised in using counts of migrating hawks as indicators of raptor population trends. Heintzelman is commendably cautious in this regard. Only in the case of the Bald Eagle are the data convincing, and that case rests upon age ratios rather than raw counts of individuals. Interestingly, Golden Eagles do not show a similar trend toward a decline in immatures at the Pennsylvania lookouts. Paradoxically, Ospreys have increased at these locations in recent years, and no convincing explanation is obvious. Most other species show no clear trends although coastal migrants, such as the Peregrine Falcon, that are little influenced by wind, should be amenable to reasonable censusing during migration.

I enjoyed reading this book. It is a good introduction to the subject. My main criticisms deal with the production of the book. I am sympathetic to the problems of university presses, but $30 is excessive for a 400-page book with no color plates. As I have suggested, a number of the photographs add little to the text and the 50-page Appendix containing all the tabular material could have been considerably reduced. Most of the tables merely contain total yearly species' counts at various lookouts and convey little useful information. The necessary tables would be much more convenient if placed in the text.—Kenneth P. Able.

40. Productivity, Population Dynamics and Systematics of Granivorous Birds. S. C. Kendeigh and J. Pinowski (eds.). 1973. Warsaw Polish Scientific Publishers.—In 1965 a world-wide study of granivorous birds was initiated through the International Biological Program by the Institute of Ecology of the Polish Academy of Science. The first general meeting of this group was held in September 1970, and this publication consists mainly of the papers presented at that symposium. Of the 31 papers in the publication 24 are concerned totally or in part with the House Sparrow (*Passer domesticus*), or with the Tree Sparrow (*P. montanus*). The remaining papers deal with various species including *P. melanurus*, *P. griseus*, and *Spizella arborea.*

The papers are arranged in five subject areas. The first, bioenergetics, begins with a paper by S. C. Kendeigh on the monthly variations in the energy budget of the House Sparrow. There are two additional papers on the energy requirements of *Passer*. The first, by J. Weiner, deals with seasonal variation in energy requirements of adult *P. domesticus,* whereas the second, by A. Myrcha, J. Pinowski and T. Tomek, considers the energy requirements during growth of *P. domesticus* and *P. montanus*. Also in this section is a paper, by W. J. Maher, on the comparative growth rates in several ground-nesting passerines and another, by R. J. O'Connor, analyzing patterns of weight change in *P. domesticus.* The one remaining paper, by V. R. Dolnik, although not presented at the symposium, provides a comparison of weight and composition of body components in *P. domesticus.*

The second subject area is concerned primarily with population dynamics. Of the 10 papers listed in the table of contents for this section, 3 appear only as summaries. Two of these were to be published elsewhere whereas the results of the third had already been published. Examples of the topics appearing in this section include energy flow and biomass production in Tree and House sparrows, by J. Pinowski and M. Wieloch, and breeding season and reproductive rate of *P. domesticus* in Baroda, India, by R. M. Naik and L. Mistry.

The third subject area is titled "Food, in relation to the primary production of cereals and weeds; economic aspects." There are two papers on the food habits of Tree and/or House sparrows and one paper on food selection in *P. montanus* under caged conditions. A paper by P. H. Baldwin is concerned with the food habits of several ground-dwelling species inhabiting the short grass prairie in the western U.S.A. Additionally there are two papers on the problems and practices concerning the management of avian pest species. The first, by T. K. Palmer, considers the House Finch and Starling in relation to California's agriculture. The other paper, by J. Tahon, discusses control methods for Starlings in Europe and calls for an I.B.P. subgroup to study this species with particular emphasis on the economic problems of birds as pests.

The next subject area is titled "Systematics and evolutionary biology of sparrows." In the first of four papers in this section R. F. Johnston and R. K. Selander investigate size differentiation in skin and skeletal characters of *P. domesticus* in North American populations. A similar study is reported by A. Nordmeyer, H. Oelke, and E. Plagemann on populations of *P. domesticus* from several locations in Germany. Age and seasonal variation of morphological characteristics in a single population of *P. domesticus* is discussed by J. D. Rising. The last paper in this section, by G. J. Morel and M. Y. Morel, deals with the comparative food habits of seven species of sympatric columbids from northern Senegal.

The final subject area, "Miscellaneous," contains five papers on assorted topics. These include work by E. W. Martin on the influence of dietary protein on low temperature tolerances in *P. domesticus* and *S. arborea*, and a paper by J. Pinowski et al. concerning the effect on nest desertion of capturing adult birds while on their nests.

As is often the case in a symposium such as this the quality of the papers is quite variable. Among the many useful and interesting papers I would include those by Kendeigh, by Pinkowski and A. Wieloch, and by Johnston and Selander. However several papers offered little new information on the ecology of granivorous birds, and these detracted significantly from the overall quality of the publication.

Notwithstanding the decided international character of this symposium all but three of the papers were in English. The three were published entirely in French, including the abstract. I am sure the readership and hence utility of these three papers would have been greatly increased had an English abstract been provided.

In several places the editorial pen might have been more insistently applied. For example, the title of Tahon's paper is nearly long enough to qualify as an abstract. Such lengthy titles waste publication space each time the article is cited by another author. Also the paper by Morel and Morel on the food habits of several columbids was quite inappropriately included in the section on systematics and evolutionary biology of sparrows. To the casual observer it did, however, make an otherwise short section appear one paper longer. Furthermore these same authors published few data. Rather they presented only a short summary of preliminary results.

In spite of some shortcomings, this volume does provide a fairly current and quite broad view mainly of autecological research on granivores, particularly the House Sparrow. Although several of the papers merit little attention, others provide interesting and valuable information and ideas. Anyone beginning research in this area or anyone wishing a broad overview of ecological research on granivores could be served adequately by this publication.—Donald F. Caccamise.

41. Birds: Brain and Behavior. I. J. Goodman and M. W. Schein (eds.). 1974. New York, Academic Press 273 p. $15.00.—This collection of papers, an outgrowth of the Lashley Memorial Conference held in Morgantown, West Virginia, in 1971, presents a view of current activity on brain and behavior studies in birds, a field that has only blossomed in the last 10 years. The degree of expertise required to read and comprehend the 11 articles varies greatly from chapter to chapter. The first section of the book contains two papers, by W. M. Schleidt ("The Comparative Study of Behavior") and W. Hodos ("The Comparative Study of Brain-Behavior Relationships") that could be read with interest and understanding by any worker in the biological sciences. Both authors are dealing with theoretical problems of comparison appropriate to all areas of zoological investigation.

Two papers in the third section, by M. Konishi ("Hearing and Vocalization in Songbirds") and L. J. Stettner ("The Neural Basis of Avian Discrimination and Reversal Learning"), although technical, are both aimed at the scientist who is not working in brain research. The former article is a brief review of studies correlating auditory and vocalization systems in birds, whereas the latter is a beautifully lucid introduction to neural and behavioral studies of avian learning. Stettner describes the techniques involved in such studies so clearly that many psychologists and zoologists might profit by looking over this paper to make clear the distinctions in test methods in their own minds.

D. H. Cohen and H. J. Karten have written a chapter (comprising the second section of the book) on the structural organization of the avian brain. This chapter provides an outline of connective pathways of the brain that should prove, through careful study, of great value to those having little familiarity with the topic. The reader who lacks thorough knowledge of brain structure should stick with this chapter until the general neural pathways seem to fall into place; only then should the remaining articles be tackled.

Most of the papers in the third and final section of the book (excepting those by Konishi and Stettner) are research reports that assume much more knowledge of brain structure and neurological and neurobehavioral technique than do those papers already mentioned. Three articles are studies utilizing brain stimulation to examine vocalization (J. L. Brown), memory disruption (R.H. McCollum and I. J. Goodman), and agnostic behavior (D. M. Vowles and L. D. Beazley). The Brown paper is mainly concerned with methods, discussing the effects that different values of electrical stimulus parameters have on the resultant vocalizing behavior. McCollum and Goodman compare the effects of chemical, shock, and intracranial electrical stimulation of mammalian and avian brains. These studies seem to make clear that no models of memory are really being tested, merely that a wide variety of brain disturbances may in fact induce some degree of amnesia. Vowles and Beazley (misspelled "Beasley" in the chapter headings) attempt to map the sites at which stimulation elicits agonistic responses in the Barbary Dove (*Streptopelia risoria*). The authors describe several ways in which errors can be made in carrying out and interpreting such research. They have attempted to avoid the unwarranted conclusions often made from electrical stimulation, and in doing so form a contrast to the confusion that other workers, too quick to find the sites of "fear" or "aggression," have introduced. One weakness of the article is the lack of explanation of the statistical methods used in their analysis, even though they state the high degree of variability of the effects of electrical brain stimulation.

Two more articles concern the effects of lesions on feeding behavior (H. P. Zeigler) and operant conditioning (H. Zeier). The Zeigler paper is a review of the author's own work for more than 10 years with the feeding behavior of the the pigeon (*Columba livia*). Many of the figures are plotted incorrectly or in a misleading manner, often omitting some of the labeling or indications of controls or standard errors. Furthermore, conclusions in the text sometimes disagree with the data plotted in the graphs. Due to these errors, this paper is of doubtful value. Zeier reports the effect of forebrain lesions on operant conditioning schedules of pigeons. Some structures (not too surprisingly) inhibit the pecking response whereas others facilitate that response. Lesions appear to disrupt certain types of schedules more than others. Zeier's predictions on these differences in disruptions seem circular, based on the results he actually found rather than being derived from the sketchy mathematical model presented at the start of the article.

The last chapter to be discussed is by I. J. Goodman, on the study of sleep in birds. Behavioral and electrographic characteristics of four categories of sleep or wakefulness are presented. One might wish for better operational definitions to be able to distinguish these states. The effects on sleep of electrical stimulation, brain lesions, and drug treatments are also discussed.

The book is valuable to give a cross-section of the type of contemporary research in avian neurobehavioral research. I recommend the work to ethologists and neuroscientists, but with a caution to those unfamiliar with the brain who may find some chapters to be difficult reading.—B. Dennis Sustare.

42. The Owls of North America. Illustrations by Karl E. Karalus. Text by Allan W. Eckert. 1974. New York, Doubleday and Co., Inc. 278 p. $29.95.—The book contains 211 pages of text, 59 full color plates, 46 full page black-and-white drawings, 59 one-quarter page distribution maps, and an appendix of 15 tables of measurements and weights. A glossary lists 120 terms. In the bibliography are 258 titles. Most of the book is devoted to accounts of the 59 species and subspecies that the author recognized as occurring in North America north of Mexico.

The introduction is brief and deals primarily with the details covered in the species and subspecies accounts, these containing: information on nomenclature, source of the original description, the common name of each race, description, the common name of each race, descriptions, mortality and longevity, habits, ecology, distribution and migration, and economic influence (how owls' feeding habits serve man).

The names of some of the taxa of owls used in the book are not the same names as in the current *A.O.U. Check-list.* This is somewhat of a surprise because the author states in the introduction to claim no knowledge of taxonomy, and in fact cited the *Check-list* as the basis of the names he recognized. For some unexplained reason the systematic order noticeably departs from that of the *Check-list.* Also, seven forms recognized in the book are not found in the *Check-list.* Only the inclusion of one of the seven forms is explained, a race of *Bubo virginianus* described since the publication of the current *Check-list.* The other six forms are from older names. Five forms that are in the *Check-list* having ranges exclusively in Baja California are omitted in the book, but forms that occur in both Mexico and the United States are included.

The distribution ranges given for most of the taxa follow the *Check-list,* often word-for-word. The 59 distribution maps show the breeding ranges and, if differing from them, the winter ranges. There are several errors in the maps. For example, the author recognized *Glaucidium gnoma pinicola,* although the *Check-list* included *pinicola* in *G. g. californicum.* Apparently Eckert overlooked this matter and consequently the range maps of the two races show nearly complete overlap. Two other races of *G. gnoma, swarthi* and *grinnelli,* are shown to occur together on Vancouver Island. The eastern race of *Asio otus* is shown to breed in western North America where the western race also breeds. I found similar errors in some of the range maps of *Otus asio* and *O. trichopsis.*

The descriptive material included in the different accounts varies in quantity and quality. Distinguishing features between the species and their races are given. Differences between similar races are not particularly diagnostic, are unreliable, or are simply omitted. For example, the author states that one of the races of *Glaucidium gnoma* may be separated from another race of the species because one of them sits more erect, and in flight has a more pronounced bat-like appearance, since it has a slightly shorter tail (p. 210). Differences between the other forms in the particular subspecies account are not given. Also annoying is the use of size as a distinguishing character without giving any measurements. *Strix varia helveola* is said to be smaller than *S. v. varia* yet no measurements are given for *helveola.*

The remainder of each account includes information on ecology, behavior, and economic importance. Although these sections are interesting none of the material is documented or supported with sufficient data. The reader is simply *told* the situation without references or is informed that the information is available from some other source. Doubt would cause me to hesitate citing most of the information as if it were entirely original. The list of bibliographic sources provides some clue for additional or original sources of information; however, the author states that not all of the consulted sources are listed.

The organization of the text is easy to follow insofar as finding the various subjects discussed in the accounts, but I had trouble finding the beginning and end of the individual subspecies accounts. This could have been remedied by a different type face. There is more than ample blank space between the different subtitles (and subspecies accounts) which could have been avoided in this day of inflated paper costs. The names of junior authors of most of the titles are repeated, with full citations, in the alphabetical sequence of the bibliography. The net result of the repetition was that one half of a page was wasted. The bibliography could have served a more useful function if the references had been placed at the ends of the appropriate accounts.

The text appears to be free of typographical errors and is relatively easy to read. The index is fairly thorough. The color plates are listed in the front of the book by plate number and the text page number facing the plate. Plate numbers, but not page numbers, are also listed at the beginning of each account. The plates are not grouped as well as could have been, and many are far removed from the corresponding accounts. Where measurements are given, the number of specimens examined are included.

The color plates by Karalus are good. As promised on the flycover, all of the species and subspecies are presented in color. Perhaps I anticipated too much, but I expected the plates to exemplify the differences between all of the races (to the extent that specimens show). In many instances this is carried out by the artist, but in too many instances he fails to show comparative aspects of the birds. Differences between certain races are difficult to see when one race is shown in dorsal view and another is in ventral view. Aside from that, most of the plates are slightly too dark and in some instances may be inaccurate. For example, the two plates of the races of *Speotyto cunicularia* are misleading, as I found that specimens of the race *floridana* have the coloration of Karalus' plate of *S.c. hypugea*. I did not check every plate against specimens but of those that I could compare I found the plates to be fairly accurate in coloration.

The 46 full page black-and-white figures are interesting and the notes on some of them impart some information about owls. I question the utility of many of the owl sketches in terms of the amount of information imparted and in terms of their aesthetic appeal. There are several full page sketches of only mammals, and one sketch that includes an assortment of live prey items including arthropods, fish, frogs, snakes, and lizards. These perhaps belong somewhere other than in a book on owls.

In summary, the color plates are appealing and are the most important contribution to the book. Had the information in the text been presented in a more reliable way, I would be inclined to give more weight to it than to the plates. Considering everything, including the book's price, the reader might beware of being misinformed or at least may experience the same frustrations I did in wondering about the sources and reliability of the data. A revised copy of this book could become a classic compilation on owls.—M. Ralph Browning.

43. A Field Guide to Birds' Nests of 285 Species Found Breeding in the United States East of the Mississippi River. Hal H. Harrison. 1975. Boston, Houghton Mifflin Co., 257 p. $8.95.—This book is not a field guide, as there is no way to identify nests in the field using the book. Harrison's color photographs of the nests and eggs of 222 species of birds form a major part of the book. Unfortunately, positioning the camera to show the eggs often means that the characteristic shape of the nest is not shown. For example, the book shows the top view of the nest of a Northern Oriole (*Icterus galbula*), but the deep pendulous cup is not thereby revealed, and the text provides insufficient additional information for a novice to recognize this distinctive nest. A strange choice of photographs was also made for the Brown-headed Cowbird (*Molothrus ater*). Because the cowbird builds no nest, one must examine the eggs to identify the presence of a cowbird egg in the nests of other birds. Nevertheless, there is no photograph of cowbird eggs, and in fact the cowbird is pictured sitting on what is apparently a vireo nest, although this fact is not mentioned in the text. In addition to the photographs, each description (including those for 63 species not illustrated) includes the breeding range and habitat of the bird, "typical" location, materials, and occasionally dimensions of the nest, normal clutch size, description of the eggs, and a brief section entitled "Notes." These notes are used to tack on tidbits of interesting information the author thought would be of value. Sometimes the notes include elaborations of material from the other sections, sometimes anecdotes from the author's experience, and for some species, comments on brood parasites. The notes are also the only place where comparisons with other species are made; unfortunately comparison is not a uniform practice.

The book lacks a key to nests, and there is no indication of which nest features are truly diagnostic. The book jacket refers to the "How to Use This Book" chapter, but no such chapter exists. Unlike other books in the Peterson Field Guide Series (of which this is Volume 21), there is no methodical way to use the book to progressively narrow down the choices as to which nest you are observing in the field. One must examine each description until a match seems to be made. The various nest guides by Richard Headstrom (e.g., "Birds' Nests, a Field Guide," New York, Ives Washburn, Inc., 1961; a book illustrated primarily by Hal Harrison's photographs) are of considerably more value in identifying the nests of birds. Roger Peterson states in his Editor's Note that the book is intended as a companion to his "Field Guide to the Birds" (Boston, Houghton Mifflin Co. 1947), to furnish descriptions of the nests and eggs of each species. I find it interesting that Peterson does not suggest that the book is intended for field identification.

This is a convenient reference work for birders to have on their shelves. The color photographs are of high quality and form a valuable collection. I would have liked a guide that allows field identification of nests, a need this book does not meet.—B. Dennis Sustare.

44. Contribution to an Annotated Bibliography of North American Cranes, Woodcock, Snipe, Doves, and Pigeons. Henry M. Reeves (compiler). 1975. Natl. Tech. Information Serv., U.S. Dept. Commerce, PB-240 999. 527 p. $12.50.—This 8½ x 11 inch photo-offset is available from the National Technical Information Service, Springfield, Virginia 22161. Published for the U.S. Fish and Wildlife Service, the bibliography includes references on four families and 15 species found in North America north of Mexico cited by publications on Middle America and some of the islands of the West Indies. There are approximately 4,500 titles that are primarily limited to the English language. The included literature appears to cover the very earliest literature through 1971. All entries are coded for accommodation of the cross references and so that new entries for a possible revision may be added. There are three different cross references. A species cross reference is subdivided by subjects including morphology, ecology, physiology, history, and management. A cross reference to the species by political units (state, province, etc.) and a list of publications by author are also included. Finally, an appendix of the standard abbreviations used in the bibliography is provided.

Annotations to the references originated from the author's abstract, summary, from *Wildlife Review,* or from *Abstracts of Mourning Dove Literature.* A few of the references are not annotated. The length of the annotations vary from one line to about a half page.

The last 81 pages of the annotated section of the copy I have before me is blurred and some of the entries are totally illegible. Otherwise, I find the book very easy to use. A spot check of all of the references for a particular geographic area revealed that not all the references (6.4%) are applicable to the area. Nonetheless, this compilation appears to be fairly complete and should prove useful to persons interested in the species listed in the title.—M. Ralph Browning.

45. Evolution, Gravitation, and Weightlessness. (Evolyutsiya, Garvitatsiya, Nevesomost.) P. Korzhueev. 1971. Moscow, "Nauka" Press 152 p. (In Russian.).—The adaptation of life to gravitational effects is the theme of this book. Physiological problems emerging during human experience in space travel have made consideration of these matters imperative. A main thread of thought is that embryos of fishes and other forms of life, which are immersed in water during development, experience less gravitational effect, or at least limited weightlessness or antigravitation. It is concluded that embryonic development in liquid suspension as it persists through Amphibia, Reptilia, Aves, and Mammalia likewise benefits from the same bouyancy effect. Following a foreword and an introduction are five chapters: Evolutionary Factors; Gravitational Forces as a Factor of Evolution; Conquest of Land—Transition to a Hypergravitational Conditions; Life Without Gravity—The Problem of Weightlessness—Conquest of the Cosmos. Bird flight occupies much of the discussion, which can rest only on the speculative and theoretical. There is a bibliography of 76 titles.—Leon Kelso.

46. Summer of a Million Wings, Arctic Quest for the Sea Eagle. H. Brandon-Cox. 1974. London (?) T. and C. Newton Abbot, 184 p. —Certain books are valuable if only for the reading pleasure they afford, and this is one of them. The author writes a dramatic, running account of his experiences during an arctic summer on the Norway coast, of the history of the species' decline, and of the avian drama as it unfolded. One example, "Gull after gull swooped to pluck up a struggling piping guillemot, or razorbill from the grass or from between the rocks. A vicious nip from the big yellow beaks of the black-backs, and the small bodies hung limp and lifeless as they were carried back to low stones by the water. With several gulps the killers swallowed their victims and were ready to hunt again." There are 14 chapters, of which the first two, "Bastions of the North" and "Return of the Birds," set the scene and start the action, and the twelfth and fourteenth, "The Long Flight" and "The Million Wings Depart," ring down the curtain. There are some striking photographs of the few Sea Eagles found.—Leon Kelso.

NOTES AND NEWS

The quality of a scientific journal is related to a number of factors one of which is an independent referee system. Over the past year numerous ornithologists and ecologists have given freely of their time and energies by refereeing manuscripts submitted to *Bird-Banding.* The Editor wishes to express his appreciation to these individuals: Kenneth P. Able, John W. Aldrich, Daniel W. Anderson, Kathleen S. Anderson, James Baird, Jon C. Barlow, Frank C. Bellrose, Jr., Charles H. Blake, Mary H. Clench, Nicholas E. Collias, Alexander Cruz, E. J. Fisk, J. William Hardy, M. Philip Kahl, Lawrence Kilham, Carmine Lanciani, Robert C. Leberman, Mary LeCroy, Horace Loftin, Peter Marler, M. Brooke Meanley, L. Richard Mewaldt, Bertram G. Murray, Jr., I. C. T. Nisbet, Robert W. Payne, Linda S. Prevett, Robert E. Ricklefs, William B. Robertson, Jr., Irvin R. Savidge, Albert Schwartz, William E. Southern, Robert M. Stewart, Walter K. Taylor, Max C. Thompson, Leslie M. Tuck, Jared Verner, Lovett E. Williams, Arthur J. Wiseman, and Glen E. Woolfenden.

Spring Meeting. A joint NEBBA/EBBA meeting is being planned for next spring. It will be held at the 4-H Conference Center in Chevy Chase, Maryland, on 9-11 April 1976. A detailed notice will be sent well ahead of time to all NEBBA and EBBA members who live close enough to attend. Those wishing to present papers at this meeting (on Saturday afternoon, 10 April) should send an abstract and the amount of time needed to Dr. John Weske, *P. O. Box 116, Sandy Spring, Maryland 20860.* The deadline for submitting the abstract is **1 March 1976.** A NEBBA Council Meeting is planned for 9 April.

Peregrine Falcon Bibliography. The U.S. Fish and Wildlife Service is compiling a bibliography with abstracts of English language literature, both books and periodical, on the Peregrine Falcon (*Falco peregrinus*). Authors who wish to have their articles included in this work should send two reprints, copies, or abstracts to the senior author, Dr. Richard D. Porter, *I. F. & R.E.S. Shrub Lab,735 North 500 East, Provo, Utah 85601.* Articles in which the Peregrine Falcon is mentioned but is not the main subject, and articles in foreign languages with English summaries are also wanted.