RECENT LITERATURE

Edited by Bertram G. Murray, Jr.

BANDING AND LONGEVITY

(See also 19)

1. Preliminary report on bird banding in New Zealand 1971-1972. C. Robertson. 1973. *Notornis,* **20**(1): 59-70.—By the close of March 1972 the grand total for the N. Z. Bird Banding Scheme was 35,125 banded, with 11,994 recoveries and 9,704 repeats for the preceding year. The total number of species banded for the whole project was 179 with 123 recovered. The recovery percentage for game species was 23.51%; for nongame, 10.87%; and for all combined, 15.17%. More emphasis on specific studies has resulted in fewer birds banded with a higher ratio of recoveries.—Leon Kelso.

MIGRATION, ORIENTATION, AND HOMING

(See also 51, 56, 57)

2. A possible shortcut spring migration route of the Arctic Tern to James Bay, Canada. W. E. Godfrey. 1973. *Can. Field-Nat.,* **87:** 51-52.—For a short period in late May and early June Arctic Terns (*Sterna paradisaea*) are found in southeastern Ontario and southwest Quebec. These observations suggest that Arctic Terns may migrate from the upper St. Lawrence overland to nesting sites on James Bay. Further observations are needed and information should be sent to W. Earl Godfrey, National Museum of Natural Sciences, Ottawa, Ontario K1A0M8.—Edward H. Burtt, Jr.

POPULATION DYNAMICS

(See also 6, 11, 15, 17, 55, 57)

3. On the life-expectancy of the Matopos Black Eagles. C. J. Vernon. 1972. *Ostrich,* **43:** 206-210.—Given the fact that the Black Eagle (*Aquila verreauxi*) at Matopos, Rhodesia, has a reproductive rate of 0.54 young per pair per year, Vernon calculated other population parameters—longevity, adult life expectancy, juvenile mortality, and first year mortality. Assuming different rates of adult mortality, the age of first breeding is 4 years, and the population size remains constant. In an appendix Vernon discusses how the calculations were determined.—Bertram G. Murray, Jr.

4. Capture-recapture methods applied to a population with known parameters. A. D. Carothers. 1971. *J. Anim. Ecol.,* **42:** 125-146.—The taxicabs of Edinburgh, Scotland, form a completely marked population of known size. Numerous samples were taken by carefully defined methods and the population size deduced from them. Tests of equal catchability and of homogeneity were applied. The author concludes: "equal catchability is an unattainable ideal in natural populations," including taxis. References to useful tests not yet in the textbooks are included.—Charles H. Blake.

5. Effect of herbicide-induced changes in vegetation on nesting ducks. L. W. Dwernychuk and D. A. Boag. 1973. *Can. Field-Nat.,* **87:** 155-165. —The application of 2, 4-D ester in two successive years resulted in virtual elimination of broad-leaved plants and an overall decrease in plant cover. Associated with the change in vegetation was a decrease in the nesting density of ducks. No corresponding population decrease was found in untreated areas exposed to a similar amount of human disturbance.—Edward H. Burtt, Jr.

NESTING AND REPRODUCTION

(See also 13, 17, 51, 57)

6. The Kakapo (*Strigops habroptilus* Gray). A review and reappraisal of a near-extinct species. G. Williams. 1956. *Notornis,* **7**(2): 29-56.—While late in review this article deserves recognition in any major compendium on ornithology in general, or in any review of animal extinction in particular. Covering all the Owl Parrot's known literature, to which little has been added since, we would note but a few of the points elaborated in the interest of the present concern for "endangered" species. Primarily all evidence indicates that the Kakapo is nearly if not totally extinct. The probable cause has elicited several theories. One is that it breeds only every four or five years. Of this there is little evidence beyond Maori tradition, further studies being hindered by growing scarcity of the species. Another suggestion is that introduced deer in New Zealand disturb Kakapo trails and runways, and even "dusting holes" for which it has a strong habitual predilection. Then there is a hypothesis that successful breeding is dependent on a "good berry season." It is almost entirely herbivorous, and the list of known plants eaten is extensive, suggesting that it is adaptable to almost any plant available. This idea is not weakened by the obvious stoutness of the mandibles, and by one observer's statement that Kakapo "chew their food more effectively than any other birds . . . for this purpose there are diagonal grooves in the upper mandible in contact with which the lower acts in the manner of a steel mill." If it has only the efficiency of a paper or pulp mill, food supply should not be a problem. Another observer states that when feeding on grass it never swallows the fibers but rolls leaves into pellets about the size of a marble, sucks until it has the appearance of tow, and leaves the macerated wad dangling on the plant. This sign well marks their feeding areas. The above with numerous facts and literature cited draws a picture inviting contrast with the situation of the Kiwis in the same part of the world. This may be exemplified by available "Classified Summarized Notes" (A. Edgar, recorder. *Notornis,* **19** (supplement): 4-5, 1972). Here according to recent field observations three species survive even in abundance locally despite extreme reduction and what might be termed specialization of features, including poor eyesight, non-flight (in contrast to limited fluttering ability of the Kakapo), long incubation period, and well over one year requisite for growth to maturity. No minor contrast is the Kiwis' specialization on animal food. Van Tyne and Berger ("Fundamentals of Ornithology," 238, 1959) note that only a small proportion of the birds of the world specialize on plant nutrition, suggesting that such is a secondary specialization. This leaves room for speculation on the proneness of vegetarian bird species toward weakness, decline, and extinction.—Leon Kelso.

7. The nesting of the Great Cormorant (*Phalacrocorax carbo*) and the Double-crested Cormorant (*Phalacrocorax auritus*) in Nova Scotia in 1971. A. R. Lock and R. K. Ross. 1973. *Can. Field-Nat.,* **87**: 43-49.—The increased size of known colonies of both species indicates an increase in the breeding population, although discovery of 34 new colonies suggests a lack of previous population data. The authors hypothesize that by killing the spruce trees in which they nest, *P. auritus* may prepare nesting areas for *P. carbo,* which nests on bald rocky islets or isolated cliffs. Another point of interest is the close and unexplained association between *P. auritus* and breeding colonies of the Great Blue Heron (*Ardea herodias*).—Edward H. Burtt, Jr.

8. On the breeding biology of the Ruff. (K biologii razmnozheniya turukhtana.) N. Ivanova. 1973. *Vestnik Leningr. Univ.,* **1973**(15): 26-29. (In Russian with English summary.)—Twelve nests of *Philomachus pugnax* in Estonia and 23 in the Leningrad Region were observed between 1966 and 1969. Active courtship by males spanned 30 days in Estonia and 20 to 25 around Leningrad. Three times as many females than males occurred at lek sites. The period of egg-laying in May and June was 24 days at the former area, 15 to 16 days at the latter. Females assumed all nesting duties including care of young and brooding after hatching, lasting 7 to 12 days. The previously described "rodent run" behavior of females was seen around the nests.—Leon Kelso.

9. Nesting of the Three-banded Courser. A. C. Kemp and G. L. Maclean. 1973. *Ostrich*, **44:** 82-83.—The Three-banded Courser (*Rhinoptilus cinctus*) uniquely among coursers incubates eggs that are buried so deeply and firmly in the ground that the eggs are probably not turned. The eggs are buried by side-throwing behavior characteristic of other Charadrii in collecting nest material. Whether the advantage of this behavior is better thermoregulation or crypticity could not be determined.—Bertram G. Murray, Jr.

10. Notes on the breeding biology of the Wood Owl. P. Steyn and J. Scott. 1973. *Ostrich*, **44**(2): 118-125.—An abundance of information, both original and summarized from other sources, is provided on nests, fledging period, development and behavior of young and of adults, feeding rate, food (largely insects), and the post-fledging period. The clear photographs provided continue the question as to whether, with the plumage characters and fullness of facial disc, it belongs in the Neotropical American genus *Ciccaba* or as it was as *Strix woodfordii*.—Leon Kelso.

11. The breeding biology of the Himalayan Rosy Finch in Zailiisk Alatau (Tyan-Shan). (O gnezdovoi biologii gimalaiskogo viyurka v zailiiskom alatau (Tyan-Shan)). E. Gavrilov. 1972. *Ornitologiya*, **10**: 228-232. (In Russian.) —This detailed field study of 19 nests of *Leucosticte nemoricola* affords some comparison with similar studies of Brandt's Rosy Finch (*L. brandti*) of central Asia and of North American species. Nesting occurs as high as about 15,000 ft., i.e. far above timber line, but breeding may extend as low as 8,000 ft. Unlike the American species, the Asiatic species reportedly feeds only on vegetable matter. Both parents feed the young, carrying nutriment in a pair of sublingual pouches. This affords enough on each foraging trip to be distributed almost evenly to each of the 4 or 5 young. This seemingly accounted for low mortality of young; survival was 4 or more per nest. The foraging adults traveled in flocks to altitudes well above and about 1 km from the nest. Nests were largely a cup of sticks with various softer lining, placed in small hollows among rocks. The female both builds the nest and incubates the eggs. Incubation covers about 15 days. Nests are kept clean even to departure of the young, which is after about 17 days. The breeding activity of the Rosy Finch population as a whole appeared well synchronized. The time from nest-building to maturity of the young varied from a minimum of only 1.5 months to a possible maximum of 2.5. The shortness of the high altitude summer season there would, however, allow no second broods.—Leon Kelso.

BEHAVIOR

(See also 6, 8, 17, 36, 38, 57)

12. The relationship of hunger to predatory behaviour in hawks (*Falco sparverius* and *Buteo platypterus*). H. C. Mueller. 1973. *Anim. Behav.*, **21**: 513-520.—Both hawk species killed more mice with increased food deprivation, but in all cases the kill was consumed before a subsequent kill was made. These data suggest that there is no predatory drive independent of hunger as proposed by the action-specific-energy model of Lorenz (*Symp. Soc. Exp. Biol.*, **4**: 221-268, 1950). Kestrels killed and ate more mice in the late afternoon than at other times of day, which correlates with an observed peak in their daily activity during migration (Mueller and Berger, *Auk*, **87**: 452-457, 1970). The Broad-winged Hawks showed no comparable circadian rhythm.—Edward H. Burtt, Jr.

13. Behaviour of the Pomarine Skua *Stercorarius pomarinus* Temm. with comparative remarks on Stercorariinae. M. Andersson. 1973. *Ornis Scand.*, **4**(1): 1-16.— Behavior of the Pomarine Jaeger was studied in northeastern Alaska. The jaegers feed mainly on Brown Lemming (*Lemmus trimucronatus*). Pomarine Jaegers left the study area in June without completing the breeding cycle when lemmings became scarce. Agonistic behavior is described and compared with that of other Stercorariinae. Behavioral and some morphological similarities between the taxa of the genus *Catharacta* and *Stercorarius* species, especially *S. pomarinus*, support the merger of *Catharacta* with *Stercorarius*.—M. Ralph Browning.

ECOLOGY

(See also 4, 6, 38, 55, 56, 57)

14. Coexistence, coevolution and convergent evolution in seabird communities. M. L. Cody. 1973. *Ecology,* **54**: 31-44.—Six species of alcids breed on the western coast of the Olympic Peninsula, Washington: Pigeon Guillemot, Common Murre, Marbled Murrelet, Tufted Puffin, Rhinoceros Auklet, and Cassin's Auklet. At least three have similar diets, and all breed at the same time of year. The subject of this paper is how their coexistence is achieved. After a very interesting detailed description of their morphology and behavior, the author uses the linear sequence above as a basis for a discussion and graphic model (Figure 3) of the interrelated factors involved in their breeding biology. Alcids that feed inshore, Pigeon Guillemot and Common Murre, nest in open dispersed breeding sites and have nidifugous young that grow rapidly to a large body size. The parents guard the chicks from marauding Glaucous-winged Gulls. The smaller species, on the other hand, Rhinoceros Auklet and Cassin's Auklet, nest in burrows and travel long distances for food. Their semi-altricial chicks are brought large amounts of concentrated food at infrequent intervals, usually at night. These same relationships are repeated in a northeastern Atlantic association of six alcid species on Grimsey Island, Iceland.

In the theoretical discussion of the results, the author suggests that the six species on the Olympic Peninsula evolved there and that their differences with respect to feeding and defense against predation are the result of interspecific competition. It seems to me that he has the chick before the egg. Species have unique attributes by definition, and unique geographic ranges. He chose a study area that offered a combination of resources that satisfy the requirements of 6 of the 12 members of the family Alcidae that occur in western North America. Why interpret species-specific adaptiveness to resources as interspecific competition?—Frances C. James.

15. Unequal distribution of Snowy Owls on eastern Melville Island, Northwest Territories. F. L. Miller and R. H. Russell. 1973. *Can. Field-Nat.,* **87**: 180-181.—The southwestern peninsula, 23% of the entire land mass, held 91% of the observed Snowy Owls (*Nyctea scandiaca*). Still more striking is the decline in population from one owl per 8.6 mi^2 in 1961 (Tener, Canadian Wildlife Service, *Occasional Paper,* No. 4, 50 p., 1963) to one owl per 26.6 mi^2 in the present study.—Edward H. Burtt, Jr.

16. Microhabitat selection during nesting of hummingbirds in the Rocky Mountains. W. A. Calder. 1973. *Ecology,* **54**: 127-134.—Incubating Broad-tailed (*Selasphorus platycercus*) and Calliope Hummingbirds (*Stellula calliope*) reduce heat loss by radiation, conduction, and convection by selecting locations for nests that are sheltered by boughs or branches. Radiant heat loss from the bird to the vegetation was reduced significantly from what it would have been had the bird been exposed to the cold night sky. It also will be necessary to quantify the evaporative heat loss, the insulating effect of the nest, and the protection it offers from heat loss by convection before it will be possible to formulate a model of the thermal energy budget.—Frances C. James.

17. Social facilitation of egg-laying in experimental colonies of a weaverbird. J. K. Victoria and N. E. Collias. 1973. *Ecology,* **54**: 399-405.—Field studies of birds that nest in colonies have demonstrated that birds in larger colonies begin to lay eggs earlier, are better synchronized in their breeding cycle, and have greater reproductive success than birds in smaller colonies. Originally described by Darling ("Bird flocks and the breeding cycle." Macmillan Co., N. Y., 1938), this effect is usually attributed to social facilitation. The authors of this paper have been able to examine the effects of sex ratio and colony size on the breeding behavior of African Village Weaverbirds (*Ploceus cucullatus*), while controlling several of the other potentially important variables. Birds of known age, having similar breeding sites, and similar environmental stimuli were compared.

Female weaverbirds do not come into breeding condition until the males have built nests and have begun to display. At the beginning and the end of the breeding season, males in larger colonies weave more nests than males in smaller ones (Collias et al., *Ecology*, **52**: 823-828, 1971). Apparently egg-laying is more limited by the number of nests present than by the number of males present. Females visit male territories more frequently and their clutch replacement interval is shorter in larger colonies than in smaller ones. Since egg-laying is maximal in the middle of the breeding season, these effects can only be demonstrated at the onset and close of the breeding season. The results support the "Darling effect." The weaverbird system is well suited for this type of manipulative study. It would be interesting to have a companion study in which the age, sex ratio, and colony size are held constant, and variables such as food supply and the physical environment are permitted to vary.—Frances C. James.

18. Interterritorial habitat variation in Grasshopper and Savannah Sparrows. J. A. Wiens. 1973. *Ecology*, **54**: 877-884.—In a 28.3-hectare grassland site in southern Wisconsin the sizes of territories of 28 pairs of Grasshopper Sparrows (*Ammodramus savannarum*) and 37 pairs of Savannah Sparrows (*Passerculus sandwichensis*) varied from 0.53 to 1.34 hectares and 0.16 to 1.09 hectares, respectively. Step-up multiple regression analysis of indices of vertical density, litter depth, stratification, and dispersion of the vegetation indicated that territories of Savannah Sparrows were smaller in the centrally-located territories where the grass cover and litter depth were maximal. Territories of Grasshopper Sparrows established late in the season were larger than those occupied earlier. Whether these differences have important consequences for fitness was not determined. This is part of a larger study on grassland birds (*Ornithol. Monogr.*, **8**: 1-93, 1969).—Frances C. James.

19. Habitat preferences and competition of wintering juncos and Golden-crowned Sparrows. J. Davis. 1973. *Ecology*, **54**: 174-180.—Results of trapping and banding efforts after removal of Golden-crowned Sparrows from the study area on the Hastings Reservation, Monterey County, California, indicated that the presence of this species was restricting juncos to the field borders and excluding them from willow thickets near a water trough. Competition between the two species was of low intensity because the three major resources involved (food, water, and dense cover) were not being contested seriously. Competition for weed seeds was not important because after the first fall rain, usually in November, the Golden-crowned Sparrows ate sprouting annuals.—Frances C. James.

20. Birds and mammals in successions of terrestrial ecosystems. F. Turcek. 1972. *Misc. Rep. Yamashina Inst. Ornithol.* **6**(5/6): 401-409. (In English)— Terrestrial ecosystem successions are examined and discussed with respect to structure, function, and energetics of the component organisms. Most of the available knowledge involves function. In most terrestrial ecosystems, within each series or stage of a succession, three vertebrate strata are recognized: (1) progressive species now entering the systems; (2) regressive species or those approaching elimination; and (3) relatively stable or permanent species' populations, the core of the system or series. Among various aspects the sources from which group (1) derives and the functions of the component species are elaborated in detail.—Leon Kelso.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(See also 5, 51)

21. A possible role of the Cattle Egret in the dissemination of the granulosis virus of the bollworm. A. Polson and H. Gitay. 1972. *Ostrich*, **43**: 231-232.—Cattle Egrets (*Ardeola ibis*) presumably ingested nuclear-polyhedrosis viruses and granulosis viruses while feeding on infected lucerne caterpillars and bollworms, respectively, in fields at Elsenberg, Cape Province. After extraction and purification of the feces, granulosis virus particles were found but nuclear-polyhedrosis viruses were not. From their appearance, the granulosis viruses seemed to have withstood passage through the digestive tract. Cattle Egrets may serve as disseminators of the virus.—Bertram G. Murray, Jr.

CONSERVATION AND ENVIRONMENTAL QUALITY

(See also 5, 44, 51)

22. Mass destruction of *Synthliboramphus antiquus* by oil pollution of the Japan Sea. T. Kazama. 1971. *Yamashina Inst. Ornithol.*, **6**(4): 73. (In Japanese with English summary.)—Particular loss of the Ancient Murrelet along with marked mortality of five alcids was noted. Among 30 dead *Synthliboramphus* analyzed it was found that foreign oil absorbed by the plumage comprised as high as 50% of the body weight.—Leon Kelso.

PARASITES AND DISEASES

(See 21, 57)

PHYSIOLOGY

(See also 16, 33, 5.)

23. Power input during flight of the Fish Crow, *Corvus ossifragus*. M. Bernstein, S. Thomas, and K. Schmidt-Neilsen. 1973. *J. Exp. Biol.*, **58**(2): 401-410.—"The ratio of power input in level flight to that at rest is about 6.0 for all three species" [i.e., those compared in the study: Budgerigar, Fish Crow, and Laughing Gull (*Larus atricilla*)]. The cost of travel for a running mammal is stated to be more than twice as high as that for the flying bird of the same size. Level flight for the Fish Crow costs about one-third more than for the Laughing Gull. "This means that to fly for a given period of time the crow must expend greater amounts of energy than the gull." So, the question arises, why? This would also suggest the desirability to compare this ably instrumented and discussed analysis with a possible study of the performance of the Common Crow (*Corvus brachyrhynchos*), which is less buoyant in flight, and more vegetarian than the Fish Crow.—Leon Kelso.

24. Embryogenesis in 100% O_2 at reduced pressure. H. Weiss and M. Grimard. 1971. *Space Life Sci.*, **3**: 118-125.—Embryonic development of domestic fowl (White Leghorn) was selected as a sensitive test in the search for artificial atmospheres suitable for life support in extraterrestrial sealed systems. Fertile eggs were incubated in an altitude chamber with a near 100% oxygen atmosphere at 225 "torr" pressure. Both nitrogen and carbon dioxide were kept under 0.5%. At a standard temperature of 37.5° C, a high relative humidity of 90% was required to prevent dehydration. In 10 trials involving 382 eggs hatchability averaged 21% of controls, and weight of chicks was 11% less than controls. The low pressure and small differences in oxygen tension might have affected the results, but absence of nitrogen is suggested as a possible explanation. A combination of using unwashed eggs, prevention of moisture on incubator walls from dropping onto the eggs, dusting the eggs with an anti-fungal agent, and spraying the isolator with peracetic acid was necessary to prevent fungal and bacterial growth. However positioning the eggs pointed end down, and rotation but once a day rather differs from treatment in natural incubation and suggests another reason for low viability.—Leon Kelso.

25. Effect of fluoride on bone formation and strength in Japanese Quail. M. Chan, R. Rucker, F. Zeman, and R. Riggins. 1973. *J. Nutri.*, **103**(10): 1431-1440.—To assess the effect of fluoride on bone metabolism, experimental groups (the numbers not stated) of *Coturnix japonica* were fed diets containing 0.075% fluoride mixed with 0.4% to 1.2% calcium. In general elevated fluoride diet results in acceleration of bone mineralization and a decrease in bone strength. Low calcium diet plus fluoride fed immediately from hatching onward resulted in 23% reduction in body weight, a 38% decrease in bone ash, and a twofold elevation in pyrophosphatase as compared with controls after 11 days. Quail fed the same diets for an additional 35 days developed no severe calcium deficiency. Yet fluoride supplemented diet resulted in as much as a 30% decrease in bone torsional strength.—Leon Kelso.

26. An analysis of constants used in indirect calorimetry of birds and mammals. (Analiz konstant primenyaemykh v nepryamoi kalorimetrii ptits i mlekopitayushchikh.) V. Dargolts. 1973. *Ekologiya*, **4**(4): 68-74. (In Russian with English summary.)—A survey, with comments of mathematical constants widely employed in studies of ecological physiology, of oxidation and caloric values of fats, carbohydrates, and proteins of birds and mammals. Tables of fatty acids (9) and metabolic constants of proteins (11) are supplied for obtaining caloric expenditure by indirect calorimetry from ecological and physiological research data.—Leon Kelso.

MORPHOLOGY AND ANATOMY

(See also 45, 54)

27. The tongues of Kiwis (*Apteryx* spp.). C. McCann. 1973. *Notornis*, **20**(2): 123-127.—Specializing in a study of birds' tongues, the author portrays in three diagrams anatomical terminal features with distributional patterns of taste pits on the three *Apteryx* species: North Island (*A. australis*), Great Spotted (*A. haasti*), and Little Spotted (*A. oweni*) kiwis. The first species he distinguishes as "*striated*" and the latter two as "*spotted.*" The patterns as he illustrates them show all three species quite diverse and equidistant from each other. Geographically they show a trend toward larger size southward. The author sees a definite correlation of taste pit distribution to local food types and terrain. The "*striated*" group inhabits more shaded humid areas, whereas the "*spotted*" occurs in less humid, often snow-clad, open terrain. Later, examination for age and sex variation in lingual patterns might yield interesting details.—Leon Kelso.

28. The identification of the smaller Australian *Diomedea*, and the status of the *Diomedea* in South Australia. J. B. Cox. 1973. *S. Austral. Ornithol.*, **26**(4): 67-75.—Five species (and some races) of *Diomedea* are illustrated, and salient field characters are given. Details on the identification of *Diomedea chrysostoma*, *D. chlororhynchos*, and *D. melanophrys* are discussed. Comparative status and seasonal occurrence of the albatrosses are summarized.—M. Ralph Browning.

29. Illustrations of five sea birds' tongues. C. McCann. 1973. *Notornis*, **20**(2): 145-150.—Here are excellent diagrams with brief descriptions and comparisons of tongues of five species: Blue Petrel (*Halobaena caerulea*), Grey-backed Storm Petrel (*Garrodia nereis*), Black-bellied Storm Petrel (*Fregetta tropica*), White-capped Mollymawk (*Diomedea cauta cauta*), and Caspian Tern (*Hydroprogne caspia*).—Leon Kelso.

30. Functional aspects of some details of bird wing configuration. N. V. Kokshaysky. 1974. *Syst. Zool.*, **22**: 442-450.—Four species of herons with different body sizes have similar ecological requirements for flight and wings of generally similar structure. Motion picture studies of flying birds show differences in wing beat frequencies and angles. The main morphological difference correlated with body size is the increasing amount of wingtip slotting associated with increased weight. The slotting provides increased lift in compensation for increased weight, although it also increases drag. The aerodynamic properties of wingtip slots in this situation are analyzed mathematically. This study of avian functional morphology utilizes an unusually good combination of behavioral and structural investigation.—Robert J. Raikow.

31. Feeding adaptations in Whistling Ducks (*Dendrocygna*). M. K. Rylander and E. G. Bolen. 1974. *Auk*, **91**: 86-94.—Comparisons were made between two pairs of sympatric species in the U. S. (*D. autumnalis* and *D. bicolor*) and Australia (*D. eytoni* and *D. arcuata*). In each area one species feeds by terrestrial grazing and one by aquatic sieving. Structural comparisons were made of bill shape, shape of the mandibular cavity, structure and relative number of maxillary lamellae, relative size of certain hyoid bones, location of the nares, and a rough estimate of the relative size of the auditory and optic lobes of the brain. It was found that the two terrestrial species were more similar to each other than to the aquatic forms, and likewise that the two aquatic forms were more alike than like the terrestrial species. In each case the similarities are presumed to be correlated with functional specializations for similar feeding habits. However, the functional significance of each characteristic is only suggested because no behavioral study was made to determine just how each species actually does feed. Studies of this kind are common in avian anatomy wherein distinct structural differences are correlated with functional specializations that are only guessed at. A proper study of functional anatomy should include an equal emphasis on both structure and function if the true significance of structural variations is to be determined. Nevertheless it is probably better to do as much as is practical than to do nothing at all. Such a study may serve to stimulate someone to do the complementary behavioral investigation.—Robert J. Raikow.

32. Dynamic features of internal proportions of Willow and Rock Ptarmigans in Taimyr. (Dinamicheskaya kharakteristika internykh osobennostei beloi i tundryanoi kuropatok Taimyra.) B. Pavlow. 1973. *Ekologiya,* 4(4): 102-104. (In Russian.)—A comparison between *Lagopus lagopus* (188 collected) and *Lagopus mutus* (94) is drawn on basis of weights and weight indices of internal organs. The latter species exceeds the former in seasonal fluctuation of sizes of the heart, liver, kidneys, adrenals, thyroid, and spleen, but not of the brain, intestine, or caecae. In the former species the open tundra population exceeds the forest tundra population in nearly all these respects. This variation is evidently correlated to more severe weather endured and more extensive migratory movements.—Leon Kelso.

33. Eco-morphological features of the eyes of five species of Laridae. (Ekologo-morfologicheskie osobennosti glaza pyati vidov chaikovykh ptits.) K. Avilova. 1973. *Vestnik Mosk. Univ., Otdel Biol.,* **28**(2): 10-16. (In Russian with English summary.)—In an analysis of eye structure it was found that the Scandinavian form of Herring Gull (*Larus argentatus omissus*) has keener vision than the southern form (*L. a. cachinnans*). Three larid groups were differentiated by radiation sensitivity. The most sensitive are those feeding in poor illumination, e.g., White-winged Black Tern (*Chlidonias leucopterus*). The second group includes the Arctic Tern (*Sterna macrura* (*S. paradisaea*)) which forages diurnally under bright illumination. The third group feeds under a wide range of illumination, e.g., the Kittiwake (*Rissa tridactyla*) and northern forms of the Herring Gull and Common Gull (*L. canus*). It is stated that judging by the pattern of colored lipids in the retinas all the larid species investigated have well-developed color vision.—Leon Kelso.

34. Some eco-morphological features of the eye in Laridae and Alcidae. (Nekotorye ekologo-morfologicheskie osobennostri rlaza chaikovykh (Laridae) i chistikovykh (Aldicae) ptits,) K. Avilova and T. Korneeva. 1973. *Z. Zhurn.,* **52**(10): 1521-1527. (In Russian with English summary.)—Details of eyes of five species of larids, four gulls and the Arctic Tern (*Sterna paradisaea*), and five alcids are examined ultramicroscopically. The visual acuity and light sensitivity are judged to be higher in larids on the basis of density of cones and lipid droplets in the retina per mm^2. The pecten averages larger with more folds in the former group than in the alcids. It is suggested that specialization in underwater foraging has restricted visual capacity of alcids but opens up to them a greater abundance of marine resources. Incidentally it is noted that the eye in both groups is smaller than in diurnal raptors, but larger than in vegetarian birds. —Leon Kelso.

35. Adaptive features of digestive systems of insectivorous and granivorous birds. (Adaptivnye osobennosti pishchevaritelnoi sistemy hasekomoyadnykh i zernoyadnykh ptits.) N. Voronov. 1973. *Vestnik Zool.,* **7**(5): 11-17. (In Russian with English summary.)—An analysis of digestive system features of four insectivores, including particularly the Common Swift (*Apus*

apus) and Bank Swallow (*Riparia riparia*), and of five granivores, particularly the Hawfinch (*Coccothraustes coccothraustes*), finds that in the former group the large and small intestines are shorter, the duodenum is longer and the liver and pancreas are more developed. Whereas body weights of the Bank Swallow and Redpoll (*Carduelis flammea*) are about the same, liver weight of the former is four times that of the latter. About 10 other comparisons are noted. All in all the insectivores are better equipped digestively to release food energy promptly for muscular effort. Intestines of granivores carry a more varied and abundant digestive microflora, which for each new generation is renewed within 6 to 12 hours after hatching. In some granivores a weaker development of the gizzard is compensated by mandibular crushing and shelling; a smaller liver and pancreas, by more prominent proventriculus and elongation of small and large intestines.—Leon Kelso.

36. Preliminary observations of the phylogenesis of thegosis. (Abstract). G. A. Tunnicliffe. 1973. *J. Dental Res.*, **53**(3): 583.—This short abstract is not likely to come to the attention of most ornithologists but contains a fascinating idea of interest to students of behavior and morphology. Tunnicliffe here expands his father-in-law's discovery (Every, *Postilla* No. 143, 1970) that mammals have specific jaw movements that function to sharpen the cutting surfaces of the teeth (thegosis). Tunnicliffe found thegosis facets in the functional analogs of teeth of some invertebrates and in the distal tomia of albatrosses (*Diomedea*). He considers that the bill clappering of albatrosses may have arisen in this whetting process and (pers. comm.) has only subsequently taken on social significance. Because the tomia are subject to wear and regrowth yet are constantly sharp, this idea may have considerable merit.—Storrs L. Olson.

PLUMAGES AND MOLTS

(See also 38, 44)

37. Neonatal plumage patterns of Three-banded and Temminck's Coursers and their bearing on courser genera. A. C. Kemp and G. L. Maclean. 1973. *Ostrich*, **44**: 80-81.—The plumage patterns of *Rhinoptilus cinctus* and *Cursorius temminckii* chicks are illustrated and described. *R. cinctus* is as different from *R. africanus* as it is from *C. temminckii*. Kemp and Maclean suggest that *Rhinoptilus* will probably prove to consist of at least three different genera.—Bertram G. Murray, Jr.

ZOOGEOGRAPHY AND DISTRIBUTION

(See also 38, 42, 43, 51, 52, 55, 56)

38. Distribution and geographic variation of the Horned Grebe *Podiceps auritus* (Linnaeus, 1758). J. Fjeldså. 1973. *Ornis Scand.*, **4**: 55-86.—Geographic variation, aging, and descriptions of plumages and molts are given from studies of 376 museum specimens. Geographic variation in the species is clinal with a reduction of pigmentation in the Palearctic birds towards North America. Bill size is similar throughout the breeding range except the longer- and thicker-billed birds from Iceland, northern Norway, and Scotland, and extinct populations of the Faeroes and Jutland. The large-billed birds belong to the race *arcticus* Boje, 1822. Nominate *auritus* is slightly paler than *arcticus* and breeds in the remaining Palearctic range of the species. The North American population named *cornutus* (revived by Parkes, *Condor*, **54**: 314-315, 1952) is further defined. The race *cornutus* and nominate *auritus* are similar in measurements. Several plumage characters are discussed for separating these two races, but I find breeding birds identifiable best by the least variable characters of postorbital color (buffy in *cornutus*; chestnut in nominate *auritus* from Europe), and crown color in nonbreeding plumage (grayish in *cornutus*; black in nominate *auritus* from Europe). The pigmentation of nominate *auritus* is heaviest in the western part of the breeding range of the race where it intergrades with dark *arcticus*. The transition between *cornutus* and nominate *auritus* is somewhere in Siberia. As with so many species, museum specimens from Siberia are unavailable. Variation of egg dimensions, ethology, and ecology are discussed, as is the relationhsip of the Horned Grebe to other grebes.—M. Ralph Browning.

39. Laysan Albatross, Scaled Petrel, Parakeet Auklet: additions to the list of Canadian birds. R. W. Campbell and M. G. Shepard. 1973. *Can. Field-Nat.*, **87**: 179-180.—Detailed field notes and photographs suggest that the Laysan Albatross (*Diomedea immutabilis*) is a rare but regular winter visitor to the coast of British Columbia and the Scaled Petrel (*Pterodroma inexpectata*), a casual visitor along the same coast. The Parakeet Auklet (*Cyclorrhynchus psittacula*), which winters along the Alaskan, Washington, and Oregon coasts, probably occurs off the British Columbia coast, but better documentation is needed.—Edward H. Burtt, Jr.

40. The birds of the Holman region, western Victoria Island. T. G. Smith. 1973. *Can. Field-Nat.*, **87**: 35-42.—Forty-eight species occur in the Holman area of western Victoria Island. The author provides ecological and behavioral information for each species. The Eskimo names, included with each species' account, are one of the fascinating aspects of this paper.—Edward H. Burtt, Jr.

SYSTEMATICS AND PALEONTOLOGY

(See also 10, 13, 37, 53, 57)

41. A review of the Boat-billed Heron *Cochlearius cochlearius*. R. W. Dickerman. 1973. *Bull. Brit. Ornithol. Cl.*, **93**(3): 111-114.—Geographic variation of the Boat-billed Heron is reviewed, and two new subspecies are described. *C. cochlearius phillipsi*, larger than other races of the species, occurs from the State of Tamaulipas, Mexico, south to Belize. The type is no. 803080 in the American Museum of Natural History. The second new subspecies, *C. c. ridgwayi*, is described as smaller than *phillipsi* but larger than the race *zelodoni*. This new race is considered richer in breast color compared to *zelodoni* and separable from *panamensis* by overall paler coloration. The type of *ridgwayi* is no. 134122 in the Carnegie Museum. Nominate *cochlearis* is tentatively considered the breeding race of South America.—M. Ralph Browning.

42. The distribution and taxonomy of oystercatchers. P. B. Heppleston. 1973. *Notornis*, **20**(2): 102-112.—Suggested taxonomic revisions of some members of *Haematopus* differing from Peters ("Check-list of birds of the world," Vol. 2, 1934) and Larson (*Acta Vertebratica*, **1**(1): 1-84, 1957) are that the south African population named *moquini* be considered a distinct species; that *H. ostralegus meadewaldio* of the Canary Islands, which the author regards as of dubious existence, be considered a subspecies of *H. moquini*; that *H. leucopodus* of southern South America become a race of *ostralegus*; that *H. ostralegus unicolor* of New Zealand be a distinct species with two races; and that *finschi* of South Island, New Zealand, be considered a race of *ostralegus*. North American forms are considered subspecies of *ostralegus*.—M. Ralph Browning.

43. Distribution and numbers of New Zealand oystercatchers. A. J. Baker. 1973. *Notornis*, **20**(2): 128-144.—Distribution patterns of the oystercatcher forms in New Zealand are based on literature and sight records. Both winter and summer data for some areas are given, and population trends are discussed. A world map shows the distribution of the taxa of oystercatchers. The systematic treatment, ascertained primarily from the map, differs somewhat from Heppleston's (see rev. No. 42). In New Zealand the Chatham Island population, *chathamensis*, is considered specifically distinct from *Haematopus ostralegus*. The species *ostralegus* is restricted to the Old World, and *palliatus* is considered the species in the New World. *H. leucopodus* and *bachmani* are given full species distinction, but *H. unicolor reischeki* is not recognized. The author, however, states that *bachmani* interbreeds with the Baja California form, *frazari*, but gene flow is restricted. All black oystercatchers are considered monotypic or have no pied or dimorphic races.—M. Ralph Browning.

44. The species of the genus *Parotia* (Paradisaeidae) and their relationships. R. Schodder and J. L. McKean. 1973. *Emu,* **74**(4): 145-156.—The species in the bird-of-paradise genus *Parotia* are reviewed, and their distribution and ecology summarized. Five species are recognized with *Parotia helenae* distinct from *P. lewesii.* The five species are separated primarily by the structure of the frontal head feathers in adult males. The terms "supra-naral tufts" and "forehead crest" are introduced to define the frontal feathering structures. *P. wahnesi* and *P. selfilata* are considered the most primitive species and have the simplest frontal feather structure. *Parotia* is considered a well defined genus closely related to *Lophorina.* Conservation of *Parotia* depends on the preservation of primary rainforest.—M. Ralph Browning.

45. Comments on taxonomy and relationships in the parrot subfamilies Nestorinae, Loriinae and Platycercinae. D. T. Holyak. 1973. *Emu,* **73**(4): 157-176.—The taxonomy and relationships of three Oriental and Australian subfamilies are reviewed by re-examining skeletal and other anatomical characters, plumage, and behavior. The three subfamilies form a monophyletic group. A possible phylogeny is presented. The genus *Eunymphicus* is merged in *Cyanoramphus* of the subfamily Platycercinae.—M. Ralph Browning.

46. Geographic variation in the Savannah Sparrows of the inland Southwest, Mexico, and Guatemala. J. P. Hubbard. 1974. *Nemouria,* No. 12. —Comparison of specimens of *Ammodramus sandwichensis* (according to the author) in breeding and fresh fall plumage from the geographic limits of the study show no mensural differences among the populations. Geographic variation is in color differences between populations, mainly darkness and hue of underparts and streaking in adults. On the basis of color and pattern the author recommends the recognition of three subspecies: *wetmorei* of Guatemala, *brunnescens* (includes *rufofuscus*) of Mexico, and *nevadensis* of the Great Basin and the Southwest.—M. Ralph Browning.

EVOLUTION AND GENETICS

(See 14, 31, 34, 53, 54)

FOOD AND FEEDING

(See also 6, 10, 11, 13, 31, 35, 51, 54, 57)

47. Estimation of the daily food intake of piscivorous birds. F. J. R. Junor. 1972. *Ostrich,* **43**: 193-205.—Several species of fish-eating birds were hand-raised from hatching or shortly after hatching to as much as five weeks after fledging. Hatchlings in the families Anhingidae, Phalacrocoracidae, and Ardeidae were taken from nests at lakes Kyle, McIlwaine, or Ngesi in Rhodesia. They were fed twice a day, and records were kept on weight before first feeding each day, amount of food ingested, plumage development, and fledging period. In all cases the weight of the food ingested, expressed as percentage of body weight, decreased from 50-60% by young chicks to about 16% when fully grown. The latter figure is one half that determined in earlier experiments but is similar to that ingested by birds raised by their parents.—Bertram G. Murray, Jr.

48. Nectar feeding by South African birds. T. Oatley and D. Skead. 1972. *Lammergeyer,* **15**: 65-74.—The list, excluding specialized nectarivores (Nectariniidae), totals 73 species of 23 families. By estimate, over one half of the species are gregarious, whether in unispecific or in mixed parties. The pattern and firmness of the plant inflorescence or flower cluster is a major factor, particularly where strong enough to support parrots and crows. Some species (e.g., bulbuls, starlings, and weavers) tear off the whole flower and squeeze the nectar out. In the majority of primarily non-nectarivorous species nectar-feeding seems an incidental habit of little significance to the overall economy of the bird. The flowering of *Aloe* spp., the primary plants involved, occurs when other food is abundant locally. "But at least ten of the birds listed feed on nectar so frequently that this food might be considered more than mere variety in their diet."—Leon Kelso.

49. Great Gray Owl captures vole by means of bill. M. K. McNicholl and V. H. Scott. *Can. Field-Nat.*, **87:** 184-185.—Great Gray Owls (*Strix nebulosa*) capture voles beneath the snow surface by thrusting their talons into the snow (Godfrey, *Can. Field-Nat.*, **81:** 99-101, 1967). This particular owl watched a vole move along the snow surface, then dove from its perch and grabbed the vole in its bill. After regaining its perch the owl transferred the vole to the talons of the right foot.—Edward H. Burtt, Jr.

MISCELLANEOUS

50. Time to phase out zoos. B. Fensterwald. 1974. *Washington Post,* 7 February, sect. A: 18.—It is stated that zoos are in trouble; "Many of them are antiquated, overcrowded, and generally depressing places. Most of them have too many species crammed into too little space, and behind too many iron bars." And so, on and on. It is declared that a proposed "Zoo Bill' conflicts with a Federal "Endangered Species Act" and the "United Nations Endangered Species Treaty." This implied trend to friction among conservation interests over territory is not altogether happy, and recalls similar conflicts in past years.—Leon Kelso.

BOOKS AND MONOGRAPHS

51. Autumn of the Eagle. George Laycock. 1973. New York, Charles Scribners Sons, 239 p. $6.95.—Carrying on the theme Rachel Carson began for all living organisms, George Laycock looks at the desperate plight of the American Bald Eagle. In a book that will both acquaint and alarm the public, the author gathers facts from all over the country on this subject as indicated by the book's subtitle, "The American Bald Eagle's Noble Past and Threatened Future." The reader finds his emotions aroused from excitement and joy to anger and disgust. Indeed, "Autumn of the Eagle "cannot help but make each reader feel that he or she has a personal interest in that national bird.

Conservationists and natural historians will be particularly interested in this book, which describes the life history, past and present distributions, and current status of the eagle. George Laycock, author of a number of wildlife books and field editor for *Audubon Magazine,* begins this easy-to-read book with a series of eagle photographs. He discusses the original distribution of the eagle and shows how man's reverence for this regal bird of prey dates back to early history. His account of the establishment of the seal of the United States is particularly interesting since Benjamin Franklin considered the Bald Eagle to be of bad moral character. A group of chapters is devoted to the life history of the eagle including nesting, feeding, and migratory behavior.

Chapter Nine discusses the real danger that eagles encounter from pesticides, presenting evidence for geographic variation in the size of egg shell with pesticide usage.

Conservationists are concerned about the senseless hunting and poisoning of eagles in sheep country. Sheep ranchers accuse the eagle of being a prime predator of young lambs. This is disputed by Laycock who shows that it would be very difficult for the eagle to lift a lamb off the ground. In addition, evidence is presented that the percentage loss of lambs is no different in Ohio, where sheep are practically raised in the backyard and Wyoming where they wander freely on open range. This information, along with a food analysis showing that 80% of the eagle food in sheep country is jackrabbit (a possible competitor of sheep), should help persuade the sheep ranchers that they are doing much more harm than good by destroying the eagles. Hopefully, stories like the Wyoming slaughter detailed in Chapter Twelve "Shotguns and Helicopters" will no longer be true.

Hope for the maintenance of the eagle population comes in reading Chapter Thirteen, "Land of Many Eagles," which discusses the large population found in Alaska. These birds have a relatively low level of DDT in their tissues. However, they face a problem because loggers are destroying some prime territory. "First

Aid and Deep Concern" is the title of Chapter Fourteen discussing the efforts of many concerned people to save the eagle population. One such incident involves the dramatic rescue of an injured eagle along the Sunshine State Parkway in Florida by a member of the Audubon Society, who flagged down traffic and received a police escort to the Audubon Society where all business stopped so the injured bird could be treated. Despite this concern the number of eagles has dramatically declined in recent times. Formerly it was found throughout the United States, but today 26 states no longer have a nesting pair of eagles and a number of states have fewer than six pairs.

Laycock certainly vividly describes the plight of the eagle, which results from man's ignorance and stupidity. This must be of concern to man, not because the eagle is a symbol of the United States but because of its position in the ecosystem at the top of a food chain, a position very similiar to that of man.

What of the future? Author Laycock concludes with a quote from John Matheson, "There may be a glimmer of hope, the solution is at least within the grasp of man."—Stanley H. Anderson.

52. Birds of the Antarctic and Subantarctic. G. E. Watson, J. P. Angle, P. C. Harper, M. A. Bridge, R. P. Schlatter, W. L. N. Tickell, J. C. Boyd, and M. M. Boyd. 1971 Antarctic Map Folio Series, Folio 14, New York, American Geographical Society. 11 x 17 in. 18 p plus 15 plates. $10.—Atlases of avian distribution are all too rare. This one is concerned largely with the seabird fauna of the cold southern oceans but includes all species "that breed or occur regularly south of the Antarctic Convergence or on islands immediately to the north of the Convergence." It is an important and much needed contribution.

An introductory chapter on "Zoogeography" by George E. Watson summarizes the biological and oceanographic features of the Antarctic environment and the major ecological features influencing seabird distribution. It also includes salient information on the biology and distribution of individual species, although one statement leaves me confused. Watson indicates that "The Southern Black-backed Gull [*Larus dominicanus*] is related to the northern hemisphere black-backed gulls, but it is unclear whether its closest relative is the Great Black-backed, *L. marinus*, or Lesser Black-backed Gull, *L. fuscus*." Because most gull experts do not consider the two northern hemisphere species very closely allied, one wonders on what basis, other than mantle color, that conclusion was reached. The impressive list of references provides an excellent guide to the extensive and scattered literature on pelagic birds. Over 700 additional references, given in abbreviated format, were used in making the distributional maps.

The folio includes 14 plates documenting the distribution of the 50 included species. Citations and the basis for inclusion are given for most records, and breeding localities are clearly indicated. The maps point out the remaining extensive gaps in our knowledge of seabird distribution. Perhaps more importantly, they clearly illustrate the importance of such dominant features as the Antarctic Convergence in limiting the distribution of certain taxa (e.g., *Aptenodytes forsteri, Pagodroma, Thalassoica*). Plate 15 is a series of photographs of the most common species. It is useful, but not essential.

The worth of any compilation, such as an atlas, depends upon the accuracy of the included material. The authors are at the mercy of the literature. They must decide early whether to include all published records, or to take an eclectic view and sort out those that seem questionable. Either course runs the risk of criticism. In this atlas, the authors seem to have fluctuated between alternatives with uneven results. For example, the maps suggest that the Blue Petrel (*Halobaena caerulea*) may be regular along the coast of Argentina. Yet, I did not observe it in three winter transects over the continental shelf, nor did Cooke and Mills (*Ibis*, **114:** 245-251, 1972) in a summer transect. On the other hand, the maps indicate that prions (*Pachyptila* spp.) are virtually unknown in the area, whereas I found them regularly, sometimes in large numbers, along the entire coast. There are several possible explanations for these apparent discrepancies. However, in view of the close resemblance between these two genera, it is curious that *all* of the reference plots for *Halobaena* are attributed to one observer, who is credited with *no* observations of *Pachyptila*.

Data on cormorants in Argentina are incomplete. The maps do not indicate that *Phalacrocorax albiventer* nests on the coast, even though supplementary notes give data on some breeding localities there; nor do they indicate that both *P.*

albiventer and *P. atriceps* winter coastally, *atriceps* to Chubut Province, *albiventer* to Buenos Aires or beyond. These closely similar species have been confused in the literature, and the authors may have chosen to treat the situation superficially rather than add to the confusion. However, they missed a good opportunity to call attention to unresolved problems in distribution, ecology, or even identification.

In a casual check I found one important error in plotting; the northernmost record for *Garrodia nereis* is given 5° north of its actual location. I also found it inconvenient to have to search through several large plates for the map of a particular species. It would have been preferable to provide a full list of maps on the table of contents.

This atlas represents a tremendous amount of work, perhaps only attainable through the combined efforts of a host of authors. As with all multi-authored works, there are differences in treatment, flaws, omissions, and inconsistencies. But these are not serious and do not detract from the general usefulness of the work. The references alone are worth the price. I consider it an indispensable reference work for anyone interested in the biology and distribution of marine birds.—Joseph R. Jehl, Jr.

53. Intra-island Variation in the Mascarene White-eye Zosterops borbonica. F. B. Gill. 1973. *Ornithol. Monogr.*, no. 12. 66p. $2.00.—"*Zosterops borbonica*, a white-eye endemic to the Mascarene Islands in the western Indian Ocean, is characterized by complex patterns of plumage color and size variation within the confines of Reunion Island, a remote volcanic island about 1,000 square miles in area and 3,000 meters high. *Z. borbonica* appears to be the second of two indigenous white-eyes to colonize this island and has lost the carotenoid pigmentation and white eye-ring characteristic of most of its relatives. However, it is still a typically social white-eye that has a generalized diet and preference for edge and disturbed habitats."

This is the opening paragraph in the summary by Gill concerning his work on variation in some remarkable birds. The paragraph covers a great deal by implication, the complexity of which will be appreciated by those who read the monograph page by page. Gill's study makes a break with the past, and this is of exceptional interest because Gill himself stands on both sides of the divide. In 1966 Gill and Robert Storer described two new subspecies, and made taxonomic use of four, in an attempt to handle the intricacies of plumage color and size variation in these birds. Subsequently, Gill came to believe, as had Moreau in Peters' "Birds of the World," that *Z. borbonica* of Reunion consisted of one taxonomic entity. He now thinks (p. 49) it is necessary to separate utilitarian classification from the history and present configuration of variation, a position happily no longer requiring suspension of disbelief.

Reunion Island lies about 500 miles east of Madagascar. Because it is a high island in a tropical latitude, Reunion's vegetation is markedly diversified. There is also topographic diversity, and the resultant is a complex interdigitation of vegetational associations, frequently with abrupt edges. *Z. borbonica* is a species of edge, disturbed, and relatively open habitats, in contrast with its congener *Z. olivacea*, another white-eye on Reunion, which lives in the arboreal canopy. With the forest thus pre-empted, *Z. borbonica* has a highly reticulate distribution, apparently allowing for isolation of stocks at a microgeographic level. Local differentiation of populations, both in morphologic and physiologic ways, has been one consequence for *Z. borbonica*.

Man's influence on the ecology of Reunion has been one of increasing the amount of edge habitats and of making openings in woody and closed-canopy vegetation. Gill believes that such changes have not played a major role in shaping the format of differentiation in *Z. borbonica*; he nevertheless supposes that such changes have increased the number and intensity of contacts between white-eye populations, resulting in the production of morphologic intergrades between some of the distinct morphs that had developed earlier.

Gill's analysis of both color and size variation is simple but always convincing. It is especially convincing for him to have shown us that character variation regresses on certain independent environmental variables. It is likely that the monograph will stand as a landmark study in systematic ornithology.—R. F. Johnston.

54. Functional Anatomy and Adaptive Evolution of the Feeding Apparatus in the Hawaiian Honeycreeper Genus *Loxops* (Drepanididae). L. P. Richards and W. J. Bock. 1973. *Ornithol. Monogr.*, no. 15. 173 p. $6.00.—The Hawaiian Honeycreepers (Drepanididae) provide a classic example of adaptive radiation in an island situation. Their variety of feeding adaptations, as reflected in their bill shapes, includes most of the specializations seen in oscines throughout the world and ranges from long, crescent-shaped probing bills to heavy, conical seed-cracking types. This study was undertaken to analyze the feeding mechanism in the presumably primitive genus *Loxops*. Most of the work is based on the subspecies of the island of Hawaii. *Loxops virens virens* feeds mainly on nectar and insects, gleaned from leaves, flowers, and tree branches. Its bill is of moderate size and is slightly decurved. *L. sagittirostris*, recently extinct, had a heavier bill and fed mainly on larger insects, apparently augmented by nectar. *L. maculata mana* is primarily a tree-trunk insect forager. *L. maculata newtoni* of the island of Maui was also studied. *L. coccinea coccinea* feeds primarily on insects taken from leaf buds. It has crossed bill tips reminiscent of the crossbills of the genus *Loxia*, although less extensively developed. This diversity of feeding habits in four congeneric species from one island presents a situation in which one would expect to find considerable adaptive specialization in the feeding apparatus leading to an avoidance of interspecific competition. The following aspects were studied. (1) The types of food and feeding habits of each species were studied in the field, and to this was added a review of the rather limited literature on the subject. *L. sagittirostris* was of course studied in less depth since it is now extinct, and no complete anatomical specimens were available. The general differences in foraging behavior between the species were confirmed, although field conditions did not permit any detailed description of movements and postures. (2) The rhamphothecae or horny sheaths of the bill were examined and correlated with feeding. Of particular interest is the left/right asymmetry in the cutting edges of *L. coccinea* correlated with a lateral component of movement in this species. (3) The cranial osteology is described in considerable detail and illustrated with well-labelled drawings. This is an excellent descriptive study of passerine cranial osteology and should be a useful reference to anyone studying the subject in other forms. Besides the descriptions there is an analysis of cranial kinesis and gaping adaptations. The crossbilled *L. coccinea* has osteological asymmetries, particularly in the jaw articulation, associated with its lateral bill movements. (4) The jaw musculature is described and illustrated in detail. Again, this will be of value to students of other groups, especially since the nomenclature is brought up to date. Functional differences between species are analyzed, and again *L. coccinea* is of interest because of its asymmetrical jaw apparatus. (5) The tongue apparatus is considered next, including both bones and muscles. The cornified tongue shows adaptive differences in the nectar-feeding and non-nectar-feeding species. This is correlated with musculoskeletal differences. A functional interpretation is given for the role of the various muscles for tongue movements.

Based on these anatomical studies the authors attempt to correlate structure with function. This is not totally successful because the observations of living birds did not permit sufficiently detailed descriptions of their movements during feeding. A particularly complex model is presented by which the asymmetrical jaw apparatus in *L. coccinea* may be used for extracting insects from closed leaf buds. These analyses are reasonable speculations, but a thorough understanding of the exact functional significance of the anatomical differences would require a more intensive study of the birds' behavior. I do not wish to minimize the value of this section; certainly the degree of behavioral study is comparable to that in most avian functional-anatomical studies. Having myself spent some time observing Honeycreepers in the field, I am well aware of the difficulties of making close observations of these small, rapidly moving birds in dense foliage. I suspect that more detailed observations of behavior would require captive specimens, and that would introduce other problems.

Following the functional-anatomical portion of the study is a brief discussion of the origin and evolution of *Loxops*. It is suggested that the pattern of species distribution and specializations resulted from a series of double invasions and subsequent divergence of the forms on different islands. Some of the findings also reinforce the theory that the Drepanididae are derived from the Cardueline finches, although this question is certainly not settled yet.

A few minor criticisms may be mentioned. For one thing, there is an unusually large number of typographical errors in this monograph. On p. 36 there is a reference to the illustration of the ectethmoid plate (e p) in Plate 8; this is actually shown in Plate 7. On p. 37 it is stated (referring to the lacrimal bone) that "a small vestige may exist but is lost during cleaning." It is unclear whether this means that the occurrence of a lacrimal bone is known in these species or is only suspected. A small tuberosity of the braincase is called the *lateral basitemporal process* (l bt p) in the text (p. 39), *lateral basipterygoid process* (l bt p) in Appendix 1, and is labelled l b p in Fig. 6. As far as I can tell, these all refer to the same structure.

In summary, this monograph provides a thorough and detailed description of the anatomy of the feeding apparatus in the genus *Loxops*, it shows a reasonably good correlation between structural variation and the behavioral/ecological differences between sympatric species, and it gives some new insights into the origin and evolution of the remarkable passerine family Drepanididae. It is an excellent reference for students of passerine cranial morphology and is an excellent starting point for a study of the morphology of the more highly specialized genera of this endemic group.—Robert J. Raikow.

55. Breeding Birds of Britain and Ireland: a Historical Survey J. Parslow. 1973. Berkhamsted, T. & A. D. Poyser Ltd. £3.60. 225 range-maps; illustrations by Rosemary Parslow.—Most of this book is a reprint, with corrections, of a series of eight papers published in *British Birds* in 1967-68, summarizing changes in the status of the breeding birds of Britain and Ireland since the last review in 1944. Nearly a page is devoted to recorded changes in numbers and distribution of each species, with full references to published and unpublished sources. This survey is brought up to date, somewhat awkwardly, with an addendum summarizing changes between 1967 and 1972. A useful Appendix has been added with a summary of status for each species and 225 range-maps (which also have been published in other books). There is a brave effort at numerical assessment: each species is classified into a numerical scale, estimating its total population to within a factor of 10. Good population estimates can be made for a surprising number of species, primarily on the basis of organized surveys of the scarcer and more localized species. For some of the commoner (and hence less-known) species the estimates seem a little more rough, and for many species the distribution maps will be superseded by the forthcoming "Atlas" of British breeding birds. Nevertheless this is a fine compendium of scattered and hard-to-find information, much more complete than I had imagined when the project was started. Its principal omission is a zoogeographical discussion: precisely what are the limiting factors underlying the intriguing patterns of distribution illustrated by the maps?

Because of its origin, the book's primary emphasis is on changes. The chapters of synthesis are very brief but point out several general trends. Despite the high human population and intensification of land use, the number of regular breeding species has increased steadily in recent decades and by 1972 had reached 200 for the first time. Only one species (Snowy Plover) has been lost since 1944 and about 20 have been added. These latter are roughly equally divided between introductions, recolonizations of species that had been extirpated from Britain in the 19th century, and new colonizations of species that have been spreading in Europe. These last include new species from both north and south. Although these trends are encouraging, many species are increasingly confined to relict habitats and small reserves: at least 67 (one third of the total avifauna) are thought to have populations of less than 1,000 pairs.

The second major trend is the steady increase and spread in seabird and waterfowl populations, extending over many decades. Like that in eastern North America, this trend appears to be primarily a response to relaxation of 19th century persecution. Recent signs of a reversal of the trend in some seabirds are treated too briefly (p. 204-207).

A third significant event was the reversal of the increase in many birds of prey that had been recorded in 1957. For at least two species (Peregrine and Sparrowhawk) this decline is clearly attributable to toxic chemicals, primarily dieldrin. In the addendum, Parslow points out that restrictions on dieldrin have led to partial recovery of several other species (including Kestrel, Golden Eagle, and Barn Owl). I feel that his book still understates the effect of dieldrin in the early 1960s on other species (e.g., Marsh Harrier, Merlin, Kingfisher, Stock Dove, Magpie, and perhaps some of the seabirds). The catastrophic losses to the bird fauna of British commercial orchards are not mentioned and indeed have never been documented properly.

Perhaps the most numerically important changes are very lightly treated in this book. The intensification of agriculture, with resulting destruction of hedgerows and marginal land, merits only one paragraph on p. 205, but must have had a very marked effect on the once rich bird life of British farmland. This may or may not be connected with the decreases in many migrant insectivores. On the other hand, there is evidence that many more species have adapted themselves, even within the last decade, to man-made habitats, and are increasing and spreading rapidly. Examples in this book are a number of finch species, Hen Harrier, Grasshopper Warbler, Reed Bunting, Oystercatcher, Curlew, various waterfowl, and gulls. The extreme example is the Collared Dove, which spread across all of Europe, colonized in Britain in 1955, and had become a significant pest within 10 years.—I. C. T. Nisbet.

56. The Natural History of Cape Clear Island. J. T. R. Sharrock (ed.). 1973. Berkhamstead, T. & A. D. Poyser Ltd., 207 p. £ 3.00.—"[P]assing through Gascanane Sound with the jagged rocks of Illaunbrock and Carrignore" is not from "Gulliver's Travels" but from the introduction to the natural history of a small island off the southwest tip of Ireland. This delightful introduction is followed by what I believe adequately fulfills the editor's "primary purpose" of the book, which is to "summarise the results and achievements of the first 11 years' work by Cape Clear Bird Observatory."

The book is written for the lay person and primarily for birdwatchers because 85 of the 197 pages are devoted to a systematic list of birds with records of average numbers during the different months of the year. This list and the vivid accounts of birdwatching on the island give a clear picture of both the weather conditions and bird species that may be expected during a visit to Cape Clear Island. Much of this is an obvious effort to promote interest in the observatory.

The 90 pages of the book that are not concerned directly with birds provide a brief summary of the geology, history of utilization by humans, and what plants and other animals may be expected on and around the island. I found the book pleasantly written with very few mistakes, and in addition to fulfilling the primary purpose of the editor, it provides an overview of the natural history of the island. Chapters on the various organisms that inhabit the island, from slugs to seaweed, have been contributed by various authors and are somewhat spottily written, but the combined whole serves as an excellent site description for anyone looking for an area to do research on bird migration or island biogeography. This book also provides information useful in planning an interesting birdwatching vacation and is certainly a worthy contribution to our knowledge of the natural history of this area.—Edmund W. Stiles.

57. The Snowy Owl. (Die Schnee-Eule, *Nyctea scandiaca.*) L. Portenko. 1972. Die Neue Brehm-Bucheriei 454. A. Ziemsen, Wittenberg Lutherstadt. 232 p. (In German; price uncertain.)—The enormity of the task of summarizing all that is known on even one bird species is exemplified here. In addition to about all the bird literature on the Snowy Owl that could be available to one person, the author could draw upon his 50 years of work in the Eurasian Arctic, particularly in Novaya Zemlya, Taimyr, Anadyr, Chukotsk Peninsula, and Wrangel Island. According to the author's foreword this account was closed in 1964. The table of contents notes about 77 topics arranged under 16 chapters. These include systematics, local names, general description and anatomy, plumage, variation, food and foraging (27 p), competitors, enemies and diseases, general distribution, practical aspects, population fluctuations, migration and other movements (44 p or about 500 words per page), breeding, distribution in geological time, bibliography (15 p), and index. The problem of price or of getting a copy of this requisite to an ample bird library is paramount. The quality of the 31 black-and-white photographs, mostly half page, and of the printing, is excellent, as to be expected. In general the work is ecological, with much pertinent discussion and comment on many points, with its thoroughness reaching back to the start of ornithological history. Many current Anglo-American authors will find themselves cited therein. —Leon Kelso.