RECENT LITERATURE

Edited by Bertram G. Murray, Jr.

BANDING AND LONGEVITY

1. Bird ringing in the Galapagos Islands. M. P. Harris. 1974. *Ring,* 7(79): 131-134.—This report summarizes banding activities through the end of 1973. An earlier report by Harris summarizing activities through 1971 was previously reviewed (*Bird-Banding,* **44:** 230, 1973). By the end of 1971, 15,012 (*not* 13,712 as in *Bird-Banding,* op cit.) birds had been banded. In the ensuing two years an additional 844 birds were banded, 219 full-grown birds and 625 pulli, bringing the total banded through 1973 to 15,856. Most of the increment is accounted for by young Waved Albatrosses (*Diomedea irrorata*), 483 banded; Flightless Coromorants (*Nannopterum harrisi*), 157; and Blue-footed Boobies (*Sula nebouxii*), 84. Through 1973, as in 1971, the most frequently banded birds were the Waved Albatross, 6,393; Madeiran Storm Petrel (*Oceanodroma castro*), 1,950; Swallow-tailed Gull (*Creagrus furcatus*), 1,300; Audubon's Shearwater (*Puffinus lherminieri*), 819; and Flightless Cormorant, 782. These five species account for approximately 71 percent of all birds banded on the Galapagos. Harris notes that, in addition, 191 Waved Albatrosses, 63 Flightless Cormorants, and a few Galapagos Hawks (*Buteo galapagoensis*) have been color-banded.

Maximum longevities attained by a number of species of Galapagos birds are also listed by Harris. These are evidently based on date of recovery as well as first known age at which adults return to the breeding colonies. This tends to give slightly greater longevities than those listed by W. Rydzewski in various issues of the *Ring,* which list longevity only in terms of elapsed time between banding and recovery. The only significant longevity record listed by Harris and not included in Rydezewksi's recent lists is of a Galapagos Penguin (*Spheniscus mendiculus*), approximately 10 years old.

As in the earlier report data are included on ages at which young first return to the colony and age at which young may first breed. Two changes in these data occur in the more recent report. Young Waved Albatrosses may return to the colony as early as one year old (not three) and Flightless Cormorants may first breed as early as two years old (not four).

Harris also reports seven recoveries of birds banded in the Galapagos and recaptured elsewhere: two Waved Albatross and three Blue-footed Boobies recovered on the coast of Ecuador and two Red-billed Tropicbirds (*Phaethon aethereus*) both taken at sea, one west of Peru, the other in the gulf of Panama.—Roger B. Clapp.

2. Mortality in ringing—a personal viewpoint. [C.] Stuart Houston. 1974. *Ring,* 7(80): 157-161.—Houston discusses at some length the problem of bird mortality caused by banding while at the same time defending the value of banding in general. He offers three criteria for determining situations in which banding activities would be inadvisable.

One criterion is that banding should not be a significant factor in the mortality of local populations. As one example he mentions that rare or vulnerable species should not be banded (since the mortality incurred might seriously endanger the chances of survival of the population). As another example Houston mentions that local songbird young banded in open nests often suffer excessive mortality.

His second criterion is that average or acceptable mortality rates from banding (for a given species) should not be exceeded but notes that for most species such information is not now available.

Houston's third suggestion is that "if the mortality rate is higher than the recovery rate, the mortality rate is too high." By this he means that if banding mortality is greater than the chance of gaining records of movement or longevity, then the banding procedures used must be improved. As an example he states that the massive banding of North American wood warblers, for which the rate of recovery (ca. one per 1,000) may exceed banding station mortality rates (ca. one per 10), may well be inappropriate.

I think that this criterion is perhaps overstated. Natural mortality of these wood warblers is rather high and even somewhat high levels of banding mortality

may have little or no effect on natural populations. In addition, data on age, sex, molt, weight, etc., taken at the time of banding, may be of sufficient scientific value so as to offset incidental banding mortality, particularly since many of the birds dying as a result of banding activities eventually become valuable museum specimens.

Houston gives, in addition, a few instances in which disturbance due to banding may be a serious source of mortality. He notes particularly that *Buteo* spp. are prone to desert their nests if disturbed during incubation and sometimes as late as the first week after hatching. He also remarks on some difficulties [specifically Ring-billed Gulls (*Larus delawarensis*) and Double-crested Cormorants (*Phalacrocorax auritus*)]. In a few examples of excessive mortality principal factors appeared to be due to environmental overexposure (heat and wind) and to trampling of younger birds by older ones.

Houston's comments are well worth considering and suggest that more hard data are needed on the mortality caused by banding and its potential effect on bird populations.—Roger B. Clapp.

3. Large-scale ringing of young gulls and terns in Estonia "Operation Larus". S. Onno. 1974. *Ring,* **7**(78): 117-119.—This is a short report on a massive tern and gull banding project conducted in 1972 and 1973 in the Matsalu Bay region of West Estonia. This note is concerned primarily with some observations obtained during the banding of 28,790 young Common Gulls (*Larus canus*).

The most interesting data presented are those on successful hatching (defined somewhat unusually by the author as "the average number of young birds leaving the nest in comparison with the total number of the nests found at the time when the first fledglings were hatched"). This definition appears to be a not particularly useful variation and combination of more conventionally defined terms "nesting success" and "fledging success."

The "hatching success" on large islands, often inhabited by foxes or raccoon dogs was 1.7 to 2.0 young per nest. Success as high as 2.6 fledglings per nest was found on smaller islands and on islands where sheep or cattle grazed, not more than 2.4 young per nest were "hatched" (=? fledged). "Hatching success" was apparently related to the number of eggs in a nest. "Hatching success" for nests containing three, two, and one eggs was respectively 87, 82 and 81 percent.—Roger B. Clapp.

4. Ringing data on White-fronted Geese, *Anser a. albifrons,* in the Netherlands, 1953-1968. W. Van Troostwijk. 1974. *Ardea,* **62**(½): 98-110. (In English with Dutch summary.)—Through the dates above, 9,275 birds of this species were trapped and banded. There were 1,400 recoveries. No trends were found in the wintering totals. The mean percentage of first-year birds was 39; mean annual mortality was 30%; 40% of those trapped were three years old and older; by summation each adult pair matured two young per year. Sex ratio was about 1:1. Mean annual weight fluctuations, winter to winter, were slight. The geese tended to concentrate in western areas, suggesting a need for additional sanctuaries along the coast of western Europe. Although the total population showed no decrease, available wintering areas did.—Leon Kelso.

MIGRATION, ORIENTATION, HOMING

5. Photorecording a radar locating screen for bird migration study. (Fotoregistratsiya ekrana radiolokatora dlya izecheniya migratsii ptits.) V. Yakovykh and A. Baturov. 1974. *Z. Zhurn.,* **53**(9): 1397-1401. (In Russian with English summary.)—By phototaping, one might call it, of radar screen patterns, bird flights have been recorded day and night within a radius of 100 km. Speed, density, directions, and heights are thus available for analysis. Mechnical details of two types of equipment are described here. The purpose of their development is prospective service for forecasting and avoiding plane strikes by bird flocks, a dilemma which tends to intensify year by year.—Leon Kelso.

6. The interaction of stars and magnetic field in the orientation systems of night migrating birds. I. Autumn experiments with European warblers (Gen. *Sylvia*). W. Wiltschko and R. Wiltschko. 1975. *Z. Tierpsychol.*, **37:** 337-355.—Recent work on migratory orientation has emphasized that birds apparently have multiple sources of directional information at their disposal. Perhaps the most important task facing workers in this field at the moment is to work out the hierarchical relationships of these cues. In this paper the Wiltschkos have attempted to answer this question for two major cue systems, the star and magnetic compasses. Their results were surprising and in many ways irreconcilable with a large body of evidence.

The experiments were straightforward. Warblers of three species (*Sylvia borin, S. communis,* and *S. cantillans*) were captured on transit in Spain and tested outdoors in the standard octagonal, radial-perch cages routinely used by Wiltschko. A 95° sector of the sky, centered on the zenith, was visible to the birds. Birds were placed in the cages just before dark and were left all night. Only activity during darkness is analyzed in this paper. Birds tested under clear skies and the natural magnetic field served as controls. A different group of individuals was tested under clear skies in cages surrounded by Helmholtz coils which altered the magnetic field such that magnetic north was toward celestial east-southeast (120°). Some birds from both the control and test groups were also placed in a third situation: clear skies with an artificial magnetic field lacking a horizontal component and with a vertical component of 90° inclination. This field (0.32 Gauss) was of lower intensity than the earth's.

The behavior of the three species was similar. Under control conditions all oriented basically southward although the orientation of the *S. cantillans* and *S. borin* individuals was not significantly directed in 1972. Under test conditions all birds oriented in a southerly magnetic direction, i.e., in a northwesterly or northerly celestial direction. In each case there is a significant difference between test and control groups, and the differences are in the predicted directions if the magnetic compass takes precedence over the stars. The tests for differences between experimentals and controls are complicated by the fact that in two cases the controls were not significantly oriented. Neither birds previously used as controls nor those used in test cages showed significant orientation in the cage with no horizontal field component. There was a non-significant tendency for the birds to orient in the directions of their immediately prior experience (i.e., celestial south for controls, celestial north for experimentals).

The Wiltschkos drew a strongly stated conclusion: ". . . we take the magnetic compass to be the primary orientation system for migrating birds, and we deny the existence of an independent star compass." The latter conclusion follows from the failure of the birds to orient in the absence of necessary magnetic information when stars were visible The data presented in the paper support the authors' conclusion, although they are not as strong statistically as one would like, especially in the face of so much contrary evidence. The frequently observed deterioration of cage orientation under solid overcast is not completely incompatible with these results. Hopping doesn't always become random, but it often does, and when it does not it still deteriorates drastically. Birds in the planetarium, even individuals of some of the same species used in these experiments, orient in appropriate celestial directions when these do not conform to magnetic directions. More important, rotation of planetarium skies consistently results in a similar reorientation of the birds. The authors' results cannot account for these data, although they propose to explain the differences in a forthcoming paper. Emlen's experiments on the development of stellar orientation in Indigo Buntings are also incompatible with these results. Finally, magnetic compass cues change abruptly when a bird crosses the equator as two of these species do. No attempt is made to explain how this problem might be dealt with.

The results reported in this paper are very important. Their implications are so important that all possible alternatives must be explored carefully. The specter of cage influences that recently clouded the exploration of magnetic cues cannot be ignored. My own work has shown that wind direction sometimes, but only sometimes, takes precedence over star and presumably magnetic cues. Things may not be as straightforward as this paper suggests and the conclusions are so contrary to a large body of literature that I am tantalized but not yet convinced.—Kenneth P. Able.

7. Normal fluctuations in the earth's magnetic field influence pigeon orientation. W. T. Keeton, T. S. Larkin, and D. M. Windsor. 1974. *J. Comp. Physiol.*, **95:** 95-103.—Southern reported a deterioration in the orientation of gull chicks during natural magnetic storms, which are caused primarily by sun-spot and solar flare activity. Keeton et al. have now found a directional effect of normal magnetic field fluctuations on the vanishing bearings of homing pigeons. Releases were made at Weedsport, New York, 45.7 mi north of the home loft (16 releases in 1970, 33 in 1972, 33 in 1973). Only experienced birds of similar age were used. Releases were made during spring, summer, and fall under clear skies. In each series of releases a significant correlation was found between the mean vanishing bearing of the birds and the summation of the four K values for the 12-hour period ending at the completion of each release. At Weedsport the slopes of the linear regressions ranged from -0.6 to -1.3, the mean bearings shifting counterclockwise with increasing K values. In the case of Weedsport, this shift brought the vanishing bearings closer to the homeward direction at higher K. Seven releases near Campbell, New York, (43.6 mi west of the loft) showed a similar correlation, but with a much steeper slope (-3.28) and in this case the shift was away from the homeward direction with increases in K.

We are dealing here with correlations rather than experimental tests. It is not obvious why only a small change in field intensity should cause a change in orientation directions on the part of the pigeons even if they could detect the fluctuation. No data are presented, but releases of magnet-bearing birds on the same days as one of the regular series yielded no correlation. Further tests of this type will be very important. If the results reported here are confirmed, they imply a remarkable sensitivity to magnetic intensity changes. In these experiments the pigeons would have to have been responding to fluctuations of 40 gamma or less, a sensitivity potentially allowing the extraction of meaningful orientational information from the earth's magnetic field.—Kenneth P. Able.

8. Orientation of gull chicks exposed to Project Sanguine's electromagnetic field. W. E. Southern. 1975. *Science*, **189:** 143-145.—This report describes some experiments performed to determine if the antenna system of the U.S. Navy's Project Sanguine (Wisconsin Test Facility) had any effect on the orientation of Ring-billed Gull (*Larus delawarensis*) chicks. The Sanguine communication system will use extremely low-frequency radio waves transmitted through two 22.6-km long antennas forming a cross with the transmitter at their intersection. Southern performed his usual orientation tests with gull chicks in orientation cages placed on the ground directly over the buried (ca 1m) north-south antenna. Tests were performed blind under clear skies and low-intensity natural magnetic disturbances. After the tests were completed the data were divided into control and experimental groups based on whether the antenna was energized. The control group (255 trials) was significantly oriented in the predicted south-southeasterly direction. The group tested with the antenna energized (642 trials) was not significantly oriented. The mean directions of both groups were similar, however, and both distributions showed a suggestion of bimodality. The inclusion of data obtained under overcast lead to a significant orientation in the experimental group. Considering only the clear sky data, the results parallel Southern's earlier finding that the orientation of gull chicks deteriorated during natural disturbances of the earth's magnetic field. Southern interpreted the Sanguine results as being caused by the magnetic field generated by the antenna, but there is no evidence regarding the cause of the disorientation among the gull chicks. Both the magnetic and electric fields over the antenna were slightly reduced when the orientation cage was in place but the resultant fields are said to be within the proposed operational range of Sanguine. Because we are obviously dealing with a subtle effect these differences are somewhat disquieting. There is no reason to predict that birds flying well above the ground level would be influenced.—Kenneth P. Able.

9. Evidence for an innate magnetic compass in Garden Warblers. W. Wiltschko and E. Gwinner. 1974. *Die Naturwissenschaften*, **61:** 406.—Six Garden Warblers (*Sylvia borin*) (4 from southwestern Germany, 2 from southern Finland) were removed from their nests at 4 or 5 days of age, before their eyes had opened. They were reared in an outdoor aviary with opaque walls that

allowed them to receive the natural photoperiod but not to see the sun or stars. At the beginning of August they were transferred to an indoor room and held on a 12:12 photoperiod. The birds were tested in the standard octagonal, radial perch cages in closed rooms from early August through late November. The local magnetic field prevailed in both the aviary and the holding and test rooms. The mean orientation directions for 23 bird-nights were used to compute a grand mean which was statistically significant and directed toward 217°. The authors conclude that the ability to establish the appropriate migratory direction with respect to the magnetic field and the use of the magnetic compass is innate in this species. Of course, no such conclusion can be drawn from the data. The only valid conclusion is that the group of birds was able to orient in an appropriate average direction when deprived of certain visual input (e.g., sun and stars). Until the appropriate manipulative experiments are done one cannot presume that the observed orientation was accomplished by reference to the magnetic field. Presumably these are preliminary results and further data will be forthcoming.—Kenneth P. Able.

10. Pigeon homing: no influence of outward-journey detours on initial orientation. W. T. Keeton. 1974. *Monit. Zool. Ital.*, **8**: 227-234.—This paper reports attempts by Keeton's group to repeat an experiment done by Papi et al. (*Monit. Zool. Ital.*, **7**: 129-133, 1973; see review, *Bird-Banding*, **45**: 63-64, 1974). Fifteen releases were performed at sites familiar and unfamiliar to the birds. The birds were transported in baskets in the back on an open pick-up truck to enhance their ability to detect odors along the outgoing route. Ten releases were made at Weedsport, New York, 73.5 km north of the loft and five were made at South Towanda, Pennsylvania, 79.5 km south of the loft. In each case the pigeons were divided into two groups and transported to the release site via different routes with opposite initial directions. Upon release, Papi's groups tended to fly in opposite directions, each reversing the direction of the initial segment of its outward trip in the truck. Keeton's groups all oriented homeward and in no case did the vanishing bearings, vanishing intervals, or homing speeds of the paired groups differ. Nor was there any trend for the mean vanishing bearings of the two groups to be in the predicted directions with respect to one another. Thus Papi's results could not be repeated with Cornell pigeons, and we have another anomaly in the navigation literature.—Kenneth P. Able.

POPULATION DYNAMICS

(See 4 and 51)

NESTING AND REPRODUCTION

(See also 3, 15, 16, 19, 29, 34, 48 and 51)

11. Egg weight and its effect on mortality of young Snow Geese on Wrangel Island. (Ves yaits i evo viyanie 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 did not hatch. The span between the lightest and heaviest egg of 163 clutches ranged from 1.2 to 32 g (average, 5.3). Weight rank and laying sequence in clutches were correlated. Generally, the eggs laid earlier were heavier than those laid later. As a rule the weight relationship 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 eggs was also irregular, which the author attributed to the lack of a brood patch, noting that 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.

12. Nestboxes for Goosanders in Leman. (Des nichoirs pour les Harles bièvres du Léman.) P. Géroudet, R. Rychner, J-C Doebeli. 1971. *Nos Oiseaux*, **31**(5-6): 111-116. (In French.)—The authors give directions for construction and placement of nestboxes for Goosander (*Mergus merganser*) and Goldeneye (*Bucephala clangula*). Results of a two-year Swiss test of this well-known Scandinavian technique suggest that their design is adequate and that nestboxes will help increase Swiss populations of these species.—Paul B. Hamel.

BEHAVIOR

(See also 34, 39, 40 and 51)

13. The comfort behaviour of Adelie and other penguins. D. G. Ainley. 1974. *Behaviour*, **50:** 16-51.—This study on *Pygoscelis adeliae*, made in the field and at a zoo, is patterned after McKinney's classical study of waterfowl (*Behaviour*, **25:** 121-217, 1965). Preening, shaking, bathing, etc. are described, the sequential correlations among them are assessed in some cases, and the use of these so-called comfort movements as signals is discussed.—Jack P. Hailman.

14. On the ontogeny of orienting movements in the triumph ceremony in two species of geese (*Anser anser* L. and *Branta canadensis* L.) T. Radesäter. 1974. *Behaviour*, **50:** 1-15.—The species are Greylag and Canada Geese, respectively, both of which have highly ritualized behavior given when meeting a social companion: the triumph ceremony, which terminates in a particular relative orientation of the birds. In the Canada, one individual turns its head laterally and backwards when meeting the other goose head-on, but in the Greylag either of two symmetrical, lateral orientations occurs: (a) the birds turn parallel (head-to-head), or (b) pass one another (head-to-body). Radesäter followed the ontogenetic development of the orienting termination in captive geese and came to very different conclusions from those of a Lorenz-trained student, Helga Fischer (*Z. Tierpsychol.*, **22:** 247-304, 1965). Radesäter finds that newly hatched goslings possess all the behavioral elements of triumph except orientation, the birds fight frequently for the first week of life, they form stable and nearly linear dominance hierarchies, and they develop orientation of the Canada-type with the subordinate gosling turning its head away from the dominant bird. Then, the dominance hierarchy breaks down in Greylags, which begin using the adult orientations. Goslings reared in sight and sound of one another, but not in physical contact that would allow fighting, formed no dominance hierarchy and no head-turning component, but the Greylags shifted to the adult orientations later without ever having been through the earlier Canada-like behavior. Ratesäter believes that the Canada's head-turning is derived from avoiding a peck to the head, and that it is the primitive pattern among geese. This study is important because it reveals what one can miss when beginning with a naive "instinct" viewpoint that specific experiences and social relations are unimportant in behavioral development.—Jack P. Hailman.

15. Mate selection and colour preferences in Lesser Snow Geese. F. Cooke and C. M. McNally. 1975. *Behaviour*, **53:** 151-170.—As is well known, *Anser caerulescens* occurs in two color-phases: white ("snow" geese) and blue-gray ("blue" geese). The color is dictated by a single gene (or co-adapted gene complex) and birds of like color tend to mate more often than chance. In this study Cooke and McNally manipulated early experience of goslings to see the influence on approach to adults, association with others as yearlings and later, and mate-choice as breeding birds. In sum, they found that birds chose the color of their foster parents, and if these were removed early, chose the color of their sibs. For various reasons these experiments are not definitive (in my view), but they do suggest that non-random mating is based strongly, if not exclusively, on experience.—Jack P. Hailman.

16. Biology and behavior of the Pectoral Sandpiper in the east Siberian tundra. (Biologiya i povedenie kulika-dutysha v vostochno sibirskikh tundrakh.) V. Kishchinskii. 1974. *Byull. Mosk. Obschch. Isp. Prirody, Biol. Div.*, **79**(1): 73-88. (In Russian with English summary.)—Not included

in the English summary are several important points. The role of the male is less than formerly believed, being little more than display and temporary territorial defense. More controversy is added to the role and nature of the throat or neck pouch, previously discussed by Nelson (1884), Sutton (1932), Pitelka (1959), and Portenko (1968). From observations and dissections of 10 males killed at the moment of display, it is suggested that distension of the throat pouch operates not by inflation of the skin or esophagus or any pouch wall but by turgor from tissue liquid infusion, analogous to milk gland turgidity in mammals. Coincident with egg-laying and the start of incubation, male territorial defense declines. Males participate in group display flights, with the pouch then less evident or absent. Average male weights declined from 95 to 85 g during this transition from late June to early July. It is suggested that the shift from solitary male territoriality to group flight display serves to bring more females into breeding activity, i.e., any local unmated surplus. The species appeared to be polygamous as a whole, the females showing no territorial attachment and the males approaching any which entered their territory. This account is based on observations of 10 nests and 65 adults.—Leon Kelso.

17. Individual chick recognition and family integrity in the Ring-billed Gull. D. E. Miller and J. T. Emlen, Jr. 1975. *Behaviour*, **52**: 124-144.—Replacement of *Larus delawarensis* chicks in the nest revealed that parents reject strange chicks from about day 7 posthatch. Substituting chicks daily for the first 8 days prevented rejection. Older chicks surgically devocalized were not rejected by their parents, but those whose markings were altered with black ink were rejected. The markings themselves did not cause aggression because young chicks so marked were not rejected.—Jack P. Hailman.

18. Defensive calls of Black-headed Gulls. (Oboronitelnye signaly ozernoi chaiki, *Larus ridibundus*.) I. Nikolskii. 1975. *Vest. Moskovsk. Univ., Ser Biol.*, **1975**(3): 26-31. (In Russian with English summary.)—At gull colonies, containing a mixture of species, including terns, with 500 to 1,500 individuals, fright and alarm calls were recorded by sound tape and oscillograph. The purpose was to record calls that would be effective for repelling gulls from field crops and airports. Results were uncertain. Whatever calls were tried, even when combined with the presence of wounded birds, the repellent effect tended to wear off with repetition. One definite result was to get pictorial oscillogram patterns of the alarm calls for comparison with those of other species.—Leon Kelso.

19. Cannibalism in the Gull-billed Tern. (Kannibalizm u chaikonosoi krachki, *Gelochelidon nilotica*.) V. Zubakin. 1975. *Vest Moskovsk. Univ., Ser Biol.*, **1975**(3): 32-36. (In Russian with English summary.)—This behavior is not known to be habitual for the species elsewhere but was observed at Sivash Islands in the Black Sea, particularly in June 1973. There were only 2 survivors from 72 chicks hatched from 41 second or late clutches. Nestlings were seized by adults, which did not tear but swallowed the prey, often dipping them in water first. Nesting in a colony of 4.5 ha area were 450 pairs. In another of 2.5 ha area were 270 pairs. The average interval between nests was 2 m. Cannibalism has been reported in the Herring, Great Black-backed, and Common gulls, but it has not been observed in the Caspian Tern. Differences in food taking have been commented upon before as concomitant to differences in cranial structure. This species appears more raptorial than other terns, its diet having more fish, frogs, lizards, and mammals. Many of the chicks seized were fed to young of earlier broods.—Leon Kelso.

20. Activity cycles in a natural brood of fowl and their coordination. (Les cycles d'activité d'une couvée naturelle de poussins et leur coordination.) J. C. Guyomatc'h. 1975. *Behaviour*, **53**: 31-75. (In French with English summary.)—A brood shows activity cycles of approximately 30-min periods, which is also true of some adult behavior. Older chicks spend more time in activities near the mother; this promotes differential experience within the brood. Substitution of the brood leads initially to uncoordinated activity that subsequently develops into a coordinated cycle.—Jack P. Hailman.

21. The influence of social deprivation and "autoperception" in the sexual behavior of the domestic cock. (Influence de la privation sociale et de "l'autoperception" sur le comportment sexuel du coq domestique.) J. M. Vidal. 1975. *Behaviour*, **52:** 57-83. (In French with English summary).—Cockerels were reared either in social isolation or with a female, then tested with models and living hens. Socially reared cocks chose partners resembling their rearing mates, and isolate-reared birds chose partners resembling themselves in coloration. The latter often attempted mounting in a head-to-tail position.—Jack P. Hailman.

22. Age variability shown by domestic chicks in selected spatial tasks. A. S. Etienne. 1974. *Behaviour*, **50:** 52-76.—Chicks of three ages learned quickly to find a mealworm that was moved out of sight in one of three different ways. Age differences are minor.—Jack P. Hailman.

23. Prior exposure to light and pecking accuracy in chicks. J. Vauclair and P. P. G. Bateson. 1975. *Behaviour*, **52:** 196-201.—Most accurate were chicks reared in isolation in light, less accurate were those whose heads were restrained, and least accurate were those reared unrestrained in the dark.—Jack P. Hailman.

24. Sounds produced by hatching Japanese Quail (*Coturnix coturnix japonica*) as potential aids to synchronous hatching. A. B. Orcutt. 1974. *Behaviour*, **50:** 173-184.—The type and repetition rate of vocalizations change from unpipped egg stage to hatching, possibly helping to synchronize hatching in a clutch.—Jack P. Hailman.

25. The effects of prenatal and postnatal auditory stimulation on early vocalization and approach behavior in the Japanese Quail (*Coturnix coturnix japonica*). J. A. Green and E. K. Adkins. 1975. *Behaviour*, **52:** 145-154.—Tone stimuli played before and after hatching had some slight effects on later peeping rates and quieting in response to later tone stimuli.—Jack P. Hailman.

26. The organization of dust-bathing components in Bobwhite Quail (*Colinus virginianus*). P. L. Borchelt. 1975. *Behaviour*, **53:** 215-237.—This is a detailed and quantitative descriptive study assessing changes in activities with increased dust-deprivation, and the results (too complex for brief summary) are consistent with the hypothesis that dust-bathing serves to remove lipids from the plumage. A fine paper.—Jack P. Hailman.

27. Adaptive behavior, adaptations, the acoustic environment, and their systematic study. (Adaptivnoe povedenie, adaptatsii, zvukovaya sreda, i sistemnye podkhody k ikh izuchenyu.) V. Ilichev. 1972. *Z. Zhurn.*, **51** (12): 1780-1787. (In Russian with English summary.)—The hearing of the Long-eared Owl (*Asio otus*) and other species concerns us not only as study models of adaptive mechanisms but as objects of unique interest. The precision of passive location in owls, down to 1° of a possible 360°, is a unique phenomenon in nature, for which previously there was no satisfactory explanation by morphophysiological mechanisms. Ethology provides a variety of special mechanisms for analysis. Parallelisms in taxonomically remote but behaviorally alike groups reveal elements playing special roles in the system. The highly specialized Long-eared Owl is our most suitable example for study, showing passive location as a multistage multicomponent. High precision localization follows sequential switching on of varied mechanisms narrowing hearing down to a point. Tuning responses occur via outer and middle ear, as fixed in phylogenesis. Watchful posing and head motion in expectancy of prey are spatially undetermined. After signals are heard, tympanal muscle response follows for sectorial estimate of sound source location. Outer and middle ears sharpen binaural contrasts and define and refine signal source boundaries. In this finding phase the owl fixes location by short single signals, "using binaural differences in signal characteristics." When right and left signal impact is equal the head and body position is set, and the owl flies to the sound source. Low frequency signals are employed in this.—Leon Kelso.

28. Auditory system characteristics and some spatial features of the hearing of the Long-eared Owl. (Kharkteristiki slukhovoi sistemy i nekotorye kharakteristiki prostranstvennogo slukha ushastoi sovy.) V. Ilichev and A. Chernyi. 1973. *Adaptive mechanisms of acoustic orientation* (Moscow Univ. Press). **1973:** 67-140. (In Russian.)—On foods and modes of securing them *Asio otus* may have occupied more space in print than any other species of bird during the past two years. This study comprises a comprehensive review and a mass of original data on the acoustic orientation by birds, with attention concentrated principally on this particular owl. Electronic equipment, too complex to be described here, field observations, and artificial models simulating owls' heads were employed. As a sample of this account, consider this analysis of the weaving and nodding head movements, familiar to owl watchers. Type A, shifting the head on a horizontal plane, usually at a distance of 2 to 4 m from sound source or prey; type B, bowing or nodding on a vertical plane, at greater or lesser distance (than 2 to 4m) from sound source; and type C, a mixture of types A and B, with rotation of the head around the axis of facial disc, on the approach of loud confusing noise or strange objects. It can spot a sound source down to the narrowness of 1° on both horizontal and vertical planes. Elaborated in detail are the roles of the asymmetry of the ears and the external aural dermal folds, which are also proven to operate in sound localization. Owls' sonar perception has developed even farther, to spotting sources without turning the head toward them.—Leon Kelso.

29. The induction of nest building in the Ring Dove (*Streptopelia risoria*): hormonal and social factors. M. C. Martinez-Vargas. 1974. *Behaviour,* **50:** 123-151.—Stuides of endocrine-behavior interactions are increasing in sophistication, as evidenced by this study utilizing castration, hormone injection, radioimmunoassay of hormonal levels in blood, and careful manipulation of the behavioral context. Basically, testosterone and estradiol both promote nest-related activities in males, but only the former promoted bow-coo displaying. —Jack P. Hailman.

30. Behavioral transitions in the reproductive cycle of Barbary Doves (*Streptopelia risoria* [L.). S. Lovari and J. B. Hutchison. 1975. *Behaviour,* **53:** 126-150.—Detailed descriptions of the behavior of paired birds show decreasing aggressive and increasing nest-oriented patterns in the male, poorly phased with changes in the female's behavior.—Jack P. Hailman.

31. On the time-course of activity of behavioral patterns of preening in a group of Tufted Mynas. (Zum Aktivtätsverlauf des Verhaltensmusters Putzen bei einer Gruppe von Haugenmainahs, *Acridotheres cristatellus* (GM).) A. Nguyen-Clausen. 1975. *Behaviour,* **53:** 91-108. (In German with English summary.)—The author would have us believe that there are morning and afternoon peaks of preening, but figures 1 and 4 show the peaks are not very pronounced. There are also short-term oscillations that appear to be random in time. Preening of six birds tended to be correlated temporally, a bout being initiated by the alpha bird.—Jack P. Hailman.

32. Aggressive behaviour in the Zebra Finch *Taeniopygia guttata*. I. Fighting provoked by male and female social partners. P. G. Caryl. 1975. *Behaviour,* **52:** 226-252.—Sight of a third bird evokes fighting between members of a socialized pair, and the sexes of the three birds determine the level of fighting.—Jack P. Hailman.

ECOLOGY

(See 51)

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(See 18 and 53)

CONSERVATION AND ENVIRONMENTAL QUALITY

(See also 53)

33. The effect of several crude oils and some petroleum distillation fractions on intestinal absorption in ducklings (*Anas platyrhynchos*). A. Crocker, J. Cranshaw, and W. Holmes. 1975. *Environ. Physiol. Biochem.*, **1975**(5): 92-106.—The effects of crude oil on contaminated birds are many and varied. Oil ingested by ducks apparently inhibits intestinal absorption of sea water. Atmospheric degradation, or "weathering," of crude oil increases its poisonous effect on the birds' physiology in general, particularly by blocking intestinal water supply. The severity varies according to the geographic origin of the oil. Where a crude oil or its fractions caused slower water and sodium transport, the combined effect was to endanger survival of the animal in a marine environment.—Leon Kelso.

34. Reintroduction of the Eagle Owl into the German Federal Republic. (Die Wiedereinbergerung des Uhus, *Bubo bubo*, in der Bundesrepublik Deutschland.) E. Herrlinger. 1973. *Bonner Zool. Monogr.*, **4**: 1-151. (In German with English summary.)—This comprehensive study in a relatively new series issued by the Alexander Koenig Museum affords much ethological and ecological information along with about 300 titles of cited literature. Most pertinent, conservation-wise, is its detailed account of restoration of this king-size owl species. Although sparsely distributed through German forests during the past century there remained an estimated 200 pairs in 1900 and fewer than 100 pairs at the close of the First World War. A census in 1938 found about 110 breeding pairs in Germany. There was a decline to about 60 pairs after 1955, owing primarily to traffic, high voltage cables, and hunting. Subsequent experimental work found that cage-reared juveniles released into the wild at about 9 months age have a better chance to survive and breed than adults of a year or more. The latter will have become too "imprinted" or accommodated to humanity for their safety. Dispersal distance from point of release of 40 juvenile Eagle Owls averaged 40 km, while that of 8 adults was but 4 km. Of 222 Eagle Owls released between 1956 and 1972, 81 (36.5%) were caught, killed, or found dead to May 1973. Only 10 instances of successful breeding in the wild by released pairs have been realized, and this in only one area. The calculated annual breeding success of the current West German Eagle Owl population is 0.8 young per pair.—Leon Kelso.

35. DDT residues in forest biota: further data. J. Dimond, R. Owen, and A. Getchell. 1975. *Bull. Env. Contam. Toxicol.*, **13**(1): 117-122.—Reviewed for the data related to birds: "For extraction [of 6 Ravens] birds were plucked, beak and feet removed, diced, homogenized in a food mill, and a 10 g sample analyzed." Residues in Ravens were high, averaging well above those of other species (including all major vertebrate classes) that were studied. Highest residues previously reported were in Kingfishers and Mergansers. The authors do not report whether or not residues were higher in certain parts of the body.—Leon Kelso.

36. Uptake and biological turnover of 109Cd in Chipping Sparrows, *Spizella passerina*. S. Anderson and R. van Hook. 1973. *Environ. Physiol. Biochem.*, **1073**(3): 243-247.—The polluting element Cadmium is released into the biosphere from industrial pigments, metal alloys, mineral refinement wastes, and burning of diesel and heating oils. Fourteen Chipping Sparrows were fed "wild bird seed" tagged with 109Cd "(167nCi/g)" for 21 days. Following this, whole-body Cadmium concentration was 14n Ci/g. Six birds sacrificed after 21 more days had concentration in feathers of 8n; in liver 14n; in Kidneys 29n, and in gut 75nCi/g. It is unique in such tests to have definite comparative figures for feathers. A question is, was the increment acquired during or after feather growth, from internal organs or by preening?—Leon Kelso.

PARASITES AND DISEASES

37. Ratio of blood-sucking midges to synanthropic birds around Kramatorsk. (Svayz krovosushchikh mokretsov s synantropymi ptitsami v

usloviyakh Kramatorska.) V. Gritsai and N. Borisova. 1973. *Vestnik Z.*, **1973**(6): 48-55. (In Russian.)—A preliminary collection of midges (*Culicoides* spp.), particularly those feeding on cattle, was made in September 1971 in the Donets Region in the Ukraine steppes. In sweep nets 26 species were taken. Collections were also made at different sites using sheets of gummed paper as traps. At a House Sparrow (*Passer domesticus*) colony of 22 nests, 1,353 midges of 16 spp. were captured; at a pigeon (*Columba livia*) coop of 40 birds, 1,179 midges of 17 species; and at a "hencoop," 812 of 12 species. Midges attack young birds just after hatching and before the plumage is sufficiently developed to cover the skin.—Leon Kelso.

38. Seasonal prevalence of avian hematozoa in passeriform birds of Atlantic Canada. G. F. Bennett and M. Cameron. 1975. *Can. J. Zool.*, **52**(10): 1259-1264.—The seasonal prevalence of avian hematozoa in populations of passeriform birds (of several dozen species) in Newfoundland and New Brunswick was broadly correlated with the seasonal activity of appropriate vectors. For ornithologists the most interesting feature of the results is probably the lower incidence of parasitic infection in young of second and later broods.—Raymond J. O'Connor.

PHYSIOLOGY

(See also 7, 8, 27, 28, and 29)

39. The oiling of large raptors by Fulmars. R. Dennis. 1970. *Scot. Birds*, **6**(4): 198-199.—At Orkney Island, a White-tailed Eagle (*Haliaetus albicilla*)" ". . . flapped and struggled in the water but could not become airborne; instead it drifted ashore, where it was caught and examined. The bird was fat and well fed but the whole plumage was soiled . . . and smelled strongly with Fulmar oil, each feather being matted and smelling strongly. It would appear that each time it had approached a young Fulmar (*Fulmarus glacialis*) on a ledge it had been spat at, before and during the struggle [the spitting of oil by Fulmars is well known] and in this way the plumage had become soiled." Later a Honey Buzzard (*Pernis apivorus*) was found dead with plumage in a similar state, and Ospreys, Ravens, and young migrant herons with feathers likewise oiled were reported.—Leon Kelso.

40. Observations on the effects of the ejection of stomach oil by the Fulmar, *Fulmarus glacialis*, on other birds. C. Sweenen. 1974. *Ardea*, **62**(½): 111-117. (In English with Dutch summary.)—Experiments on captive birds, 3 Herring Gulls (*Larus argentatus*), 2 Guillemots (*Uria aalge*) and 1 Common Gull) *Larus canus*), found that in all cases where feathers had been "hit" they wetted on water contact. The results in all instances but one were water-logging and death by exposure or drowning. "Still it is remarkable that the Fulmar should have such a dangerous weapon at its disposal. The final destruction of an opponent after a slight confrontation seems rather excessive. . . . Although low temperature certainly quickened the process of dying, it is clear that oil from the stomach of a Fulmar threatens the life of sea-birds in the same way as fuel oil. Birds which have got the full blast are sure to die when alighting at sea. For birds which have got only a few drops it will at least mean a lot of trouble before they are quite clean and dry again".—Leon Kelso.

41. Plasma and depot fat fatty acids in Canada Geese in relation to diet, migration, and reproduction. V. G. Thomas and J. C. George. 1975. *Physiol. Zool.*, **48**: 157-167.—Adult *Branta canadensis interior* were collected in March in Missouri and in early May and mid-June in Manitoba to provide samples of birds immediately before and after migration, and during breeding. The fatty acid composition of the lipid fractions of adipose tissue, blood, gizzard contents, and eggs was measured. Pre- and post-migrant birds differed little in fat composition, and sex differences were also slight at this time. Post-reproductive geese, however, differed from migrants in the proportion of C-18 compounds present, apparently reflecting the scarcity of these compounds in the diet on the breeding grounds. Analysis of the sex differences in post-reproductive

body composition in relation to the fatty acid composition of the egg-yolk lipids suggests that all the major fatty acids in the eggs except oleic and arachidonic acids were either directly available from the diet or from the depot fat of the female.

The main reservation one must make about this paper is pointed out by the authors themselves, that the birds sampled share the same migration route but may have wintered in different areas. If so, the similarity in composition of pre- and post-migrants could mean either that the diets in different areas were similar or that the regulation of fatty acid composition occurred.—Raymond J. O'Connor.

42. Motor responses triggered by diving and by mechanical stimulation of the nostrils and by the glottis of the duck. L. Leitner, M. Roumy, and M. Miller. 1974. *Respir. Physiol.*, **21**(3): 385-392.—With 11 domestic "White Peking" ducks as experimental subjects, it was found that diving in cold (15°C) water halts action of inspiratory muscles; the expiratory muscles are stimulated thereby. This was evidently controlled by bill surface dermal thermoreceptors. Expiration is retarded with rise of water temperature to 37°C. "In addition to apnoea, an adequate respiratory response to active diving must ensure the exclusion of water from the airways during immersion." These results would recommend use of more habitual "diving ducks" as subjects.—Leon Kelso.

43. Aspects of the winter metabolism of Ruffed Grouse (*Bonasa umbellus*) with special reference to energy reserves. V. G. Thomas, H. G. Lumsden, and D. H. Price. 1975. *Can. J. Zool.*, **53**(4): 434-440.—Blood samples from Ruffed Grouse held in cages indoors at 20°C and outdoors at winter ambients at Guelph, Ontario, were analyzed for glucose, free fatty acids, and triglycerides. Samples taken in mid-February showed significant increases only in glucose levels. Analysis of livers and pectoral muscles in four birds held at −10°C for four weeks revealed marked increases compared with four controls. Lipid levels in carcasses taken between January and August were low, but the pectoral muscles declined in relative size over this period, from 37% to 32% of body weight. Males were heavier than females throughout the year, and winter weights were slightly heavier than summer weights within each sex.

These results are used to estimate the energy reserves available to the birds in winter. Lipid and carbohydrate reserves are adequate for less than two days without food in the wild, and protein catabolism in the pectoral muscles cannot overly enhance the total energy reserves. The authors suggest, therefore, that regular feeding supplemented by nival burrowing and a highly insulative plumage are the main defenses against low temperatures available to the species.

The statistical treatment of the data in this paper, while not actually wrong, leaves a lot to be desired. The authors obviously gave more thought and care to their "Discussion" section than they gave to the presentation of their results.—Raymond J. O'Connor.

44. Role of the caeca in Japanese quail energetics. D. C. Thompson and D. A. Boag. 1975. *Can. J. Zool.*, **53**(2): 166-170.—Caecectomized quail needed to ingest about 5.6% more energy than did intact birds, at constant ambients of 3°C. Oxygen consumption rates were constant between the two groups, the difference lying in greater energy losses through excretion.—Raymond J. O'Connor.

45. Mechanics of running by quail (*Coturnix*). J. Clark and R. McN. Alexander. 1975. *J. Zool., Lond.*, **176**(1): 87-113.—The theory of the aerodynamics and energetics of avian flight has been placed on a fairly firm footing in recent years as a result of studies by Pennycuick and by Tucker, but comparable attention has not been paid to the energetics of cursorial birds. This paper by Clark and Alexander goes some way to correcting this situation. Quail were made to run on a force platform allowing measurement of the forces exerted in three dimensions while the entire sequence was filmed to record muscle positions. Quail typically lost and regained about 7 mJ potential energy and 13 mJ external energy in a typical step, with little fluctuation in internal kinetic energy. Two independent analyses (force measurement, cine film study) gave comparable results for energy expenditure during running, but these were substantially below

empirical measurements from oxygen consumption obtained from other workers. The power requirements of running in quail would be reduced were a different gait used to reduce the acceleration and deceleration inherent in each normal step, but the bird would then pitch badly. Energy costs are, however, reduced by having large feet and transferring the weight from heel to toe in the course of each step.

This is an important study of a neglected topic.—Raymond J. O'Connor.

46. The influence of brood size upon metabolic rate and body temperature in nestling Blue tits *Parus caeruleus* and House sparrows *Passer domesticus*. R. J. O'Connor. 1975. *J. Zool., Lond.*, **175**(3): 391-403.—Metabolic rate and body temperature in nestling Blue Tits and House Sparrows were measured in broods of different size and age. Surface-volume effects were found in both poikilothermic and homeothermic Blue Tits at ambients of 15°C but not at 20°C. The possibility of incipient hyperthermia among young nestlings maintaining sub-adult body temperatures is discussed. For the House Sparrows heat retention by the nest was of greater importance than the surface-volume effect. Differences in nest structure between the two species are described and related to the thermal requirements of nestlings in large as against small broods. —From author's summary.

MORPHOLOGY AND ANATOMY

(See 45)

PLUMAGES AND MOLTS

(See 40)

ZOOGEOGRAPHY AND DISTRIBUTION

(See 50)

SYSTEMATICS AND PALEONTOLOGY

47. New birds. [W. Rydzewski]. 1974. *Ring*, **7**(69): 145-146; **7**(70): 168-169; **7**(81): 194-195.—In this new column, Rydzewski, the indefatigible compiler, attempts to list all newly described forms in the literature, formidable as this task may be. For each form he lists the author(s); where described; data, locality, sex, and collector of the type specimen; and place of deposition and museum number of the type. Occasionally some of these data (collector, museum number) are not listed, apparently because this information was not available to Rydzewski.

New forms and the general area in which they were collected that are listed in his first three columns are as follows, with that issue of the *Ring* in which the listing occurred preceding each list of names: *Ring*, **7**(79), *Accipiter tachiro croizati* (Ethiopia), *Halcyon coromanda linae* (Philippines), *Halcyon coromanda claudiae* (Philippines), *Ispidina madagascariensis diluta* (Madagascar), *Hemispingus parodii* (Peru), *Paradoxornis heudei polivanovi* (U.S.S.R.), *Agelaius phoeniceus arthuralleni* (Guatemala); *Ring*, **7**(80), *Acrocephalus baeticatus hopsoni* (Nigeria), *Swynnertonia swynnertoni ombratica* (Mozambique), *Cameroptera brachyura transitiva* (Rhodesia), *Muscicapa adusta mesica* (Rhodesia); *Ring*, **7**(81), *Ptilonopus rarotongensis goodwini, Collocalia sawtelli, Halcyon ruficollaris, Halcyon tuta aliu, Halcyon tuta mawke* (all from Cook Islands), *Pericrocotus flammeus neglectus* (Philippines), *Acrocephalus vaughani kerearako* (Cook Islands), *Acrocephalus vaughani kaoko* (Cook Islands), *Malimbus ballmanni* (Ivory Coast), *Arremonops rufivirgatus rhyptothorax* (Mexico), and *Pipilo albicollis marshalli* (Mexico).

Such a compilation should be of much use to taxonomists if it can be kept even reasonably complete. To this end Rydzewski requests that describers of new forms send him reprints of their paper.—Roger B. Clapp.

EVOLUTION AND GENETICS

(See also 15)

48. Four Galapagos Islands. P. R. Grant. 1975. *Geograph. J.*, **141:** 76-87.—In the course of his biological work, Grant discovered that the names of two smaller Galapagos islands were reversed mistakenly by early map makers, and in the course of this account he provides the first biological survey of the Hermanos islands (Crossman islands but evidently originally named Brattle), just off the southeast coast of Isla Isabela (Albemarle). These had been visited only once previously by a biologist, on 4 April 1902 by Rollo Beck. Grant found that the resident ground finch, *Geospiza fuliginosa,* originally described as *G. harterti,* is characterized by being much larger than the population on nearby Isabela. He visited the island to determine whether the larger size is due to the availability of larger seeds or to the lack of competition, an issue not resolved in this paper. Surprisingly the birds were decidedly wild compared with the usual tameness of other geospizine populations. The flora and fauna discovered on the island during the two-day visit are reported. The name change of the islands is of historical interest only, as the islands' official names are Spanish.—Bertram G. Murray, Jr.

BOOKS AND MONOGRAPHS

49. The Life of Birds. J. C. Welty. 1975. Philadelphia, W. B. Saunders Company. 2nd Ed. 623 p. $18.50.—As Welty notes in a preface, anyone attempting to write a comprehensive and up-to-date textbook of ornithology faces the imposing problem of assimilating the vast quantity of published ornithological studies. Welty reports examining a total of 14,000 books and papers in preparing the two editions of this text, but, as he acknowledges, even this tremendous effort was insufficient for a review of avian biology in the broadest sense. Most ornithologists are principally interested in wild birds, and Welty has properly stressed these. Yet much of pertinence for ornithology comes from other, highly diverse, sources such as poultry science, basic medical sciences, and a variety of basic biological disciplines. In a specific case Welty provides only two brief discussions of the bursa of Fabricius (termed bursa Fabricius by Welty) despite the importance of studies of this organ for the general field of immunology during the past 20 years. The immunological function of the thymus is not discussed. Such gaps in coverage are probably inevitable and perhaps not too serious in a one volume survey of ornithology by a single author. Examples of topics perhaps too new to be included by Welty are recent analyses of continental drift in relation to global bird distribution and the role of polychlorinated biphenyls as pollutants affecting avian populations.

Nevertheless, this book contains a wealth of information on the physiology, ecology, and behavior of birds. The beginning student can certainly learn much from this volume, and I have seen no better single-authored text with such breadth. Regrettably, however, the new edition falls short of the highest expectations.

With regard to evolution, the book contains too many misleading or poorly worded statements. "Natural selection . . . often produces heritable variations . . . " (p. 518). "As the genetic complexion of a bird population changes, the species may be forced to seek a new habitat . . ." (p. 420). "The population is the evolutionary unit, not the individual" (p. 511); individual selection is not clearly distinguished from group selection. Indeed, the overall approach of evolutionary ecology as championed by Lack, MacArthur, and their associates is weakly represented in this book, despite the citation of a number of pertinent references. Perusal of the text and references suggests that perhaps too little attention was given to influential papers of the past 20 years in the journals *American Naturalist, Ecology, Evolution,* and *Systematic Zoology.* I found no citations to the *Annual Review of Ecology and Systematics.*

Many phrases or statements might well have been omitted or changed as illustrated in the following few examples. "As a result of adaptation to flight, the muscles of birds . . . have become altered in both structure and distribution" (p. 60). "Nature seems rarely to push a species' reproductive performance

much beyond a comfortable 'live and let live' level" (p. 304). On page 63 the hatching muscle of the chick is characterized as "very transitory," whereas it is the enlargement of that muscle around the time of hatching that is transitory. Natural selection or nature is repeatedly mentioned throughout the text as a cause of evolution, but the mere mention of natural selection fails to clarify many of the points discussed.

At a level of fine detail the misleading statements are bothersome. The following list is far from exhaustive. On page 6 the sense of smell in birds is termed "apparently almost nonexistent," but then page 73 provides examples of birds orienting by smell. Recent studies reporting a role for odors in pigeon homing are unmentioned. On page 266 the Eastern Meadowlark is said to build a roofed-over nest, but on page 269, 17% of the nests in one study are reported to have been open from above. Contrary to Welty (p. 13), not all *Dendroica* warblers nest off the ground. Welty erroneously states (p. 411) that finches do not occur in Australia. On page 23 one species of starling is indicated to have been introduced into North America, but on page 319 the second species is mentioned. On page 25 there is no indication that alpha keratins occur in birds as well as in mammals. Welty (p. 108) reports a group effort by Brown Pelicans swimming and driving fish into shallow water, but the described behavior is ordinarily attributed to White rather than Brown Pelicans. On page 36 we read that the spinal and ventral tracts are variable, but without indication whether this refers to taxonomic or individual variation. I question whether "infanticide is a widespread phenomenon among birds" (p. 351).

In systematics, the section on "Criteria of relationships" (p. 10-14) poorly represents the current status of the topic. Certain of the features cited as taxonomic characters have rarely if ever been so invoked. The statement (p. 13) that "species that resemble each other most closely are generally closest together in space" seems misleading. Phenetics and cladistics are not mentioned. I doubt that any ornithological taxonomic authority now recognizes 25,000 species of birds (p. 10).

The extensive list of references is not maximally useful as many of the numerous facts and interpretations in the text lack literature citations. In addition, many widely used publications are not cited, e.g., certain major field guides and regional publications. Furthermore, there is no mention of certain bibliographic aids that would help in locating additional publications of interest. I would prefer to see citation of such useful reference works as Strong's *Bibliography of Birds*, *Zoological Record*, and *Science Citation Index*.

The volume is attractively produced, reasonably well illustrated, and contains relatively few obvious typographic errors. On page 353, a table on nestling development lacks a caption to indicate the species of bird. The terminal index appears quite usable. With relatively little revision this adequate second edition might have been substantially better, but it is, of course, far easier to criticize such a text than to write a better one. Teachers of introductory ornithology courses should seriously consider this volume.—George A. Clark, Jr.

50. Birds of New York State. J. Bull. 1974. Garden City (New York), Doubleday/Natural History Press. 655 p. $29.95.—State bird books are a peculiar phenomenon. Neither birds nor serious students of their distribution heed political boundaries and yet we have a plethora of distributional works based on artificial units, particularly states. Perhaps the important role played in ornithology by the amateur has contributed to this development. State books take a variety of forms: bird finding guides, popular accounts directed at the layman, and technical treatises presenting detailed analyses of distributional patterns and their history. New York State has both a great diversity of habitats and a long history of ornithological activity. At one end the state is bounded by the Atlantic Ocean, at the other it has long shorelines of two Great Lakes and the Niagara River. Between these lie 48,000 mi² of habitat types from deciduous forests of southern affinity to the 5,300-ft peak of Mt. Marcy, one of several Adirondack mountains that extends above tree line. It is no wonder that the state supports such a rich bird life.

No exhaustive attempt to produce a "state book" for New York has been made since Eaton's "Birds of New York" in 1910 and 1914. In the interim major works have been produced at both ends of the state (Bull's own "Birds of the New York Area" in 1964, and Beardslee and Mitchell's "Birds of the Niagara

Frontier Region" in 1965). Bull's new volume includes breeding data through 1972 and other noteworthy reports to the end of 1973 and tallies 410 species (vs. 366 in Eaton after taxonomic corrections). Over one half (228) of these species are known to have bred in the state (190 breeders listed by Eaton).

The introductory section of the book (45 p.) describes the species accounts, gives a very brief ornithological history of the state, details the climate, topography and vegetation, lists a few outstanding birding areas, and gives a tabular analysis of the avifauna. The latter section includes two useful tables: one lists the distributional limits for all species that reach their breeding limits within the state; the other gives brief information on the breeding ranges of species with restricted distributions in the state. The mixed nature of the avifauna is obvious from the figures in these lists. Fifty-nine species of northern affinities reach their southern limits in New York State, most (39) in the mountainous regions of the Adirondacks or Catskills. Species reaching northern limits total 49, most of which (37) do not extend north of central New York. Sixty species from Common Loon to Lincoln's Sparrow have restricted breeding distributions in the state. Most of these are water birds confined to Long Island (15) or boreal species found only in the Adirondacks and/or Catskills (25).

The species accounts comprise the bulk of the book (558 p.). Each contains the English and scientific names of the species, a description of its range, its status in New York State, a discussion of its nonbreeding and breeding status (or occurrence if it does not breed) including extreme dates and maxima, and remarks on geographic variation, taxonomy, etc. The emphasis in the book is on breeding distribution. In fact, except for hawk flights, migration is discussed very little. Over one half the breeding species (107) are accompanied by maps, in many cases showing individual breeding records that are discussed in the text. Bull is at his best in the analyses of recent changes in the status and distribution of breeding species, especially the invaders from the south and west and special cases such as the Blue-winged and Golden-winged warblers.

Whatever the author's intention, the book falls somewhere between the popular account and the technical treatise. For the bird finder with limited time the section on outstanding birding areas will be of little help. Anyone with a map will know instinctively that Montauk is a place worth checking, and the simple listing of places like Madawaska and the Chubb River Swamp is useless without additional details. Discussions of nomenclatural matters and subspecies are frequently given, but lists of specimens examined are not included. Species not documented by specimens or photographs (8) are considered hypothetical, but specimens no longer in existence are considered valid if they were verified at some time by "competent ornithologists." This was probably a reasonable way to handle the problem of species inclusion on the state list because in this case nearly all species are documented by specimens or photos. Bull is overly disdainful of sight records, and I suspect that much interesting and useful information was omitted from the book because it was based on sight records. However, his treatment is uneven in this regard: the Semipalmated Sandpiper is listed as rare but regular in winter based on sight records (cf. Phillips, *Amer. Birds*, **29:** 799-806, 1975). The text is often verbose and the style sometimes recalls similar works of a half-century ago: the Golden Eagle is described as a "fine species," the Starling is "obnoxious."

Basically, this is a good book and John Bull is to be commended for completing a vast and potentially endless task. The book will be the baseline for future work; indeed it is already obsolete in some areas, particularly in the knowledge of the occurrence of pelagic species. I found no errors in a cursory examination of selected species accounts, but I have not attempted a rigorous evaluation of its accuracy in details. My main criticisms of the book relate to matters of its production and some are serious. The nine color plates, which undoubtedly account for a considerable portion of the substantial cost of the book, add nothing essential to the book. As pretty bird paintings they are of mixed quality: all have too many birds packed into a small space (I am still not sure that I found all the birds hidden in Plate IV) and the color reproduction is bad in some. There are 57 full page maps depicting banding recoveries. Several of these maps have as few as two recoveries. Except in cases with large numbers of recoveries, these data are meaningless and in any case could be presented briefly in the text. Likewise, far too many full page state maps are used to show the breeding distribution of species confined to only a small portion of the state (e.g., Sharp-tailed

Sparrow, p. 577). Some of the breeding distribution maps could have been eliminated and most could have been reduced to half-page size. Some of the space saved could have been used to give more of the useful detail characteristic of Bull's earlier (1964) book on the New York City area.—Kenneth P. Able.

51. Breeding Biology and Behavior of the Oldsquaw (*Clangula hyemalis* L.). R. M. Alison. 1975. *A. O. U. Monograph,* No. 18. 52 p. 13 figures. $3.50.—This excellent monograph describes the breeding biology of the Oldsquaw, including population characteristics, homing, nesting, the nest and eggs, incubation, young, territoriality, displays, other aspects of reproductive biology, and a discussion of the factors influencing reproduction. The research was conducted over a four-year period at Churchill, Manitoba. The study area contained sparsely forested tundra, dry upland, marshland, and scrubland with 90 ponds and lakes. An average of 45 pairs of Oldsquaw nested in this area each year, outnumbering all other species of waterfowl. Observations on winter behavior were made at Toronto Harbor, Ontario, where about 7,000 individuals overwintered.

The sections on population characteristics and homing are concise. Oldsquaws arrive in early June and are paired upon arrival. Adult populations increased in June and decreased thereafter. Some breeding pairs occupied small ponds; larger lakes had two or three pairs. Drakes began departing by 10 July, forming flocks on the Hudson Bay Coast. Thirteen females and 2 males were recaptured in the study area in subsequent years. Little adult and no sub-adult mortality was observed.

The nesting behavior section is excellent. Oldsquaw nests tended to be clustered, although 37.9% of the 95 nests located occurred singly. The study area contained 79 islands in the ponds and lakes, 34 of these had evidence of active or past nestings on them: 58.9% of the nests were located on these islands, 25.3% were on mainland tundra, 9.5% were in marshy areas, and 6.3% were on scrubland and dry upland. It would have been helpful to know the percentage of each habitat type available to the birds for nesting in order to determine the extent of selection for habitat types. Alison ranks nests according to the degree of concealment as a function of island and mainland nesting. Twenty-six (27.3%) of 95 nests were well concealed by black spruce boughs, grass, dwarf willows, or dwarf birches. Sixty-one (64.1%) of the nests were open from above, but concealed from all sides. All 8 (8.6%) of the nests partially or poorly concealed were on the mainland. However, mainland nests were more completely concealed than nests located on islands. 30.4% of Oldsquaw nests located on islands were destroyed by predators whereas on the mainland only 20.5% were destroyed by predators. On islands 50% of the 14 nests under trees were destroyed, mainly by Parasitic Jaegers systematically searching under every tree on the islands. Only 23.8% of the 42 islands nests in open tundra were destroyed. The percentage of nests destroyed by predators also varied by habitat on the mainland with 50% being destroyed in the dry upland and none destroyed in the scrubland. Only 33.3% of the 12 mainland nests under trees were destroyed by predators. Again, the figures on the number of nests in each habitat type would be enhanced by knowing the percentage of habitats in each category. The loss due to predators was directly related to predator density.

On islands there was a significant association between Oldsquaw nests and Arctic Terns whereas on the mainland there was significant disassociation. Alison attributes this to similar nest site requirements rather than to the Oldsquaw seeking out terns, because the Oldsquaw nests are initiated prior to the arrival of the terns.

Females select the nest site and males follow them about during this period. Clutch size (6.8 eggs), larger than that previously reported, was the same on islands and the mainland. The mean date of clutch initiation varied between 9 and 23 June over the four years and seemed to be a function of May temperatures. The mean incubation period was 26.03 days for 106 eggs, with extremes of 24 and 29 days. Of the 303 eggs, 75 (19.3%) were non-viable.

Communal broods were common as some females abandoned the study areas as soon as the young hatched. Fledging occurred between 35 and 40 days, much less time than that reported for other sea ducks.

Territoriality is described in detail. Defending males chased intruding females whenever a pair intruded. Alsion attributes this behavior to the fact that paired males follow their females whereas paired females do not always

follow their mates; therefore, it makes sense to chase the female. He used decoys to show that females never defend any territory. Single drakes and females were ultimately ignored by territorial drakes, and the defending male always threatened the female decoy of a pair. When drakes were experimentally removed from the territory, new drakes quickly moved in. This removal of pairs resulted in replacement by capable breeders. Alison suggests that a maximum number of suitable territories exists and that at greater densities some males are prevented from establishing territories by resident males; thus, territorial behavior seems to limit local breeding population size. This is an interesting conclusion, but further study is necessary to substantiate that a floater population of males and females capable of breeding is present.

Displays are described adequately although diagrams might have been useful to this "non-duck" ornithologist. Frequencies and order for the courting displays are given for a large number of courtship sequences. Paired males displayed less frequently (data not given) than unpaired males. An excellent description of courtship display intensity over time and a discussion of displays are given.

Alison concludes with a section on the factors influencing production which summarizes and pulls together the monograph. I feel that this is a major contribution to avian behavior in general and to the duck literature in particular. I found it succinct, readable, and enjoyable. I heartily recommend it to ornithologists.—Joanna Burger.

52. The Book of Owls. Lewis Wayne Walker. 1974. New York, A. A. Knopf. 256 p. $12.50. This book popularizes the biology of the following, species of owls: Barn, Screech, Great Horned, Snowy, Hawk, Elf, Burrowing Long- and Short-eared, and Saw-whet. Additional chapters are by other authors: Pygmy Owls by Bert Harwell, Spotted Owls by Grace M. Miller, and Great Gray Owls by Al Oeming round out the picture providing coverage on nearly all species of owls found in Canada and the United States. The final chapter entitled "A Potpourri of Facts" provides many little known facts on owls. Each chapter consists of sections on general discussion, measurements, voice, nesting, hours of activity, and food with an occasional section "of special interest". Especially good are the chapters on the Elf, Spotted, and Great Gray owls for they provide information on little known species for the laymen.

Although there is some good information on the overall biology of all species treated I am disappointed in the lack of a modern ecosystem approach to the treatment of owls as predators. Instead, the old-fashioned, economic ornithologist approach of categorizing owls as good or bad depending on the specific prey that they take is used. The modern concept of owls is totally lacking, namely that they are an integral part of natural communities, are valuable as biological indicators of environmental conditions, generally prey on what is most readily available, and should be handled on an individual basis when they cause depredation. The statement that "there is a correlation between the [Elf] owl's progressive decline and the ever-widening use of insecticides in the valley below . . ." alludes to it and provides a nice introduction to the principle of biological magnification but is not developed.

The purpose of the book is not designated, so I will assume it is to educate lay people. If this is the case, it would have been appropriate to include a chapter on owl conservation.

The author claimed he was a strong proponent of conservation, but I have to wonder. He describes building a blind in a heron rookery prior to the nesting season in order to photograph the herons later. Upon returning Walker found the herons disturbed, apparently by the presence of a pair of horned owls nesting within the rookery. He decided the owls must go, but he had difficulty in "disposing" of the two owlets from the nest by means "other than killing." He did not want to raise them and could not find any friends who would do so. Nearby zoos refused them because horned owls "had become a glut on the market." He finally places the two owlets in another nest with two owlets already present under the guise of conducting "research" on the "owl's ability to count" and to determine if this technique could be used to restock owls "in areas where they have become scarce." In placing the foster owlets, he drove the resident owlets out of the nest, moved the nest to another tree about 100 years away, and finally got the four owlets to stay in the nest long enough for him to leave the

area. Only later on, after struggling with his conscience, did he return to see if the foster owlets were accepted. More concern is thus expressed for photographing wildlife than for the well-being of the wildlife.

Bert Harwell suggests, relative to the Pygmy Owl, that owls are supposed to conform to some anthropomorphic moral code in their struggle for life. "From a human viewpoint one of their methods of obtaining food is not strictly according to Hoyle, for on several occasions they have been seen to drag fledgling Downy Woodpeckers and Sapsuckers from their nesting cavities. Unfortunately it takes only one or two observations of nest robbing to create such descriptions as fiend, villain, rapacious, bloodthirsty, but actually this little owl usually follows accepted rules of hunting."

There are some puzzling statements, e.g., "Courtship for most birds usually precedes the nesting season." The author apparently meant that the nesting season, and hence the courtship period, is restricted to a single season of the year. There are also erroneous statements. The picture caption for the Barn Owl on page 14 identifies a white-footed mouse in the beak of the owl as a meadow mouse. On pages 61 and 62 the author suggests that "polar bears, ptarmigan, fox and last but not least the Snowy Owl, are dedicated northerners completely disdaining a change from winter white." This is not true for the ptarmigan and arctic fox do undergo plumage and pelage changes to a more somber summer garb. On page 170, 13 skulls of Redpolls are reported coming "from the crop of a single Great Gray [Owl]". Although hawks possess a well defined crop it is lacking in owls. In page 231, the author uncertainly points out that the reversed sexual dimorphism found in most of the hawks and owls is found in all species, apparently unaware that Earhart and Johnson (*Condor*, **72:** 251-264, 1970) had shown that the male Burrowing Owl is larger that the female. Lastly, on page 199 the author points out that the Short-eared Owl differs from most ground nesting birds in that it does not lay an excessive number of eggs, which leads to an expendable surplus of young. It is stated that since the average clutch size is "only five or six eggs" and they are presumably only single brooded "something about the bird or its manner of life sets it apart and makes it successful." That something is mobility and a flexible fecundity in response to food availability. Clutch sizes of up to 14 have been reported for this species.

Mechanically the book is relatively free from errors. There are a few typographical errors, and the page reference to an "accompanying photo series" of Burrowing Owls is made on page 247 (no page number cited) while the photos are on page 124, leaving the reader to search.

Although there is much factual information presented in a readable way with many fine pictures I find a major shortcoming of this book is that it fails to put owls in their proper place ecologically speaking.—Richard J. Clark.

53. To Save a Bird in Peril. D. R. Zimmerman. 1975. New York, Coward, McCann & Geoghegan. 286 p. $9.95.—The author presents a variety of current conservation programs for endangered birds. The book's concern is "clinical ornithology"—the crisis oriented intervention into the life cycle or environment of a threatened bird to enhance populations and prevent extinction. Interestingly, most of the therapeutic techniques are quite recent and very much experimental.

The literary format of the book can be well described with brief comments on a few of the chapters, each of which considers one or more endangered species. In the pages on peregrines, Zimmerman reflects on "peregrine politics" and the conflicts of falconry with conservation. The report on the northeast Osprey program is presented as a personal success story for Paul Spitzer. Whooping Crane research at Patuxent reveals the struggles for results of scientists working in a "glass house" of publicity. In Hawaii, the Nene Goose causes discussion of the high costs of conservation programs—how much are we willing to spend on a decreasing species? The remaining chapters include the Cahow, Kirtland's Warbler, California Condor, Saddlebacks of New Zealand, and vultures and eagles of Europe.

The author is a professional writer, whose literary style presents each conservation effort in a dramatic tone. Often conservationists are portrayed as heros (with occasional villains). I know four main "actors" of the book and have heard some of *their* concern for this emphasis on personalities in the book. Zimmerman also criticizes professional ornithologists for their lack of interest

or contributions in the endangered species dramas, although clearly more than one half of the conservationists he mentions have livelihoods in biology. As a non-ornithologist, the author has done fairly well in gathering the essential facts of each program and has carefully presented critical ideas (such as the importance of the "genetic pool") in an easily read text. Some readers will find his anecdotes distracting, but most will appreciate the honest presentation of real-world successes and bureaucratic failures. This layman's book is exciting and informative for anyone.

An epilogue presents noteworthy late developments in the endangered species programs.—Charles F. Leck.

54. Watching Birds. J. Fisher and J. Flegg. 1974. Berkhamsted (England), T. & A. D. Poyser. 159 p. illus. £2.80.—Jim Flegg has undertaken to revise the late James Fisher's "Watching Birds," which first appeared in 1940. The present book is an elementary introduction to bird watching—English style; that is, serious bird watching. The opening chapters introduce the reader to the bird's external and internal anatomy, the classification of birds, and the tools of bird watching—binoculars, cameras, books, field clothing, notebooks, and so on. There follow chapters on migration, habitats, numbers of birds, cryptic coloration and aggression, how birds recognize one another, a chapter including territoriality, courtship, and the breeding cycle, and a final chapter on "what you can do" (join a bird or conservation organization).

Fisher and Flegg provide a readable and informative general introduction to the study of living birds. The book is nicely produced. The figures, including some drawings by James Fisher's son, Crispin, and photographs are useful and illustrative. There are few typographical errors.

Perhaps the best chapter is "the number of birds." It certainly is the longest, which reflects the authors' and the British bird watchers' interest in numbers—from world populations to the size of local breeding populations—and more importantly population trends. Flegg presents some results from the Common Birds Census, organized by the British Trust for Ornithology around 1961. The examples may have been selected for effect rather than for being typical because species are either increasing or decreasing throughout the decade or they are fluctuating greatly from one year to the next. Armchair population ecologists should look at these data.

Mostly, though, the discussion is too general. The chapter on migration dismisses navigation theories as "too complex to be discussed here," but surely mention could have been made that some ornithologists believe that birds use the sun, or stars, or even the magnetic field of the earth, and surely a brief description of the techniques of studying migration and navigation could have been included, without getting into the difficulties of evaluating the results.

Too much space (over five pages) is used in describing the territorial behavior of a pair of fictional "standard" birds, and not enough space is devoted to the diversity of territorial behavior as can be observed easily.

These errors of omission are, of course, matters of judgment and personal taste. Nevertheless, I think the beginner who can handle the material already included in this book can easily handle more sophisticated treatment. At least, there are few errors of commission. I'll mention one dreadful example with the hope that a future printing will correct it. That is a comparison of species occupying American, European, and British coniferous forests. The White-winged Crossbill but not the Red Crossbill is listed for American forests, whereas the ecological representative in Britain is the Scottish Crossbill (a race of the Red) and representatives in Europe are the Continental Crossbill (another race of the Red) and Parrot Crossbill (often considered a race of the Red). The American representative of the British and European Goldcrest and Firecrest is the Kinglet. Our representative of the Continental Crested Tit and the Scottish Crested Tit is the Chickadee. The table continues with Wood Grouse, Siskins (sic), and Spotted Woodpeckers inhabiting American forests.

Finally, considering the general treatment of topics in this introductory book, a bibliography directing the "turned-on" reader to other sources of information would seem to be desirable.

But never mind the negative criticism if you are looking for a readable, informative, general book surveying the biology of living birds to offer to beginners of almost any age. This is certainly a good one.—Bertram G. Murray, Jr.