RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

NEW JOURNAL

1. Centzontle. Published quarterly by the Sociedad Mexicana de Ornithologia (Apartado Postal 70–300, Mexico 20, D. F. Mexico). First issued in 1977.—This mimeographed newsletter provides members with timely notices, particularly for ornithological meetings. Considerable attention is given to the papers and business of the most recent (1976 and 1977) National (Mexican) Symposia of Ornithology. Notices further include information on international ornithological events, meetings of Mexican zoological societies, and the establishment of new wildlife sanctuaries in Mexico.

A few brief papers also appear in the 10 to 20-page issues. For example, the first year included an introduction to avian taxidermy methods and a review of the avifauna in the Palmar (palm habitat) zone of coastal Veracruz. The newsletter will be of interest to both Mexican ornithologists and those interested in that country's ornithological affairs.—Charles F. Leck.

BANDING AND LONGEVITY

(See also 15, 21, 23, 24)

2. Bird-banding at Powdermill, 1977. R. C. Leberman and M. H. Clench. 1978. *Carnegie Mus. Nat. Hist., P. N. R. Res. Rep.* **38:** 1–21.—As the title indicates, this is an annual report of a bird-banding facility, the Powdermill Nature Reserve, operated by the Carnegie Museum of Natural History. In 1977, 8,549 birds of 115 species were banded and 2,340 additional birds were processed (either repeats or returns) for a total number of 10,889 birds handled. In its 17 consecutive years the program at Powdermill has banded 150,448 birds of 160 species. The numbers of different species banded are tabulated as are minimum estimates of longevity for four nonpasserine and 34 passerine species. Among these were 11 new records for the reserve and three for the species as a whole (Swainson's Thrush (*Catharus ustulata*) 6 - 4 (six years, four months), Black-throated Blue Warbler (*Dendroica caerulescens*) 3 - 11, and American Redstart (*Setophaga ruticilla*) 6 - 2). There are 12 recoveries, involving reserve bandings or trappings. Seasonal and long term fluctuations among banded species are discussed for the Ligonier Valley (Westmoreland Co., PA) as well as the reserve proper. Beginning in 1977, record keeping was done via an electronic data processing system and the conversion of earlier records to the same system was begun. In addition to in-house news, this report contains worthwhile ornithological information and a good indication of the research being done at Powdermill.—Richard J. Clark.

3. Hawk Cliff Raptor Banding Station sixth annual report 1976. M. Field and W. Rayner. 1978. *Ont. Bird Banding,* **12**(1): 1–27.—This report summarizes bandings accomplished at the raptor trapping facility operated annually since 1969 at Hawk Cliff (Elgin Co., Ontario, Canada). The facility is also a part of an American Kestrel (*Falco sparverius*) nest box survey. There were 3,080 individuals of 13 species banded. Grand totals for the eight years of operation were 13,296 individuals of 23 species. Tabulated information for 1976, by species, includes annual totals for all years, monthly bandings for the total operation (i.e., includes roadtraps and nestlings as well as those banded at the station), methods of capture, species numbers observed daily and a comparison of raptors caught with various lure animals. Inter-station banding totals and a comparison of species by age (HY versus AHY) and station for the trapping results are provided for the 1975 and 1976 seasons. Finally, the American Kestrel nest box results and a summary of recoveries and retraps of kestrels banded at Hawk Cliff for the year 1976 are provided.

This report, as are many annual reports, is short on analysis of data. For example, the authors point out that the decline in the number of raptors banded was due to fewer operating hours and bad weather in December. Their data show a 28.9% decrease in bandings with the stations being operated 16.8% fewer hours spread over 11.2% more days. Birds banded per hours of effort averaged 2.95 in 1975, but 2.52 in 1976 (a 14.6%

decline in efficiency). This was all calculated by the reviewer from the authors' data. They record numbers of raptors observed on a daily basis, but no attempt is made to compare numbers observed versus numbers trapped. A table making the above comparison was compiled by the reviewer.

Percent of raptors (trapped versus observed) banded at Hawk Cliff in 1975.

Species	Sept.	Oct.	Nov.	Dec.
Sharp-shinned Hawk (*Accipiter striatus*)	13.5	8.6	18.9	
Cooper's Hawk (*A. cooperii*)	18.3	19.6	19.2	
Red-tailed Hawk (*Buteo jamaicensis*)	4.2	3.5	5.8	15.0
Red-shouldered Hawk (*B. lineatus*)				60.0
Marsh Hawk (*Circus cyaneus*)	5.1	2.7	2.7	11.1
American Kestrel (*Falco sparverius*)	9.3	11.4	2.7	

Such analysis has some shortcomings, but is of value in pointing out trends in trapability, e.g., the Cooper's Hawk is consistently trapable whereas the Sharp-shinned, Red-tailed and Marsh hawks become more trapable as the migration season lengthens. With the American Kestrel perhaps it is trapable migrants versus wary residents yielding the results?

The number of raptors of each species caught on different lure "birds" (*mouse* is listed as a lure *bird*) does not allow one to assess the effectiveness of the various lure animals, for no indication of the numbers and their exposure times are listed for each lure, e.g., starling-hours, sparrow-hours, etc. Similarly no data are provided in the raptor species versus method of capture table. Such information would be useful.

Little attempt is made to analyze the results of the American Kestrel nest box survey. By calculating the percent of boxes with either young and/or eggs in them (43%), they could have compared their results with Hamerstrom, Hamerstrom and Hart, (*J. Wildl. Manage.*, **37:** 400–403) who reported 30% for the most successful of their five years. Similarly 38.9% of the boxes yielding fledged young compares most favorably with 30% in the Wisconsin study.

In summary, authors of such reports could, by analyzing their data, contribute much more to ornithological literature and continually evaluate their operation for greater efficiency and scientific effectiveness.—Richard J. Clark.

4. Two successful nestings of Tengmalm's Owl in one summer. (Hemipollo pesinyt kahdesti samana kesana.) E. Kellomaki, E. Heinonen, and H. Tiainen. 1977. *Ornis Fenn.*, **54**(3): 134–135.—(In Finnish with English summary.)—A female Tengmalm's Owl (*Aegolius funereus*) banded as a nestling in 1967 was recovered two years later at a nest in Virrat central Finland, about 35 km from her birthplace. Her five young, found 5 May, were banded, and fledged about 28 May. Later in the same summer she nested 10 km from the first nest. "As the first chick of the second brood hatched on 30 June the female must have abandoned its first brood in May before the young fledged (incubation of the first egg takes about 30 days)." The four young and one unhatched egg (of second brood) were checked on 8 July. Here is a fine example of information derived from banded birds. Because 1969 was a peak year for voles, it was also favorable for enhanced owl nesting.—Leon Kelso.

MIGRATION, ORIENTATION, AND HOMING

(See also 21, 24, 73, 77)

5. Postnesting movements of the Common Starling. (Poslegnezdovye kochevki obyknovennogo skvortsa, *Sturnus vulgaris*) L. D. Nankinov. 1978. *Acta Ornithol.*, **16**(11): 309–313. (In Russian, with Polish and English summaries.)—Although little different from Starling movements elsewhere in the expanding range of the species, one may reflect that these movements were recorded within the Arctic Circle. Observations in 1966–1970 at

the Biological Station of Leningrad University showed three types of postnesting nomadic movements: late summer movements of flocks of siblings from individual broods, later summer movements of flocks of varied age components, and local autumnal foraging flock movements as adults and juveniles partly migrate to the south. These are followed by local nomadic movements that are continued until a permanent snow cover is formed. The author suggests that during nomadic movements adult birds transfer their individual experience to the young. Food is a dominant objective in much of the local nomadism.—Leon Kelso.

6. An apparent lunar rhythm in the day-to-day variations in initial bearings of homing pigeons. T. Larkin and W. T. Keeton. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton, eds., p. 92–106. Heidelberg, Springer-Verlag.—In August 1977, a symposium on animal migration and orientation was held on the occasion of the 500th anniversary of the University of Tübingen. A number of important papers based on studies of birds were presented. I review a selection of those that presented significant new data.

In earlier work, Keeton's group has shown that natural fluctuations in the earth's magnetic field account for some of the day-to-day variability in the initial orientation of homing pigeons. In other species (e.g., honeybees), magnetic influences on orientation often seem related to simultaneous responses to gravity. Larkin and Keeton searched for possible influences of changes in gravity on pigeon orientation by examining day-to-day variations in the mean vanishing bearings of pigeons released at a single site as a function of day of the lunar month. In six series of releases in four different years, the mean vanishing bearings of the pigeons at a given site varied linearly with day of lunar month, changing as much as 0.75 degree per day. However, in some series the changes in bearings cycled with the day of the lunar month beginning at new moon whereas in others they cycled beginning with full moon. Thus the relationship appeared to be stable in one of two states with opposite phase. Because the effect is a minor perturbation, the interpretation of these data must be considered preliminary since no direct relationship to any gravitational variable could be found and the possible involvement of natural magnetic fluctuations is unclear and problematical. Perhaps an analysis of data from birds carrying magnets would shed some light on these problems.—Kenneth P. Able.

7. Inversion of the magnetic field during transport: its influence on the homing behavior of pigeons. J. Kiepenheuer. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton, eds., p. 135–142. Heidelberg, Springer-Verlag.—**Effect of outward journey in an altered magnetic field on the orientation of young homing pigeons.** R. Wiltschko, W. Wiltschko, and W. T. Keeton. 1978. P. 152–161, ibid.—A new technique for exploring the use of magnetic information by homing pigeons is to transport the birds to the release site in an altered magnetic field. Experiments of this sort could shed light on the way in which magnetic information is used and whether magnetic cues are involved in navigation beyond their presumed role as a compass. These papers report on the first experiments performed and they provide no clear answers, but yield some effects that certainly warrant follow-up.

Kiepenheuer transported his pigeons in an earth-strength magnetic field with an inverted vertical component. By the Wiltschko model, this manipulation should reverse the magnetic compass. An effect was observed only in first-flight pigeons in which experimentals had a mean vanishing bearing deflected a significant 30° to the right of controls in releases under sunny conditions. Experienced pigeons showed no effect and no differences in vanishing times or homing speeds. The Wiltschkos and Keeton reversed the horizontal component of the field and took advantage of straight roads to reach the release points. The only effect was an increase in the scatter of vanishing bearings among the experimental birds. Out of 20 releases, the experimentals failed to reach Rayleigh significance in eight experiments in which the controls were oriented. In two other releases the controls were oriented, the experimentals were not, but a third group of birds exposed to the altered magnetic field only after arriving at the release site also failed to show significant directionality. Thus in these experiments the only apparent effect was a dec-

rement in initial orientation. It appears that magnetic information perceived during the outward journey may have some influence on pigeon homing, but it is not yet clear what that influence is.—Kenneth P. Able.

8. Importance of daytime flights of nocturnal migrants: redetermined migration following displacement. S. A. Gauthreaux, Jr. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton, eds., p. 219–227. Heidelberg, Springer-Verlag.—Typical nocturnal migrants are frequently observed moving during the early morning hours. The best known of these movements is the coastward flight of birds that have presumably drifted out to sea during the previous night's migration. The function of *inland* morning flight has remained obscure and reflects the paucity of studies examining this phenomenon. Gauthreaux, in a first exploration, hypothesizes that inland morning flight by nocturnal migrants results in a correction for wind displacement accrued during nocturnal migration. His hypothesis is based on the premise that migrants fly a preferred heading at night, and are displaced from this heading by lateral wind components. At least a partial correction for displacement results if morning migrants fly into the wind, a direction more or less orthogonal to their preferred heading at night. Migration on calm nights in western South Carolina is oriented northeast in spring and southwest in autumn. These are assumed to be the preferred headings. Prevailing westerly winds during both seasons cause an eastward displacement from the preferred heading. The hypothesis predicts a northwest morning movement regardless of season. Morning flight in South Carolina was directed toward the northwest in both spring and fall, supporting the hypothesis. Gauthreaux concludes that morning flight results in a correction for displacement. The critical test of Gauthreaux's hypothesis is the observation of a southeastward morning flight after nights with easterly winds. On the few occasions with easterly winds, Gauthreaux has observed the predicted southeast morning flight. East winds are relatively rare and the data too few for any conclusions regarding westward displacement.

Whereas morning flight in South Carolina seems to occur in directions that compensate for wind displacement, similar movements in eastern New York are consistently oriented in the same direction as the previous nocturnal flight. I have interpreted these movements as continued migration (Bingman, 1978, unpubl. M.S. thesis). The basis of this geographic variability in the behavior of nocturnal migrants in the early morning is unknown.—Verner P. Bingman.

9. Further analysis of the magnetic compass of migratory birds. W. Wiltschko. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton, eds., p. 302–310. Heidelberg, Springer-Verlag.—The orientation of European Robins (*Erithacus rubecula*) in indoor cages was used to explore some new aspects of magnetic orientation that may shed light indirectly on the mechanism of the magnetic compass. First, Wiltschko explored the functional intensity range of magnetic orientation. Robins trapped and held in a field of 0.46 gauss showed orientation over an intensity range of ±0.2 gauss. After about three days of acclimation, the birds could orient at considerably higher or lower field strengths (0.16–1.50 gauss). Interestingly, birds acclimated to these field values still oriented at earth-strength fields (i.e., 0.46 gauss), but not at an intermediate value (0.81 gauss).

A second series of experiments tested the orientation abilities of robins under alternating magnetic fields. Three types of 1 Hz oscillations (rectangular, sine, and saw-tooth waves) were used, each including normal intensity values (0.46 gauss) within its amplitude range. No orientation was observed under any sine wave, regardless of amplitude (one very low amplitude sine wave was used), whereas under the rectangular and saw-tooth waves typical weak directionality occurred. These data suggest that to be usable for orientation, a magnetic field must have at least some portion of constant intensity within the functional range of the bird. The minimum duration of this constant intensity was not determined.

The results of both sets of experiments may be interpreted in the context of Leask's recent model of magnetoreception (*Nature, Lond.*, **267:** 144–146, 1977; see *Bird-Banding*, **48:** 375, 1977).—Kenneth P. Able.

10. Anomalies in the Earth's magnetic field increase the scatter of pigeons' vanishing bearings. C. Walcott. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton, eds., p. 143–151, Heidelberg, Springer-Verlag.—Earlier reports concerning effects of minor temporal variations in the earth's magnetic field on bird orientation suggested a very high level of sensitivity to magnetic stimuli. These results have now been supported by experiments with homing pigeons that show the influence of very small field variations associated with local magnetic anomalies. At five of six anomalies with variations in field strength to 3,000 gamma over distances of less than 1 km, the vanishing bearings of pigeons were significantly more scattered than at two magnetically normal sites. These releases were performed under sunny skies and the results suggest that the magnetic influence is acting either upon the sun compass or upon the navigational system itself. Similar results obtained by Wagner (*Rev. Suisse Zool.*, **83:** 883–890, 1976) at very weak anomalies (ca. 80 gamma variation) point to a behavioral sensitivity to changes in the magnetic field on the order of a very few percent of the local field strength.—Kenneth P. Able.

11. Local anesthesia of the olfactory membrane and homing in pigeons. K. Schmidt-Koenig and J. B. Phillips. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton, eds., p. 119–124. Heidelberg, Springer-Verlag.—A new and potentially powerful technique was applied to Papi's olfactory navigation hypothesis of pigeon homing. Commercial xylocaine spray was shown to eliminate the ability to detect a strong odorant (amylacetate) through experiments employing cardiac conditioning. Control applications of xylocaine under the tongue had no effect on odor discrimination, supporting the thesis that the results were not due to irritation or some nonspecific effect. Two series of homing experiments were performed at 40 km and 70 km N, S, E, and W of the loft. Significant results supporting the olfactory hypothesis were obtained only in the 40-km series. Whereas the pooled results from all eight releases at 40 km showed no significant differences, there were differences in the first three releases of that series. Pigeons sprayed with xylocaine before departure from the loft showed significantly poorer initial orientation than either controls (sprayed with xylocaine solution lacking the active ingredients) or birds to which xylocaine was administered at the release site. The experimentals also had significantly poorer homing speeds (vs. controls). Although these results were not as clear-cut as those of Papi's group, they provide some support for the olfactory hypothesis.—Kenneth P. Able.

12. Orientation strategies used by free-flying bird migrants: a radar tracking study. S. T. Emlen and N. J. Demong. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton, eds., p. 283–293. Heidelberg, Springer-Verlag.—Who would have thought that one could catch a migrant, release it aloft at night from a small box carried by a balloon, and expect it to initiate migration? Emlen and Demong had precisely that daring idea and in 1971 they proceeded to find out if such a risky technique would allow the study of orientation mechanisms of free-flying migrants to be brought under a degree of experimental control. If it worked, the procedure would enable one to examine the orientation behavior of birds of known species and prior treatment released under conditions selected by the investigator. During the springs of 1971 and 1972, 64 White-throated Sparrows (*Zonotrichia albicollis*) were released and tracked with radar at Wallops Island, Virginia. Remarkably, when birds physiologically ready for migration were released under good migration conditions, most birds embarked on climbing or level flights of long duration that gave every indication of being migratory (see Demong and Emlen, *Bird-Banding*, **49:** 342–359, 1978). This paper presents some results pertinent to questions concerning orientation cues. Under clear night skies, 45 sparrows headed almost due north, even when released in stiff west winds that resulted in seaward tracks. Six birds released during the interval between sunset and the appearance of the first stars also headed in a NNE direction. Under solid overcast skies the birds appeared to be able to select a northward heading, but they did so more slowly and often exhibited zigzagging flight. In addition, flight headings were quite scattered under solid cloud cover. The authors claim that the obvious landmarks associated with the coastal release site were used minimally if at all by the birds. Whereas some birds did fly along

tracks that carried them out to sea, most followed a course closely parallel to the general direction of the coastline and I am less convinced than Emlen and Demong that landmarks were not used.

This important and innovative study supports the idea that celestial cues are important in the orientation of the White-throated Sparrow, but that the birds can probably select an appropriate direction in the absence of sun or stars. The data support the idea, also prominent in other recent studies, that the position of sunset may be an important directional cue for nocturnal migrants (see review **16**).—Kenneth P. Able.

13. Test of magnetic sensitivity in seven species of European birds using a cardiac nociceptive conditioning procedure. J. Beaugrand. 1977. *Behavioural Processes,* **2**(2): 113–127. (In English with French resumé.)—In an attempt to show magnetic sensitivity in *Streptopelia turtur, S. decaocto, Corvus monedula, C. corone, Turdus philomelos, T. viscivorus,* and *Anas penelope,* the author conditioned them to a light. They were then given 100 "presentations" of magnetic stimuli (CS+) reversing the vertical Z component of the local field, and 100 of a control stimulus for artifacts (CS−). "Cardiac activity was used as an index of reactivity throughout the study. Results indicated that magnetic stimuli were not used as a cue presaging the forthcoming shock." Results were in agreement with those of several other workers who have failed to show clearly magnetic sensitivity in birds subjected to conditioning.—Leon Kelso.

14. Migratory movements and plumage of subadult Saskatchewan Bald Eagles. J. M. Gerrard, D. W. A. Whitfield, P. Gerrard, P. N. Gerrard, and W. J. Maher. 1978. *Can. Field-Nat.,* **92:** 375–382.—Vinyl wing markers, first described by Kochert (*Raptor Res. News,* **7:** 117–118, 1973), were used to mark individually 43 Bald Eagles (*Haliaeetus leucocephalus*) hatched at Bresnard Lake, Saskatchewan in 1973 and 1974. These conspicuously marked eagles have yielded an impressive amount of information on survival (e.g., 37% survive their first year, 23% their second year, 19% their third year) and dispersal. Birds moved through southern Saskatchewan to winter in a broad region extending from Montana to Missouri, Texas, and southern California. Most eagles returned to Bresnard Lake in subsequent summers, but did not breed until their fourth or fifth summer, by which time they had attained complete adult plumage. Many of the eagles returned to the same winter quarters in succeeding years.

Despite the enormous potential of vinyl wing markers as a research tool, they are not without risk. One of the 43 eagles tangled its markers in a tree and perished.—Edward H. Burtt, Jr.

15. Endogenously controlled changes in migratory direction of the Garden Warbler (*Sylvia borin*). E. Gwinner and W. Wiltschko. 1978. *J. Comp. Physiol. A,* **125:** 267–273.—Banding returns and the wintering range of the Garden Warbler indicate that individuals of this species change their direction of migration upon reaching or approaching northern Africa. The authors hypothesize that this shift in migratory direction is controlled by endogenous timing factors. Birds were tested indoors for orientation under constant light conditions. The study took place in the autumns of 1972–1975. Orientation prior to 1 October was compared with that after 1 October, when free-flying birds should have reached Africa and flight directions were presumed to have shifted counterclockwise. Pooled results from 1972–1975, along with the results from two individual seasons (1972, 1975), showed a significant counterclockwise shift in the mean direction of orientation after 1 October. No significant differences in orientation were observed in the remaining two seasons. The observed counterclockwise shift in orientation is that predicted for free-flying birds nearing Africa, and the authors conclude that this directional shift is endogenously controlled.

The mean directions of individual bird-nights prior to and after 1 October were pooled to test for directionality. The use of the mean direction of an individual bird-night, even though activity may have been random, makes any statistical treatment of the pooled mean directions suspect. It is unknown just how many individual bird-nights were actually random in this study. However, low levels of activity and low concentrations about mean directions reported for individual bird-nights suggest that random activity was not infrequent. In any event, the novel treatment of the control of direction changes during mi-

gration in this study should encourage further research into this intriguing question.—Verner P. Bingman.

16. Sunset and the orientation of a nocturnal migrant bird. F. Moore. 1978. *Nature, Lond.*, **274:** 154–156.—Numerous environmental stimuli are known to be used by nocturnal migrants to orient. Surprisingly, the setting sun has been neglected by researchers as a potential orientational cue (but see review **12**). Moore's study is the first to verify experimentally the use of the sun by *nocturnal* migrants. Individual Savannah Sparrows (*Passerculus sandwichensis*) were tested for orientation under three experimental conditions: (1) birds exposed to both the setting sun and stars; (2) birds exposed only to stars; and (3) birds exposed only to the setting sun. Of the 14 birds examined in this study, 13 showed nonrandom orientation when exposed to both stars and sun. Eleven birds were oriented when exposed only to the setting sun whereas *one* of 14 oriented when exposed to stars only. The author concludes that the setting sun is used as a directional cue by migrating Savannah Sparrows. Moore's results have recently been replicated with another nocturnal migrant, the White-throated Sparrow (*Zonotrichia albicollis*) (Bingman and Able, *Anim. Behav.*, in press).

This study clearly shows that the sun may be used as a directional cue, but it raises serious questions as to the nature of the star compass (only 1 of 14 birds was oriented when exposed to the stars only). It now becomes tempting to speculate that Savannah Sparrows cannot use the stars as a directional cue independent of reference supplied by the setting sun. The absence of orientation in the "stars only" group may be a result of an inability to use the stars without seeing the sun first, or simply reflect the reduced activity levels observed in this group. Unfortunately, a distinction cannot be made at this time.—Verner P. Bingman.

17. Proposed principles of magnetic field perception in birds. H. G. Wallraff. 1978. *Oikos,* **30:** 188–194.—Wallraff, in a stimulating theoretical paper, addresses the question of how a migratory bird uses the earth's magnetic field as an orientation cue. His model is based on the premise that it is the strength or intensity component of the magnetic field vector that is used, not the directional component employed in a typical compass. In effect, the animal possesses an analog of a gaussmeter probe. A bird with a given inclination to the earth's magnetic field might sense varying intensity inputs as it moves in a horizontal plane. Within a wide geographic range, between approximately 20° and 70° north and south latitude, the range in measured intensities with respect to the bird's body axis is unimodal. The bird could use the direction of highest (or lowest) intensity as a reference for orientation. However, the unimodal distribution is dependent on the bird's inclination which will vary with its geographical location. The measurement of intensity is based on electromagnetic induction and therefore dependent on the bird's movement. Wallraff cites this as the likely reason why it has been difficult to show magnetic sensitivity in cage studies. He further hypothesizes that the probe is dependent on flapping flight with the important part of the probe located in the wings. The proposed mechanism does not involve the measurement of absolute intensities, but only on the change in intensity as the bird moves through a horizontal plane.

The model is independent of the polarity of the earth's magnetic field and consequently is consistent with the Wiltschko model of the magnetic compass (see review **9**). However, a bird migrating where the inclination of the earth's magnetic field approaches 0° or 90° (near the equator and the poles) could not orient by the mechanism proposed here because the distribution of intensities becomes bimodal or uniform, respectively. Regardless of this limitation, Wallraff's model will undoubtedly be the focus of much empirical research in the years to come.—Verner P. Bingmam.

18. On the possible influence of earthquakes on the migration of birds. D. Nankinov. 1977. *Ring* (Wroclaw), **92**(3): 133–136. (In English.)—Fragmentary observations and inconclusive opinions on possible sensitivity of birds to earthquakes occur in ornithological literature but there is little substantial evidence of a connection. The following is offered for evaluation, particularly as to mode of analysis. Recorded were the data from an earthquake of 4 March 1977 between 2300 and midnight in southeastern Europe,

covering much of the Balkan Peninsula with an epicentrum in Vrancei Mts. in Romania. Its intensity spanned 4 to 8 on the Richter Scale. Starting 20 February 1977 local migratory movements were observed. In spring 1976, *Fringilla coelebs* was abundant in flocks of 10–400. In 1977, passage was normal to 2 March, then ceased, to resume only after 20 March. For *Sturnus vulgaris,* normally in thousands, passage ceased entirely. Compared to spring 1976, *Emberiza citrinella, E. cirlus, Carduelis chloris, Phoenicurus ochruros, Luscinia megarhynchos, Sylvia atricapilla, Delichon urbica, Hirundo rustica, Otus scops,* and other common migratory species were absent. The author suggests that all alteration of transients in 1977 "were caused by the earthquake which occurred in March and April 1977, as no noticeable climatic changes were noted in the area concerned." He theorizes that birds react to the "voice of the earth;" in other words they are sensitive to infrasounds emitted by the slightest movements of the earth's crust components.—Leon Kelso.

19. Breast feathers and an air-current sense organ for the control of flight behaviour in a songbird (*Carduelis spinus*). M. Gewecke and M. Woike. 1978. *Z. Tierpsychol.,* **47:** 293–298.—Several authors have shown that there is a most efficient flight speed for a given avian species: more energy is expended when the bird flies at slower or faster air speeds. It would therefore be useful for a bird to sense its air speed, and in an ingenious experiment Gewecke and Woike show that Pine Siskins (*Carduelis spinus*) do this with their breast feathers. Very briefly, the bird is tethered on a lever that records lift and thrust forces while a photocell records wing beats; the bird is placed in a wind tunnel where an anemometer senses air speed. Then air speed is adjusted so that thrust is zero, giving the speed of the bird through the air. Siskins flap constantly when taking off, but when reaching presumably efficient speed go into the undulating flap-sail alternation characteristic of cardueline finches. When the breast feathers are sprayed with a micro-thin layer of acrylic acid ester, so that feathers are stuck together, the alternation between flap and sail phases becomes more rapid, primarily because the sail portion is considerably shortened. The authors conclude that depression of feathers by the air stream over them activate mechanoreceptors at their base, and these receptors provide negative feedback that inhibits flapping. A very interesting study.—Jack P. Hailman.

20. Wind effect on the flight altitude of the Chaffinch. (Vliyanie vetra na vysotu proleta zyablika (Fringilla coelebs L.)) A. Poluda. 1978. *Vest. Zool.,* **1978**(2): 42–45. (In Russian.)—The altitudinal variation of migratory flight in Chaffinches is correlated with wind velocity and direction. Against head winds migration is at lower altitudes than in still air, presumably because wind velocities decline as one approaches the ground. The authors believe that wind exerts a simple direct effect on the flight altitude of passerines in general. But how is this effected? This seems less simple the more one considers it. In mild weather independent of other factors (cloudiness, visibility) Chaffinch flight varies from 10 to 120 m but the bulk of the flocks fly at heights of 15–30 m. With irregular, incidental winds the altitude of migratory flight commonly rises to 200–500 m and more as the wind velocity will be higher than near the ground (10 m), and the birds may find it more advantageous to accompany stronger incidental winds. With head winds altitude decreases but altitude in this case is influenced not only by a trend to favor the lowest velocity head wind but also by a contrary trend—to hold to a satisfactorily broad field of vision.—Leon Kelso.

POPULATION DYNAMICS

(See also 4, 32, 36, 37, 85)

21. Recoveries of Saskatchewan-banded Great Horned Owls. C. S. Houston. 1978. *Can. Field-Nat.,* **92:** 61–66.—Great Horned Owls (*Bubo virginianus*) disperse farther during years when Snowshoe Hares (*Lepus americanus*) are scarce (see review **23**) than in years when the population of hares is increasing or abundant. Furthermore, dispersal is almost exclusively southeastward into Manitoba, North Dakota, South Dakota, Minnesota, Nebraska, and Iowa. The study is based on 2,229 owls banded as nestlings or flightless fledglings, incredible even for the indefatigable Dr. Houston and his volunteer army of owl-watchers. However, I wish that the analysis explored the data a bit more. Which age

class wandered the most? Which age class wandered most erratically? most systematically? Are the answers dependent on the abundance of hares? These are answerable, but unanswered questions.—Edward H. Burtt, Jr.

22. Decline of a Ruffed Grouse population in Manitoba. D. H. Rusch, N. M. Gillespie, and D. J. McKay. 1978. *Can. Field-Nat.,* **92:** 123–127.—The fantastic decline in Ruffed Grouse (*Bonasa umbellus*) in the Interlake Region of Manitoba, from 134 per hectare in the spring of 1971 to 2 per hectare in the spring of 1973 is the result not of reproductive failure nor of emigration but of increased mortality during the summer and fall. The population of Snowshoe Hares (*Lepus americanus*) declined about a year before the crash in the grouse population, leading the authors to suggest that predators shift their attention from hares to grouse. This seems reasonable, but supporting data are inconclusive and there the paper ends.—Edward H. Burtt, Jr.

23. Regional movements and mortality of Great Horned Owls in relation to Snowshoe Hare fluctuations. R. S. Adamcik and L. B. Keith. 1978. *Can. Field-Nat.,* **92:** 228–234.—Analysis of banding records from Saskatchewan, Alberta, and Manitoba reveals that during years when the population of Snowshoe Hares is increasing Great Horned Owls are sedentary; only 10% of the banded birds were recovered more than 100 km from the site of banding. In years when the population of Snowshoe Hares is declining, the owls disperse; 48% of the recovered birds had moved more than 100 km from the place of banding. The direction of dispersal is independent of the abundance of Snowshoe Hares and the number of emigrating owls (see review **21**). Whereas dispersal depends on fluctuations in the population of Snowshoe Hares, mortality is affected primarily by the age of the owls.—Edward H. Burtt, Jr.

24. Arrivals and departures of wintering Common Snipe in Central Brazos Valley of Texas. K. A. Arnold and D. J. Jirovec. 1978. *N. Amer. Bird Band.,* **3**(2): 45–47.—This study of the Common Snipe (*Capella gallinago*) in East-Central Texas was based on birds captured in mist nets between January 1968 and April 1974. Over 1,900 birds were trapped in 18 m × 2.7 m 2-pocket nets of 10 cm mesh and were banded. Nets were randomly set up in areas where birds were seen and were operated in late afternoon and early morning hours. The earliest arrival date was 17 September (14 days earlier than previously reported date) and the latest departure was 7 May (17 days later than previously reported). The data suggest fidelity to the wintering grounds and average arrival/departure earliest/latest dates of 10 November and 10 March. This study amply shows the long-term, concentrated effort required to demonstrate population phenomena such as resident periods for wintering birds and fidelity to wintering grounds.—Richard J. Clark.

NESTING AND REPRODUCTION

(See also 3, 4, 42, 49, 50, 52, 60, 65, 69, 74, 77, 82, 84, 92, 93)

25. Growth of nestling Meadow Pipits *Anthus pratensis*. [La croissance des jeunes Pipits farlouses *Anthus pratensis* au nid.] J.-C. Pedroli and M. Graf-Jaccottet. 1978. *Alauda,* **46:** 171–176. (In French with English and German summaries.)—Weights and lengths of several developing wing feathers were measured on nestlings in 12 nests of *A. pratensis* in the Swiss Jura. The authors propose combinations of several of the measures as useful for aging nestlings of this species, but do not present their criteria explicitly. The duration of nest life determined in this study was the same, ca. 12.5 days, as that previously determined in other parts of the species' range.—Paul B. Hamel.

26. On the biology of the Vinous-throated Parrotbill. (K biologii buroi sutory, *Suthora webbiana mantschurica* Tacz.) Yu Nazarov, O. Valchuk, and E. Kushmarev. 1978. *Biol. Nauki,* **1978**(4): 68–72. (In Russian.)—The placing of this species in an uncertain family, Paradoxornithidae, is as problematic as its little-known habits. It was common in South Primor but its numbers varied in 1974–1976. Nests were built in late April. Clutch size was 5–7, incubation lasted 13–14 days, nestlings departed after 11–12 days and there were 2–3 clutches per season. In summer the main foods were small lepidopteran larvae and spiders. Nests were deep-cylindrical to cup-like in shape, open at the top, and attached

to pliant plant stems 16–135 cm above ground. Forty-one nests were observed. Both adults built the nests, in 3–5 days, bringing material from distances of 30–150 m, at 4–5 minute intervals. Initiated nests were readily abandoned, with egg laying only after 3–4 attempts. Nests were readily found although in dense growth, sheltered by broad leaves or tufts of dry nodding grass. Nest materials included shredded stems and leaves of grasses, sedges, wormwood, tree bark, alder, poplar and willow leaves, and other bits picked from spider webs and butterfly cocoons. In almost every nest were 2–3-cm stems and leaves of reeds. In one case only, horse hair was found. Nest shapes were long-cylindrical (72%) or broad and flat. Measurements (of 41 observed) were 60–125 × 60–95 mm. Cavity diameter was 43–70 mm, depth 35–60 mm. Colors of eggs varied from deep blue to greenish or pale blue. Both parents incubated, alternating every 20–50 minutes. The young (of 104 seen) varied in coloration from flesh color to fleshy-gray above. Most showed two elongate dark patches on the anterior palate. One banded pair fledged three broods in a little over three months. Second nests were begun 4–6 days after a fledging. Both parents fed the young, foraging 30–50 m from the nest. Visiting frequencies were every 15 min in morning, every 15 min in evening. The items brought were less than 20 mm in length. Their nests were victimized by *Cuculus canorus* and *C. poliocephalus,* the Common and Little cuckoos. Their main enemies were *Pica pica,* the Common Magpie, and *Lanius cristatus,* the Brown Shrike, and snakes. Nest mortality by raptors was about 30%. There was some loss from domestic cattle, breaking up nests as they thrashed paths through the undergrowth.—Leon Kelso.

27. The breeding biology of the Dipper. G. Shaw. 1978. *Bird Study,* **25**(3): 149–160.—This analysis of nest record cards, collected from 1943 to 1972, quantitatively describes many aspects of the nesting habits of the European Dipper (*Cinclus cinclus*). Included in the analysis are: nest sites, height of nests above the ground or water, seasonality of nesting, presence of second broods, clutch and brood sizes, incubation and fledging periods, and fledging success. Among the more interesting results are that genuine second broods are raised in the same nest as first broods, unlike many other passerines. The only real drawback to the paper is the method of data collection, which may have introduced biases into some of the analyses, such as habitat preferences for nest sites.—Scott R. Robinson.

28. Some breeding statistics of Reed and Sedge warblers. C. J. Bibby. *Bird Study,* **25**(4): 207–222.—This paper, based on an analysis of nest record cards submitted to the British Trust for Ornithology, adequately describes most of the important measures of breeding activity for Reed (*Acrocephalus scirpaceus*) and Sedge (*A. schoenobaenus*) warblers in Britain. Included are: seasonality of nesting, clutch and brood sizes, nesting success, causes of failure, and number of attempted broods. In spite of the techniques employed in data collection, which might produce biased samples, the comparisons of the breeding biology of the two related species appear sound.—Scott R. Robinson.

29. Breeding ecology of the Merlin in Northumberland. I. Newton, E. R. Meck, and B. Little. 1978. *British Birds,* **71**(9): 376–399.—Observations from 1961–1976 provide information on habitat, breeding, food, and movements of Merlins whose populations have suffered from organochlorine contamination and reduction of breeding habitat. Levels of DDE and PCB and shell-thinning found in recent eggs are thought to have depressed breeding success.—Patricia A. Gowaty.

30. Nesting behavior and food habits of Parasitic Jaegers at Anderson River Delta, Northwest Territories. M. Martin and T. W. Barry. 1978. *Can. Field-Nat.,* **92:** 45–50.—The authors discuss the reproductive biology of Parasitic Jaegers (*Stercorarius parasiticus*) in an area uninhabited by Pomarine (*S. pomarinus*) and Long-tailed (*S. longicaudus*) jaegers. Seven nests were found in the river delta, a density of 1 nest per 2,300 ha. Reproductive success was 14.3% despite constant incubation by both parents in alternation. Eggs in the clutches hatched asynchronously and in all seven broods the smaller chick disappeared a few days after hatching. The parents at one nest attended their surviving chick 92% of the time. Analysis of 173 food pellets confirms the predatory nature of jaegers. Avian remains, mostly passerine, occurred in 85% of the pellets and mammalian remains oc-

curred in 25%. The authors fail to compare their results with those of Pitelka et al. (*Ecol. Monogr.*, **25:** 85–117, 1955) and Maher, (*Pac. Coast Avifauna,* **37,** 1974) who studied the reproductive biology of the three species of jaegers in areas of sympatry. Comparison of the reproductive biology of the Parasitic Jaeger in areas of sympatry and allopatry with other jaegers should have been possible and would have raised this article above the realm of "interesting anecdotes I have read somewhere."—Edward H. Burtt, Jr.

31. Reproductive success of Herring Gulls on Granite Island, northern Lake Superior, 1975 and 1976. J. P. Ryder and T. R. Carroll. 1978. *Can. Field-Nat.,* **92:** 51–54.—Herring Gulls (*Larus argentatus*) nesting on Granite Island in Lake Superior raised 1.32 young/pair in 1975 and 1.55 young/pair in 1976. Such reproductive success is the highest yet recorded among Herring Gulls in the Great Lakes ecosystem, yet Lake Superior has a higher concentration of pesticides and PCB's than Lakes Huron and Erie. The authors point out that reduced reproductive success may result from factors other than contamination by organochlorines. However, there are no measurements of organochlorine contaminants present in eggs, chicks, adults, or fish. The lack of correlation is based on analysis of water samples, a shaky basis.—Edward H. Burtt, Jr.

32. The ecology of the Great Tit in the Murmansk Region. (K ekologii bolshoi sinitsy v Murmanskoi Oblasti.) V. Bianki, and E. Shutova. 1978. *Byull. Mosk. Obschch. Ispyt. Prirody, Biol. Div.,* **83**(2): 63–70. (In Russian.)—Another contribution to the life history of the Great Tit (*Parus major*) would seem superfluous in light of its vast current literature. However, this study focuses on the tit's nesting phenology from 1971–1976 on the islands in Kandalaksha Bay. Nesting materials are analyzed. Instances of second nesting after first brood departure are cited. Data on egg size relative to duration of first and second broods are discussed. The diurnal singing of males and persistence of females on the nest during egg laying, incubation, and rearing of young are tabulated. The fall molt of juveniles and adults is described. The authors suggest that the sparse human population has limited the population of *Parus major.* There was variation in nest composition: weight varied from 14–67 g; the amount of mammal fur varied from 42% in May to 35% in June, and 18% in July. First clutches were laid in mid-May. Replacement clutches started 2–6 days after loss of the preceding clutch, and 1–2 days after fledging of a preceding brood. The first clutch averaged 9 eggs, the second clutch 8.7 eggs. The last young to fledge left on 13 August. Incubation lasted 14–15 days for first clutches, 10–11 days for second clutches, (numerous authors report 13–16 days for more southern locales). Most young fledged in 17–19 days. Of 123 eggs, 107 (87%) hatched, of which 54 (50%) fledged. Of 57 young banded none returned to nest locally. The shortest distance between nesting females was 100 m. Replacement nests were about 700 m distant from the former (3 instances).—Leon Kelso.

33. Egg and clutch sizes in four passerine species in northern Finland. M. Ojanen, M. Orrel, and R. A. Väisänen. **1978.** *Ornis Fenn.,* **55:** 60–68.—Studies of four species breeding in nestboxes (Great Tit *Parus major,* Pied Flycatcher *Ficedula hypoleuca,* Redstart *Phoenicurus phoenicurus,* and Starling *Sturnus vulgaris*) provided basic data on clutch size and egg dimensions and tested the relationship between these. Clutch size tended to increase with latitude in Europe in three of the four species; no tendency to increase was found in the Redstart. No geographic trend was found in size or shape of the egg. In Great Tits and Starlings egg size increases with increasing clutch size, but in Redstarts it decreases. Egg measurements from small clutches tend to have a high length:width ratio, and the authors caution against using egg measurements from small clutches as representative of a population. The authors cite the paper of Perrins and Jones (*Condor,* **76:** 225–229, 1974) as evidence for a high "heritability" of egg size and clutch size, whereas in fact that paper merely estimated "heritability" as the unexplained variance after a series of stepwise regressions of environmental and age variables known to be related to egg size and clutch size. This statistical approach is unsound and has been discussed in detail by Lewontin (The analysis of variance and the analysis of causes, *Amer. J. Human Genetics,* **26:** 400–411, 1974), which should be read by any biologists attempting to sort out multiple causes or environmental vs. genetic causes.—Robert B. Payne.

34. Breeding biology of the Starling *Sturnus vulgaris* in western Finland. E. Korpimäki. 1978. *Ornis Fenn.*, **55:** 93–104.—Based on analysis of 239 nesting records over the years 1966–1977 in Kauhava, clutch size averages 5.12 and decreases linearly through the breeding season. Incubation takes 12 days and the nestling period is 20 days. Losses during incubation are greater than during the nestling stages. The timing of breeding varies with late spring temperature, with cold temperatures delaying breeding, and timing also varies with latitude across Finland, with later breeding in the north. Clutch size varies directly with the temperature during egg laying, not with earlier temperatures. Clutch size varies with latitude in mainland Finland, from a mean of 4.94 at 60–62° N to 5.27–5.44 at 65–66° N, but clutch size is higher on the SW archipelago. Breeding success (young fledged/clutch) is lower in three studies in Finland than in most studies in Continental Europe and the British Isles. The effect of temperature on timing of breeding, clutch size, and breeding success all suggest that Starlings do better in more southern regions. Besides temperatures, Starlings are affected by changing agricultural practices, and decreasing numbers may also result from control in their wintering areas.—Robert B. Payne.

35. Optimal egg shape in waders. M. Andersson. 1978. *Ornis Fenn.*, **55:** 105–109.—Why are eggs narrow at one end? A simple geometrical model compares the volume of spherical eggs with spheres having a cone with a maximum radial length of $r\sqrt{3}$. Conical eggs with this dimension fit into the same volume in the nest, with the cones pointed to the center and touching the floor of the nest, and they contain 8% more egg volume than the spherical egg. The implicit assumption in the model is that the size of the brood patch is fixed and limiting, and under these conditions waders with a clutch of four eggs may "optimize" egg shape by maximizing the volume of eggs having the assumed shape characteristics of a sphere capped with a cone. As with most "optimization" models current in biology, the engineering solution is not quite the same as the observed natural egg shape, and so we postulate other "selective pressures" such as cooling rates, physical stresses on the eggshell, and economy of shell material which compromise the "optimal." The lesson of the "optimization" studies is that no single function can be optimized independently of the others.—Robert B. Payne.

36. Breeding biology of the Pied Flycatcher *Ficedula hypoleuca* in eastern Finland. S. Pasanen. 1977. *Ornis Fenn.*, **54**(3): 119–122. (In English.)—The aim of this study is to elucidate geographic variation. A total of 119 nests were examined at Lieksa (63°30'N, 29°40'E) in 1972–1975. The clutch size averaged 6.08. An average of 5.56 young hatched. The total hatching percentage of 115 completed clutches was 91.3%. After egg laying had started 16% of the nests were deserted or destroyed by predators. The clutch size, the number of young hatched, and the hatching percentage declined as the season advanced. These decreases correlated well with other Fennoscandian studies (i.e., a general decrease of clutch size northwards). Provision of nest boxes variously favored or controlled the nestings. The bottoms of nest boxes were 10 × 15 cm, with entrances (35 mm in diameter) 15 cm from the bottom. The boxes were fastened on trees at heights of 1.5–2 m, at distances of 30–50 m apart. A total of 65 breeding females and over 500 nestlings were banded. These data are suitable for comparison with the numerous other studies.—Leon Kelso.

37. Fluctuations of the nesting populations of Snow Geese of Wrangell Island in 1969–1973. (Izmeneniya chislennosti gnezdyashchikhsya belykh gusei o-va Vrangelya 1969–1973). E Syroechkovskii, A. Krechmar, and A. Artyukhov. 1977. *Ornitologiya*, **13:** 212–213. (In Russian.)—On this island for the years 1969–1973 inclusive, the nesting areas for *Anser caerulescens* totaled 1,950, 2,600, 850, 920, and 200 ha respectively. Nesting densities per ha were 30, 14, 14, 20, and 30 respectively. Nesting pair totals were 67,000, 60,000, 12,000, 19,500, and 6,000 respectively. As pointed out by the authors, weather conditions were the major cause of the fluctuations and decline. Only two spring seasons were favorable for nesting, 1969 and 1970. Some of the decline was attributed to Arctic Foxes. Yet the yearling increment of the total population declined from about 10% in 1971 to less than 1% in 1973.—Leon Kelso.

38. The Short-toed Eagle. (Zmeeyad.) V. M. Galushin. 1978. *Priroda,* **256**(8): 158. (In Russian.)—That the Short-toed Eagle (*Circaetus gallicus*) is not considered a "Serpent Eagle" is something of an injustice, since its most striking characteristic is not that its toes are unusually short but that it feeds almost exclusively on snakes; its name in Russian (*zmeeyad,* "snake-eater") and other European languages reflects its peculiar diet.

Although distributed over a wide area (southern, western, and central Europe, the southern half of European USSR, the USSR's Kazakh Republic, Central Asia, the Near East, Iran, and northern India), this species is fairly common only in Central Asia, where snakes (and lizards) are locally abundant. In groves of Turkish terebinth (*Pistacia mutica*) in Badkhyz, their density reaches 3–4 active nests per 10–12 km^2. In European forest regions, where snakes are almost extirpated, Short-toed Eagles are rare. A nest found recently (the year is not given—probably mid-1970's) in the Oka Nature Preserve, about 150 miles southeast of Moscow, is the first record of this species in European USSR in 50 years.

In European forests, the eagle is secretive, wary, and quiet. It builds a loose, slip-shod nest, so small that there seems hardly room for the sitting bird, whose tail always protrudes over the edge. A Short-toed Eagle chick is unenergetic and quite shy. Most raptor chicks can hold their own when confronted by a threat: they fall over on their backs and with dexterous fencing-like thrusts of their talons keep the enemy at a distance. The Short-toed Eagle is different: it "droops," pressing itself down onto the bottom of the nest, and freezes. Sometimes even the arrival of a parent with food cannot bring the chick out of this state.

Because the Short-toed Eagles' prey are cold-blooded, the birds have a shorter "working day" than other raptors (starting 3–4 hours later and ending 1–2 hours earlier), and therefore lower "labor productivity." Perhaps as a reflection of this, Short-toed Eagles lay only one egg. On Central Asian deserts, parents have been observed making 5–7 flights to the nest with food daily, but the pair in the Oka Preserve managed only 3 or 4. No food other than snakes (about half of them poisonous) was recorded. The average weight of the snakes was 120–150 g, or 8%–10% of the chick's weight shortly before it fledged; during the chick's stay in the nest (70–80 days), the parents may have brought it 250–270 snakes.—Elizabeth Anderson.

39. Incubation ecology of Snow Geese on Wrangell Island. (Ekologiya nasizhivaniya belogo gusya (*Anser caerulescens*) na Ostrove Vrangelya.) A. Krechmar, and E. Syroechkovskii. 1978. *Z. Zhurn.,* **57**(6): 899–910. (In Russian with English summary.)—This is a continuation of life history researches on *Anser caerulescens* comparable with those on the species in the American north. Specially designed photoelectric equipment recorded the incubation pattern of birds, registering temperatures of the clutches, of a model egg in the clutch and of the soil surface around the nest, during egg laying and subsequent incubation. Attention focused on female nesting behavior revealing many details discussed at length. The data include over 840 hours of incubation time. Uncertain, fluctuating weather conditions were the dominant ecological feature of consideration.—Leon Kelso.

BEHAVIOR

(See also 19, 52, 54, 65, 69, 79, 81, 83, 87, 89, 93)

40. On bluebird "responses to apparent female adultery." E. S. Morton, M. S. Geitgey, and S. McGrath. 1978. *Amer. Nat.,* **112:** 968–971.—Barash (*Amer. Nat.,* **110:** 1097–1101, 1976) reported that male Mountain Bluebirds (*Sialia currucoides*) attacked their mates when he placed a mounted male near two nests before the clutch was completed, but attacked only the mount afterward. This study has been cited by authors fond of "sociobiological" interpretations of behavior as an anti-cuckold mechanism protecting the male from adultery by his female. Morton et al. apparently set out to confirm this effect using a larger sample size of 17 pairs of Eastern Bluebirds (*S. sialis*) breeding in the National Zoological Park's research center in Virginia. They used a male mount, female mount, and a mount of the Hermit Thrush (*Catharus guttata*), but had to abandon the experiment after working with eight pairs because their birds tore up the mounts so badly. Both sexes attacked the male mount, but only the female attacked the other two mounts. The authors

managed to present the male mount at five nests prior to completion of the clutch, and in no case did the male attack his mate at this time, nor in any tests after completion of the clutch.—Jack P. Hailman.

41. Aggressive communication by *Larus glaucescens*, Part VI: interactions of territory residents with a remotely controled (sic,) **locomotory model.** C. J. Amlaner, Jr. and J. F. Stout. 1978. *Behaviour*, **66:** 223–251.—A stuffed Glaucous-winged Gull was mounted on a radio-controlled cart and the reactions of territory holders to this intruder were noted. The excruciatingly detailed data amount to this: gulls attack a moving model more than a stationary one, they tend to choke or otherwise display to an approaching model but tend to attack a receding one, they attack a model facing away more than one facing toward them, and males attack more than females. The only non-obvious finding seems to be that "the lower head-neck posture was correlated with fewer attacks." The radio-controlled gull is a marvelous gadget, but I am unconvinced that it led to anything that could not have been learned by simply watching gulls behave.—Jack P. Hailman.

42. Lack of nest site tenacity and mate fidelity in the Starling. C. J. Feare and S. E. Burham. 1978. *Bird Study*, **25**(3): 189–191.—Male Starlings (*Sturnus vulgaris*) commonly switch mates after their first brood to raise a second brood during the same breeding season. This lack of fidelity is based, in part, on lack of success with the first brood. The authors conclude that male Starlings may be maximizing their reproductive effort by investing little, relative to the female, in initial broods and beginning second or even third broods with other females. However, males may be simply choosing mates using previous breeding success as their criterion for mate selection; thereafter males may show strong fidelity both within and between breeding seasons. What is needed to understand these problems are more long-term studies tracing the breeding history of marked individuals within discrete populations.—Scott R. Robinson.

43. Territorial responses to energy manipulation in the Anna Hummingbird. P. W. Ewald and F. L. Carpenter. 1978. *Oecologia*, **31:** 277–292.—Evolution of territorial behavior is presumably favored when the accrued benefits in fitness are greater than the costs of defense. Anna Hummingbirds (*Calypte anna*) defend feeding territories during the nonbreeding season. Two key aspects of territoriality were measured as the energy availability (nectar) on the territory was experimentally varied: (1) territorial exclusiveness and (2) the form of defense. The authors were interested in testing a threshold model of territorial defense proposed earlier by Carpenter and MacMillen (*Science*, **194:** 639–642, 1976). Does territorial behavior disappear below a threshold level of energy availability or does it change gradually as territorial rewards decline?

When energy availability was unlimited, the residents defended highly exclusive territories primarily by energetically expensive, although very effective, defensive behavior (chases). As energy availability decreased, exclusiveness declined gradually, relative use of energetically inexpensive defense increased, and owners spent less time on their territories. Territorial behavior also varied with short-term depressions in energy availability. A lower percentage of intruders was chased and departures of an owner from its territory were more frequent shortly after feeding.—Frank R. Moore.

44. Effect of blackened epaulets on the territorial behavior and breeding success of male Redwinged Blackbirds, *Agelaius phoeniceus*. L. Morris. 1975. *Ohio J. Sci.*, **75:** 168–176.—Morris confirms the earlier work of D. Smith (*Behaviour*, **41:** 251–268, 1972) wherein the red epaulets of Red-winged Blackbirds were found to function in male territorial defense. A higher than average trespass rate was recorded in territories of males with blackened epaulets when compared with control males. Males with blackened epaulets were able to mate, however, and bring off successful broods, a finding in keeping with Smith's conclusion that epaulets communicate threat between rival males but have little role in intersexual encounters.—Frank R. Moore.

45. Cultural transmission of enemy recognition: one function of mobbing. E. Curio, U. Ernst, and W. Vieth. 1978. *Science*, **202:** 899–901.—Two Blackbirds (*Turdus merula*) were placed in large cages a meter apart. Between them was a four-chambered box, which could be positioned so that each bird could see into only one of the two opposite chambers.

The "teacher" saw a stuffed Little Owl (*Athene noctua*) and opposite it, the "observer" saw a stuffed Noisy Friar-bird (*Philemon corniculatus*). A mobbing response by the "teacher" stimulated a similar response by the "observer." Any novel situation, as an empty chamber or a colored plastic bottle causes a slight reaction, but a "teacher's" reaction was necessary to cause a strong reaction. "Observers" later functioned fully as "teachers." Although mobbing seems to be adaptive, the authors say "we are far from understanding which selection pressures have molded the adaptedness of this behavior."—C. H. Blake.

46. Social plasticity in the Acorn Woodpecker. P. B. Stacey and C. E. Bock. 1978. *Science,* **202:** 1298–1300.—*Melanerpes formicivorus* is one of the most fascinating of American birds. In recent years we have learned through studies by the MacRoberts and others that as many as a dozen of these white-eyed woodpeckers maintain a year-round territory, communally storing acorns for the winter and communally rearing young in the summer. I have often wondered whether its food supply is so secure that it does not have to wander in search of good acorn crops, in the manner of its erratically migrating congener, the Red-headed Woodpecker (*M. erythrocephalus*). Stacey and Bock have shown that in Arizona some Acorn Woodpeckers behave much more like their eastern cousins whereas others behave like previously reported California Acorn Woodpeckers. The former birds nested in traditional pairs, did not exhibit cooperative storage, and, if they scatter-stored sufficient acorns, they might remain as individuals through the winter, but otherwise migrated to parts unknown. Even if both birds of a pair returned to the same area the following year, they found different mates, and although territorial boundaries tended to remain similar from year to year, the birds occupying the territories were often totally changed. The decision as to whether or not to remain over winter depended on the number of acorns stored in the fall. This more usual kind of social organization occurred in birds with territories adjacent to those of communally storing, highly social birds that remained throughout the winter on territory. This contrast in patterns within a local population gives one second thought about the "sociobiology" theories assuming a high degree of genetic determination in social behavior. Stacey and Bock have produced a most interesting study, which bears following through on the Red-headed Woodpecker as well.—Jack P. Hailman.

47. Investigations into the symmetry concept in the Great Tit (*Parus major* L.). (Untersuchungen zum Symmetriekonzept bei Kohlmeisen.) M. Menne and E. Curio. 1978. *Z. Tierpsychol.,* **47:** 299–322.—In a series of discrimination experiments characteristic of the exhaustive testing of Eberhard Curio, tits were shown to be able to detect and utilize bilateral symmetry as a cue for distinguishing shapes. It should be pointed out that not all of the "asymmetric" shapes used actually lack bilateral symmetry. It is true that they are all asymmetric in the sense that if bisected by a vertical line, the two halves are not identical. However, if the bisecting line is rotated, some of the "asymmetric" figures prove to be bilaterally symmetric or very nearly so (e.g., in Figure 6 on p. 305, shape 6 when turned 90° appears bilaterally symmetric, shape 3 is very nearly so, and shape 5 is reasonably close; shape 4, when rotated 45°, also approaches bilateral symmetry). Furthermore, other "asymmetric" figures in fact show more complex kinds of symmetry (e.g., the parallelogram of shape 9). Therefore, the tits have actually been asked to discriminate bilateral symmetry relative to gravity—perhaps a more difficult distinction than the authors had in mind. The ecological relevance of this investigation is, of course, recognition of such prey shapes as that of a butterfly with wings spread, which is bilaterally symmetrical when approached in a plane through the body axis and normal to the outspread wings. I suspect that a Great Tit can still recognize the bilateral symmetry when approaching a butterfly from the side, and it seems possible that "mental rotation" of some of the figures (making "asymmetric" shapes actually symmetric) might have contributed to difficulties in the tits' discrimination learning.—Jack P. Hailman.

48. Behavioral and physiological effects of testosterone propionate and cyproterone acetate in immature male domestic ducks, *Anas platyrhynchos*. J. Balthazart. 1978. *Z. Tierpsychol.,* **47:** 410–421.—Testosterone injections had no effect on the frequency of familiar courtship-party displays such as introductory shake, grunt-whistle, head-up-tail-up, nod-swim and down-up, but did dramatically elevate head-flick frequency (an effect

blocked by cyproterone). Testosterone also elevated frequencies of all the copulatory-associated actions: head-pumping, mounting, grasping neck feathers and copulation itself, and in some cases cyproterone did not block the effect. Lastly, testosterone had little effect on molt of head-feathers (the iridescent green head probably is an important display component in wild mallards), but it caused evident development of the penis, development which was not inhibited by cyproterone.—Jack P. Hailman.

ECOLOGY

(See also 22, 58, 76)

49. Notes on ecology of the Tufted Duck in the mid-stream of Anadyr River. (Materialy po ekologii khokhlatoi cherneti v sredniem reki Anadyri.) A. Artyukhov. 1978. *Biol. Nauki,* **1978**(6): 55–59 (In Russian.)—Although not rare in northeast Siberia, the Tufted Duck (*Aythya fulvigula*) has drawn but few fragmentary notes locally, and this adds but few more. It comprises about 1% of the area's waterfowl population. These observations in 1975–1977 east of Markov in the Anadyr basin provided data on incubation and brooding temperatures that are limited and inconclusive for the species. Migratory flocks of about 10 arrived or departed about 30 min after sunset. Nuptial display in late June led to 6–8 eggs in sedge hummocks, hatching in early July. Eggs 39–42 × 53–61 mm had an average weight of 56 g. During 162 hr of continual recorded nest occupancy, the females covered the nests 85% of the observed time.—Leon Kelso.

50. Reproductive interdependence of Piñon Jays and piñon pines. J. D. Ligon. 1978. *Ecol. Monogr.* **48**(2): 111–126.—Piñon Jays (*Gymnorhinus cyanocephalus*) are not ordinary north-temperate-zone passerine birds, especially in the exceedingly dry San Augustin Plains near Magdalena, New Mexico. Ligon documents that in this area the reproductive cycle, rather than showing strict photoperiod control, shows specific effects dependent on piñon pines (*Pinus edulis*) which irregularly but synchronously produce a superabundance of seeds. In particular, Piñon Jays breed in the late summer of such "bumper" years and also breed up to two months earlier than usual (early February rather than late March or April) the following spring. Laboratory work showed that it was not the mere presence of abundant food that produced these effects in the Piñon Jays from Magdalena. Rather, some particular constituent of the lipid-rich piñon seeds accelerates development of the testes of most birds during the winter and so, too, the presence of green cones in the summer prevents regression of the gonads.

Ligon also discusses the interdependence of the Piñon Jays and piñon pines from the point of view of the pine trees. He points out that the presence of heavy seed predation on the occasional nonsynchronous tree will produce strong selection against that tree. On the other hand, trees that show synchrony in production of large seed crops will not only have some seeds spared from predation, but also have many of these spared seeds cached by Piñon Jays in desirable sites for germination and survival.

Several problems are alluded to which merit further study. Among these are the precise mechanism whereby the gonadal cycle is affected by the piñon seeds and the degree of reproductive isolation between the Piñon Jays near Magdalena that are dimorphic in showing the effects documented and the jays farther north that never breed in the fall. Clearly Ligon's excellent work and that he cites could be merely the start of a further fascinating study.—A. John Gatz, Jr.

51. Nonrigorous foraging by robbing egrets. J. A. Kushlan. 1978. *Ecology,* **59**(4): 649–653.—Great Egrets (*Casmerodius albus*) usually hunt by standing alone and seizing fish from the water. In tropical and subtropical areas, however, shrinking water areas during the dry season concentrate fish, which can lead to mixed foraging flocks of herons, egrets, and ibises. In such flocks egrets use two feeding methods: normal hunting and robbing smaller neighbors of their prey.

Although his samples are small and collected during a single week, Kushlan makes an interesting case for believing that the robbing of neighbors is not profitable for Great Egrets. Through such piracy, their cost:benefit ratio is more than 5 times higher than for normal hunting in the same pools. They obtain prey on only 27% of their attempted

thefts, compared with 58% by normal hunting. Thus they ingest less food per minute when robbing.

Kushlan interprets these data as evidence that natural selection does not always lead to short-term optimal foraging. In fact, he considers the theory of optimal foraging to be "nearly tautological." But why would anyone expect short-term behavior to be optimal? Natural selection operates on the efficiency of the phenotype's lifetime reproductive success. An isolated examination of a single aspect may or may not reveal the likelihood of that success. It occurred to me that, in this case, selection may have favored the tendency to pursue larger-than-average prey items (stolen prey *are* significantly larger, but not to the degree where it compensates for reduced capture rates). If this tendency increases feeding efficiency during most of the year, selection may not penalize it for encouraging low-return piracy in flocks. It might be an inconsequentially rare side product of an otherwise adaptive trait. There are sure to be other alternative explanations as well.

Unfortunately, Kushlan did not tell how long such inefficient robbing behavior persists in the annual cycle, or if the same individuals stay with it for long. In fact, the brevity of his study makes it quite difficult to know the importance of the whole phenomenon.—Douglas Mock.

52. Ecological study of the social organization in the great tit, *Parus major* L. I. Basic structure of the winter flocks. T. Saitou. 1978. *Jap. J. Ecol.*, **28**: 199–214.—Here is a superior descriptive study, rich in detail and implication. The author invested much time (1968–1974) and effort (*all* birds color banded for individual identification) to examine the Great Tit's winter social organization in Japan. The results were both interesting and somewhat unexpected. Previous discussions (e.g., Hinde, *Behav. Suppl.*, **2:** 1–201, 1952) of wintering tits concluded that flocks (2–50 birds) were random assemblages of individuals, frequently changing in membership and size. Saitou discovered that by mid-October, tits were found in two distinct flock types. "Basic" flocks (2–16 birds) were constant in both membership and size (other than deaths), and centered their activity in bounded geographical areas (flock centers). "Compound" flocks (4–50 birds) were formed when different basic flocks "joined" in areas where their ranges overlapped. Both the membership and size of compound flocks fluctuated. It appears that an inability to identify individual birds led earlier investigators to conclude wrongly that compound flocks were *the* social unit in wintering Great Tits.

Saitou's data on the formation and structure of basic flocks are the most interesting aspect of his study. To whet your appetite for more, let me briefly list his conclusions about the "normal" formation of an "average" flock (=4 birds). The nucleus of the flock is a previously mated pair which remains in the general vicinity of their breeding territory from the previous spring (the flock range includes the smaller breeding territory within its boundary). The remainder of the flock are usually juveniles, which, after wandering about the study area during late summer and early autumn, have settled in this particular pair's range (usually some distance from their birthplace, median = 300 m). Widowed or widower adults usually associate themselves with the basic flock of a surviving pair that bred in an adjacent territory. Occasional flocks consist entirely of juveniles, but such flocks range over unfavorable breeding habitat that contained no adult breeding territories. Finally, at the end of winter, the basic flocks become mating flocks (113 of 155 resident pairs with mates drawn from the same *wintering* flock), with surviving pairs breeding in the same area in which they wintered.

My only disappointment with this paper was its failure to explore most of the evolutionary implications that emerge so readily from the data. Organization and presentation of the data make it clear that Saitou has not overlooked them. In fact, some references to forthcoming companion papers suggest that such discussions will emerge. Still I cannot resist some of my own. It appears plausible to me that the basic winter social organization of the Great Tit results from competition for *future* breeding sites. Adults remain in the vicinity of their previous territories; juveniles settle to winter in areas that offer the "best" chance for successful breeding. They associate with adults on the *best* territories, "hoping" for a death in the family. In spring, the survivors sort themselves out and settle in the areas in which they wintered. If this is true, winter flock size (basic) is not necessarily indicative of the quality of the winter environment; rather, it probably reflects the quality

of an area as a breeding site. This may be the tip of an iceberg, an indication that this is only the first of a series of papers.—William M. Shields.

53. Resource partitioning in Finnish woodpeckers. R. H. Alatalo. 1978. *Ornis Fenn.*, **55:** 49–59.—The four common woodpeckers in southern Finland are *Picus canus, Dendrocopos major, D. minor,* and *Dryocopus martius.* The author applies a multivariate analysis to data on feeding stations and tree species used by these four species. His technique (described in *Ecology,* **58:** 900–906, 1977) is called "the components of diversity method" and provides nonorthogonal factor-analytical axes. The habitat variables are ordered according to their contribution to these axes, and the author suggests that the ordering reflects the ecological importance of differences among these variables that the woodpecker species use to avoid competition. The multivariate technique provided a 33% separation of the woodpecker species. No tests of statistical differences can be made from the axes or the data presented in this paper. What is the usefulness of analytical techniques that (1) cannot show the presence or absence of competition, (2) cannot be used for testing null hypotheses, and (3) fail to account for most of the variance in the data?—Robert B. Payne.

54. Notes on ecology and behavior of the Tufted Puffin. (Zametki po ekologii i povedeniyu toporka.) E. Mikhtaryants. 1977. *Ornitologiya,* **13:** 127–133. (In Russian.)—In 1969, on the Commander Islands, the Tufted Puffin (*Lunda cirrhata*), whose briefer local name is "toporka," was the most abundant bird species. It was obliged to share space with Glaucous-winged Gulls, (*Larus glaucescens*) and Parakeet Auklets (*Cyclorrhynchus psittacula*). It occupied most of the space on narrow coastal belts on the islets except for sites with dense grassy vegetation. By late May most of the "toporka" had occupied their burrows. Yet friction between occupants continued to mid-June. Aggression relative to other breeding species on the islets was slight and rarely in evidence. Line drawings illustrate the poses and reactions assumed to challenge and repel auklets intruding into the puffins' nest sites. Figures also illustrate the puffins' distribution on the islets, the mechanics of their running, hopping and flight takeoffs, and their gathering of nest material. There are also a multitude of descriptive details of these behaviors, in addition to those of nest building, incubation, and feeding of young. Excavation of new burrows occupied only a few pairs. Most of them took renovated or old deepened burrows. The growing young were fed on fish foraged at sea by the adults. The fishes that were captured (20 cm in length) were carried, several per trip, in the adult's bill. Foraging Kittiwakes (*Rissa tridactyla*) harrassed and robbed the returning puffins.—Leon Kelso.

55. Contemporary status of the ecological niche concept. (Sovremennoe sostoyanie kontseptsii ekologicheskoi nishi.) A. Gilyarov. 1978. *Uspekhi. Sovrem. Biol.,* **85**(3): 431–446. (In Russian.)—After a brief introductory statement, the topic is discussed under the headings: history; fundamental properties of a multivariate model of the ecological niche; homogeneity of niche space; quantitative estimate of niche scope; quantitative estimate of niche overlap; and niche structure of communities. Interest in the complexities of the topic is shown in the 90 bibliographic titles cited, most of which are British and American. Certain titles are more frequently cited than others, for example "Theoretical ecology. Principles and application," R. M. May (editor). 1976. 217 p. At present the niche concept is in a state of flux. Whereas most workers grant the "niche" an imprecise definition, they generally conceive of it as a unified entity. Dominating consideration is the multidimensional or multimeric niche model proposed by Hutchinson. Major progress in development of the concept relates to mathematical estimation of the proportions of the niche and extent of overlapping. Of major importance are methods of multidimensional or multivariate statistics. Basic to our understanding of the concept are descriptions of principles and mechanisms of competitive pressure, and stability of species in a particular community. Granting the limited value of definitions, the author suggests his own definition of the ecological niche. "An ecological niche is a situation embodying a species in a system of factors of the environment relative to other species competently competitive with it."—Leon Kelso.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(See also 14, 22)

56. White-tailed Eagles in Britain and Norway. J. A. Love, M. E. Ball, and I. Newton. 1978. *British Birds,* **71**(11): 475–481.—Threatened in Europe by habitat loss, persecution by humankind, and chemical pollutants that seriously affect breeding success, the White-tailed Eagle (*Haliaeetus albicilla*) is found around northwest Norway and is being reintroduced on the island of Rhum in the west of Scotland. Between 1975–1977, 13 young White-tailed Eagles were released. Eight additional birds were to be released in autumn 1978.—Patricia A. Gowaty.

57. Evaluation of bird damage to strawberry patches in the Leningrad region. (Otsenka vrednosnosti ptits na zemlyanichnikakh v leningradskoi oblasti.) E. Golovanova. 1977. *Ornitologiya,* **13:** 79–81. (In Russian.)—Censuses and other observations were taken of birds involved in strawberry damage in five areas of the Leningrad region in 1969–1970. Extent of damage beyond the season of crop harvest was determined by recorded quantity of berries, and by harvest of the crops damaged as expressed in relative weights. The original weight of damaged fruit was estimated on the basis of an equivalent amount of undamaged berries. This was followed by calculations of the overall damage by various bird species to the berry crop. The berry patches were attacked mainly by *Turdus pilaris, Sturnus vulgaris, Corvus frugilegus,* and *C. corone.* The heaviest damage was by the first named. The author suggests that particular populations of these species have resorted to specializing on consumption of cultivated fruits. At randomly selected sites, bird damage was 24% in 1969. In the agricultural institute gardens loss of the early fruit was 43%, while at the height of ripening it was 38%. The author calculates that one Fieldfare (*Turdus pilaris* could consume 212 g of strawberries, or 94 g of black currants daily.—Leon Kelso.

CONSERVATION AND ENVIRONMENTAL QUALITY

(See also 29, 31, 75, 99)

58. Suburban bird populations in west-central California. T. Vale and G. Vale. 1976. *J. Biogeography,* **3:** 157–165.—The authors evaluate the notion that species diversity and abundance would change with time as suburban areas age and woody horticultural plantings grow. Spring and summer censuses of bird populations were made in 17 suburban neighborhoods which ranged in age from 1 to 29 years. *Ceteris paribus,* this sampling procedure may be used to study temporal changes in populations that may be responding to an aging suburban environment. Increased species diversity and abundance were correlated with suburban age, although most of the increase occurred in the initial years following housing construction. When compared to presuburban habitats, residential areas supported larger numbers of both species and individuals. The suburban environment is thought to be more diverse than presuburbia as a result of horticultural plantings. This difference is necessarily dependent on the nature of the habitat prior to construction.—Frank R. Moore.

59. Coho salmon (*Oncorhynchus kisutch*) and Herring Gulls (*Larus argentatus*) as indicators of organochlorine contamination in Lake Ontario. R. J. Norstrom, D. J. Hallett, and R. A. Sonstegard. 1978. *J. Fish. Res. Board Can.,* **35**(11): 1401–1409.—Coho salmon and Herring Gulls were compared as indicator species for assessment of contamination of Lake Ontario by compounds that included PCB's, DDE, mirex, and photomirex. Herring Gull eggs showed 50 ± 10 fold concentration of the four compounds listed relative to the alewives and smelt that the adult birds take as food. The organochlorine levels in the Herring Gull eggs are often 20 times higher than those in coho salmon tissue, and thus the Herring Gull is the indicator species of choice for recognition of minor residues. The salmon, however, seem to have relative abundances of residues more nearly like the entire Great Lakes system than have the gull eggs.—A. John Gatz, Jr.

60. Notes on "Falco peregrinus" in Argentina. (Algunas consideraciones sobre *Falco peregrinus* en nuestro país.) W. G. Vasina. 1975. *El Hornero,* **11**(4): 281–284. (In Spanish.)—The article provides a general discussion of chlorinated hydrocarbons, their effect on

raptor biology, and steps taken in the United States to reverse the decline in *Falco peregrinus* populations. In continental Argentina, *F. p. cassini* breeds in semidesert habitats in the Patagonian precordillera, but breeding habitat along the Atlantic coast seems to be inadequate due to constant high winds, despite higher populations of potential prey species along the coast. The greatest breeding populations occur on the Malvinas Islands, Tierra del Fuego, and neighboring islands. Incubation begins in the first part of September. The author suspects that populations of *F. p. cassini* have never been high in Argentina, but notes a decline in numbers in the last 10–15 years at Viamonte on the Atlantic coast and El Bolsón (province of Río Negro), both stations on the migratory route of the subspecies. The author concludes with a review of what little is known about *F. kreyenborgi,* a related species.—Robert B. Waide.

61. The Kirghiz Republic's Game Management Administration. (Kirgizkoe gosokhotkoziaistvo.) A. Kaletskii. 1978. *Okhota i okhotnich'e khoziaistvo,* May: 6–7.—Most of this article is devoted to description of the game management areas run by the USSR's Kirghiz Republic; at least one of the areas specializes in raising gallinaceous birds for sale, apparently to stock game management areas or hunting preserves in other parts of the USSR. Another undertaking of the Kirghiz Republic's Game Management Administration is sustaining falconry, which is acquiring a new purpose, namely live-trapping.

The ancient art of falconry, widely practiced since the 9th century in Russia and other regions now comprising the USSR, almost completely died out with the advent of firearms. It has remained relatively popular only on the Black Sea coast of the Caucasus, where Eurasian Quail (*Coturnix coturnix*) are hunted with Sparrowhawks (*Accipter nisus*; literally "quail hawk" in Russian), and in the Kirghiz Republic, where hereditary hunters still use Golden Eagles (*Aquila chrysaetos*) or falcons or accipters.

What can be the value of preserving falconry, the author asks rhetorically. For one thing, it is thrilling sport ("With Golden Eagles, even wolves can be hunted"), and it is the least destructive method of hunting to boot: as a rule, there are no wounded quarry that escape. (It also would be worth maintaining as part of the Kirghiz culture.) Finally, in the Kirghiz game management areas it has become more than sport: raptors are being taught to catch pheasants, quails, and partridges, but to bring them to the hunter alive and uninjured, for they will be released later to stock a new area. Unfortunately, no details are given on how the raptors are trained.—Elizabeth Anderson.

62. Parks, preserves, and nature conservation in Quebec. [Parcs, réserves et protection de la nature au Québec.] Y. Brien, É. Kiendl, and M. LeDémézet. 1977. *Penn Ar Bed,* **91:** 211–221. (In French.)—Analysis of the organization, policy, and management of Quebec's parks and nature reserves is presented, based upon a study commissioned by the Office Franco-Quebecois in October 1977. The authors point out confusion of the word park as the single term for disparate areas including hunting and fishing reservations, recreation areas, and nature preserves. Brien et al. forthrightly discuss the problems they perceive with the provincial park system as compared with the Canadian national parks, the conflicts between protection and exploitation policies, and the relative failure of organizations on both levels adequately to provide public contact and nature interpretive programming; however, in this latter area the national park system is well ahead of the provincial system. Wildlife management programs conducted in the province draw praise from the authors, notably the management of Snow Goose (*Chen hyperborea*) populations at Cape Tourmente, which has resulted in population increases from 2,000–200,000 birds during this century. Brien et al. suggest, correctly in this reviewer's opinion, that relatively severe man-land problems have not occurred in Quebec's parks primarily because the population of the province is low. The analysis is interesting reading because the authors, representing the perspective of an intensely developed France, anticipate problems that are not felt as immediately by the Quebecois.—Paul B. Hamel.

63. The decline of the Thick-billed Murre in Greenland. P. Evans, and G. Waterston. 1976. *Polar Record,* **18**(114): 283–293.—The total breeding population of the Thick-billed Murre (*Uria lomvia*) in western Greenland in 1951 was estimated at 4,000,000 pairs (Salmonsen, 1951). A recent decline is indicated here. With the advent of modern shotguns and cheap ammunition the hunting toll is now severe. Massive declines in numbers

have been reported for many localities, despite a total ban on harvesting murres in some localities (e.g., Umanag). The estimated annual loss of Murres to "commercial drift nets" was 500,000 in western Greenland. "Our personal observations lead us to concur with Salmonsen's urgent recommendations. Hunters are clearly not observing the restrictions on shooting close to the colonies. Disturbance of the colonies has led to a low breeding success and may be affecting feeding rates."—Leon Kelso.

PHYSIOLOGY

(See also 11, 19, 48, 50, 83)

64. A comparative study of hearing in owls of the family Strigidae. T. Van Dyk. 1973. *Netherlands J. Zool.*, **23**(2): 131–167. (In English.)—For new light on geographical variation and systematics of owls we have a comparative study of their hearing. Through conditioning experiments audibility curves were obtained for six Tawny Owls (*Strix aluco*) and six Long-eared Owls (*Asio otus*). In addition cochlear potentials for "tone bursts" were recorded for five Tawny Owls and four Long-eared Owls. The potentials were correlated to applied sound levels. Frequency curves and sound pressure at "constant size" of cochlear potential were obtained, showing to some extent the owls' frequency response. As to sensitivity the owls proved to be "extremely good hearers," with lowest thresholds of −91 db for the Tawny and −95 db for the Long-eared Owl. The frequency range for highest sensitivity is 0.4–7 kHz in Tawny Owls, 8 kHz in Long-eared Owls (thresholds for these frequencies do not exceed -80 db). This spans four octaves of very sensitive hearing. Records of cochlear responses corresponded closely to behavioral responses. In additional experiments curves were recorded for eight other owl species whose ears are less specialized than the above, such as in genera *Athene* and *Otus*. Their best hearing equaled that in *Strix* and *Asio*. Yet they could not perceive frequencies above 6 kHz.—Leon Kelso.

65. The endocrinology of a natural breeding population of the White-crowned Sparrow (*Zonotrichia leucophrys pugetensis*). J. C. Wingfield and D. S. Farner. 1978. *Physiol. Zool.* **51:** 188–205.—Seldom does one encounter a paper that bridges the gap between sophisticated molecular biology ("real science"—as my cell biologist friends describe it) and the functioning of the organism in the field. The present paper is interesting not only for that reason, but also because it is an excellent example of work directed by a man at the peak of his field and demonstrates the incredible extent to which the study of endocrinology of wild birds has been developed by Professor Farner and his students. The paper is much too extensive to be abstracted here, but basically demonstrates the interactions between several hormones (testosterone, dihydrotestosterone, luteinizing hormone, estradiol, estrone, and corticosterone), the avian reproductive tract, and the nesting cycle of both sexes of this finch. This should be required reading for students of the biology of avian reproduction.—C. R. Blem.

66. Light-to-dark transition and dark-time sensitivity: importance for the biological clock of the House Sparrow. S. Binkley. 1978. *Physiol. Zool.*, **51:** 272–277.—Activity rhythms in House Sparrows (*Passer domesticus*) kept in constant bright light generally disappear within two weeks. When sparrows are transferred from constant light to constant dark, free-running circadian rhythms are exhibited that are synchronized as though the transition is a normal dusk. This and other lines of evidence are interpreted as indicating that synchronization of the circadian "clock" in this species is cued by dusk. The measurement of daylength depends on the presence of a sensitive period close to the light/dark transition. Why the light/dark transition instead of dark/light synchronizes the endogenous oscillation remains an interesting mystery to be solved.—C. R. Blem.

67. Center-surround organization of auditory receptive fields in the owl. E. I. Knudsen and M. Konishi. 1978. *Science*, **202:** 778–780.—The experimental subjects were Barn Owls (*Tyto alba*). By methods detailed in other papers the response to sound of limited receptive fields in the *mesencephalicus lateralis dorsalis* region of the auditory nucleus was measured. The authors conclude that each limited field is most responsive to a sound source in a particular position in front of the owl. Exciting a field inhibits the response of surrounding fields. The inhibited area was not quite symmetrical about the area of best

response and might not be closed above or below the latter area. It appears that the Barn Owl does have the means to localize accurately in azimuth but does less well in elevation. The question remains: how does the relatively simple middle ear apparatus convey such a detailed partition of space to the brain?—C. H. Blake.

68. The pineal gland: a biological clock in vitro. S. A. Binkley, J. B. Richman, and K. B. Reilly. 1978. *Science,* **202:** 1198–1201.—N=acetyltransferase activity in cultured pineal glands of chickens *in vitro* shows a daily rhythm regulated by light and dark that may persist under constant illumination for several days with diminishing amplitude. Inhibitory and stimulating agents were also studied. The rhythm itself is well known in birds and mammals and is, to some degree, inherent.—C. H. Blake.

69. Quantitative investigations of the interactions between courtship and testosterone titers in male Zebra Finches (*Taeniopygia guttata castanotis* Gould). (Quantitative Untersuchungen zu Wechselbeziehungen zwischen Balzaktivität und Testosterontitern bei männlichen Zebrakinken.) E. Pröve. 1978. *Z. Tierpsychol.,* **48:** 47–67 (In German with English summary.)—The blood plasma titer of the androgen was measured by radioimmunoassay after courtship tests. Testosterone is positively correlated with the amount of solitary song and the amount of courtship song, although I am not certain the relationship is strictly linearly as concluded. Sexually experienced birds exhibit an immediate fall in blood hormone after the courtship tests, but inexperienced birds do not; on the other hand, experienced males have a higher testosterone base level. Grouped housing depresses hormone levels markedly. Of special interest is the methodology, which allows assay of volumes as small as 0.1 ml.—Jack P. Hailman.

MORPHOLOGY AND ANATOMY

(See 97)

PLUMAGES AND MOLT

(See also 14)

70. The primary moult of the Lapwing. G. F. Appleton and C. D. T. Minton. 1978. *Bird Study,* **25**(4): 253–256.—A conventional study of the wing molt of Lapwings (*Vanellus vanellus*) yields longer estimates of the duration of primary molt than an earlier study by Snow and Snow (*Bird Study,* **23:** 117–120, 1976) that relied on discarded feathers collected at restricted roosting sites. The discrepancy between the studies is due in part to sample size, but also in part to assumptions and methods of the earlier study. This appears to be a useful, short, methodological paper for those interested in measuring molt in wild birds.—Scott R. Robinson.

ZOOGEOGRAPHY AND DISTRIBUTION

(See also 33, 34, 38, 95, 100)

71. Atlas of the breeding birds of France and ecological biogeography. [Atlas des oiseaux nicheurs de France et biogéographie écologique.] J. Blondel and R. Huc. 1978. *Alauda,* **46:** 107–130. (In French with English and German summaries.)—Using data from the atlas of European birds, Blondel and Huc describe two summary statistics for studying "chorology" (static distribution patterns) and "areography" (causative factors that have produced observed distributions). The first statistic, the barycenter (centroid), is a weighted average of presence-absence data grouped on suitable latitude and longitude scales. Results of computations are the coordinates of a point representing the geographic center of gravity of the observed distribution. The second statistic, called the distribution index, is an information-theoretic measure of the dispersion of observations across the same grouped latitude-longitude data. Both statistics are sensitive to the scale of grouping the data. The authors use the two statistics in combination to advantage in analyzing the distribution of 10 species of *Sylvia.* They further demonstrate the usefulness of the barycenter concept by grouping the species by their known centers of origin and plotting barycenters. The resulting plot, Fig. 8, is a most interesting depiction of the origins of the

French avifauna. Blondel and Huc interpret their results in terms of the historic changes in the French landscape from primarily forested to predominantly rural agricultural. These changes have primarily not reduced the ranges of forest species, which remain widespread; species associated with human activities have increased their ranges, however. Comparison of mean of distribution indices for species found on Corsica with that of all French species showed, not unexpectedly, that species found on Corsica were more widespread than average.—Paul B. Hamel.

72. Relationships between the European and African avifaunas. D. W. Snow. 1978. *Bird Study,* **25**(3): 134–148.—Is the avifauna of Europe more similar to that of sub-Saharan Africa or to that of North America, and how have these assemblages of species interacted over the past few tens of thousands of years? This paper, after a brief introduction to the taxonomic and practical problems facing zoogeographers, addresses these questions by examining the species, "superspecies," and species groups shared by these three faunal regions. The paper deals almost exclusively with land birds with passerines predominating. The author concludes that Europe and Africa have exchanged species infrequently in the recent past, with Europe providing more species that invaded Africa than vice versa. Although the conclusions and speculations are all reasonable, the paper is actually more of a summary than a quantitative presentation of data. This is in keeping with its original appearance as a lecture at the British Trust for Ornithology Conference in 1977.—Scott R. Robinson.

73. Origins and movements of Oystercatchers on the Wash. K. R. Anderson and C. D. T. Minton. 1978. *British Birds,* **71**(10): 439–447.—The analysis of 249 recoveries from a ringed population of 12,000 Oystercatchers (*Haematopus ostralegus*) on the Wash, Lincolnshire/Norfolk has shown that the majority of Oystercatchers caught on the Wash are of Norwegian origin (80%) with comparatively few from Scotland and the Faeroes (7.1%) which are the main breeding areas of Oystercatchers in Wales and west England (73.5% of recoveries).—Patricia A. Gowaty.

74. Birds of the coastal zone of Melville Island, 1973–1975. L. S. Maltby. 1978. *Can. Field-Nat.,* **92:** 24–29.—Among 38 species of birds sighted on Melville Island during the summers of 1973, 1974, and 1975, were the first sightings of the Arctic Loon (*Gavia arctica*), Canada Goose (*Branta canadensis*), White-fronted Goose (*Anser albifrons*), White-winged Scoter (*Melanitta deglandi*), Least Sandpiper (*Calidris minutilla*), and Semipalmated Sandpiper (*C. pusilla*). The Ruddy Turnstone (*Arenaria interpres*), Semipalmated Sandpiper, and Arctic Tern (*Sterna paradisaea*) were confirmed as breeding birds.

In 1974, the lack of snow-free lowlands prevented most waterfowl and shorebirds from nesting. Although failure to nest in adverse seasons has been recorded for arctic geese, this is the first study to demonstrate failure to nest among other waterfowl and among shorebirds.—Edward H. Burtt, Jr.

75. Bird use of a Beaufort Sea barrier island in summer. D. Schamel. 1978. *Can. Field-Nat.,* **92:** 55–60.—The Yellow-billed Loon (*Gavia adamsii*), Arctic Loon (*G. arctica*), Red-throated Loon (*G. stellata*), Common Eider (*Somateria mollissima v-nigra*), King Eider (*S. spectabilis*), Oldsquaw (*Clangula hyemalis*), Red Phalarope (*Phalaropus fulicarius*), Glaucous Gull (*Larus hyperboreus*) and Arctic Tern (*Sterna paradisaea*) summer in large numbers among the coastal islands of the Beaufort Sea. A number of other species occur in lesser numbers or infrequently. These data on seasonal use of the coastal zone can serve as a baseline against which to measure the effect of development in the oil fields of the Beaufort Sea (e.g., Prudhoe Bay). However, the data were collected in the summer of 1972, a phenologically late summer with poor reproduction. Hence, as the author points out, additional baseline data are needed.—Edward H. Burtt, Jr.

76. Species number and compositional similarity of the Galápagos flora and avifauna. E. F. Connor and D. Simberloff. 1978. *Ecol. Monogr.,* **48**(2): 219–248.—The flora and avifauna of the Galápagos have repeatedly been used to test hypotheses related to island biology. In the present instance, Connor and Simberloff provide a critical review and reanalysis of the published data on number of plant species per island and on the compositional similarity of islands in terms of floral lists and bird lists. Regarding plant

species, they found that in an untransformed model the number of collecting trips per island was a far better predictor of species number than area ($r = 0.97$ vs $r = 0.52$) and also better than elevation or isolation. In a transformed, log-log model they found that log number of collecting trips and log area were nearly equivalent, although the former was slightly better. They suggest that previous observed relations between number of plant species and elevation may be primarily an artifact of increased collections being made on islands with the greatest range in elevation.

Connor and Simberloff attack the problem of assessing compositional similarity by developing two new indices corresponding to two related stochastic null hypotheses. The first null hypothesis is that the observed number of species shared by two islands is no different than would be expected if two random samples were taken from a common pool of species equally likely to colonize both islands. The second null hypothesis relaxes the last assumption of equal likelihood of colonization and substitutes for each species an independently determined relative ability to disperse and persist. Neither hypothesis provides an accurate model of compositional similarity for birds or plants, but Connor and Simberloff feel that the fit of the data to the second hypothesis is sufficiently close that stochastic processes of dispersal and persistence nonetheless explain to a large degree the number of species shared between islands. They feel that the effects of the physical environment and species interactions must be secondary.

Beyond the specific results pertaining to the Galápagos, this paper is significant in its development of new indices for faunal (or floral) comparison in the first place and in the existence of null hypotheses for these indices in the second place. Hopefully the use of these or analogous indices will become the norm in future comparisons of avifaunas.—A. John Gatz, Jr.

77. Range of the Hooded Crane. (Areal chernogo zhuravlya v svete imeyushchikhsya dannykh.) I. A. Neufeldt. 1978. *Ornitologiya,* **13:** 56–61. (In Russian.)—This meticulous examination of many published references to the Hooded Crane (*Grus monacha*) evaluates them in light of the most recent discoveries, to determine which accounts refer to breeding birds, which to nonbreeding vagrants, and which to migrants. The Hooded Crane was considered an inhabitant of low-lying marshes and lakes of the forest-steppe and steppe of southern Siberia. The locations of sightings of chicks since the late 1960's have shown that the species' nesting habitat is actually larch-peat moss bogs, which are found in valleys and hollows in the zone of perennial (but not eternal) permafrost in the central taiga, and parts of the southern taiga, of eastern Siberia and the Soviet Far East. Those birds sighted or collected in a different habitat to the north and west of this area of the USSR are, Neufeldt maintains, vagrant nonbreeders that, like the young of other *Grus* cranes, stray far from their species' breeding grounds. The first nest was discovered in 1974, 140 years after the species became known to science. The nest was in a small dish-shaped valley along the Bikin River, a tributary of the Ussuri River in the Maritime Territory of the Soviet Far East. The ground cover of this valley is hummocks of sedge (*Carex*) and of sphagnum and hypnum mosses; two thirds of the site bears a thin growth of a low-growing larch (*Larix dahurica*) and of dwarf Arctic birch (*Betula nana*).

This species' known wintering grounds are in Japan (Izumi, on Kyushu Island, and Yashiro, on Honshu Island), and the central part of the Korean peninsula. The total world population of Hooded Cranes may be only about 2,300 birds. Migrants pass through Outer Mongolia and northern China, or along the Amur River valley and across the USSR's Maritime Territory.

This otherwise excellent summary of information about the Hooded Crane's range lacks a map. Therefore, it is difficult to visualize the species' distribution without an intimate knowledge of USSR geography. A non-Soviet must seek out a large and detailed map and search for the unfamiliar names of remote places.

The dearth of ornithological information from the People's Republic of China and the apparent lack of access by Soviet scientists to what is available, make one wonder if this is not an unavoidably incomplete picture of the distribution of *Grus monacha.* Since Hooded Cranes are found in parts of the Soviet Union bordering China, then surely either breeding birds or nonbreeding vagrants, or both, might be found in ecologically suitable regions of China. But Neufeldt does not discuss this; indeed, she quotes no

Chinese sources at all. She has no information more recent than from the late 1940's about sightings in China (these pertain only to migrants), and none from this century about birds wintering on the Yangtze River delta.—Elizabeth Anderson.

78. Winter biogeography of North American Fringillidae (*Aves*): a numerical analysis. C. E. Bock, J. B. Mitton, and L. W. Lepthien. 1978. *Syst. Zool.*, **27**(4): 411–420.—The importance of winter as a determinant of distribution, abundance, and life history phenomena of birds has gained increased recognition and examination in recent years. In the context of this paradigm, the accumulated data from the social-scientific Audubon Society Christmas Bird Counts are an invaluable source of information from which hypotheses can be developed and general principles sought. Bock et al. have analyzed such count data from the winters of 1969–1970 to 1971–1972, in an attempt to discern major biogeographic patterns, to compare results based on abundance vs. presence-absence information, and to compare results that include simultaneous absences as data with those which ignore such "negative matches." In their enthusiasm for their own approach they omit reference to the Cooperative Breeding Bird Survey (Robbins and Van Velzen. *Acta Ornithol.*, **14:** 27–48, 1974) which is also an avian biogeographer's goldmine. Four matrices of similarity coefficients were computed from data on 65 species grouped into 59 latitude-longitude blocks. Cluster and principal components analyses in NT-SYS were used to summarize the information in those matrices. The results are exciting. Abundance data are more informative than simple presence-absence data, reinforcing the idea of bias inherent in Christmas Counts as bird-listing tournaments. Inclusion of negative matches had no effect on results, suggesting to this reviewer that Christmas counters do an efficient job of finding virtually *every* species present! Four major regions emerge: the north; the middle latitudes, which show some east-west separation; the southwest; and the southeast. Analysis of abundance data indicated that the central plains are a distinct region separating middle latitude eastern deciduous from western montane coniferous avifaunas. This relationship had been hypothesized by earlier biogeographers, but it did not show up in analysis of presence-absence data. Cluster analytical results are much easier to display than those from principal components analysis, although the authors' choice of patterns in their Fig. 4 makes it a very ineffective figure. As Bock et al. point out, however, the principal components analysis may be more appropriate to the continuous nature of distribution patterns, and Fig. 5 shows at least two complex gradients, possibly temperature and moisture, which constitute the next hypotheses for test. This is a most interesting paper, which shows that a plethora of satisfactory data on winter bird distribution are available, and that their analysis has only just begun.—Paul B. Hamel.

SYSTEMATICS AND PALEONTOLOGY

(See also 26, 97, 100)

79. Hybridization of Herring and Lesser Black-backed Gulls in Britain. M. P. Harris, C. Morley, and G. H. Green. 1978. *Bird Study*, **25**(3): 161–166.—Three definite hybrids and 12 probable hybrids between *Larus argentatus* and *L. fuscus* are described. Nearly all are associated with breeding colonies in which cross-fostering experiments were conducted in the early and middle 1960's. The existence of these hybrids suggests that the chicks sexually imprinted on their foster parents, and raises the question of how ornithological field experiments may inadvertently affect reproductive behavior, and even gene flow, in wild populations.—Scott R. Robinson.

80. The Muscisaxicola of Argentina. (Los Muscisaxicola Argentinos) M. J. I. Pergolani de Costa. 1975. *El Hornero*, **11**(4): 242–254. (In Spanish.)—This paper presents a revision of the genus *Muscisaxicola* Lafr. and D'Orb. (Passeriformes: Tyrannidae) as part of the revision, begun in 1946, of the species of Tyrannidae found in Argentina. The author presents descriptions of the 10 species (14 forms) of this genus found in Argentina and includes a key for their identification. Other than a general description of the habits of the genus, little information on the ecology or behavior of each species is included.—Robert B. Waide.

EVOLUTION AND GENETICS

(See also 79, 90)

81. Differential survival in common grackles sprayed with Turgitol. M. C. Baker and S. F. Fox. 1978. *Amer. Nat.*, **112:** 675–682.—It was a good idea. The authors ingeniously realized that the much publicized blackbird control programs in Kentucky and Tennessee (1974–1975 version) offered an opportunity to investigate selection in action much in the manner of the "Bumpus effect." The control program applied a wetting detergent and water to roosting birds in order to induce lethal cold stress. The authors planned to compare survivors and nonsurvivors to reinvestigate the effects of natural selection under conditions mimicking Bumpus' winter storm. Logistic difficulties limited their sample to 16 male Common Grackle survivors. Using electrophoretic and principal-component analyses, they compared the genetic (18 loci) and morphometric (24 measurements, including the 9 reported by Bumpus) characters of the living, with 42 birds that had succumbed to the stress. They discovered no electrophoretically detectable differences between the living and the dead, with both showing the low genetic variability characteristic of many bird species. They found significant morphological differences which indicated that smaller, less stocky males survived better (directional selection for small body size). But they also reported a "weak trend" for elimination of extremes (stabilizing selection). How both directional and stabilizing selection can simultaneously act on the same population through the same characters is never explained. The bulk of their discussion is negative, dwelling on why what might have happened did not happen, rather than on why what happened did happen. I would have preferred less discussion of selection in House Sparrows, which is probably irrelevant to this study, and more on the authors' intriguing hypothesis that the increased survivorship of smaller birds might not have resulted from selection distinguishing between morphological size differences, but rather as an artifact of the smaller birds' social subordinance. In essence, Baker and Fox suggest that larger birds might prefer higher roosting positions, relegating smaller subordinates to lower limbs in the roost trees, where, by chance, they would be less susceptible to the artificial stress. It was a good idea, and it almost fulfills its promise.—William M. Shields.

82. The evolution of parental care in birds. A. Ar and Y. Yom-Tov. 1978. *Evolution,* **32:** 655–669.—Other than the slightly misleading title (insert altriciality for parental care), this is a fairly solid and extensive review and analysis. Using data gleaned from the literature (summarized in a useful appendix), the authors performed a series of regression analyses to investigate the major avian reproductive strategies. They convincingly demonstrate that altricial species are generally smaller bodied and lay smaller eggs in smaller clutches than their precocial counterparts. Even when egg size overlapped (at different body sizes), altricial species loaded their eggs with proportionately more albumin (water) and less yolk (protein). "Semiprecocial" species were intermediate in most of these characters. The authors concluded that the primary difference between altriciality and precociality was in their pattern of energy investment in reproduction. They also concluded that the altricial strategy was both more efficient (energy directly to offspring rather than through yolk with concomitant losses) and less expensive (smaller gross energy investment in eggs and nonhomeothermic young) in terms of the energy invested in eggs and young. Almost in passing, they noted a correlation between reproductive strategy and trophic level, with precociality (considered the ancestral state) associated with herbivory, and altriciality associated with higher trophic status (e.g., insectivory). They concluded that, "if food for egg production were not a limiting factor," perhaps the precocial strategy might have been preserved more widely.

In a rather disjointed section on "selective pressures" apparently they lost sight of their own conclusions. They invoked r and K selection as major forces shaping the evolution of altricial and precocial bird species. They noted that a higher proportion of precocial species are found in temperate rather than tropical environments. Although they fail to address the issue of why altriciality is dominant in both regions, they do suggest that the relative differences result from associated differences in environmental predictability. They conclude that the unpredictability of temperate environments generates

more *r* selection, favoring the relatively larger clutch size of precocial species. Similarly, tropical stability is viewed as generating *K* selection, which favors the smaller clutches of altricial species. They believe that the observed distribution of altricial and precocial species, therefore, offers support for more general models of *r* and *K* selection. I disagree. They fail to note that such a conclusion is logically incompatable with their earlier conclusion that precociality is associated with superabundant (and predictable?) resource bases. I prefer the implied alternative that the altricial mode evolved many times from precociality during shifts from herbivory (especially grazing and browsing, with which it is still associated) to the less abundant resource bases associated with higher trophic levels. The reduced energy available to individuals for reproduction after such a "niche" shift would favor the energy conservatism of the altricial strategy. On this view, the difference in the relative abundance of altricial and precocial species in temperate and tropical regions, could result not from differences in stability or predictability, but rather from differences in the relative abundance of niches available to primary and secondary consumers available in the two regions. Only more rigorous predictions and careful comparisons can distinguish between these alternatives. This paper is an interesting way station rather than a final destination.—William M. Shields.

83. Dominance, survival and enzyme polymorphism in Dark-eyed Juncos (*Junco hyemalis*). M. C. Baker and S. F. Fox. 1978. *Evolution,* **32**(4): 697–711.—The genetic structure of winter populations of juncos was investigated using starch gel electrophoresis. Eighteen loci were examined; the rate of polymorphism was 16.6%. Mild heterogeneity existed between flocks and years. An average of 3.33 variants existed per polymorphic locus; the average proportion of heterozygous loci per individual was 0.053. (In keeping with most other bird species that have been studied, juncos appear to be enzymatically less polymorphic than other vertebrates.) In four captive flocks, dominant individuals survived food stress better than subordinates. Survival could be predicted from dominance rank, genotype, weight, sex, bill dimensions, hood color intensity, and tarsal length. The best predictor of dominance was long wing length. Dominant members of flocks were usually heterozygous for L-leucylglycylglycine peptidase. Correlations between enzyme polymorphisms and behaviors are fascinating, and suggest that we will eventually succeed in uncovering the precise molecular mechanisms regulating behavioral traits.—Elliot J. Tramer.

84. Genetic analysis of eggs from the Common Tern *Sterna hirundo*. L. V. Bogdanov and L. M. Shelobod. 1978. *Genetika,* **14:** 609–613. (In English, Plenum translation, p. 421–424.)—The authors conclude that the phenotypic variability in egg ground color observed in a tern colony on an island in the Gulf of Korf, Kamchatka Peninsula, is best explained as resulting from the segregation of two codominant alleles (maximum and zero pigment) at each of two (brown and green) unlinked color loci. Observed genotype frequencies support their interpretation. They suggest that the "best adapted" eggs have intermediate coloration, a condition which would maintain the observed polymorphism. They also estimated heritabilities (h^2) for egg weight (0.61), length (0.53), width (0.62), and shape (width/length, 0.40), which indicated substantial genetic control and within-population variability for these traits.—William M. Shields.

FOOD AND FEEDING

(See also 22, 30, 38, 43, 46, 51, 54, 57)

85. The Marseilles dump as foraging habitat for the Black-headed Gull *Larus ridibundus*. [La décharge d'ordures ménagères de Marseille comme habitat d'alimentation de la Mouette rieuse *L. r.*] P. Isenmann. 1978. *Alauda,* **46:** 131–146. (In French with English and German summaries.)—Since 1918, the city of Marseilles has disposed of its household garbage at a site near the center of the Camargue. The annual volume of waste tripled from approximately 80,000 tons in 1960 to 1971. Isenmann studied the relation-

ship of the dump to the Camargue nesting population of *L. ridibundus* and to wintering Black-headed Gulls in 1971–1975. His results indicate that the household wastes dumped at the site are an important food source for Black-headed Gulls during a large part of the year, particularly for wintering individuals from other parts of Europe. This gull feeds by following machinery which spreads the refuse. The superior mobility of this species is a distinct advantage over the larger Yellow-legged Herring Gull (*L. cachinnans*), the only other gull that uses the dump as foraging habitat in large numbers. The number of Black-headed Gulls at the dump peaks during the winter and reaches a low in late summer. Interestingly, although the species breeds within 25 km of the dump, and adults feed there during the breeding season, immature birds comprise less than 10% of individuals feeding at the dump at any time. One important aspect of the study was Isenmann's attempt to estimate the available food and per capita consumption of the two gull species on a daily basis. During the winter months combined daily consumption by gulls is very close to the amount supplied by the citizens of Marseilles. He suggests that this dump has been a significant factor in the recent increase in the number of Black-headed Gulls.—Paul B. Hamel.

86. The raptors of a savannah-forest contact zone in the Ivory Coast: food habits. [Les rapaces d'une zone de contact savane-forêt en Côte-d'Ivoire: spécialisations alimentaires.] J.-M. Thiollay. 1978. *Alauda,* **46:** 147–170. (In French with English and German summaries.)—In this final report on a long-term study of raptors of the Lamto savanna (*Alauda,* **43:** 75–102, 387–416, 1975; **44:** 275–300, 1976; **45:** 197–218, 1977), food habits of 23 species are presented. Detailed data were gathered on the 13 most common species by analysis of stomach contents, pellets, and direct observations of the birds. The paper contains a wealth of natural history data on the species. Thiollay shows that the several species have distinct diets which are not random samples of available foods, and which constitute a significant amount of predation on those foods.—Paul B. Hamel.

87. Selection and dropping of whelks by Northwestern Crows. R. Zach. 1978. *Behaviour,* **67:** 134–148.—The Northwestern Crow (*Corvus caurinus*), which might be only subspecifically different from the Common Crow (*C. brachyrhynchos*), is a Pacific coastal form ranging from Washington to Alaska. The crows take whelks (*Thais lamellosa*) in their bills, fly horizontally to a particular spot, swoop upward, and repeatedly drop the gastropod until it breaks open. Crows take only the largest of available whelks on the beach, a quantitative observation confirmed by experiments supplying different sizes, but they will eat any size removed from its shell. Zach also provided crows with large whelks that were made unusually light by stuffing the shells with cotton and unusually heavy by stuffing with sand; crows took natural and heavy whelks in preference to the light ones. (Because different-sized shells of the same weight were not tried, we do not know whether the crows are selecting the larger whelks on weight alone or weight plus size.) The modal number of drops required to open a shell is two, but the mean is more than four, and with each failure the crow takes the whelk higher for the next drop (on the average). If the crow cannot eat all of the gastropod, it takes the remainder up and drops it again to break more of the shell for access. This study exemplifies a fine interplay between quantitative observation and simple field experiments, clearly reported, that is in the best tradition of Tinbergen's brand of ethology.—Jack P. Hailman.

88. Seasonal food habits of the Barn Owl (*Tyto alba*) on the Alaksen National Wildlife Area, British Columbia. 1978. N. K. Dawe, C. S. Runyan, and R. McKelvey. *Can. Field-Nat.,* **92:** 151–155.—Not surprisingly a microtine, Townsend's Vole (*Microtus townsendii*), is the Barn Owl's (*Tyto alba*) most frequent prey and represents the largest contribution to the owl's dietary biomass. The Vagrant Shrew (*Sorex vagrans*) is the second most common item in the diet, but rats, especially juvenile *Rattus norvegicus,* comprise the second largest contribution to the dietary biomass. No seasonal variation occurs in the number of voles consumed, but shrews are consumed more frequently in summer and rats more frequently in winter, presumably when other prey animals are less available. More detailed data on prey availability would help us to judge the selectivity of Barn Owls better.—Edward H. Burtt, Jr.

SONGS AND VOCALIZATIONS

(See also 64, 67)

89. Habituation and song repertoire in the Great Tit. J. R. Krebs. 1976. *Behav. Ecol. Sociobiol.,* **1:** 215–277.—Song repertoires of passerine birds are thought to be an adaptation to reduce habituation in listeners. The problem with this hypothesis is that habituation does not seem to be adaptive, so it is not clear why listeners should habituate. Krebs suggests that song repertoires may be mechanisms by which resident birds deceive others, through increasing the apparent density of singing birds—Beau Geste hypothesis (see Krebs, *Anim. Behav.,* **25:** 475–478, 1977). If prospective neighbors assess the density of breeding birds in an area by listening to songs, then habituation may be the means of assessment.

Krebs looked at the response of Great Tits to repeated playback of a single song type and to playback of a repertoire. In one experiment he placed a loudspeaker on the edge of a territory and played either a single song or a repertoire of songs. In a second experiment songs were played through one of two loudspeakers in different parts of a territory, alternating between speakers on successive trials. Birds tended to habituate to single song playback more rapidly than to repertoires. The overall level of habituation was lower in the second experiment, and the difference between the two treatments was less marked. In addition, two features of song repertoire organization were found to be consistent with the habituation hypothesis (1) the avoidance of low recurrence intervals in switches between song types, and (2) the fact that within repertoire variability is as great or greater than between repertoire variability. It should be pointed out that Beau Geste is not without its critics (see Slater, *Anim. Behav.,* **26:** 304, 1978).—Frank R. Moore.

90. Song dialects as barriers to dispersal in White-crowned Sparrows (*Zonotrichia leucophrys*). M. C. Baker and L. R. Mewaldt. 1978. *Evolution,* **32**(4): 712–722.—The authors hypothesize that where two populations with different song dialects meet, gene exchange across the boundary should be reduced. In an earlier paper they documented genetic differences between two contiguous coastal California populations with different song dialects. Here they present the results of a banding-recapture study on 371 individuals whose fledging and adult breeding sites were known. Dispersal (plotted as number of individuals vs. dispersal distance) followed a gamma probability distribution. From this they calculated an expected value of 26 birds crossing the dialect boundary; however, only five banded birds actually did this. They conclude that song dialects can significantly reduce movement of birds from one population to another.—Elliot J. Tramer.

91. Individual vocal recognition in the Kittiwake Gull, *Rissa tridactyla* (L.). R. D. Wooller. *Z. Tierpsychol.,* **48:** 68–86.—From the title and abstract one expects this paper to concern mainly playback experiments, but unfortunately these are given but a few sentences. Mainly the paper is yet another demonstration that every bird's voice is a little different (in this case, principally in the length of the "kittiwaak" call and in the harmonic structure of the sounds). The playback experiments to 47 pairs apparently show a higher percentage of "reactions" (defined as "some change in ongoing activity") to the mate's call than to recordings of another bird. The ethology here is quite superficial and much too briefly reported; we are not told what the listener was doing when the playback was begun, what it did during the playback, what it did afterward, which birds reacted only to their own mate's call, which only to a strange bird's call, which to both, what sexes the birds were, how many tests were repeats on the same pair (at least three pairs had to be tested as much as three times), what stage of the breeding cycle they were in, or even what the real data were (only percentages are reported). A suggestive but quite disappointing study.—Jack P. Hailman.

92. Differential responsiveness of Great Tit nestlings, *Parus major,* to natural auditory stimuli: response-strength as related to stimulus significance and previous individual exposure. O. Ryden. 1978. *Z. Tierpsychol.,* **47:** 236–253.—The principal focus was the "seeet" call, which acts as an alarm call to the nestlings. Because it is rare and distinctly different ("opposite" in author's terms) from the begging call, nestlings suppos-

edly react strongly to it. The study included field observations of sounds in the environment and two fairly complicated laboratory conditioning studies.—Jack P. Hailman.

93. The significance of antecedent auditory experiences on later reactions to the 'seeet' alarm-call in Great Tit nestling *Parus major*. O. Ryden. 1978. *Z. Tierpsychol.*, **47:** 396–409.—A pure-tone call at about 8 kHz frequency and lasting more than a second is given by the Great Tit when sighting a predator. (Many passerines have similar calls.) Hearing the call causes the nestlings to cease vocalizing and become immobile. Ryden investigated the role of experience in this reaction through three experiments. (1) In the first experiment, playbacks at the nest-box were given in different contexts to each of three broods: just before a parent returned to feed (positive experience), together with a simulated attempt at predation (negative experience) and more-or-less randomly (neutral experience). After four days of such experience (at 11–14 days of age), the nestlings (in pairs) were given three laboratory tests. In the first, the *seeet*-call was played after feeding, and it did not cause positive-experience nestlings to cease begging in any case, had the same quantitative effect on neutral-experience nestlings as it does on natural broods, and caused an unusually strong response in negative-experience nestlings. Less clear-cut but similar results were found in the other two tests. (2) In the second experiment playbacks to a nest-box consisted of equal amounts and intensities of the *seeet*-call and a portion of Blue Tit (*P. caeruleus*) song. In subsequent tests the nestlings still reacted more strongly to the *seeet*-call, which has great acoustical contrast with natural ambient sounds. (3) In the third experiment, week-old nestlings were reared for a week in the laboratory with high-pitched ambient sounds, and showed a much weakened response to the *seeet*-call relative to the Blue Tit song in subsequent tests. These results, along with the author's previous studies, suggest that Great Tit nestlings have an initial tendency to react to *seeet*-calls, that this tendency is reinforced by the simple rarity of such sounds in their acoustic environment during development, and that it may be further shaped by specific positive or negative experiences. This is an important study of behavioral ontogeny.—Jack P. Hailman.

MISCELLANEOUS

94. Zoological iconography in the West after A. D. 1200. G. E. Hutchinson. 1978. *Amer. Sci.*, **66:** 675–684.—In his delightful and erudite style, the author illustrates in word and picture the iconic uses of animals (often birds). Examples range from the marginal decoration of religious manuscripts to such serious works as a manuscript of Frederick II's *De arte venandi cum avibus*. More modern depictions are touched upon.—C. H. Blake.

BOOKS AND MONOGRAPHS

95. An Annotated Check-list of the Birds of Illinois. H. D. Bohlen. 1978. Ill. State Mus. Pop. Science Ser., vol. IX. 156 p. $2.00 plus 75¢ postage, from Ill. State Museum Society, Springfield, IL 62706.—A most important feature of any avifaunal work is that it be current at the time of publication. This annotated check-list, which summarizes the status of Illinois birds through 1976, and 1977 in some cases, appeared in late summer 1978, effectively within a year after culmination of the research. Bohlen's major emphasis has been to produce an authoritative work that succinctly describes the temporal status, relative abundance, primary habitat, and present documentation for birds known or reported to occur in Illinois. On these grounds his work is an unqualified success. In a crisp direct style the major geographic areas in the state are introduced, as are 13 status and 10 abundance categories. The abundance categories are operationally defined, allowing the reader to develop a reasonably quantitative expectation of the frequency of occurrence of the various species. Status categories are, if anything, oversplit; e.g., a separate category "Stragglers" is defined and the Orange-crowned Warbler (*Vermivora celata*) listed as a member of that category. However, straggler is not mentioned in the account of *V. celata*. Bohlen treats 416 forms in the list. Thirty-three are relegated to a hypothetical status and nine are listed as either extinct (4) or extirpated from Illinois (5). An interesting statistic is the author's statement that 362 forms have been recorded in Illinois since the last work

on the status of birds in the state (Smith and Parmalee. 1955. Ill. State Mus. Pop. Science Ser. vol. IV). The species' accounts include a general outline of the dates during which the species can be found in Illinois, and sections on the Status, Documentation, and Remarks on the habitats and Illinois records of the species. Status is separately defined for each of three geographical regions of the state where appropriate. Documentation is usually presented as a specimen examined by the author; frequently the specimens are post-1970. The Remarks section contains brief, sometimes too terse, comments on the habitats, habits, and other pertinent information about the species. Additional data are presented on extraordinary records, high counts, and other recent records. These records are documented by abbreviated citations of the original sources. The work contains however, typographical and other errors. Among those I found are the failure to list Wisconsin as a border state (map, p. 7), listing a specimen of Red-throated Loon from UMNZ rather than UMMZ; and incorrectly listing the dates of *American Birds* in the Literature Cited. By far the greatest value of this work lies in the copious documentation and review of records of each species. Bohlen has produced an authoritative document that will be useful to the ornithological community, particularly in the midwest. Its usefulness is not limited to that area, however, as I have already had occasion to cite it twice.—Paul B. Hamel.

96. The Complete Outfitting and Source Book for Bird Watching. M. Scofield. 1978. The Great Outdoors Trading Co. (24759 Shoreline Highway, Marshall, CA 94940). 192 p. $6.95.—This book, compiled by the staff of the Trading Co., is organized into several chapters including History of Bird Watching, Basic Equipment (binoculars, scopes, recorders, etc.), Publications, Clubs and Organizations, Best Bet Birding Sites, Tours and Expeditions, Appendices (lists of museums and zoos, rare bird phone numbers, etc.), and a Glossary of bird watching terms. It is unfortunate that the title includes the word "complete" because no listing of any of these items could possibly be complete. As a matter of fact, the selections are incomplete and spotty, a fact that should be emphasized to the buyer.

In most of the sections, I spotted significant errors or omissions. Some examples follow, with emphasis on Florida partly because the state is renowned for its fabulous birdlife and because it is one state with which I am especially familiar. No mention is made of the premiere Florida Ornithological Society, an organization composed chiefly of serious-minded birdwatchers, and less than half of the active Audubon Society chapters are mentioned. The book list is disappointing—"Florida Bird Life" is omitted, as is Grossman and Hamlet's "Birds of Prey of the World"; only one of the several guides to Mexican birds is listed; I doubt that any birdwatcher would be interested in the multi-volume, highly technical Farner and King series on "Avian Biology." Would you believe that for California, under Zoos and Natural History Museums, no mention is made of the renowned California Academy of Science? Knowledgeable birdwatchers elsewhere in the United States, as I, will probably find errors and omissions for their own areas.

I am particularly disappointed in their treatment of NEBBA and *Bird-Banding*. NEBBA is presented as a strictly Massachusetts organization and *Bird-Banding* receives scant attention, buried in small print, as it were. Obviously, *Bird-Banding* and NEBBA should have been listed side-by-side with *Auk, Condor, American Birds,* and *Wilson Bulletin.*

One wonders if the spotty coverage of this book is worthwhile for even the least experienced birdwatcher. I suppose it is. But clearly *caveat emptor* is appropriate.—David W. Johnston.

97. Feeding and Feeding Apparatus in Waders. A Study of Anatomy and Adaptations in the Charadrii. J. F. K. Burton. 1974. British Museum (Nat. Hist.), Cromwell Road, London, England. 150 p.—The author presents detailed information on the anatomy of jaws, tongue, and neck devoting special attention to the important superfamily Charadrioidea. The adaptive significance of modifications encountered is assessed as far as feasible, enhanced by studies of feeding behavior and diet in five representative species—Golden Plover (*Pluvialis apricaria*), Redshank (*Totanus totanus*), Curlew (*Numenius arquata*), Dunlin (*Erolia alpina*) and Common Snipe (*Capella gallinago*). These five also receive special attention in the anatomical analyses. These studies are followed by sum-

maries of available information on feeding behavior of other members of the superfamily. Environmental forces presumed to act on the skull and jaws during feeding are analyzed, and essential features of the morphology and mechanics of the skull are reviewed and discussed. Succeeding sections describe jaw musculature, tongue, the hyoid skeleton and hyoid musculature, salivary glands, epidermal features, and cervical muscles inserting on the skull. Particular attention is given to orientation and positions of raphes and aponeuroses. Quantitative data on relative tongue and bill lengths are presented. Structural descriptions accompany functional discussions throughout the monograph. The specific features of the Charadrii as a whole are reviewed from adaptive and taxonomic standpoints. The concluding discussion considers evolutionary implications involved in interpreting the phylogenetic significance of anatomical studies. This trenchant monograph well covers its world literature including a fair number of slavic contributions.—Leon Kelso.

98. A Guide to Eastern Hawk Watching. D. S. Heintzelman. 1976. The Pennsylvania State University Press (Keystone Books), University Park, 99 p. Cloth $8.95; Paper $5.95. The audience for this work is implied to be birders, and the author states: "There is still a need for a good field guide to hawk watching." It is basically "a where to go" (to see large numbers of hawks) and "how to do it" (hawk identification) book. The former material occupies about 60 pages (much of this appears in "Feathers in the wind." J. J. Brett, and A. C. Nagy. 1973. Hawk Mountain Sanctuary Association, Kempton, Penn.) whereas the latter information is covered in about 30 pages and is only readily available in Heintzelman's other book "Autumn Hawk Flights: The migrations in eastern North America," (1975. Rutgers University Press). The inclusion of species of kites, the caracara, and some of the "Rarer Buteos" (e.g., Swainson's Hawk) seem incongruous with the intended audience of the book and can only add to the confusion of a beginning birdwatcher.

According to the table of contents, major section titles and the number of pages devoted to each is as follows: Hawk Identification (8), Plates (black-and-white photographs and line drawings) (37), Field Equipment (2), The Migration Seasons (3), Mechanics of Hawk Flight (4), The Hawk Lookouts (29). One short paragraph is devoted to the general topic of hawk identification; thus the topic is really not discussed. It would seem that a brief discussion of major taxonomic groups (scientific taxa need not be mentioned) would be in order even in a strict field book: e.g., the woodland hawks, falcons, buteos, etc.; their general ecology; sexual dimorphism; and characteristic flight patterns. This could serve to whet the appetite of even the rankest amateur to learn something more than the name of the hawk.

Species' accounts include the following information: Wingspread, Field Recognition, Flight Style, Spring Migration, Autumn Migration. Some good information appears here and there but it is not consistent; for example, only about one fourth of the size descriptions relate to bird species that are apt to be familiar to a birder, i.e., the Peregrine is "crow-sized," the American Kestrel is "robin-sized" (how about Mourning Dove-sized?), etc. Finally, no attempt is made to facilitate the users' linking up with the information in this section with the photographs in the next section; for example, no page numbers are given indicating where the hawk being discussed may be seen in photographic form. Similarly no page number(s) appear with the photographs linking them with discussion. Many of the photographs are good to excellent but they could have been used much better if the users' attention was called to field characters, especially those that tend to be species-specific.

Discussion of field equipment is extremely scanty. In discussing binoculars no mention is made of the field of view, coated optics, light-gathering capacity, and apparent movement, all very important topics relative to hawk-watching. It is suggested that a telescope is useful under "dim light conditions," which is misleading because you get relatively less light through a telescope due to its less favorable objective-to-ocular diameter ratio. The camera is mentioned only peripherally in a brief discussion of "other equipment."

The Migration Seasons and Mechanics of Hawk Flight sections are well done, full of content in layman's terms, and are (to this reviewer) the best of the book. The Hawk Lookout section is thorough with a couple of notable exceptions: the References are brief to the point of excluding essential information (author and title), and "information can

be secured in the headquarters and information center" does not seem to cover adequately what might be obtained at the Hawk Mountain Sanctuary nature interpretation center.

The map of major eastern hawk-watching sites (page 65) would be much more useful if the sites were numbered and keyed to the description in the text and much more easily accessed if placed at the very beginning of that section rather than the fourth page into it.

Oversights such as the *Ontario Bird Banding* in the preface and John Haugh's ("A study of hawk migration in eastern North America." 1972. *Search,* Cornell U. Ag. Exp. Sta. **2**(16): 1–60) study seems to be substantial.

In summary, although the book contains much good information, it is not easily accessible and falls short of what is needed for a beginning hawk-watcher. Other than the contents in the Hawk Lookout section most of the information and considerably more can be obtained from Brett and Nagy's work mentioned earlier. I agree with the author's statement that "there still is need for a good field guide to hawk-watching."—Richard J. Clark.

99. Owls by Day and Night. H. Tyler and D. Phillips. 1977. Naturegraph Books. 987 Happy Camp, California 96039. 208 p. $10.95, cloth. $6.95, paper.—Here is further evidence of the fascination that owls hold over today's nature lovers after ages of disfavor. Perhaps such books as this enhance their present favored status. This text covers the 18 species found in the United States and Canada. It is in a style that readers can understand and enjoy. The distinctive personalities and habits of species are emphasized.

The book is helpful as well as intriguing. There are a number of tables that list distinctions between species, where each species is found, and their major calls, supplemented with range maps. One unique feature is a chapter on the views and traditions of American Indians regarding owls. Their ecology is approached with respect to their ranges and habitats, particularly in relation to other owls and birds. In an "afterword" the authors reflect on man-owl relationships, and make specific recommendations on what steps might be taken to ensure a future for owls.—Leon Kelso.

100. Working Bibliography of Owls of the World. With summaries of current taxonomy and distributional status. R. J. Clark, D. G. Smith, and L. H. Kelso. 1978. National Wildlife Federation, Scientific/Technical Series, No. 1. $9.00 (Order from Raptor Information Center, National Wildlife Federation, 1412 Sixteenth St., N.W., Washington, DC 20036).—The title of this work is self-explanatory. For anyone interested in any feature of owl biology, this publication is a "must." Introductory chapters deal with taxonomy and distribution, but the master list of citations (6,590!) is absolutely indispensible. To this reviewer, a subsequent chapter is even more valuable: it deals with a list (for each genus) referring to citations relating to subjects such as anatomy, behavior, distribution, ecology, physiology, taxonomy, and conservation. Despite the herculean efforts expended in amassing this particular bibliography, one might anticipate omissions, oversights, or errors (I personally have three); so the authors are already accumulating addenda for a future updating.—David W. Johnston.

101. The World of Roger Tory Peterson. J. C. Devlin and G. Naismith. 1977. New York, Times Books. 266 p., 29 numbered black-and-white photos, 7 colored plates, numerous text drawings (by RTP). Cloth. $14.95.—This book about a fascinating, important, and historic figure of American natural history reflects poorly on the publisher and the authors, and certainly should not become the definitive biography of my friend, Roger Peterson. As other reviewers have said before, the book tells very little about RTP—what makes him tick so to speak. Instead we are inflicted for the most part with a shallow "Ladies Magazine" type story—gossipy, glossing over Peterson's place in conservation and ornithology, and dwelling instead on personal details about divorce, idiosyncracies, foibles, and trivial events. Padding is apparently deliberate. On page 132 we learn that James Fisher wore a 6⅞ hat. Most of page 157 is occupied by a quote of Roger Caras' CBS broadcast defense of birdwatching by elderly women. The reporting is vague, suggesting that the authors did not really care to master even such things as place and organization names. A fine book by Peterson and James Fisher is mentioned as "A (*sic,* read The) World of Birds"; a popular migratory bird observation locality as "Mount (*sic,* read Point) Pelee"; and the Wilson and Cooper Ornithological societies as "Clubs" (which they stopped being

known as long ago). Much careless writing makes us re-read to understand: "Roger has seen over 100 birds that are on the A.O.U. checklist, but he has not seen them within our continental limits" (p. 160). "Roger's contact, of course, at *Life* was Joseph Kastner" (p. 117). There are several references to "birds and animals," an error so persistently and curiously characteristic of journalists. An often unfeeling and sometimes tasteless treatment of delicate or tragic facts creeps in time and again. As a result Mildred and Barbara (Mrs. Peterson numbers 1 and 2) are at times roughed up a bit. And poor James Fisher receives a wholly uncalled for posthumous snipe: Fisher and Peterson are driving on a field trip, Peterson at the wheel. Peterson makes a driving error and they argue the issues. "'Well, have it your way,' finalized James. 'I think you're a bloody bad driver.' (But it was Fisher who was killed driving in England in 1970.)" So there, smarty pants, is the feeling one gets from such an observation.

The account of Roger's boyhood is informative and displays the only consistent evidence of sensitivity and scholarship by the authors. The color plates are attractive but lightweight in the league they occupy as compared to Peterson's field guide illustrations, which are among the best of the genre. Many people are quoted in an attempt to show that Peterson is regarded as one of the great nature artists; but those who seem emphatic about it also seem to be those least qualified to judge, whereas those most qualified to judge (such as Peter Scott and Guy Coheleach) skirt the matter while complimenting Peterson on the influence he has had in the development of nature art.

This book is billed as "an authorized biography." But I simply will not believe that Roger read it in manuscript. If he had, I think it would not have been published as is.—John William Hardy.

NOTES AND NEWS

REQUEST FOR INFORMATION

I am attempting to construct a map of peak Ruby-throated Hummingbird migration times in eastern North America which I will relate to geographic trends in flowering times of major ruby-throat food plants. I would appreciate any observational or netting data on ruby-throat abundances over the spring or fall migration seasons that would help me pinpoint the time of peak migration for that area. Data for several years at one site are especially useful but not essential.—ROBERT BERTIN, *Vivarium Bldg., Wright and Healy Streets, Champaign, IL 61820.*

Symposium on Integrated Study of Bird Populations—A symposium will be held at Wageningen (The Netherlands) from 17–21 September 1979 on the occasion of the 25th anniversary of The Institute for Ecological Research of the Royal Netherlands Academy of Arts and Sciences. Further information: I.A.C., *Postbus 88, 6700 AB Wageningen, The Netherlands.*

DUES CHANGES

At the NEBBA Council Meeting on 11 May 1979, it was decided to raise dues and subscription rates to *Bird-Banding* effective with payment of 1980 dues. This decision was made because annual deficits have occurred in the operating budget of NEBBA. The new rates will be:

Student—	$ 6.00	Institutional subscriptions—	$ 10.00
Individual—	8.00	Contributing—	15.00 or more
Family—	10.00	Life—	200.00
(2 or more in the same family)		(may be paid in four equal payments over a one-year period)	

Until 1 September 1979, life memberships will continue to be $150.00. Members who can are urged to take advantage of the lower life membership rate now, thus saving $50.00.