RECENT LITERATURE

Edited by Bertram G. Murray, Jr.

BANDING AND LONGEVITY

(See also **20**)

1. Seasonal distribution of Great Lakes region Ring-billed Gulls. William E. Southern. 1974. *Jack-Pine Warbler,* **52**(4): 155-179.—Southern analyses the data from over 18,000 Ring-billed Gull (*Larus delawarensis*) encounters in an attempt to define the breeding and postbreeding ranges of the Great Lakes breeding population, to define the timetable and pattern of spring and fall migrations, and to indicate geographic areas having monthly concentrations of gulls. The article begins with a brief discussion of historical and present breeding ranges and suggests that the present proportions of birds nesting on each of the Great Lakes may be reflected by the encounter data for the month of July when the fewest birds occur away from the breeding colonies. These proportions are 53% for Lake Huron, 22% for Lake Ontario, 19% for Lake Michigan, 6% for Lake Erie and less than 1% for Lake Superior Encounters for various areas (e.g., Florida, the Chesapeake Bay area) are mapped for each month and from these data Southern draws most of his inferences on the monthly patterns of occurrence of these gulls. Unfortunately, except for Figure 6, these maps of the eastern United States are shown four to a page, and the numbers placed on them are too small. Otherwise, the paper is quite successful in obtaining its objectives. Southern reports that adults begin arriving in the breeding colonies by late March, with most birds being present by May. Egg-laying reaches a peak before mid-May and adults and juveniles begin their southward dispersal in late July. As the months pass, the gulls are fairly widely distributed, but by January and February a majority of encounters are reported from Florida. Southern also presents a table which lists band recoveries for areas outside the primary range of these gulls. This paper is a useful contribution, not only for the data on occurrence and dispersal of Ring-billed Gulls, but also because it serves as a model for papers dealing with large numbers of band recoveries. —Roger B. Clapp.

2. Ageing Acorn Woodpeckers. Ruth G. Troetschler. 1974. *Western Bird Bander,* **49**(4): 67-69.—Ninety-five % of 20 juvenile males and 88% of 33 juvenile females had white on the outer rectrices but only 14% of 14 adult males and 9% of 11 adult females were so marked. Bill lengths of young birds tend to be shorter. The author presents a table utilizing tail spotting, degree of wear in the plumage, and maxilla length, which allows aging of at least a fair proportion of Acorn Woodpeckers (*Melanerpes formicivorus*). The article closes with the suggestion that eye color may prove of use in aging as it does for several other species of woodpeckers.—Roger B. Clapp.

3. Effect of color on retention of leg streamers by Red-winged Blackbirds. W. C. Royall, Jr., J. L. Guarino, and O. E. Bray. 1974. *Western Bird Bander,* **49**(4): 64-65.—The authors tested the retention of colored leg streamers on Red-winged Blackbirds (*Agelaius phoeniceus*) held in captivity for a period of 119 days. Four colored streamers of Saflag material and 3 colored streamers of Facilon were placed on 8 males for each combination of color and material tested. The Rocket Red Saflag streamered birds all lost their streamers by the 119th day whereas only four streamers were lost for all other colors and materials combined. The authors suggest that the red streamers were lost more frequently because the birds pecked and tugged the red streamers more persistently but present no quantitative data substantiating this conclusion. The study at least points out one potential source of bias in studies that depend on this method of color marking.—Roger B. Clapp.

4. Recoveries of Brown-headed Cowbirds banded at Sand Lake, South Dakota. Olin E. Bray, John W. De Grazio, Joseph L. Guarino, and Robert G. Streeter. 1974. *Inland Bird Banding News,* **46**(2): 204-209.—This brief paper reports and maps 20 recoveries of *Molothrus ater*. Most recoveries were obtained from various Mexican states. A significantly higher recovery ratio was obtained from birds with colored leg streamers (1.4%) than from those that were normally banded (0.4%).—Roger B. Clapp.

5. **Bird-banding in Japan.** (Koltsevanie ptits v Yaponii.) M. Lebedeva and A. Kishchinskii. 1974. *Okhot. i okhotniche khozyaistvo,* **1074**(11): 42. (In Russian.)—Banding in Japan began in 1924. After an interval from 1940 to 1961, it was renewed under I. Yamashina and seven collaborators in Tokyo The annual total expanded from about 30,000 to 50,000. Waterfowl received most attention, with the Turnstone (*Arenaria interpres*) a species of special study. The Yamashina Institute employs and guides workers and supplies materials. A network of several hundred volunteers, organized under a state environmental protection agency, does most of the work. About 30 banding stations are planned, and these are to employ up to 10 workers each. University student groups will join the staff members for periods of a week to months. Bands used are of aluminum or copper, stamped in English as "Japan," or "Hong Kong." In Japan an estimated 2,000 birdwatchers are available to record observations of birds wearing plastic colored tags.—Leon Kelso.

6. **A trap for snaring birds nesting in burrows.** (Lovushka dlya lovli ptits, gnezdyashchikhsya v norakh.) V. Lavrovskii and S. Priklonskii. 1974. *Z. Zhurn.,* **53**(12): 1869-1870. (In Russian with English summary.)—For live trapping and banding Bee-eaters (*Merops apiaster*) in colonies at the Oks State Reserve a wire-hoop trap, cheap to make and readily fitted into burrows (as described and illustrated), was used. The average percentage of birds captured in each colony was 58%, with both birds of a pair taken in 17% of the instances. In similar situations the results for cord or loop traps were 24% and 1%, respectively. These hoop traps are recommended for other burrow-nesting birds. —Leon Kelso.

MIGRATION, ORIENTATION, AND HOMING

(See also 1, 54)

7. **Endogenous temporal control of migratory restlessness in warblers.** E. Gwinner. 1974. *Naturwissenschaften,* **61**: 405.—Gwinner has championed the notion that Sylviid warblers have an endogenous temporal program that controls the temporal pattern of fall migratory restlessness, as well as the distance covered by first-year migrants. This paper reports on an experiment designed to test the hypothesis that the gross temporal course of migratory restlessness (and possibly that of true migration) is primarily determined by an endogenous time program and not by the energy spent during migration.

In two groups of hand-reared Garden Warblers kept under a 12:12 hour light-dark cycle throughout their first fall migratory season, one group had 0.01 lux light intensity at night throughout the experiment, and the other group had complete darkness from 1 September to 30 October and 0.01 lux before and after this period. Total darkness suppressed nocturnal migratory activity, and both groups terminated their seasonal activity at the same time in late November.

Gwinner claims that these results support the above hypothesis. I think that an adaptive endogenous timer would utilize an energy expenditure feedback. Otherwise, any delay by bad weather during migration would mean that the migrants could not reach their normal wintering areas. If Gwinner's interpretation of his results are indeed correct, then delayed Garden Warblers stop migrating before they reach their wintering grounds, and this I believe would be maladaptive.—Sidney A. Gauthreaux, Jr.

8. **Evidence for an innate magnetic compass in Garden Warblers.** W. Wiltschko and E. Gwinner. 1974. *Naturwissenschaften,* **61**: 406.—The results show that hand-raised warblers deprived of seeing star patterns or the sun develop an orientation system that enables them to establish their normal migratory direction. The nonvisual orientation system, the magnetic compass as previously demonstrated by Wiltschko and Wiltschko (*Naturwissenschaften,* **60**: 553, 1973) and Wiltschko (*J. Ornithol.,* **115**: 1-7, 1974), can mature without

connection to visual information and does not require learning processes based on celestial cues. The authors conclude that in Garden Warblers the ability to establish the appropriate migratory direction with reference to the magnetic field and the use of the magnetic compass is innate.—Sidney A. Gauthreaux, Jr.

9. A comparison of the bird migration recorded by radar and visible field observations in the middle of Sjaelland, Denmark, spring 1971. J. Rabol and O. Hindsbo. 1972. *Dansk Orn. Foren. Tidsskr.*, **66:** 86-96.—This paper reports on simultaneous radar and visible field observations of migration carried out in the middle of Sjaelland, Denmark, in the spring of 1971. Positive correlations were found between the daily intensities and directions of migration recorded by both means, and the correlation was better when the higher visible movements were compared with radar data.

The low altitude visible migration contained a component that moved into the wind while the higher visible migration and that displayed on the radar screen contained a downwind component. The degree of movements to the SW (reverse migration) was more pronounced at lower altitudes. The Skylark (*Alauda arvensis*) was emphasized in this paper because it was found to show the strongest tendency to fly into the wind at inland locations. Rabol and Hindsbo point out that based on banding recoveries the Skylark should move NNE-NE, but they did not record this direction. Instead the migrations were to the NNW. The authors suggest that the NNW direction is a response to correct displacement sustained by the prevailing SW-W winds, thus they feel the NNW tendency could be a manifestation of navigation towards "goal areas" on the migratory route.—Sidney A. Gauthreaux, Jr.

10. Bird migration observed by radar in Denmark October 1968 to September 1969. J. Rabol, H. Noer, and R. Danielsen. 1971. *Dansk Orn. Foren. Tidsskr.*, **65:** 1-11.—This paper represents the first radar study of bird migration in Denmark. The authors used an L-band (23 cm) radar located at a station in the southern part of Zealand, and except for small breaks the radar screen was filmed continuously with a 16-mm camera. The radar information agreed well with the earlier information on bird migration over Denmark collected by field observers and ringing.

The daytime activity from late November to late February showed a well defined bimodal directionality with peaks E-ENE and W-WSW. This pattern was probably caused by the responses of wintering birds to fluctuating weather. Daytime spring activity showed a clear shift in direction from ENE to NNW, and daytime movements in summer were weak and scattered. Autumnal daytime migration was light in August, but in September and October, the intensity of movements increased and most echoes moved to the S-SW.

The winter nocturnal movements were very weak, but in the spring, during April and May, nighttime migration increased in intensity and showed a shift in direction from E and NE to NNW and NW. In June the NE component of nocturnal migration decreased while the SW component increased. The greatest nocturnal movements occurred in September and October, and SE-SSE and SSW-SW components were characteristic. The strong SE movements in October were thought to be partially the result of wind drift by strong westerly winds. The authors found more nocturnal migration than daytime migration in autumn. By November the nocturnal movements became drastically reduced.—Sidney A. Gauthreaux, Jr.

11. Intraspecific wingbeat rate variability and species identification using tracking radar. C. R. Vaughn. 1974. *Proc. Conf. on the Biol. Aspects of the Bird/Aircraft Collision Problem*, p. 443-476.—The identification of the birds responsible for radar echoes has been a perpetual problem for radar ornithologists. In theory, several kinds of information may contribute to the solution of this problem; these include wingbeat frequency, flap-pause pattern, radar cross-sectional area, Doppler signature, and air speed. All of these can be measured with available radar instrumentation, but before the data are of value, the measures must be associated with known species or species groups, and we must know the extent of individual variability in the parameters. This is a particularly difficult problem with nocturnal migrants when it is usually impossible to obtain visual confirmation of species identity. With the aid of the sophisticated NASA Wallops Island facility, Vaughn has at least begun to resolve the problem. Over 121 individual birds of 37 species were dropped from a helicopter at night between 600 and 900 meters of altitude and tracked with the AN/FPS-16 radar. Most of the species used were nocturnal migrants and included a variety of passerines and five species of shorebirds. It has been known for some years that some fluctuations in the radar cross-sectional area of a bird are correlated with its wingbeats. The usual means of monotoring these fluctuations is to look at voltage fluctuations in the automatic gain control (AGC) circuits common to most tracking radars. In this study, the basic data were AGC levels over time recorded on magnetic tape. Wingbeat frequencies were determined directly from these data with an oscilloscope. The AGC records were also examined with a spectrum analyzer to estimate the fundamental frequencies. An examination of the results (Table 3) should dash any remaining hope that we will ever be able to distinguish bird species based on the single character, wingbeat frequency. Warblers, sparrows, vireos, and waxwings overlap broadly in the range 14-17 Hz. To make matters worse, intraspecific variability is generally high, although some of this may be due to erratic flight behavior in some individuals induced by the release procedure. In two species with large sample sizes (White-throated Sparrows and Semipalmated Sandpipers), intraspecific variability exceeded intra-individual variability. Data from these two species indicated that AGC versus time determinations of wingbeat rate are as useful as the more sophisticated Fourier spectra. Fifteen Semipalmated Sandpipers yielded mean wingbeat frequencies of 6.1 to 10.8 Hz. (by AGC method); twenty-five White-throated Sparrows ranged between 12.1 and 16.2 Hz. Although wingbeat frequencies by themselves will not serve to distinguish species of migrants, they do separate broad classes of species. This in itself will be helpful, and finer discrimination may be possible by combining several kinds of measures. It is obvious that considerably more cataloging of wingbeat frequencies is necessary before its potential as an identification tool can be fully evaluated.—Kenneth P. Able.

12. Problems in identifying bird species by radar signature analyses: intraspecific variability. S. T. Emlen. 1974. *Proc. Conf. on the Biol. Aspects of the Bird/Aircraft Collision Problem*, p. 509-524.—If the previous review (rev. No. 11) gave an optimistic view of the potential of radar signature analysis, this one adopts a pessimistic tone. Again using the Wallops Island FPS-16 tracking radar, Emlen released White-throated Sparrows at night from boxes carried aloft by balloon. AGC versus time records were plotted for each bird, and wind information was obtained from the balloons at the exact time and place at which the bird was released. This paper presents a preliminary analysis of several signature parameters based on long, straight, level tracks. The mean wingbeat frequency of the sample was 14.67 Hz (range = 13.67-16.13 Hz), remarkably similar to the value reported for this species by Vaughn (previous review). Wingbeat frequencies showed a slight, but significant, increase with air speed, suggesting that migrants may increase their air speed by beating their wings more rapidly. Mean lengths of flap and pause periods showed great variability, with some individuals flapping constantly. The proportion of time spent flapping showed no correlation with air speed, but did increase when birds were climbing very gradually. Air speed was quite variable, but was predictably related to the following wind component, as previously shown by Bellrose, Bruderer, and others. These are the first published data showing this relationship for one species of nocturnal migrant, and it is interesting that the slope of the regression is nearly identical to Bruderer's sample of Chaffinches. The conclusion that must come from this paper, as well as that of Vaughn, is that it is going to be difficult to accomplish fine identifications from radar signatures; however, we can probably be optimistic about the possibility of cruder, but still useful, categorizations. Whereas intraspecific variability precludes the possibility of distinguishing between species of passerines, its analysis may tell us some interesting things about the flight strategies of migrants. Emlen has begun to probe some interesting questions of that sort.—Kenneth P. Able.

13. Identification of flying birds using a Doppler radar. J. L. Green and B. B. Balsley. 1974. *Proc. Conf. on the Biol. Aspects of the Bird/Aircraft Collision Problem*, p. 491-508.—This paper discusses yet another technique for obtaining radar information on birds that is potentially useful as an identification tool. In over-simplified terms, a Doppler radar compares the frequency of the transmitted pulse or wave with that received from the target. In this way it measures the Doppler shift in frequency resulting from the velocity of a moving target. When a flying bird is followed with a Doppler radar, frequency shifts caused by both the movement of the bird's body through space and the movement of its wings are detected. The data can be recorded and analyzed in several ways: (1) the frequency shifts can be plotted as sonograms; (2) power spectrum analysis; and (3) the audio frequencies may be played through speakers or headphones. This paper describes in detail the theoretical and practical aspects of analyzing Doppler signatures. They appear to contain less information than AGC signatures and would require much additional equipment if they were to be obtained in conjunction with a tracking radar. However, by listening to the Doppler output, experienced workers claim to be able to identify bird types before visual contact is made with the target. An audio recording of the Doppler signature of a bird in flapping flight sounds much like wind whistling through a duck's wings, and qualitative differences between different types of birds are distinctive to a trained ear. This capability gives Doppler signatures a potential that other techniques may not possess.—Kenneth P. Able.

14. The identification of birds by radar. W. L. Flock. 1974. *Proc. Conf. on the Biol. Aspects of the Bird/Aircraft collision Problem*, p. 429-442.—This paper is a brief discussion of both amplitude and Doppler signatures. Flock presents few data, but describes one result of interest that has not been previously discussed in detail. He has subjected AGC imput from flocks of birds to Fourier spectrum analysis. A flock containing gulls and Mallards showed peaks at frequencies characteristic of the two species when 30 four-second spectra were averaged. A second harmonic of the presumed Mallard peak was also evident. Obviously, more than one example is required to make the case, and all of the problems concerning AGC signatures discussed in the papers reviewed above are even more severe. However, there may be special situations where this capability could be very useful if it proves reliable.—Kenneth P. Able.

15. Bird casualties at a Leon County, Florida TV tower: October 1966-September 1973. R. L. Crawford. 1974. *Bull. Tall Timbers Res. Sta.*, No. 18: 1-27.—This paper is a follow-up report to the earlier compendium of Stoddard and Norris (*Bull. Tall Timbers Res. Sta.*, No. 8: 1-104, 1967). It reports kills of about 5,550 birds of 148 species between October 1966 and September 1973. These data are tabulated by species and month, with all years combined. Six species new to the tower list were recorded (most were water birds), and new extreme migration dates are given. A table of monthly and yearly totals for all the years the tower has been studied (1955-1973) shows some interesting things. During the "Stoddard years" (1955-1966), annual high counts were 4,415 (1957) and 4,019 (1965), and the lowest total was 1,765 (1961). Beginning in 1967, the magnitude of kills dropped drastically and in 1970 only 389 birds were collected. This phenomenon of towers seemingly losing their lethal potency over time has been noticed in many areas. Crawford offers some evidence supporting his firm belief that nocturnal predators that have learned to seek the easy foraging around the bases of towers are responsible for these apparent declines in kills. At Tall Timbers, the main scavengers are feral house cats and Great Horned Owls, and they may take up to 80% of groups of birds scattered on the ground around the tower. Predator control was ceased at this tower in 1967 and re-instituted in 1973. We shall have to wait a while for the conclusive results, but workers interested in drawing quantitative conclusions from TV tower kills had best heed the warning.—Kenneth P. Able.

16. Clock-shifting effect on initial orientation of pigeons. J. Alexander and W. T. Keeton. 1974. *Auk*, **91**: 370-374.—The data presented here add to the mounting evidence against Matthews' sun-arc hypothesis. The predictable changes in initial flight directions obtained by subjecting pigeons to clock-shifts have long argued in favor of separate map and compass components in navigation and against the involvement of the sun in the map component. Critics of this interpretation of the phase-shift experiments have argued that the birds are prevented from seeing the sun for so long during the clock shift that they forget the necessary information on the sun's altitude by the time the release occurs. To test this hypothesis, Alexander and Keeton performed seven releases with pigeons subjected to a six-hour fast clock shift. During the phase shift period, the birds were placed in an outdoor aviary during the time of overlap between the real and artificial daylight periods. In this way they could observe the sun while simultaneously undergoing a clock shift. Releases were made from three sites 73.5, 33.5, and 15.4 km to the north, east, and southeast of the home loft, respectively. All control groups were significantly oriented homeward (vanishing bearings), and all experimental groups showed significant shifts in the predicted direction, although the magnitude of the shifts showed some variability (33°-137°). In all but one release, the controls had significantly greater homing success. As expected, the results fail to support the sun-arc hypothesis.—Kenneth P. Able.

17. Homing as an experimental mode of bird study. (Khoming kak metod eksperimentalnogo izucheniya ptits.) A. Kistyakovskii and N. Sukhodols kaya. 1974. *Vestnik Zool.*, **1974** (5): 72-75. (In Russian with English summary.) —The advantages of experimental short distance homing are discussed with examples. They require no stops for resting or feeding. Distances of about 100 km or less are recommended, with radar tracking, if possible, and close follow-up of local weather and other conditions. Possible combinations of records would include: relation of return velocity to stage of nesting period; to progressive ability to orient with training; to weather, cloudy versus clear; to single versus group releases; to experience and age; to release from enclosures or in view of open landscape; to initial direction taken on release; transfer for release overland versus over sea; to the effect of rotation of pouch or container in transit to release point; to original direction of transfer; to time of choice of final direction. Other variants and combinations of criteria are possible. The suggestion is that brief period homing releases can thus yield reliable results.—Leon Kelso.

POPULATION DYNAMICS

(See also 1, 21)

18. Great Blue Heron and Double-crested Cormorant colonies in the prairie provinces. K. Vermeer. 1973 *Can. Field-Nat.*, **87**: 427-432.— Between 1967 and 1972, 123 active heronries with 3,764 nests were found in Alberta, Saskatchewan, and Manitoba. During this period 56 Double-crested Cormorant (*Phalacrocorax auritus*) colonies with 6,397 nests were found. The Great Blue Heron (*Ardea herodias*) population appears relatively stable, whereas the cormorant population is decreasing. Heronries that were vandalized or where decayed nesting trees resulted in abandonment were usually relocated within 10 miles of the original site. Cormorants nest on the ground and must nest on islands surrounded by wide, deep water channels if they are to escape predation by coyotes (*Canis latrans*) (see Vermeer, *Can. Wildl. Serv. Ser.*, **12**: 52p, 1970, for discussion of coyote predation on colonial birds). Cormorant colonies that are vandalized are usually abandoned and not relocated.—Edward H. Burtt, Jr.

19. A comparison of the colonizing abilities of native and introduced bird species onto islands around Australia and New Zealand. J. Abbott. 1974. *Victoria Nat.*, **91**(9): 252-254.—Successful colonizations of five native species involving 12 instances and of 11 species introduced from Great Britain involving 78 instances since 1860 are briefly discussed. Introduced species form flocks during migratory behavior compared with the native Australian and New Zealand species that do not form flocks. Abbott believes that the flocking behavior is responsible for most of the differences in the success of colonization of offshore islands.—M. Ralph Browning.

20. On the use of mist nets for population studies of birds. R. H. MacArthur and A. T. MacArthur. 1974. *Proc. Natl. Acad. Sci.*, **71**(8): 3230-3233. —Shortly before his tragic death Robert MacArthur recognized the usefulness of mist-netting for estimating bird populations. As this paper reports his initial exploration in this area, it is of questionable value. The theoretical discussion begins with the assumption that the decrease in numbers of birds captured with time is caused by the birds' learning to avoid nets, although the authors do not discuss J. Swinebroad's analysis, which came to a contrary conclusion (*Bird-Banding,* **35:** 196-202, 1964). The field data (captures and recaptures) were generated by setting up two sets of five nets each in a mixed hardwood and coniferous forest in Vermont for 10-day periods in 1971 and 1972. These were used for estimating (a) the total number of birds in the area, (b) the probability that a bird would be captured per unit time, and (c) the number of drifting (i.e., nonresident) birds, using a rather complicated model developed in this paper. Unfortunately, no independent estimates of these parameters were made in order to evaluate the accuracy of this method with respect to others. Nor are the results or the theory presented in this paper discussed in the context of *any* earlier work on estimating populations. For example, a more sophisticated analysis of this particular technique appeared in *Bird-Banding* almost 15 years ago (Stamm, Davis, and Robbins, **31:** 115-130, 1960).—Bertram G. Murray, Jr.

NESTING AND REPRODUCTION

(See also 18, 36, 40, 42, 62)

21. Some aspects of the breeding and mortality of Common Loons in east-central Alberta. K. Vermeer. 1973. *Can. Field-Nat.,* **87:** 403-408.—Common Loons (*Gavia immer*) arrive in east-central Alberta in early May as soon as the lake ice melts. Egg-laying begins in the third week of May, and 48% of the population lays during that week although laying might continue until the third week of June. The mean clutch-size (1.93 ± 0.14) in Alberta was significantly larger than the mean clutch-size (1.55 ± 0.14) in Minnesota (Olson and Marshall, *Occas. Papers Minn. Mus. Nat. Hist.,* **5:** 1-77, 1952.), but the average of 0.4 fledling/breeding pair is probably not significantly different from the 0.5 fledling/breeding pair found in Minnesota by Olson and Marshall. These data confirm the tendency toward larger clutches at higher latitudes reported by Lack (*Ibis,* **90:** 25-45, 1948) but do not indicate increased productivity of more northerly populations as found for the Rough-winged Swallow (*Stelgidopteryx ruficollis*) by Ricklefs (*Auk,* **89:** 826-836, 1972).

Encouragingly PCB and other organochlorine residues in the eggs were below levels found in other fish-eating birds in 1968 in Alberta (Vermeer and Reynolds, *Can. Field-Nat.,* **84:** 117-130, 1970), but adult mortality from fish nets in which the adults become entangled is still a major problem.—Edward H. Burtt, Jr.

22. Sex ratio in the Common Eider. (O sootnozhenii polov u gagi obyknovennoi.) L. Belopolskii, G. Goryanova and T. Tarnovskaya. 1974. *Ekologiya,* **1974**(2): 110-111. (In Russian.)—Of 77 embryos (1-3 days before hatching) of *Somateria mollissima* from the Murmansk area, 62.4% were male. This sex ratio (1.7:1) tended to approach (1:1) as the study progressed from younger to older and larger groups of Eiders. So, of 1,445 individuals from Ainov Islands, males comprised 50%. Of 255 on Saarem Islands, 51.4% were males. —Leon Kelso.

BEHAVIOR

(See also 7, 8, 59, 60, 62)

23. Observations on bird singing during a solar eclipse. J. A. Elliot and G. H. Elliot. 1974. *Can. Field-Nat.,* **88:** 213-217.—Solar eclipses are regrettably infrequent, and knowledge of behavior during solar eclipses is largely rumor. For 1.5 hr before and after totality the authors monitored songs/min of flycatchers, warblers, and sparrows singing on a hillside near Malignant Cove, Nova Scotia. The data were correlated with changes in light intensity measured rather crudely with an unidentified photographers' light meter.

Frequency of songs decreased markedly in the first minute of total eclipse, but in the second and last minute the number of songs was not different from any other minute before or after the eclipse. A number of species monitored during the eclipse first sing in the morning when the illuminance is 0.01 to 0.05 foot-candles and cease singing in the evening when the light intensity drops to 0.2 to 10 foot-candles (Leopold and Eynon, *Condor*, **63:** 269-293, 1961). During totality the light intensity dropped to about 0.2 foot-candles, low enough for these species to stop singing, but the light intensity remained at about 0.2 foot-candles, not dark enough to prevent the resumption of "morning" song. Therefore song decreased dramatically in the first minute, then increased during the second and last minute.

The suggested explanation fits the facts well. Now another solar eclipse is needed to test the model.—Edward H. Burtt, Jr.

24. Interspecific differences in avian feeding behavior and the evolution of Batesian mimicry. J. Alcock. 1971. *Behaviour*, **40:** 1-9.—Black-capped Chickadees (*Parus atricapillus*) more frequently ate mealworms with quinine and their palatable mimics than did White-crowned Sparrows (*Zonotrichia leucophrys*), thus confirming Klopfer's decade-old results with tits and finches eating sunflower seeds.—Jack P. Hailman.

25. Interaction between early experience and depth avoidance in young Eider Ducks (*Somateria mollissima* L.). M. Nystrom and S. B. Hansson. 1974. *Behaviour*, **48:** 303-314.—Young precocial birds avoid the deep side of a visual cliff, so the authors question why ducklings take to the water so readily. I think the question is silly: the birds can tell whether there is a true cliff even if it is covered by glass. Indeed, when the authors fill the deep side of their apparatus with water the little eiders swim happily into it. The puzzlement the authors seem to evince about the development of cliff-edge responses in young birds might have been somewhat relieved by better homework (e.g., Hailman, *Ibis*, **101:** 197-200, 1968).—Jack P. Hailman.

26. Food caching behaviour in the American Kestrel (*Falco sparverius*). H. C. Mueller. 1974. *Z. Tierpsychol.*, **34:** 105-114.—All six captive birds cached food, most of them about 70% of the time. Caching and to a lesser extent retrieval-attempts increase with the length of food deprivation periods, although this is not the author's conclusion. With some effort one can deduce from the text that the unspecified axis of Figure 1 is in hours. The author claims that Table 2 shows a circadian rhythm in retrieving, but not caching; maybe. Intact mice seemed to be cached more often than skinned ones. Statistics would have helped this study become convincing; at the least correlations could have been run on the data in Figures 1 and 2. A sample size of six birds is frustrating: it is just great enough to entice one into conclusions, but just small enough that those conclusions cannot really be secured.—Jack P. Hailman.

27. The development of prey recognition and predatory behaviour in the American Kestrel *Falco sparverius*. H. C. Mueller. 1974. *Behaviour.*, **49:** 313-324.—Of nine hand-reared birds only a couple showed responses to models and dead mice, behavior that seemed more like play than predation. All but one bird attacked the first live mouse presented, and all nine became expert predators by the sixth trial with live mice.—Jack P. Hailman.

28. Effects of prior exposure to light on chick's behaviour in the imprinting situation. P. P. G. Bateson and G. Seaburne-May. 1973. *Anim. Behav.*, **21:** 720-725.—The method is to expose chicks to a particular early experience ("prior exposure") and then later to measure their approach to a flashing light. Prior exposure to light increases subsequent approach; prior exposure to cool temperature has no effect; and prior exposure to chicks calling loudly in the dark decreased approach relative to prior exposure to silence in the dark.—Jack P. Hailman.

29. Winter hunting of Snowy Owls in farmland. E. O. Hohn. 1973. *Can. Field-Nat.*, **87:** 468-469.—The account of foraging behavior is interesting but vague. Detailed description is lacking as when the "attack" flight is described, "After a lowlevel flight its [the Snowy Owl's] aerial manoeuvering with lowered feet almost touching the snow, followed by perching. . . ." What is "low-level?" Is it 0.5, 1.0, 2.0 m? When during flight were the feet lowered and by how much? The description fails to paint an unambiguous picture of the behavior pattern. Quantitative data are provided only occasionally as when use of lookout posts is described. More commonly behavior is discussed in qualified terms: "Take-offs followed by attack flights were in some cases made without noticeable preliminary." Or, if quantified, the data are summarized so as to give only a crude idea of what actually occurred, ". . . birds never just sat looking into the distance, but peered in one direction for a few (up to about 10) seconds. . . ." More descriptive ethology is desperately needed, but interspecific comparison and theoretical advances must depend on detailed and quantitative observation. Edward H. Burtt, Jr.

30. The food searching behaviour of two European thrushes. I· Description and analysis of search paths. J. N. M. Smith. 1974. *Behaviour,* **48:** 276-302.—The European Blackbird (*Turdus merula*) and Song Thrush (*T. philomelos*) were watched foraging in a meadow. Their alternating moves and pauses were mapped with a grid system and timed on movie film. Only about 10 to 15% of foraging time is spent moving. the rest spent scrutinizing or feeding. Song Thrushes and female blackbirds move quicker than male blackbirds. The rules of foraging are roughly these: the bird moves a straight line for some particular length that has a highly skewed distribution. which may approach random; then it turns and runs again. The distribution of turns is symmetrical about the mean value of going straight ahead, and there is some evidence that the length of previous runs helps determine the length of the next run and that the angle and direction previously turned helps determine the next angle. The serial dependencies probably do not go back more than two runs or two turns, and the results of the strategies employed seem to insure that the bird will avoid searching ground just covered.—Jack P. Hailman.

31. The food searching behaviour of two European thrushes. II. The adaptiveness of the search patterns. J. N. M. Smith. 1974. *Behaviour,* **49:** 1-61.—The species are the European Blackbird (*Turdus merula*) and the Song Thrush (*T. philomelos*), which seem frequently to be treated together as simply "thrushes," species comparisons being clearly drawn only at certain points in the data. The paths of thrushes in a meadow were such that after capture of an earthworm the bird stayed longer in the immediate area than it otherwise would. With artificial prey, the thrushes made larger turns and showed less left-right alternation at higher prey densities. A number of subsequent experiments elicit quantitative changes in the foraging of the thrushes, and Smith argues that at least some of these changes lead to greater average prey capture. The changes are summarized by two cartoon-like diagrams (p. 51 and 53), and the reader can draw his own conclusions about how adaptive these changes really may be.—Jack P. Hailman.

32. Social facilitation in the Bengalese Finch. L. I. A. Birke. 1974· *Behaviour,* **48:** 111-112.—*Lonchura striata* pairs were observed in captivity: the two birds tended to preen, feed, bill-wipe and drink at the same time, and when one fed, the other sang. Then birds were paired in adjacent cages and the behavior of one (the actor) manipulated. For example, it was denied food for a period to increase feeding, denied nesting material to increase manipulation of it when reinstated, and its seed made sticky to induce bill-wiping. The observing bird's behavior was recorded before and during the induced behavior of the actor, and, in general, the same sorts of synchronous behavior were found.—Jack P. Hailman.

ECOLOGY

(See also 18, 19, 20, 30, 53, 62, 63, 64)

33. Estimation of energy flow in bird communities: a population bioenergetics model. J. A. Wiens and G. S. Innis. 1974. *Ecology,* **55:** 730-746.—The authors have created a simulation model that attempts to estimate the population density flux, biomass change, and bioenergetic demand of bird populations during the breeding season. The population submodel is based upon census data and values for clutch size, mortality rates, and reproductive phenology. By means of nonlinear difference equations, the model calculates population densities and biomass for nestling, fledgling, juvenile, and adult age classes. With these values plus mean weekly ambient temperature values, the energy submodel calculates existence energy requirements according to the formulations of Kendeigh (*Condor,* **72**: 60-65, 1970). Multiply by 1.40 to adjust for extra activity and by 1.43 to adjust for digestive efficiency and you get the total energy intake requirement for individuals of the various age classes at different times during the season. Subroutines for the cost of molt and egg production are optional. Examples are given for censuses of a population of Dickcissels (*Spiza americana*) in Oklahoma and of Horned Larks (*Eremophila alpestris*) in North Dakota in 1970. The authors are pleased with the internal consistency of the model as determined by sensitivity analysis in spite of the fact that they know they have coupled scanty field information with a lot of guesswork. Just because generality, realism, and precision can not all be maximized in model construction (Levins, *Am. Sci.,* **54**: 421-431, 1966), it does not follow that if you sacrifice precision you will increase the generality and realism.—Frances C. James.

34. The role of birds in nutrient cycling in a northern hardwoods ecosystem. F. W. Sturges, R. T. Holmes, and G. E. Likens. 1974. *Ecology,* **55**: 149-155.—As a result of the intensive interdisciplinary study of nutrient cycling in the Hubbard Brook Experimental Forest, West Thornton, New Hampshire, the input of nutrients and other chemicals via precipitation and the output in drainage waters are known (G. E. Likens and F. H. Bormann, *Proc. 31st Ann. Biol. Colloq.,* p. 25-67, 1972). In this study the seasonal standing crop biomass of birds on a 10 ha plot was determined by multiplying the number of individuals of each species present by the average weight for the species. This varied from 15 dry g/ha in winter to 222 g/ha in late June and early July. The nutrient contents of 79 specimens of 20 species were analyzed by atomic absorbtion spectrophotometry. The net annual loss of calcium via streams is 9,430 g/ha, whereas a maximum of 3 g/ha is removed by population losses of birds during migration. The standing crop of calcium in annual plant parts is 26,900 g/ha, whereas there is only 6.9 g/ha in the bird population. The pattern is the same for nitrogen, phosphorous, sulfur, potassium, and the other elements considered. This supports the conclusion that the role of birds in ecosystem nutrient cycling is negligible.—Frances C. James.

35. Avian species diversity in desert scrub. C. S. Tomoff. 1974. *Ecology,* **55**: 396-403.—In deciduous forests plant species composition is not directly related to breeding bird species diversity (R. H. MacArthur, and J. W. MacArthur, *Ecology,* **42**: 594-598, 1961), and physiognomic diversity of the vegetation is minimal. But these generalizations do not apply to desert scrub communities. In the Sonoran Desert of southern Arizona, particular plants have distinctive growth forms that meet specific needs of birds, especially as nest sites. Physiognomic coverage diversity (PCD) was determined by assigning each plant species a life form or physiognomic character (see R. H. Whittaker, "Communities and ecosystems," Toronto, MacMillan, 1970) and then finding the diversity (H) from the relative coverage of the life forms. This statistic and the number of equally important physiognomic dimensions (E_P), calculated as e^{PCD} corresponded well with the overall visual appearance of each site and was a better predictor of bird species diversity than foliage height diversity. The diversity of foraging behaviors employed by the birds on each plot showed the same pattern as bird species diversity.—Frances C. James.

36. Territorial behavior, pesticides, and the population ecology of Red-shouldered Hawks in central Maryland, 1943-1971. C. J. Henry, F. C. Schmid, E. M. Martin and L. L. Hood. 1973. *Ecology,* **54**: 545-554.—A reduction in the number of breeding pairs of Red-shouldered Hawks along the Patuxent River floodplain occurred only on the area where large portions of the habitat had been destroyed, whereas the population remained unchanged or increased on the Patuxent Wildlife Research Center. During the period of the study there was a three-fold increase in the human population of Prince Georges County. Land fills, apartment buildings, and shopping centers replaced areas that were formerly bottomland forest. Of three eggs tested for pesticides, one had 0.35 ppm wet weight of dieldrin and 2.40 ppm of p,p'-DDE, probably sufficient to cause the observed 9% decrease in eggshell thickness. Nevertheless, the authors conclude that, since the recruitment rate during years of optimum density (1.95 young fledged per nest) seemed to be sufficient to maintain a stable population, the reduction in the population as a whole was due to habitat destruction. I hope that biologists who are preparing environmental impact statements will cite this paper.—Frances C. James.

37. Foraging behavior of Black-bellied Plovers (*Pluvialis squatarola*). M. C. Baker. 1974. *Ecology*, **55**: 162-167.—Migrating Black-bellied Plovers near New Haven, Connecticut, feed mainly on polychaete worms (*Nereis*) and small clams (*Mya*). The birds were slightly more successful in capturing prey in the fall than in the spring, but there was no evidence that they reduced their food resources significantly. By means of a probabilistic analysis of uncertainty, the author shows stereotyped patterns in the sequence of foraging events. These are independent of season, environmental conditions, and number of individuals present. Individuals that have just captured prey take fewer steps than birds that have been unsuccessful. The influence of the stage of the tide, although known to be correlated with foraging rate, was not analyzed.—Frances C. James.

38. The 1972 midwinter census of waders in Scotland. A. Prater. 1973. *Scot. Birds*, **7**(8): 391-398.—In January 1972 at 29 coastal points 209,639 shorebirds were counted. Of the 19 species recorded, the more numerous were: Knot (*Calidris canutus*), 64,572; Oystercatcher (*Haematopus ostralegus*), 36,062; Dunlin (*Calidris alpina*), 34,726; Redshank (*Tringa totanus*), 19,428; and Lapwing (*Vanellus vanellus*), 18,632. It was estimated that in all this totaled about one-fourth of the shorebird population wintering in Britain.—Leon Kelso.

39. Preliminary examination of stomach contents of murres (*Uria* spp.) from the eastern Bearing Sea and Bristol Bay, June-August, 1970-1971. H. Ogi and T. Tsujita. 1973. *Jap. J. Ecol.*, **23**: 201-209.—Murres in Bristol Bay and the eastern Bering Sea feed on fish, particularly walleye pollock *Theragra chalcogramma*) and Pacific sandlance (*Ammodytes hexapterus*), on euphausiids (*Thysanoessa raschii* and *T. longipes*), and occasionally on squid and amphipods. At one location stomachs of 29 Slender-billed Shearwaters (*Puffinus tenuirostris*) were found densely packed with *T. raschii* and a few Pacific sandlance. Murres caught in the same area had fed on Pacific sandlance exclusively. However, in areas where shearwaters were absent murres fed on fish and euphausiids indiscriminately.

Drift gill nets were used to capture seabirds foraging underwater with the advantage that the prey population (i.e., fish and marine invertebrates) could be simultaneously sampled. Unfortunately this technique leaves time of capture of the seabirds unknown. Curiously data on the prey populations are not mentioned. Data from Common Murres (*Uria aalge*) and Thick-billed Murres (*Uria lomvia*) are combined, and no attempt is made to separate data from murres of different sex, size, or age.

The study undertakes to clarify the food relationship between murres and juvenile sockeye salmon (*Oncorhynchus nerka*) but fails to do so. Very few juvenile sockeye salmon were found in murre stomachs, but inshore areas where the salmon are most abundant were not sampled. Murres eat many of the same prey items as the juvenile salmon, but the quantitative effect of the murres on the prey populations is not discussed.—Edward H. Burtt, Jr.

40. Functional analysis of space-related behavior in the seaside sparrow. W. Post. 1974. *Ecology*, **55**: 564-575.—Breeding populations of Seaside Sparrows (*Ammospiza maritima*) at six sites on the southern shore of Great South Bay, New York, occurred in ditched salt marshes and in unaltered salt marshes. In the altered (ditched) areas where feeding was suboptimal the population density was low (minimum of 0.6 pairs/ha) although the availability of nest sites was more than adequate. In the unaltered areas the only nest sites at the time of nest building were in the scattered undamaged patches of *Spartina alterniflora* that remained from the previous year's growth. As a result the birds nested close together (maximum of 30 pairs/ha) in grouped territories. They displayed more aggression and made irregular distant foraging flights to open muddy areas used as undefended common feeding grounds. Predation was low and did not affect the spacing pattern between nests. No differences in activity patterns, breeding success, or even rate of delivery of food to the nestlings were found between the two types of territories.—Frances C. James.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(See 41, 69)

CONSERVATION AND ENVIRONMENTAL QUALITY

(See also 36)

41. Decline of DDT residues in migratory songbirds. D. W. Johnston. 1974. *Science,* **186**: 841-842.—Little is known of the lethal or sublethal effects of chlorinated hydrocarbon pesticides on populations of insectivorous or granivorous birds. Eggshell thinning has not been demonstrated for these species, and only scant evidence links population declines with pesticide application. Nonetheless the decrease from 1964 to 1973 in concentration of DDT and its metabolites in the adipose tissue of migratory songbirds is most encouraging. The decline over the last five years is particularly dramatic; a mean of 17.80 ppm (total DDTs) for five species in 1969 was down to a mean of 2.06 ppm in 1973. The quantity of dieldrin found was small, and no consistent annual trends of it were discovered.

The author asserts that excretion from the body or relocation within the body of DDT and its metabolites could not alone account for the observed decrease in concentration. The change appears correlated with the decreased use of DDT in North America. Recent decline in European use of DDT and of the DDT content in the eggs of the shag (*Phalacrocorax aristotelis*) (Coulson et al., *Nature,* **236**: 454-456, 1972) support the suggested correlation.—Edward H. Burtt, Jr.

42. The 1973 distribution and abundance of breeding Ospreys in the Chesapeake Bay. C. Henry, M. Smith, and V. Stotts. 1974. *Chesapeake Sci.,* **15**(3): 125-133.—Good news regarding conservation comes from federal and state aerial and ground surveys, which estimate 1,450 pairs of *Pandion haliaetus* breeding along the bay. Of 713 on the western and 737 on the eastern shore, only 31.7% were nesting in trees; the remainder occupied channel markers, blinds, and other man-made structures, particularly special nesting platforms provided for the purpose. Overall these structures seem to have increased the population in certain areas.—Leon Kelso.

PARASITES AND DISEASE

43. Cutaneous staphylococcosis and secondary infection of the House Sparrow by the fungus *Cladosporium herbarum*. Z. Hibalek. 1974. *Folia Parasit.,* **21**(1): 59-66.—Although the variety of Acarina (mites) identified as associated with feathers is vast and ever growing, very few instances of fungi affecting feathers have been recorded. This account associates the latter with plumage but indirectly. Microscopic examination found 20 of 171 *Passer domesticus* infected by this widely distributed airborne fungus. It chiefly affected slight lesions of the skin, in one case following bacterial infection by *Staphylococcus aureus*. Most of the infection associated with skin lesion was beneath the nape feathers of females. Because the cases occurred in the nesting season, it is suggested that dermal trauma was due to copulation. In all affected cases the plumage showed definite wear and deterioration.—Leon Kelso.

PHYSIOLOGY

(See also 7)

44. Bird hematocrits: effects of high altitude and strength of flight. F. L. Carpenter. 1975. *Comp. Biochem. Physiol.,* **50A**: 415-417.—

Hematocrits for 14 species are compared. No difference in values between high altitude and lowland species was found but values were significantly lower in species with weak flight when compared with strongly flying species.—Raymond J. O'Connor.

45. **Metabolism of molting birds.** (Metabolizm linyayushchikh ptits.) V. Gavrilov. 1974. *Z. Zhurn.*, **53**(9): 1363-1374. (In Russian with English summary.)—A comparative elaborate analysis of the energetics of molting in migratory and sedentary forms of the Chaffinch and House Sparrow yielded the following data: adult *Fringilla coelebs*, 240 kcal, and juvenile, 147; adult *F. c. solomkoi* (migrant), 260, and juvenile, 158; adult *Passer domesticus*, 356, and juvenile, 369; and *P. d. bactrianus* (migrant), 326 kcal (juveniles not recorded). Energy expenditure for molt correlated approximately to mass weight of feathers replaced, the diets being equal. Calculated molt energetics comprised 60 to 65% requirement of molt proper. It is suggested that the remaining expenditure compensates for accelerated heat loss through extra exposure during plumage replacement. On the whole this can pertain only to granivorous birds. For insectivorous birds the expenditures may be much less.—Leon Kelso.

46. **Glycogen utilization by the white fibres in the pigeon pectoralis as main energy process during shivering thermogenesis.** G. H. Parker and J. C. George. 1975. *Comp. Biochem. Physiol.*, **50A**: 433-437.—Adult *Columba livia* were exposed to $-25°$ C for 30 minutes and the resulting electromyographic activity and histochemical changes in the pectoral muscles recorded. To summarize the results of this well-planned series of experiments, the glycogen content of the white fibers of the pectorals was heavily depleted when thermogenic shivering took place in partially defeathered birds but not when such shivering was prevented experimentally, e.g. with curare; there were no such changes in the fat-fuelled red fibers of the pectorals. It follows that the glycogen metabolism in the white fibers is the main energy source for shivering thermogenesis.—Raymond J. O'Connor.

47. **Gastroliths in Norwegian Grouse (*Lagopus lagopus*).** A. Tindall. 1973. *Acta Physiol. Scand.*, **89**(Suppl. no. 396): 66. (In English.)—Gravel in gizzards was finer and in greater amounts in summer than in winter. Some individuals contained none in late winter. Those kept in captivity carried stomach gravel year round. Experimentally supplied glass beads showed that heavier particles were retained longer in the gizzard. Calcareous gravel disintegrated and disappeared in several days, evidently dissolved by digestive juices.—Leon Kelso.

48. **Winter survival of passerines.** (Vyzhivanie vorobinhky ptits v ziminii period.) S. Postnikov. 1974. *Ekologiya*, **5**(4): 84-85. (In Russian.)—Ten species of common passerines were tested for cold weather survival by exposure in outdoor cages at Perm, West Urals (58° N), at an average January temperature of $-15°$ C. Species customarily wintering south of this latitude enjoyed 70 to 90% survival; an exception was the Scarlet Grosbeak (*Carpodacus erythrinus*) with no survivors. Of a boreal wintering species, the Siskin (*Spinus spinus*), 100% survived. For drinking, birds preferred water to snow. An individual's snow thaw for its average 8 ml of drinking water per day required 1.98 kcal of energy.—Leon Kelso.

49. **Oxygen consumption in relation to ambient temperature in five species of forest-dwelling thrushes (*Hylocichla* and *Catharus*).** R. T. Holmes and R. H. Sawyer. 1975. *Comp. Biochem. Physiol.*, **50A**: 527-531. —The standard metabolic rates of *Hylocichla mustelina*, *Catharus fuscescens*, *C. guttatus*, *C. ustulatus*, and *C. minimus* were measured as functions of ambient temperatures during daylight hours. Thermoneutral values were close to those predicted by the Lasiewski-Dawson equation, whereas values below thermoneutrality varied linearly and inversely with ambient temperature. This slope was at least 20% lower in *C. minimus* than in any other species, which feature the authors suggest might be adaptive to the colder conditions of its subalpine habitats. Extrapolation of these lines to zero metabolism gave temperatures of 45° to 66° C, suggesting to the authors that these species do not fit the Newtonian model of heat regulation in homoiotherms.

Two points need bearing in mind with this paper. First, extrapolation of metabolic regression lines to intercept the temperature axis inevitably yields intercept estimates with large uncertainties: my rough calculations from the authors' graphical data suggest that the Newtonian values for body temperatures of about 41° C fall within the confidence limits of their data in all five species. Second, as pointed out by the authors themselves, we know little as yet about diurnal patterns in the metabolism of insectivorous birds, and such temporal variation could be a source of systematic bias in the daylight-only measurements of this study.—Raymond J. O'Connor.

50. Seasonal changes in bone mineral content and alkaline phosphatase activity in the House Sparrow (*Passer domesticus* L.). M. Ojanen, H. Haarakangas, and H. Hyvärinen. 1975. *Comp. Biochem. Physiol.*, **50A:** 581-585.—Phosphatase activity and water content of the tibia were high in first-year sparrows in autumn and, in the case of females, again during the breeding season. Zinc and calcium contents of the tibia also rose in putatively laying females. The breeding season changes are clearly attributable to nutrient mobilization in laying birds. The authors suggest that the autumn patterns for both sexes are correlated with the progress of ossification in immature birds. It is unfortunate that they took no autumn samples of adult (non-yearling) birds to confirm this explanation.—Raymond J. O'Connor.

MORPHOLOGY AND ANATOMY

(See also 62, 63)

51. Rate of post-natal digestive system development of Jackdaw and Rook. (Temp rosta pishchevaritelnoi sistemy u ptentsov galok, *Corvus monedula*, i grachei, *Corvus frugilegus*, v postnatalnyi period.) N. Voronov. 1974. *Zhurn. Obshchei Biol.*, **35**(6): 934-943. (In Russian with English summary.)—Growth of corvid digestive tract organs proceeds at an irregular tempo in two phases; the first is rapid, when in a few days after hatching (10 for Jackdaw, 13 for Rook) the size of nestlings' digestive organs equals or exceeds that of adults'; and the second is involute, when growth halts, or they even shrink to normal size for adults. Liver, pancreas, proventriculus, duodenum, and rectum develop most rapidly. Gizzard and large intestine, requiring 2 to 3 months to reach adult size, are the slowest. The shift from rapid to arrested growth in certain organs appears correlated to change from animal to vegetable food supplied to the nestlings.—Leon Kelso.

PLUMAGES AND MOLTS

(See also 45, 62)

52. Comparative morphology and chemical composition of grey, blue, and white plumage in Guinea Fowl. (Sravnitelnaya morfologiya i khemicheskii sostav perya tsesarok seroi, goluboi, i beloi okraski.) S. Voroshilova. 1974. *Biol. Zhurn. Armenii*, **27**(5): 80-88. (In Russian with Armenian summary.)—This study would indicate that plumage color phases are not more than skin deep if that penetrative. Analyses of groups of four individuals for each of three *Numida meleagris* color variants, reared in similar conditions, yielded data for statistical treatment. No significant differences developed, whether in feather weight, shape, number, length, arrangement on areas, or density. Eighteen chemical elements were identified. Microanalyzed for weight comparison, the white feathers recorded higher chemical content than the colored feathers. For example, they showed more calcium, iron, and copper, as though colors were submerged, diffused, or masked over in the white.—Leon Kelso.

ZOOGEOGRAPHY AND DISTRIBUTION

(See also 1, 19, 55, 62, 63, 64)

53. The Arcto-alpine avifauna and its origin. (Arktoalpiiskaya avifauna i ee proiskhozhdenie.) A. Kishchinskii. 1974. *Z. Zhurn.*, **53**(7): 1036-1051.

(In Russian with English summary.)—An analysis of eco-distributional studies of five selected species—Dotterel (*Eudromias morinellus*), Rock Ptarmigan (*Lagopus mutus*), Rock Pipit (*Anthus spinoletta*), Shore Lark (*Eremophila alpestris*), and Wheatear (*Oenanthe oenanthe*)—is presented in detail with ample discussion. The one common ecological feature shown by the five species is their affinity to mesophytic or mesic tundra communities, rather than arctic desert or shrubby or boggy tundra. This appears irrespective of major or minor surface features. Theory elaborated here holds that *Lagopus* evolution initiated in the "Beringian" area, while *Eudromias, Anthus, Eremophila,* and *Oenanthe* evolved in arid central and southern Asia and moved into their present range during Quaternary and Holocene times.—Leon Kelso.

54. The Sandhill Crane. (Kanadskii Zhuravl.) I. Neifeldt. 1974. *Okhota i okhotniche khozyaistvo,* **1974**(10): 44-45. (In Russian.)—What is called abroad the Canadian Crane (*Grus canadensis*) has a disjunct breeding range extension into northeastern Siberia with a trans-Beringian migration; this is reviewed in detail here. There is a concise survey of its American distribution with speculation that the form known as "Little Brown Crane" has the best chance of survival.—Leon Kelso.

SYSTEMATICS AND PALEONTOLOGY

(See also 62, 63, 64)

55. A new species of *Nesotrochis* from Hispaniola, with notes on other fossil rails from the West Indies (Aves: Rallidae). S. L. Olson. 1974. *Proc. Biol. Soc. Wash.,* **87**(38): 439-450. (With Spanish summary.)—A new species of flightless rail, *N. steganinos*, is described from Pleistocene cave deposits. Olson reassigns two other recently described species of flightless birds from the Pleistocene of Cuba: *Fulica picapicensis* Fischer and Stephan to the genus *Nesotrochis;* and *Rallus sumiderensis* Fischer and Stephan to the living species *Cyanolimnas cerverai,* the Zapata Rail. Olson suggests that *Fulica podagrica* Brodkorb deserves further study as his examination indicates that it is a composite of several species.—Bertram G. Murray, Jr.

EVOLUTION AND GENETICS

See also 22, 24, 53, 62, 63, 64, 68)

56. Parthenogenesis in birds. (Partenogenez u ptits.) B. Astaurov and Y. Demin. 1972. *Ontogenez,* **3**(2): 123-143. (In Russian with English summary.)—Unfertilized or nonconjugate initiation of embryo development in birds and other vertebrates was until recently so little known that most zoological texts did not mention it. Later, cultivation of a parthenogenetic breed of domestic turkey, "Beltsville White," attained attention in the "daily press." It has been found to occur sporadically in various strains of domestic fowl and pigeons. The present reviewers have found a literature of 85 titles on the subject, derived mostly from poultry journals and research. Some recorded instances of bird parthenogenesis find viruses initiating or at least coincident to parthenogenetic embryonic development, examples being those of "Raus sarcoma" and "fowl pox." Among other vertebrates, the phenomenon is now known among lizards, mostly the desert dwelling forms as exemplified by the "whiptail"and "spinosus" groups, and in *Lacerta* spp. and *Cnemidophorus* spp.—Leon Kelso.

FOOD AND FEEDING

(See also 24, 26, 27, 29, 30, 31, 37, 39)

57. Rodents and insectivores in pellets of the Barn Owl in Mauretania. (Rongeurs et Insectivores dans les pelotes d'Effraie en Mauretanie.) A. Poulet. 1974. *Mammalia,* **38**(1): 145-146. (In French.)—Contents of 100 pellets from *Tyto alba* included 240 rodent skulls, mostly of *Gerbillus* spp., 205

(86%). Four (2%) shrews were identified as *Crocidura lusitanica.* The remaining 12% consisted of miscellaneous rodents.—Leon Kelso.

58. Principal prey of Barn and Long-eared Owls in Hungary. (A gyongybagoly (*Tyto alba*) es erdei fulesbagoly (*Asio otus*) legfontasabb taplalekallatai Magyarorsagon.) E. Schmidt. 1973. *Aquila,* **77**: 55-64. (In Hungarian.) —For a regional analysis pellets were gathered throughout Hungary between 1959 and 1970. In 38,000 Barn Owl pellets gathered at 125 stations, the common vole (*Microtus arvalis*) comprised 58% by occurrence. A variety of rodents (18%) and the House Sparrow (*Passer domesticus*) (24%) comprised the remainder. In 29,000 pellets of the Long-eared Owl from 65 stations, the common vole constituted 86%, and the House Sparrow only 3%.—Leon Kelso.

59. On food of the Redtailed Wheatear in Badakhshan. (O pitanii Kamenki Ryzhekhvostom (*Oenanthe xanthoprymna*) v Badakhshane.) V. Loskot and A. Petrusenko. 1974. *Vest. Zool.,* **8**(5): 59-65. (In Russian with English summary.)—As here described we have a definite example of "wing flashing" serving for food foraging. Feeding mainly around desert rock heaps and boulder fields, the Wheatears employed wing fluttering and flashing, accompanied by loud "*chuk-chuk*" calls, to drive insect prey into the open. Analysis of contents of 55 spring and summer stomachs revealed only a trace of vegetable food; the predominant animal foods were Lepidoptera (caterpillars), Coleoptera, Hymenoptera, and Hemiptera in that order. As to actual insect numbers, ants (Formicidae) were the principal prey item, 648 out of 1,294 total items.—Leon Kelso.

SONG AND VOCALIZATIONS

(See also 23, 61, 62, 64)

60. The effects of songs of wintering White-crowned Sparrows on song development in sedentary populations of the species. L. F. Baptista. 1974. *Z. Tierpsychol.,* **34:** 147-171.—Individuals of the migratory race *Zonotrichia leucophrys pugetensis* winter in the San Francisco Bay area and adjacent parts of California where a sedentary local race *Z. l. nuttalli* breeds. During the period 1968-1971 recordings of 450 White-crowned Sparrows in the breeding season revealed seven territory-holders (five of these mated) with song-dialects of the migratory *pugetensis.* Six of the seven males were identified by plumage as being probably *nuttalli,* and four of the five mates were also morphologically *nuttalli.* In pairs no. 5 and 6 the females were captured, injected with testosterone and their singing recorded; the singing was not the "full blown" singing of males, but appeared to be of the typical *nuttalli* dialect. The best guess is that young *nuttalli* males sometimes learn the song of visiting *pugetensis* birds, either from late-wintering *pugetensis* that overlap the beginning of *nuttalli*'s breeding season, or from early fall *pugetensis* that arrive before *nuttalli*'s breeding season is complete.—Jack P. Hailman.

PHOTOGRAPHY AND RECORDINGS

61. Les Oiseaux de l'Ouest Africain. C. Chappuis. 1974. *Alauda Supplément Sonore,* Disque no. 1. Société d'Etudes Ornithologiques, 46, Rue d'Ulm, 75230 Paris, Cedex 05. Subscription 30 Fr.—This is the first recording in a series of West African birds to be published as a sound supplement to *Alauda.* Doves and cuckoos sing here. Each is introduced by scientific name only. Chappuis has published the details of recording (locality, date, technical information on recording equipment and filtering) along with some behavioral observations of these doves and cuckoos in *Alauda* (**42:** 197-222, 1974).

The recordings are good and carry something of the feeling of hearing the birds themselves in the field, in particular *Columba guinea* taped in a village with sounds of *Passer griseus,* chickens, and cows in the background (the chicken has a loud solo).

Side A of the record presents 22 species of doves in systematic sequence. A few species of doves were recorded in more than one locality, and their songs generally are similar in populations hundreds of miles apart. My own tape recordings of some of these species made in southern Africa are similar to the west African birds. The songs and calls of *Oena capensis*, the Long-tailed or Namaqua Dove, and of *Streptopelia decipiens*, the Mourning Dove, sound much the same in Mali or Mauritania as in Maun, Botswana, or Lochinvar, Zambia.

Although Chappuis does not discuss behavior in general in his accompanying notes, the uniformity of the songs of the widespread doves is probably related to the innate development of dove behavior. Both songs and the posturing displays of doves develop normally in doves regardless of the species of dove that rears them, and hybrid doves reared in aviaries develop songs and displays intermediate in form between those of their parental species (Lade and Thorpe, *Nature*, **202**: 366-368, 1962; Davies, *Behaviour*, **36**: 187-214, 1970). Some African doves are known through banding studies and long term field observations to be migratory (*Oena capensis*, for example, is highly seasonal near Maun and Lochinvar in southern Africa), and the reshuffling of local genetic population structure that likely accompanies migration may help maintain the uniformity of songs across broad areas.

The recordings are useful for recognizing species of doves and for comparing the behavior of closely related species. Songs of *Turtur afer* and *T. chalcospilos* are rather similar. The recording of the Lemon Dove (*Aplopelia larvata*) from Douala may be helpful in confirming the identification of the hard-to-see doves in the Gloucester forest near Freetown, Sierra Leone, or other spots with "mystery" doves. The Vinaceous Dove (*Streptopelia vinacea*) has an emphatic song, "Better go home" as Bannerman phrased it, for the visiting birder in west Africa who regrets having to go home and leave the doves.

Songs of five kinds of hybrid doves (bred in the lab of A. Brosset, not wild hybrids) are intermediate in some characteristics with the songs of the parent species. The hybrids on the record are *Streptopelia roseogrisea* x *risoria*, *roseogrisea* x *decaocto*, *senegalensis* x *decaocto*, *senegalensis* x *roseogrisea*, and *roseogrisea* x *turtur*. The rising-falling pitch of laughter of *senegalensis* is slurred into a warbled gargle by the influence of the faster strophe of *roseogrisea* in the hybrid of these two. It would have helped to include a song of *risoria* and *decaocto* on the record for comparison although these are not African doves.

On side B are songs and calls of 18 species of cuckoos. The African Cuckoo's "cuckoo" song is quite different from the song of the European *Cuculus c. canorus*, and it has a rising, not falling, inflection on the second note. Chappuis suggests that the African Cuckoo should be recognized as a distinct species, *C. gularis*. I agree and would also point out that the other species of parasitic cuckoos on this record and elsewhere show generally much song uniformity over broad geographic areas (like doves), so an abrupt break in behavior accompanied by a distinct morphology is likely to indicate that the two forms would not interbreed if they were brought together. The recordings of *C. solitarius* from Ivory Coast and Gabon sound like my recordings from South Africa, Zambia, and Kenya. Chappuis' recording of *C. clamosus gabonensis* helps us to recognize this bird of equatorial forests as conspecific with the *C. c. clamosus* of more open country as the songs of all are similar series of whistles rising with each of the three notes. The long-tailed cuckoos, *Cercococcyx mechowi* and *C. olivinus*, have long calls like those of Stuart Keith's record, "Birds of the African Rain Forests." No recordings of *Pachycoccyx* were available. The *Clamator* calls all seem incomplete. *C. levaillantii* males have a song of two long series of notes; the recording has only the first series. The recordist should have given more details of the identification of the *C. "jacobinus"* because the recording sounds different from Jacobin Cuckoos I have heard in southern and east Africa; Chappuis says *C. jacobinus* sounds much like *C. levaillantii*, and the recordings (particularly the one from Chad) do sound like the latter species.

All four species of glossy cuckoos (*Chrysoccoccyx*) are clear whistlers. *C. cupreus* in the Upper Guinea region (Ivory Coast) appears to have a different song than in Lower Guinea (Gabon). The Gabon recording sounds like the *cupreus* I know in South Africa and Zambia, whereas the Ivory Coast bird represents a different subspecies as recognized in Peters' "Check-List of Birds of the World" (Vol. 4, 1940). *C. caprius* and *C. klaas* from Ivory Coast sound much like the same species in southern and east Africa. *C. flavigularis*, a little-known bird of primary equatorial forest, has a long song and in tonal quality resembles the song of *klaas* more closely than it does the songs of other African glossy cuckoos.

The vocal repertoires of nesting cuckoos include five species of coucals (*Centropus*). Duetting coucal species are distinguishable by the pitch and cadence of their "water-bottle" calls. Several calls of *Ceuthmochares aereus* complete the record.

Additional disks are being prepared in the series, and the Society and Chappuis would like to obtain recordings of several additional species to complete the records.

The record is well worth the listening time for gaining information about the vocal behavior of some birds of West Africa and for evoking images of birds in the tropics.—Robert B. Payne.

BOOKS AND MONOGRAPHS

62. Behavior, Mimetic Songs and Song Dialects, and Relationships of the Parasitic Indigobirds (*Vidua*) of Africa. Robert B. Payne. 1973. *Ornithol. Monogr.*, no. 11. 333 p (50 figures, 2 color plates). $8.00.—This A. O. U. Monograph covers several aspects of the biology of the parasitic indigobirds (*Vidua*) of Africa, and their hosts, the firefinches (*Lagonosticta*). The title indicates the breadth of this work, which could easily have formed two separate monographs, one on host-parasite interactions and vocalizations, and one on relationships among the indigobirds themselves. Lanyon (*Auk*, **91**: 640, 1974) has already reviewed many of Payne's techniques and his systematic treatment, and I will try not to duplicate that review. Payne's study was indeed an extensive one, covering 55,000 miles of road travel and three miles of tape (an intensive study would presumably have these figures reversed).

Payne recognizes four species of indigobirds as a result of "field work, analysis of musuem specimens and long contemplation." None of these components should be underestimated. He documents the inter- and intra-specific variability in morphological characters that make this group a most complex taxonomic puzzle. It soon becomes obvious that one must be subjective in applying the species concept to this group, but it is not until page 210 that we learn Payne's guidelines. However, if he has not been prompt in presenting his criteria, he explains them clearly when the time comes.

About one-third of the monograph covers vocalizations of indigobirds and firefinches and another one-third covers distribution and systematics. Those who might feel inclined to skip over the section on geographical variation are warned that it is full of discussion of ecology and host-parasite relations. Payne frequently cites J. Nicolai's extensive observations on indigobirds made largely in aviaries, and he notes that although interpretation of behavior of captive birds often provides good insights, birds might behave atypically in captivity, and confirmation of the occurrence and adaptive significance of behavior patterns should be sought in the wild. I feel this point cannot be overemphasized. For example, the role in nest-finding imputed to male indigobirds by Nicolai could not be observed in the wild, and Payne doubts its importance.

Indigobirds are renowned for mimicry. Mimicry is an important adaptation for a parasite, because it hinders the development of counteradaptations by hosts. Because parasites generally interfere with host reproduction, there is strong selective pressure on hosts to evolve defenses, and this increases if the parasite is host-specific. The close resemblance of eggs, nestling markings, and juvenal plumage of Viduine parasites to their Estrildine hosts has often been cited as an adaptive mimetic complex. Friedmann (*U. S. Natl. Mus., Bull.*, No. **223,** 1960) suggested that the similarities were due to common descent rather than mimicry. Payne found that in the known nestlings of parasites and their hosts, the pattern of mouth markings was uniform. Thus all indigobirds resembled all firefinches. This is comforting because the reported specific host mimicry in mouth markings always seemed to me "too good to be true."

Payne found fragmentary evidence that mouth-lining color and reflective gape tubercles could involve host-specific mimicry, but he urges caution in interpreting these because many forms are still inadequately studied. One would like to know how firefinch adults respond to nestlings with various markings and linings, and whether they can or do discriminate. But, if the complex markings are not for recognition, why have they evolved at all? Do they play a role in adult displays? Hopefully answers will be forthcoming now that Payne has put the questions in perspective.

He does stress that the specialized begging behavior of young indigobirds resembles the unique behavior of firefinch young and is essential for survival in firefinch nests while being maladaptive for nests of other species. He interprets the available evidence for morphological and behavioral similarity between the indigobirds and their hosts as mimicry, because the resemblance has been maintained by natural selection, even though the common ancestors may have had these characters. This may eventually prove to be a meaningful interpretation, but until the adaptive values of some or all of the features are understood, the application of the term mimicry requires qualification.

It is remarkable that the vocal mimicry of firefinches by indigobirds was apparently not recognized until 1960. Nicolai documented mimicry for one indigobird species, and all species and populations studied by Payne had mimetic songs. He found that the mimicry was often so good he could not distinguish mimic from model. Generally one indigobird male mimics one firefinch species, and one indigobird population also mimics a single species at any one locality. The same species may mimic different species in different parts of its range. Payne found that any male indigobird watched for more than "a few minutes" gave mimetic song, a fortunate arrangement. Only four individuals mimicked the "wrong" host species. judging from other birds in the same population.

Payne discusses how learning of host-specific firefinch song is likely to occur, and I understand he is pursuing this topic experimentally. At present it seems that male and female indigobirds learn the song of their male foster parent. As adults, male indigobirds often sing this mimetic song, and since it is the male firefinch that builds the nest, a female indigobird can locate a conspecific mate and the "correct" host nest, by approaching a song that she learned as a nestling, a most parsimonious system.

Whether indigobirds have some innate programming which allows them to learn the songs of only a limited range of firefinches, or whether any indigobird can mimic any firefinch, remains to be determined. Experiments with tutors or with cross-fostering can clarify this. Presumably the few indigobirds that sang a "wrong" song were raised in a "wrong" nest, indicating that specificity is not absolute. The specificity of indigobird for firefinch is thus foster-specificity maintained by a "cultural" process. I consider this to be a basic adaptation for brood parasitism, although it remains undocumented for most species, inasmuch as the fact that one has matured is tangible evidence that one was raised by an appropriate host. At the same time, the system is flexible, allowing host-diversification, either through errors, or if the preferred host becomes rare.

Payne discusses at length the problem of speciation within the indigobird complex, where the cultural traditions of vocal mimicry by imprinting, are potential isolating mechanisms. In view of the historical debate over whether all speciation occurs after geographical isolation vs. speciation occurring in sympatry, I anticipated that Payne would provide an "answer" to the debate. Significantly, he compares these views as alternative "models"—geographic vs. sympatric speciation. Laws and models in nature are similar in that they allow one to make predictions about natural events, but laws are often treated as immutable, whereas models are treated as testable. As a model, the idea that geographic isolation is a prerequisite for speciation has stimulated useful investigation, but, treated prematurely as a law, it has probably lead to stagnation. I am impressed with Payne's treatment because he presents several types of data that are suitable for testing the models, and he found some support for each. He concludes that the processes are not mutually exclusive. I infer that he considers proof or disproof of sympatric speciation as such, to be only mildly interesting compared with clarification of the population ecology, behavior, and genetics underlying speciation within the indigobirds.

Payne provides evidence (particularly in Table 26) on how song functions in positive assortative mating in wild indigobirds. Only 4 of 302 males (1.3%) sang "wrong" songs, and only 5 of 185 females (2.7%) responded to "wrong" males. It is worth noting that Mayr's criticism of some cases proposed as sympatric speciation involved small but persistent gene flow due to errors of just this sort and magnitude which he believed would retard speciation, whereas geographic isolation would keep errors and gene flow much closer to zero. There are, however, few studies of actual rates of gene flow between bird populations in the wild (D. Ewert, F. Cooke, pers. comm.)

The organization of material in Payne's monograph is good. Maps, photographs, figures, and tables are abundant, generally clear, and are usually close to the text reference. The itinerary and specimens are well documented. I found some difficulty in going from indigobird sound spectrograms to corresponding model spectrograms, without referring back to the text. Some cross-referencing would have been useful. The tables of morphometric data are extensive and provide sample sizes, means, ranges, standard deviations, and 95% confidence limits, all of which are useful. They are organized to allow comparisons of different populations of a single species, but comparing sympatric vs. allopatric populations of different species proved difficult. Means ± 95% confidence limits are graphed for reflectance spectrograms of male indigobirds, and such graphs would have been useful for measurenemts as well. There are several interesting bivariate scatter diagrams comparing wing length with coloration. In some cases there are clearly defined clusters (= species or subspecies?), but in other cases there are not (see for example p. 275). I wonder whether a multiple discriminant function analysis, using more phenotypic information, might have provided better separation of some of the difficult groups.

The figures are generally valuable (for example Fig. 16 showing feeding behavior of indigobirds), but I have difficulty interpreting Fig. 50 that summarizes indigobird relationships. Despite the detailed caption and accompanying text, it seems to confirm Payne's statement (p. 279) that the indigobirds "show a pattern of variation which defies unambiguous statement. . . ." These are hardly criticisms, however.

The monograph is valuable not only for the wealth of well-documented data it presents, but for the numerous interesting questions and thought-provoking ideas that the author poses. The carefully described techniques are a bonus. Payne discusses his comparison of unknown specimens with a series of "color standard" specimens, and I was surprised to learn that this technique and that of spectrophotometric reflectance analysis do different things and are not directly comparable.

Considering the wealth of illustrative material (including two color plates) the low price of this monograph compared with others of similar size and coverage is remarkable. It should serve as a rebuke to other scientific monograph series that price themselves out of reach of most individuals. This is important because the present work will appeal to many people because of its broad coverage and interesting discussions. Much good natural history is in this work.

In view of the author's obvious time-energy investment in the parasitic indigobirds, one might not imagine that during his time in Africa he also accomplished significant studies of parasitic cuckoos there. The material in this work reflects his extensive experience not only with the finches, but with avian brood parasitism in general, and it carries our knowledge of both topics far forward.—Michael Gochfeld.

63. Geographic Differentiation in the Genus *Accipiter*.—Jan Wattel. 1973. *Publ. Nuttall Ornithol. Club*, no. 13. 231 p. $17.50.—In this work, data on external morphology, foraging methods, food habits, and preferred habitat of the 43 "bird hawks" comprising the genus *Accipiter* are used to test the hypothesis that two species with closely similar ecologies cannot survive in the same habitat and to discuss the probable past distribution and relationships of these hawks. Data on the species are presented in five chapters, each treating a geographic region: Eurasia, Africa, North and South America, Australasia, and Celebes. The species accounts include sections on distribution, subspecies, migration, plumage, geographic variation, size and structure, habitat, hunting behavior, food, and a discussion. Range maps, tables of wing length and of analyses of lengths of tarsus, middle toe, hind claw, bill, tail, and wing tip (all expressed as percentages of wing length), and graphic representations of these analyses are also included. No attempt is made to present detailed information in the first five sections, because this is covered in other works. Information on habitat, hunting behavior, and food is largely taken from the literature and from specimen labels. Each of these chapters ends with an account of the ecological geography of the region. With the exception of one sentence in the chapter on Europe and Asia, in which members of the genera *Spizaetus* and *Hieraaetus* are mentioned as behaving "more or less like giant goshawks," there is no mention of possible ecological relationships of members of the genus *Accipiter* with species in other genera.

Slightly less than 1,800 specimens (a mean of less than 42 specimens per species or 16 per subspecies treated) were measured. Because the samples are of necessity broken down by sex as well, the mean sample size is approximately eight. A very high proportion of the samples consist of four or fewer specimens, owing in part to the presence of a few very large samples and in part to the scarcity of material of some of the species in collections. Geographic representation is uneven; the nine New World species are represented by data from 198 specimens, 40 less than the number used in the analysis of a single Old World species (*nisus*). Examples of only three of the 10 races of *striatus* were measured.

Mean, standard deviation, standard error of the mean, range, and sample size are given for wing length of both sexes of each subspecies treated, but for the other measurements, only the mean relative measurement for each subspecies is given. Expressing these measurements as percentages of wing length has two serious drawbacks: wings of large birds are relatively larger than those of small birds, and, as Wattel's studies show, wing shape, especially the length of the wing tip, varies considerably within the genus studied. It is not surprising, therefore, to find in the analysis that species in which the males appear to have relatively longer tarsi than the females tend to be small species with strong sexual dimorphism (e.g., *minullus, francesii, castanilius*). Without all the original data, it is not possible to check the results by using a less biased standard such as an exponent of the length of the wing minus the tip.

Two chapters, "Structure and Ecology" and "Conclusions," summarize much of the work. In the former, most of the species are divided into seven bill and foot types: a *nisus* type—birds having long legs and toes, small, sharp claws, and a small bill; a *gentilis* type—birds having short, stout tarsi and toes, heavy claws, and moderately large bills; a *bicolor* type, which is intermediate between the first two; a *brevipes* type—birds having small hind claws and bills and short tarsi and toes; and three others. Several species are considered intermediate between types, and different forms of *A. novaehollandiae* are placed in three different groups plus a fourth labelled "other." Long tarsi and middle toes are considered adapted for capturing small prey in midair, whereas short tarsi are used in taking larger prey on the ground; the size of the hind claw is positively correlated with prey size, and bill size with both the size of prey and the toughness of its skin. In a like manner, the species are divided into five groups on the basis of wing and tail structure. Species with relatively long or pointed wings tend to forage in open country and may be migratory, whereas birds with short or rounded wings tend to inhabit forests. The latter birds often have long tails, which is considered a further adaptation for maneuverability.

It is concluded that the genus *Accipiter* is a natural group, and a reasonable classification and a sequence of species are presented. It is further concluded that the conditions of Gause's Principle are in general fulfilled by members of this genus.

The major contributions of this study are the complex analyses of measurement data, their use in grouping the species into "types" based on the proportions of the bill and foot and of the wing and tail, and in the ecological and phylogenetic conclusions based on the data as a whole. It also points up how little is known about the food habits and hunting methods of many of the species. It would have been considerably improved by adopting a better standard of overall size than wing length or at least publishing the other measurement data, by including more of the available material of the genus, and by fuller discussions of the ecological geography. The last is particularly weak on the possible effects of different degrees of sex dimorphism and of radiations in other genera on the accipiter faunas. For example, the relatively greater numbers of species of *Buteo* in North America and of *Circus* and *Falco* in Eurasia are not mentioned, nor is the very accipiter-like Neotropical falconid genus *Micrastur*.—Robert W. Storer.

64. Avian Speciation in Tropical South America. J. Haffer. 1974. *Publ. Nuttall Ornithol. Club*, no. 14. 390 p. $19.00.—Haffer has over the past decade been deeply involved with studies of speciation patterns in Neotropical birds, especially lowland forest inhabitants in northern South America. Most workers with interests in this region are familiar with his earlier publications, based primarily on the correlation of recent zones of secondary contact between semispecies or allospecies of various superspecies groups with the arid-humid climate cycles occurring during the late Quaternary. The present work is the most extensive that he has published and is essentially an expansion of his earlier ideas accompanied by a very thorough and detailed study of two families, the toucans (Ramphastidae) and the jacamars (Galbulidae). Further data that he has accumulated seem to have strengthened considerably his earlier research, indicating that his assumptions concerning refugia and speciation patterns are basically sound, although there is considerable room for argument with the time elements involved.

The first one-half of the book (through Chapter 15) deals with background material, primarily ecological geography, avifaunal composition, distributional patterns, geological and climatic history, forest refugia, and the like. Contained herein is a wealth of information of value to anyone dealing with avifaunal or evolutionary aspects of the region. Discussions include also Middle American areas and both highland and lowland avifaunas on the South American continent. A section treating important collecting stations in lowland South America (Chapter 7), essentially a gazeteer and map, will be most helpful to workers dealing with distributional studies, because many of these localities are difficult or impossible to locate on standard maps.

Chapters 16 and 17, which deal with the toucans and jacamars, respectively, occupy almost one-half the book. All forms in each family are treated thoroughly with respect to distinguishing characters, vocalization patterns (where significant taxonomically), distribution, and speciation patterns. There are many line drawings depicting characters, two color plates of toucan heads (the only color plates included in the work), sound spectrograms of vocalizations, and range maps for all forms. Haffer recognizes in the toucans six genera with 14 "zoogeographical species" (= superspecies plus monotypic species) and 33 species (= monotypic species plus allospecies of superspecies groups), and in the jacamars five genera with eight zoogeographical species and 17 species.

In chapters preceding the two mentioned above one may also find range maps for the following superspecies groups: *Cotinga maynana, Manacus manacus, Psarocolius bifasciatus, Phoenicircus carnifex, Xipholena punicea, Pipra aureola, Euphonia cayennensis, Celeus undatus, Psophia crepitans, Pipra serena,* and *Pionopsitta caica.*

Perhaps of greatest interest to evolutionary biologists are the time elements of speciation suggested by Haffer's studies. Evolutionary rates are reflected on page 189 in his dendrogram of the proposed evolutionary history of the Ramphastidae, suggesting radiation of the entire family in a period of 800,000 years, an extremely fast rate, especially for a nonpasserine group in a tropical, continental region. I have, however, become convinced that this premise is essentially correct, as my own studies in Central America suggest rates at least as rapid under similar conditions of contracting and expanding refugia.

This work is an absolute "must" for students of speciation patterns and evolutionary trends in tropical America. The book is remarkably free of typographical errors, indicating thorough and critical editing. My only criticisms are relatively minor: there is no index or list of the figures and tables; Chapter 6 (Brief History of Ornithological Exploration) is indeed brief (four pages) and could have been either omitted or perhaps expanded greatly into something of real use; and I find the list of references (Chapter 19) most annoying, being broken into sections on "Bibliographies," "Symposia," "Geographical and Botanical," "Geological, Paleoclimatological, and Paleontological," and "Zoological," requiring considerable time in attempting to run down a reference.— Burt L. Monroe, Jr.

65. Birds of the World: a Check List. James F. Clements. 1974. New York, The Two Continents Publ. Group, Ltd. 524 p. $15.00—When bird books appear, they seem to come out in spurts. We waited for years for a field guide to Mexican birds. Now, there are four. Until recently, no lexicon of bird names was readily available. Now, there are two. And, there has been a need for a one volume list of the birds of the world, as birders have moved farther and farther afield. Now, two such volumes are in print, and a third is reported to be on the way. Of the two before me, E. P. Edwards's "A Coded List of Birds of the World" and the book under discussion, I much prefer the latter.

Clements lists 8,904 species compared with Edwards' list of 8,908. The former has a bibliography of 52 items, and the latter one of 55, but only 16 publications appear on both lists. I need hardly add that I have not compared the 8,900 species in a similar manner. From the viewpoint of the professional taxonomist, both lists undoubtedly contain far too many "species," and the specialist in any one field will decry the omission of certain "important" publications.

This is, however, a book for listers, and it is purely as a lister that I write (I hesitate to use the term "pure lister").

The format of Clements' book is excellent. The scientific and vernacular names of each bird are listed on the left side of the page, and the distribution, in considerably more detail than in Edwards' book, is on the right. More than adequate space is provided to write in the date and place of personal observations. It provides, therefore, a convenient method for keeping a world life-list, which is, of course, the principal reason for this publication.

The moderately detailed ranges for each species are very valuable and serve to act as a check on the imagination in a way that Edwards' list cannot possibly do. If one is in Uganda and is about to record a Red-rumped Tinkerbird, as I was, and finds the species listed for "Senegal to the Congo," it makes the identification questionable, to put it mildly. (This case was probably the first sight record for Uganda, and fortunately the species was later collected in the same area.) Edwards merely lists the range as "E" which, after one turns to the key, is found to mean "African mainland, north to Sahara, and western islands." The same situation occurs with the South American distribution. Clements gives specific countries or parts of countries, whereas Edwards treats the entire area as one unit.

There has been no attempt to resolve difficult taxonomic problems. If a bird has been listed as a species in one of the major field guides that Clements used as prime references, it is listed as a species in this book. Certain families such as the cracids, parrots, owls, and sunbirds have the benefit of the very latest taxonomic thinking. The most recent Supplement to the A.O.U. Check-list is followed. On the other hand, birders in Africa will either applaud or bemoan the use of Mackworth-Praed and Grant's "Handbook" as the prime source, depending on their point of view, morality, or both. The stated rationale is that it is easier to cross off a bird which may not be a valid species than to find space to write in an additional species. I would merely point out that most listers I know are unwilling to remove any bird from any printed list—listen to the screams that greeted the above mentioned A.O.U. Supplement. Listing is, however, a game badly in need of rules. This book could well provide the standard of comparison for all world lists without implying the taxonomic validity of the "species" involved.

This rather permissive species listing works well for the most part. Certain forms are listed as "probably a race of . . ." or "probably an aberrant form of . . . ." Others are stated as being known from only a few specimens or, in some cases, as unique. This is good because it serves as a warning to anyone who thinks he might have seen one of these forms in the field. There are other cases that are much less clear, however. The Knob-billed Goose and Comb Duck are listed separately with different binomial Latin names but are said to be conspecific. So, too, are Cory's and Mediterranean shearwaters, White-shouldered and Black ibises, "Eurasian" and American flamingos. This is even more unfortunate in the case of the *Pterodroma* petrels, *P. arminjoniana* and *P. heraldica*, which are listed as conspecific but separated by 10 other species because of the alphabetical arrangement of that group. The strangest case of this type of hedging occurs in the *Junco* group in which Clements follows the recent A.O.U. Supplement but lists Oregon Junco in its trinomial form, *J. hyemalis oreganus* and the Guadalupe Junco as *J. h. insularis*. On the other hand, the Northern Oriole is quite properly listed as *Icterus bullockii* (*galbula*) to indicate the recent change. I do not understand why any forms that are positively stated to be conspecific are listed at all.

I also question the use of the word "endemic" throughout the list. It is used for all of the unique Hawaiian avifauna but for none of the remarkable birds of Madagascar. The Lilac-crowned Parrot is listed as endemic to "Western Mexico," but the Zapata Rail of Cuba is not given the distinction of endemic status. For many listers traveling about the world, endemism is the name of the game. A White-fronted Redstart from the mountains of Venezuela is much more prestigious than other, more widespread members of the genus, even though each tick counts the same in the total list. I wish that the term "endemic" had been avoided completely.

The treatment of the ranges of introduced species is variable. Spotted Dove is listed as introduced into "western U. S.," but the European Tree Sparrow is not mentioned for the New World. Ringed Turtle Dove is listed as "widespread distribution worldwide" with no mention of its natural range or its introduced range. There are many examples of this problem.

The chosen common names are probably as good as could be achieved at this point in time. Clements has taken, for the most part, the generally accepted English name for the region where the bird lives. If the British and American names are different, the American name is always preferred. It was a great shock when I found that my Southern Black-backed Gull of South Africa had "vanished" into the Kelp Gull of Ecuador. There has been little attempt to unify worldwide names; Stone Curlew lives in the midst of Thick-knees and the Anhinga stands out among the other Darters. This also means that there are times when the same name is used for more than one species. Yellow Oriole is applied to both *Oriolus flavocinctus* and *Icterus nigrogularis*. This is not a major problem and probably contributes more to the standardization of common names than would an effort to be sure that there is a unique English name for every species in the world. This brings up the fascinating case of *Spilornis asturinus* whose common name is given as "Unique." What a bird to add to one's list!

In summary, then, this is a very useful book for anyone who is interested in a world list. At the very least it provides a basis from which to work. At the best it provides a unified standard for comparing lists. The final use to which the book will be put depends on the sophistication and interests of the individual lister. After all, listing is a highly personal activity.—Robert W. Smart.

66. Birds of Western North America. Paintings by Kenneth L. Carlson. Text by Laurence C. Binford. 1974. New York. MacMillan Publ. Co., Inc., 223 p. $25.00.—This book is most easily discussed by dividing it into three sections: (1) the eight-page introduction, (2) the text referring to the 50 species described (one page per species), and (3) the paintings of the 50 nonpasserine species.

The introduction is somewhat disjointed from the main body of the text. It presents a capsule history of the sport of birding. The author's enthusiasm is quite evident as he introduces specific birding techniques, makes recommendations concerning equipment, and discusses overall strategy of birding. His experience in the field is obvious as his recommendations are quite good, apparently based on a great deal of trial and error. He is convincing in both his appeal to start birding as a hobby and in his efforts to make quantitative ornithologists out of the "competent birder."

The remainder of the book follows a format of one page of text and one page of painting accompanied by one blank page and one almost blank page. The book could have been condensed to one-half its length, possibly lowering the price so that some of the younger enthusiasts for whom the introduction was written could afford it.

The text is interesting and informative. For each of the included species the author includes size, range, habitat, diet, nest and egg descriptions, and the family. This is accompanied by other biological, historical, and anecdotal information on the species or the family or order to which that species belongs. The major problem I found with the body of the text was that the author's extremely "flowery" style led to cases of overstatement. Describing the Rufous Hummingbird as a "pugnaceous ball of animated lightning" or the Prairie Falcon as "rocketing skyward in a towering ascent into the azure void" is poetic but unrealistic. This is a minor point because the majority of the statements are not so inflated and are biologically correct. There are only a few questionable statements. For example, "In its marine winter quarters, the arctic loon leads a solitary existence or associates with only a few of its kind. . . ," yet numbers greater than 1,000 individuals have been reported in wintering congregations in the San Juan Islands of the Pacific Northwest; and concerning the Black Brant, "[This] is the only common goose of western North America that inhabits the marine environment. . . ," yet large populations of the Snow Goose winter in the marine environments of Washington and British Columbia. Nevertheless, the descriptions give interesting and usually accurate biological accounts.

The third aspect of the book is the paintings by Kenneth Carlson. They are beautiful. The coloration, morphology, and behavioral attitudes of each species are for the most part excellent. The environmental settings in which the species are placed are ecologically correct, and the identification of some of the other species of plants and animals included in the paintings add to the overall impression.

One or two small problems exist in the captions of the paintings. One of these is identifying the sex of the illustrated bird, even when it is not possible to determine sex from plumage characteristics. For example, the Inca Doves are identified as male and female even though the text refers to them as virtually identical. Another slight problem is the use of lengths of the different species, which appear to be taken directly from Peterson, "A Field Guide to Western Birds." These museum skin measurements overestimate the natural position sizes of these birds; however, no mention is made of how the measurements were taken. The only other minor criticism involves the action of the male Broad-billed Hummingbird depicted pulling on a spider web. The text states the nest is constructed partly of spider webs and that the "male takes no part in nesting duties."

Overall, "Birds of Western North America" is an excellent "coffee table" style book with beautiful paintings and interesting text. It should be a welcome addition to the libraries of west coast birders.—Edmund W. Stiles.

67. Natural History of Vermont. Zadock Thompson. 1972. Charles E. Tuttle Company, Rutland, Vermont, 286 p. $3.85.—This paperback book is a reprint of the first seven chapters of Zadock Thompson's "History of Vermont, Natural, Civil and Statistical," originally published in 1842, and includes the "Appendix to the History of Vermont, . . ." published in 1853. Perhaps no state, certainly none in New England, has been more neglected by naturalists than Vermont. "Thompson's Vermont," as this work has long been known, remains the only comprehensive publication on Vermont natural history. The publisher is to be commended for making this 130-year-old classic available again. The book is reproduced by photo-offset plates made from the original edition. The result is an exact copy except for the pagination of the Appendix for which the pages have been renumbered to follow consecutively those of the main text. It is printed on high quality paper with sewn signatures. The work is copiously illustrated with somewhat stylized engravings executed by J. H. Hills. Most of the engravings measure approximately 1½ x 2 inches; a few are larger. This reprint does not include the fold-out map of the state, which was included in both the original edition and Appendix. The publisher has added a frontispiece portrait of Thomspon and a short biographical sketch prepared by T. D. S. Bassett.

Chapter I is entitled "Descriptive and Physical Geography of Vermont." Here are described the boundaries, topography, and climate of the state.

Chapters II through V describe the vertebrates of Vermont. Including the species added in the Appendix, Thompson describes the following numbers of vertebrate taxa as occurring in Vermont: 48 fishes, 35 "Reptiles" (including amphibians), 161 birds, and 47 mammals.

Chapter VI describes the invertebrates of Vermont. The bulk of this chapter is a discussion of the Mollusca prepared by Thompson's friend Charles B. Adams, then Professor of Natural History at Middlebury College. A scant four pages are devoted to insects, crustaceans, and other invertebrates.

Chapter VII, "Botany of Vermont," was prepared by the noted botanist, William Oakes. Oakes lists 929 species of vascular plants as occurring in Vermont. His list, prefaced by an interesting introduction, constitutes the first accurate and detailed flora of Vermont. Only Samuel Williams had published an earlier account. In a grossly inaccurate work published in 1794 Williams listed approximately 120 species of plants then known from Vermont.

Modern readers will perhaps be most interested in Thompson's comments on those species that are now rare, endangered, or extinct. Here we learn that even in 1842 the moose was ". . . exterminated from all portions of the state except the county of Essex. . . ," the wolverine ". . . is now extremely rare, none having been met with to my knowledge for several years," and the raven ". . . has for several years been less frequently seen in Vermont than formerly and it was always a rare bird here compared with the crow."

These statements apply as well today as they did 125 years ago, but we are surprised to learn that some species now abundant in Vermont were once in danger of extirpation. Thus regarding beaver, Thompson writes ". . . formerly a very common animal in Vermont now nearly or quite exterminated, none having been killed within the state to my knowledge for several years." Of the white-tailed deer we learn, ". . . their numbers have constantly diminished within the state, till they have become exceedingly scarce, except in a few of the most unsettled and woody sections."

Because Vermont was one of the last bastions of the Peregrine Falcon in the eastern United States, it is curious that Thompson was ". . . not sure that any of this species have been taken in Vermont. . . ." It is equally surprising to discover that although the lynx has ". . . been taken occasionally. . . ," the bobcat is ". . . now very rare."

Thompson's treatment of the pine marten, the fisher, the whooping crane, and the wild turkey is meager. The reader is left with the impression that his accounts of these animals were largely extracted from the writings of Richardson, Harlan, Audubon, Brewer, and Nuttall, whose works he frequently quotes.

It is interesting to note that Thompson described only two gulls as occurring in the state, Bonaparte's Gull and the Herring Gull. Today the Ring-billed Gull is by far the most common and conspicuous gull in Vermont. Does this mean that the Ring-bill was absent or rare in 1842, or must we conclude that Thompson's identifications were faulty? Recent accounts list more than 250 species of birds as occurring in Vermont. Thompson's work describes only 161 birds The discrepancy, as might be expected, is largely due to the omission of species known only as migrants or irregular visitors.

Although several new floras of Vermont have been written in the last century, a more recent study of the fauna has yet to be produced. "Thompson's Vermont" still stands as the only comprehensive study of the natural history of the state. —Wm. D. Countryman.

68. A Doctrine of Evolutionary Progress (Aromorphosis theory). (Uchenie ob evolyutsionnoi progresse.) L. Davitashvili. 1972. Academy of Sciences, Georgian SSR. Paleobiological Institute. "Metsniereba" Press. Tbilisi. 324 p. (Unpriced.) (In Russian with English summary.)—Of the few, new, Slavic texts on theoretical evolution from southwestern USSR, this one, by their leading exponent of evolutionary theory, should be of interest. It includes a Foreword, Introduction, 20 chapters covering the principal classes of living things, plus indices of authors, topics, and Latin names. Two frequent terms are "aromorphosis," which means elevating or progressive evolution, and "post-neodarwinism," evidently signifying trends in evolutionary thought in "the West" as seen in the Eurasian world. According to the English summary, Western evolutionists distinguish "microevolution" and "macroevolution." Although scrupulously analyzing microevolution they only vaguely refer to macroevolution, i.e., evolutionary trends beyond species' limits. Intraspecific evolution, he states, is not evolution per se. Progressiveness, or aromorphosis, is the very core of evolution but is unclearly defined by leading "post-neodarwinists." Among these are included G. G. Simpson, with one or two others in the U. S. consistently not named. During the past 15 years many authors, more properly philosophers, have dwelt on problems of evolutionary progress, but have speculated with too little analysis of factual data. Thus arose another biological dilemma scarcely amenable to scientific research. The only general criterion of biological advance is that of use, and in a variety of ecological situations. He states that progressive evolution, as well as evolution in general, proceeds through natural selection of variations. Such variations usually occur on the periphery of ecosystems, where situations are conditioned by proximity to other ecological zones and where adaptations to a wider scope of conditions are of greater selective value. Whenever he turns to birds he emphasizes, for whatever reason, that birds are the only non-viviparous class of vertebrates.—Leon Kelso.

69. Present Status and Developmental Trends of Wildlife Management Science in USSR. (Sovremennoe sostoyanie i puti razvitiya okhotovedsheskoi nauki v SSR.) Abstracts of reports. 1st Allunion Conference, October 1974. Headquarters of Conservation, Reserves, and Game Management, Ministry of Agriculture, USSR. Kirov, 1974. 285 p. (In Russian; unpriced.)—This paperback book gives concisely summarized information from 210 reports and includes an index. The reports emphasized mammals more than birds and were strongly inclined to general administrative and management aspects. The topics can be classified as: Economics and organization of game management, 46 reports; Biological fundamentals, 58; Census methods, 39; "Biotechnics," 37; Broadly general and theoretical, 30. Those reports that dwelt incidentally on individual species or related groups of mammals or birds totaled 94.—Leon Kelso.