RECENT LITERATURE

Edited by Bertram G. Murray, Jr.

BANDING AND LONGEVITY

(**See also 18, 59, 60**)

1. **Operation Baltic 1969.** (Akcja Baltycka 1969.) M. Gromadzki. 1973. *Acta Ornithol.* (Warsaw), **14**(1): 1-23. (In Polish with Russian and English summaries.)—This is a progress report of a Polish bird-banding series initiated in 1960 (rev. 1, *Bird-Banding,* **42**(1): 51, 1971). It summarizes the field work of 1969 for two stations in spring and seven in autumn, wherein 38,970 individuals of 110 species were banded. Total recoveries for the year were 169 and for the whole project to date, 1,451 out of a total of 297,069 ringed.—Leon Kelso.

2. **Bird-banding at Powdermill, 1972.** R. C. Leberman and M. H. Clench. 1973. *Powdermill Nature Reserve Research Rept.* No. 31, 46 p.—Over half this report is devoted to the variation of age ratios and to differential migration of age classes of autumn migrants. The ratio of adults to immatures varies with species, from year to year for each species, with reproductive success, and perhaps with the local weather. Comparing species, the ratio varies from 4.8% for 333 Yellow-bellied Flycatchers (*Empidonax flaviventris*) to 56.8% for 1,814 Slate-colored Juncos (*Junco hyemalis*). Over an 11-year period adult Red-eyed Vireos (*Vireo olivaceus*) comprised from 23.0% (1971) to 70.8% (1963) of the total captured. Some species were more variable from year to year than others.

Differential migration of age classes in autumn is plotted in histograms by five-day intervals. This is unfortunate because actual numbers cannot always be exactly determined for an independent statistical analysis (no statistics are reported). Nevertheless, the data clearly show extensive overlap of migration periods of adults and immatures. And unquestionably, some species show a peak earlier of adults than of immatures, such as the Red-eyed Vireo (a pattern shown consistently throughout its range), a later peak of adults, such as the Nashville Warbler (*Vermivora ruficapilla*), whereas a good many species show an essentially synchronous pattern.

The remainder of the report summarizes the 1972 season of 192 banding days. A new high total of 11,783 birds were banded, and the landmark of 100,000 birds banded was passed. Returns, recoveries, and age records are included.—Bertram G. Murray, Jr.

MIGRATION, ORIENTATION, AND HOMING

(**See also 2, 34, 59**)

3. **Oriented bird migration in or between opaque cloud layers.** Donald R. Griffin. 1973. *Proc. Amer. Phil. Soc.,* **117**(2): 117-141.—This paper asks two important questions: (1) Do migrating birds fly inside or between opaque clouds? and (2) Do they fly straight when doing so? To answer these questions Griffin used a low power 3 cm tracking radar (AN/GPG-1) to track migrating birds at two hilltop locations in New York state. During the fall of 1970 and spring of 1971 about 1,600 birds were tracked during 29 nights of observation when low clouds were anticipated. Although several hundred birds were tracked while flying under opaque cloud cover that prevented any view of the stars or moon, on one night in fall and four nights in spring a total of 63 targets were tracked at altitudes where the best available evidence indicated the presence of opaque cloud. On two other nights radar echoes from clouds and other evidence (dew-point depression reading less than 2 ° C) strongly suggested that 26 birds were also flying in or among clouds sufficiently opaque to greatly impede vision of the sky or the ground.

Although a few birds displayed slightly irregular tracks, most were as straight as the radar was capable of measuring. Accurate wind measurements by radar-tracked balloons enabled the comparison of the tracks and ground speeds of birds with wind directions and velocities and allowed the computation of a bird's heading and air speed. The birds flying in or between clouds showed a strong tendency to move approximately downwind. The mean heading-track difference of all tracking data was only 9°, but the difference for a given night had the same sign (clockwise or counterclockwise) for almost every bird tracked. The direction of this apparent attempt to correct for wind drift was such as to bring the resulting tracks closer to northeast in spring and southwest in the fall.

There is a meaningful message in Griffin's discussion for all of us interested in bird migration and orientation. After pointing out that current thinking supports the idea of multiple forms of orientation behavior in birds, he adds that it is important "to avoid the temptation of feeling that the mere postulation of multiple mechanisms somehow explains anything at all".—Sidney A. Gauthreaux, Jr.

4. **Homing in pigeons with impaired vision.** K. Schmidt-Koenig and H. J. Schlichte. 1972. *Proc. Nat. Acad. Sci.*, **69**(9): 2446-2447.—This paper and the group following should be required reading for anyone who has thought that the bird navigation problem is near solution. Most attempts to explain pigeon homing have relied on visual input from the sun or landmarks. The experiments reported in this paper were designed to answer the simple question, "How important are visual cues in pigeon homing?" Experimental pigeons were fitted with frosted contact lenses, controls with clear lenses. Releases were made on clear days from several compass directions at distances of 15 and 130 km. Although the experimental birds clearly had some flight problems (some refused to fly, others hit trees, wires, etc., and those that flew did so in a peculiar manner), there was no difference between the vanishing directions of the experimentals and controls. The birds with impaired vision showed higher loss rates and late returns, but many of them reached the home lift, some even at normal speeds. In one release the initial flight directions of the experimental birds were well-oriented, that of the controls random. Perhaps under some conditions visual cues are confusing! These experiments seem to preclude the use of landmarks by the birds, even in the vicinity of the loft. Tests showed that the experimental birds could not recognize a conditioned landmark at 6 m distance. However, the birds with frosted lenses could determine sun position well enough to have used a sun compass in the initial orientation. I eagerly await the results of tests performed under overcast skies.—Kenneth P. Able.

5. **Non-visual migratory orientation of European Robins.** (Nichtvisuelle Orientierung Zugunruhiger Rotkehlchen (*Erithacus rubecula*)). H. G. Wallraff. 1972. *Z. f. Tierpsychol.*, **30**: 374-382.—In an attempt to resolve the recent controversy concerning the orientation of European Robins in visually cueless environments, Wallraff used an orientation cage obtained from Merkel's group. Although he had previously been unsuccessful in repeating the results of Merkel, Fromme, and Wiltschko by using a cage with tangential perches, Wallraff was successful in obtaining appropriate spring and fall orientation in the Merkel cage with radial perches. In order to obtain a significant directionality, the data were treated in the same manner as Wiltschko's, i.e., a significant vector exists only when all data from all birds for the entire season are lumped together. In the autumn data (38 bird-nights), none of the performances of individual birds on a single night appear to be significantly oriented and indeed the mean vector for the whole season (227°) is barely significant. The spring data are fewer (12 bird-nights), but much better oriented; at least two individual performances by different birds showed significant directionality. The season vector (40°) was significant at $P < .01$ and the spring direction differed significantly from the fall. Even though it is obvious that these experiments are dealing with an extremely subtle behavior, this reviewer continues to be disturbed by the fact that statistical significance can be obtained only by combining data, none of which are significant in themselves. To my mind, the seasonal change in direction found here and also in Merkel and Wiltschko's experiments is the most compelling evidence that the results are not an artifact. Even so, the possibility for artifacts seems exceedingly great—it is essential that the cages be rotated frequently and that all perches are equally sensitive to the birds' hops. It might be informative for someone to observe the birds in the cages as Sauer did in his early experiments.—Kenneth P. Able.

6. **Olfaction and homing in pigeons.** F. Papi, L. Fiore, V. Fiaschi, and S. Benvenuti. 1972. *Monit. Zool. Ital.*, **6**:85-95.—The following series of papers from Professor Papi's laboratory represent the most important recent contributions to the study of homing navigation. The results were completely unexpected. The first data from these experiments were published in a short note (*Monit. Zool. Ital.*, **5**: 265-267, 1971); those results are combined with other experiments and discussed more fully in this paper. Data are presented from three pigeon releases involving a total of 25 experimental birds whose olfactory abilities were impaired by olfactory nerve section, cotton nostril plugs, or unilateral nerve section with contralateral cotton plug. The most notable difference between the experimentals and the controls was that 16 of 25 experimentals (vs. 3 of 28) landed within sight of the release point. The experimentals that did fly were not oriented homeward at their vanishing points and their homing success was reduced. A second part of the paper examined the maintenance, nesting, and social behavior of caged pigeons before and after bilateral nerve section. No differences were found.

Based on the homing performances, the authors hypothesize mechanisms for homing based on olfactory cues. During the first months of life the pigeons learn the odors around the loft. At the same time, winds bring odors from other areas, allowing the birds to associate particular odors with the compass directions from which they have come. As preposterous as the speculations may sound, homing based on olfactory cues can explain observations of homing by untrained pigeons. It can also account for the experiments of Kramer and Wallraff which showed that housing pigeons in an aviary with walls of wood, glass, or cloth impaired homing ability. The experiments of Schmidt-Koenig and Schlichte (see rev. 4) and the annual fluctuation in homing ability noted by Gronau and Schmidt-Koenig could be explained on an olfactory basis. Perhaps the most important aspect of these studies is their relation to homing theory. Kramer proposed that homing is based on a two-step process involving a "map and compass." Although we have considerable information on cues used in determining compass directions, virtually no progress has been made in resolving the so-called map. The "olfactory regions" envisioned by Papi et al. could be a component in the determination of position.

Whereas the data included in this paper are rather meager, considerably stronger experimental data supported by statistical analysis are contained in the papers reviewed below. However, some important questions remain unanswered. First, the winds that carry odors from distant areas to the loft also create considerable mixing of air masses. This should make the recognition of geographic areas based on their odor a very uncertain proposition. Second, the relationship between olfactory orientation and the sun compass is not clear. The birds in these experiments did not use sun compass orientation when deprived of olfactory cues. On this basis, one would not predict that the classic sun compass clock shift experiments would work. Olfactory cues should prevail and the birds fly homeward.—Kenneth P. Able.

7. **Homing performances of inexperienced and directionally trained pigeons subjected to olfactory nerve section.** S. Benvenuti, V. Fiaschi, L. Fiore, and F. Papi. 1973. *J. Comp. Physiol.*, **83**: 81-92.—Previous work from this laboratory reporting the importance of olfactory cues in pigeon homing dealt with experienced homers. The experiments detailed in this paper were designed to evaluate the performance of pigeons with different homing experiences after olfactory nerve section. Nineteen birds with bilateral olfactory nerve sections and 40 controls (unoperated) were released singly from nine points in various directions up to 12 km from the loft. There was a marked difference in the homing success of the two groups: 15 of 19 experimentals were lost vs. 2 of 40 controls. The homing ability of the operated birds was improved when they were released from familiar localities at which they had received pre-operative training. However, when released from an unfamiliar site the experimental birds homed poorly (5 of 11 lost) although their initial flight directions were homeward. In fact, even inexperienced anosmic birds released from unfamiliar sites showed a significant homeward orientation (vanishing bearings), although a much higher proportion of experimental birds landed in the release area and their orientation was poorer than controls.—Kenneth P. Able.

8. Disturbances of homing behavior in pigeons experimentally induced by olfactory stimuli. S. Benvenuti, V. Fiaschi, L. Fiore, and F. Papi. 1973. *Monit. Zool. Ital.*, **7**: 117-128.—If olfactory cues are important inputs into the homing process in pigeons, as suggested by recent work from Professor Papi's laboratory, the application of odorous substances to the birds' external nares at the time of release might influence their performance. Ten releases of birds with varied flight experience were made from directions between ENE and SSE of the loft at distances to 130 km. In nine releases, experimental birds received odorous substances spread on the beak and external nares with a brush: ether extracts from several species of Mediterranean coastal plants (5 releases), alpha-pinene (4 releases), and olive oil (1 release). The odorous substances were applied in vaseline and controls received unaltered vaseline (9 releases) or were totally untreated (1 release). In the 10th release the odorous substances (olive oil and alpha-pinene) were applied to bits of cotton rather than directly to the beaks; controls were untreated. The results were somewhat variable. In 9 of 10 cases the mean vanishing bearings of the controls were closer to the home direction than the experimentals, but this difference was slight in most cases. In only two cases were the vanishing bearings of the experimental birds random. In all releases the dispersion of vanishing directions was greater among the experimentals than the controls. Controls had significantly shorter disappearance and homing times. It appears that the manipulations had subtle effects on the performance of the pigeons, but they clearly did not prevent the birds from homing. This is not particularly surprising, given the recent history of experiments on pigeon homing. —Kenneth P. Able.

9. An experiment for testing the hypothesis of olfactory navigation of homing pigeons. F. Papi, L. Fiore, V. Fiaschi, and S. Benvenuti. 1973. *J. Comp. Physiol.*, **83**: 93-102.—A possible mechanism of olfactory navigation in homing pigeons was outlined in review 6 above. This hypothesis was tested by impairing the olfactory experience of young birds. A plastic mask was designed which seemed to prevent breathing through the external nares. Experimental birds wearing the masks were placed in an open aviary with free access to the outside for three-day periods. To avoid irritation by the masks, the experimental birds were unmasked and placed in an adjacent closed aviary for alternate three-day periods. Here they could not experience wind. Controls were masked in the closed aviary and unmasked in the open aviary on a 3:3 day schedule, alternating with the experimentals. With only limited homing from short distances from the loft, the birds were released at five points in various directions to 60 km on sunny days with little or no wind. All birds were released without masks. Experimental birds had significantly poorer homing performance, with more individuals late or lost. There was also a significant difference in the initial orientation of the two groups: in eight releases, the vanishing directions of experimentals were nonrandom in only two and in only one was the direction closely homeward; controls were random in two of 8 releases. The experimentals showed a tendency to fly westward regardless of the home direction. How the successful experimentals managed to home is unresolved. Several pigeons reappeared over the release sites some time after vanishing. The authors speculate that these birds may have made sorties in various directions in search of familiar odors associated with the aviary. In the absence of supporting evidence, other, more conventional, methods seem equally likely.—Kenneth P. Able.

10. Pigeon homing: outward journey detours influence the initial orientation. F. Papi, V. Fiaschi, S. Benvenuti, and N. E. Baldaccini. 1973. *Monit. Zool. Ital.*, **7**: 129-133.—If birds could somehow gather information about directions, distances, and turns experienced during an artificial displacement, they could theoretically use this input to retrace the route when homing. One means of doing this would be by inertial navigation as proposed by Barlow nearly a decade ago. An imposing body of experimental evidence is inconsistent with the hypothesis that information about the displacement journey is necessary for homing or that it is used when available. Against this background, the following experiment was performed. For each of five releases a group of birds with similar pre-trial experience was divided into two sets. The sets were transported to the release site via different routes. The birds were transported by automobile in boxes which let in light but from which the birds could not see outside. In all five releases the two sets of birds showed markedly different initial flight directions (based on vanishing points). Amazingly, all groups showed a strong tendency to fly in a direction opposite to that of the first part of their outward journey. While differences in homing performance were not consistent and most birds ultimately returned to the loft, it appears that initial orientation was influenced in a predictable way by the outward journey. These birds were all familiar with the areas through which they were transported and based on other recent data from their lab, the authors hypothesize that olfactory stimuli may be involved. Perhaps more workers should transport their pigeons to release sites over circuitous routes. —Kenneth P. Able.

11. Experiments on the homing behavior of caged pigeons. G. Chelazzi and L. Pardi. 1972. *Monit. Zool. Ital.*, **6**: 63-73.—Although circular cages have been useful in studies of migratory orientation, the few attempts to elicit homeward orientation from displaced birds have yielded equivocal results. To my knowledge, this paper reports the first successful experiments of this type. A total of 98 pigeons (homing experience from 50 to 60 km in a variety of directions and from 100 km to the north) were used in releases at distances of 71 to 165 km in the four cardinal compass directions. All experiments were conducted under sunny skies. The birds were placed in an octagonal cage with plexiglass sides and their behavior was observed for three minutes. The directions of all flights and pushes against the walls of the cages were scored and only birds with 20 or more such escape attempts were included in the results (71 birds). At the end of 3 minutes the movable side panels (every other panel) were opened and the pigeons were allowed to fly out. Their vanishing bearings were noted with binoculars. The means of the first 20 escape attempts were significantly oriented from all directions except north. The vanishing bearings were remarkably similar, both in degree of orientation and direction; only those from the north release point were not statistically oriented. Interpretation of this result is complicated by the fact that the flight directions of the birds leaving the cage were clearly not independent of the immediately preceding escape attempts inside the cage. Both the escape attempts and vanishing bearings were roughly in the homeward direction (even in the non-significant north point data). Departures of the mean vectors from the homeward direction are all in accord with the well-known northwestward bias found in many homing pigeons. Homeward orientation by pigeons in a cage seems to preclude systematic searching and familiar landmark features as necessary inputs in the determination of initial flight directions, at least. Given the obvious complexity of homing navigation, many more data are needed before these results can be fully evaluated vis-a-vis other recent work. The results certainly rekindle one's interest in the potential usefulness of orientation cages in homing studies.—Kenneth P. Able.

POPULATION DYNAMICS

(See also 29, 30)

12. The population dynamics of the Collared Turtle Dove, *Streptopelia decaocto* (Friv), in Brno, CSSR. (Zur Populationsdynamik der Türkentaube, *Streptopelia decaocto* (Friv.), in Brno, CSSP.) V. Kubik and F. Balat. 1973. *Zool. Listy*, **22**(1): 59-72. (In German with English summary.)—In Brno, Czechoslovakia, the Collared Turtle Dove breeds four times a year, mostly between March and July. Of 302 nests, 266 contained two eggs and 36, one, for an average of 1.88. Of 229 clutches, 436 eggs produced 377 young (86.47%). The total breeding success from egg laying to rearing of young was 68.6%. Mortality of young was attributed most frequently to accidental ejection from nests and to predators, 4.2% each. Dead young in the nest were not removed by the parents.—Leon Kelso.

13. Population biology of the Yellow-breasted Chat (*Icteria virens* L.) in southern Indiana. C. F. Thompson and V. Nolan, Jr. 1973. *Ecol. Monogr.*, **43**: 145-171.—A small population of chats was studied from April to September for a five-year period near Bloomington, Indiana. The results of intensive mist-netting, color-banding, and nest observation are reported. Of the

23 males that maintained territories for at least four days, five did not acquire mates and one had two mates. During the period of the study the number of fledglings produced per year declined from 24 to 0, and the end of the egg-laying period moved from 20 July in 1966 to 23 June in 1970. As each season progressed both clutch size and degree of predation decreased. The latter influence counteracted the former so that as the season progressed the number of fledglings produced per territory increased. An overall average productivity figure of 1.05 fledglings per territory includes those territories held by nonbreeding males. Assuming that this would not be sufficient to replace annual mortality, the authors conclude that this area represents unfavorable habitat. Some of the questions raised by the study, such as the cause of the annual variation in nesting success, are not discussed. Presumably in better habitats chats would occur at higher densities, predation would be reduced, and the egg-laying period would be consistently about 60 days. It is discouraging that even with such concentrated field effort and careful documentation of demographic information, it is still difficult to quantify the relative importance of the factors involved. The authors describe the many complexities and are properly hesitant to draw simple conclusions.—Frances C. James.

NESTING AND REPRODUCTION

(See also 26, 27, 49, 61)

14. Growth, development, and food habits of young Pinon Jays. G. C. Bateman, and R. P. Balda. 1973. *Auk,* **90**: 39-61.—Between 1968 and 1971 in Arizona the authors found 25 nests containing 89 eggs in clutches of four and five. The incubation period was 17 days. During the early days growth was rapid, during the latter half of nest life (11 to 21 days age) weight increase slowed while plumage growth continued rapidly. At first the female and brood were fed by the male, much of the food supplied from caches in the ground. After the start of thermoregulation in the young the female also foraged. Frequency of food visits was low, about one per 66 min., because of the large amount carried each trip, 15 to 20 items. In comparison with other passerines growth is rapid. The young depart the nest at 21 days. The dark skin of the young, heavier plumage development above, southern nest exposure, and good nest lining plus ample food provision seem well adaptive to survival despite nesting in severe weather conditions. After departure the young gather in groups that are given communal care and protection from predators by adults.—Leon Kelso.

15. Cuckoo reared in Swallow's nest. R. H. Heath. 1973. *Brit. Birds,* **66**: 279-280.—This is the first record of a cuckoo (*Cuculus canorus*) successfully reared by Swallows (*Hirundo rustica*) since Atkinson recorded the fact in 1894 [*Zoologist,* (3rd ser.) **18**: 340,1894]. The interesting and still unanswered question is how the cuckoo deposits its egg in the nest? Because of its size the adult cuckoo may be unable to squeeze into the narrow space between the swallow's nest and the ceiling above the nest. Could the cuckoo place the egg in the nest with its bill?—Edward H. Burtt, Jr.

16. Optimal niche space of the Red-winged Blackbird. III. Growth rate and food of nestlings in marsh and upland habitat. 1973. R. J. Robertson. *Wilson Bull.,* **86**: 209-222.—Reproductive parameters of Red-winged Blackbirds (*Agelaius phoeniceus*) were measured in freshwater marshes and upland old fields near New Haven, Connecticut, in 1968, 1969, and 1970. Mean clutch size was significantly higher in the marsh ecosystem, but fledging rates in the two habitats were similar. Nestling growth rates and starvation losses were equivalent in the two habitats. Starvation losses increased as the season progressed. Robertson's experiments with enlarged clutch sizes yield inconclusive results because the experiments were apparently conducted only in marsh habitat. Foods brought to nestlings were sampled with the pipecleaner method, whose limitations are pointed out. Terrestrial food sources comprised 98% of foods brought to nestlings in the uplands and 55% of foods brought in marshes where 33% of the foods were from aquatic sources, primarily emergent odonates. Although fledging rates were equivalent in the two habitat types, the far greater nesting densities of the marshes produced greater numbers of young. Robertson suggests but does not demonstrate that the higher densities are made possible by greater absolute food abundance.—Paul B. Hamel.

BEHAVIOR

(See also 14, 15, 27, 28, 41, 48, 51, 57, 58, 61)

17. Individual egg and chick recognition by adult Royal Terns (*Sterna maxima maxima*). P. A. Buckley and F. G. Buckley. 1972. *Anim. Behav.*, **20:** 457-462.—Ashmole and Tovar (*Auk*, **85:** 90-100, 1968) reported that the period of dependency in Royal Terns extended into the chick's first winter. Individual recognition, apparently by voice, between parent and chick was maintained during migration to and in winter quarters in Peru. The present authors in an earlier paper (*Auk*, **87:** 1-13, 1970), while agreeing that voice was an important basis for parent chick recognition, showed that chick coloration was sufficiently variable to permit recognition by visual cues.

In the present study chicks and eggs from nests less than 1 m apart were exchanged. Adults consistently recognized their own egg as measured by their going to the egg and incubating it. Nest site was important, however. Preliminary experiments showed that adults were unable to find an egg displaced one to 10 m from the nest. Furthermore when the egg was in the wrong nest incubation was frequently interrupted with standing and walking around. When the egg was replaced in the correct nest, incubation was resumed without interruptions.

Recognition of the chicks did occur, but the results do not distinguish between the use of visual and vocal cues. This is in part due to the use of only four chicks in two exchange experiments, a shortcoming the authors freely acknowledge. The authors suggest that recognition is largely vocal, but that redundancy in the form of color variation is present as added insurance that the correct choice will be made. This individual color variation persists in the juvenal plumage, but is lost in the first winter plumage. On the wintering grounds in Peru antiphonal calling seems to be the basis for parent-chick recognition.—Edward H. Burtt, Jr.

18. Personality as a variable in the behavior of birds. 1973. H. E. Burtt and M. L. Giltz. *Ohio J. Sci.*, **73:** 65-82.— Using birds banded in their continuing decoy-trap program at Columbus, Ohio, Burtt and Giltz measured the responses of Starlings (*Sturnus vulgaris*), Red-winged Blackbirds (*Agelaius phoeniceus*), Brown-headed Cowbirds (*Molothrus ater*), and Common Grackles (*Quiscalus quiscula*) to a standardized testing regime. Having first defined bird behavior into either aptitude or personality categories they designed tests to measure two personality variables, complacency-agitation and aggressiveness. Aggressiveness was measured in the hand by a rating scale approach, complacency-agitation in a holding cage by an observational approach. Both tests were reliable as indicated by high correlation of paired scores for individual birds. The aggressiveness scores indicated that grackles and cowbirds are significantly more aggressive than Starlings and redwings. Cowbirds were most complacent, Starlings most agitated; grackles and redwings showed intermediate agitation scores. Sex, age, and seasonal comparisons of agitation in redwings and cowbirds revealed the following: cowbirds—no sex differences, adult males more complacent than first-year males; redwings—females more complacent than males, adult males more complacent than first-year males, and summer birds more complacent than birds in the fall migration season. The authors suggest that agitation may be related to Zugunruhe. A weakness in the methodology of the study was always testing adult birds before testing first-year birds rather than randomizing the order of testing. Sample sizes throughout are more than adequate. The low correlation of complacency-agitation with aggression indicated they were manifestations of independent personality traits.

In addition to these two direct tests of personality variables, further banding data on repeats, recoveries, and relative frequencies of occurrence in different locations are presented. These data reinforce the agitation-complacency as a personality trait and also indicate another possible trait, topophilia, which is particularly well-developed in grackles.

This paper is loaded with data on some of the 100,000 birds banded by Burtt and Giltz. The contrived nature of the personality tests, especially that for aggression, although they show species differences, do not lead to their easy use as predictors of behavior in the field; hence they may be meaningless to field workers. The existence and importance of personality to understanding bird behavior is the significant contribution of this work.—Paul B. Hamel.

19. Extended survival of the chick embryo in vitro. M. Corner and S. Richter. 1973. *Experientia,* **29**(4): 467-468.—The purpose was to determine if warm blooded animals' central nervous tissues cultivated in artificial isolation preserve normal prenatal behavior, i.e., similar to that in the egg. White leghorn embryos of the low percentage surviving to "stage 41" or the 15th day of incubation, were "motorially responsive to tactile stimulation" and also displayed spontaneous motility which was quite like that observed during life in the egg. Most of those attaining advanced development stages were in almost continuous movement.—Leon Kelso.

20. Changes in fishing ability of terns associated with windspeed and sea surface conditions. E. K. Dunn. 1973. *Nature,* **244**(5417): 520-521.—Sandwich Terns (*Thalasseus sandvicensis*) and Common Terns (*Sterna hirundo*) studied in Northumberland, England, exhibited greater fishing success and a higher rate of prey capture in moderate seas than when seas were calm. For the former species both were positively correlated with windspeed but plunge diving rate was not. Dunn suggests two factors that might account for the increased success with increased surface disturbance. First, increased windspeed apparently made it easier for terns to hover in place with less vigorous flapping, thus rendering them less conspicuous to the prey species; and second, disturbance of surface waters possibly impaired the prey species' chance of sighting the tern. Hopefully such quantitative observations will be made subsequently on other species to discover whether the relationship discovered by Dunn is of widespread occurrence.—Roger B. Clapp.

21. Spine-tailed Swifts over Kaipara Flats. F. Hudson. 1968. *Notornis,* **15**(1): 42.—Near Warkworth, New Zealand: "I became aware of six strange birds [*Chaetura caudacuta* of manuals] darting and circling at incredible speeds, when one began repeatedly diving at me. They flew about the knoll for about half an hour during which time they 'buzzed' me and the dogs frequently. . . . Their flight was remarkable in that there was very little wing-beating for the speeds maintained and they seldom went where expected. . . . It seemed they were jet-propelled." This form of "fowl" play is another instance of birds apparently not confined in their exercise to a strict energy budget. It also recalls the radar-proven predilection and power of the common species of the family to stay aloft overnight.—Leon Kelso.

22. Conservatism and lability of the parental behavior stereotype of some species of nesting birds. (Konservatizm i labilnost roditelskogo stereotipa povedeniya nekotorykh vidov ptits v gnezdovoi period.) A. Krapivnyi and L. Kharchenko. 1973. *Z. Zhurn.,* **52**(2): 229-237. (In Russian.)—A paper by these authors on nestling acceptance of feeding and care from alien adults was reviewed previously (rev. 34, *Bird-Banding,* **43**(3): 230-231, 1972). This paper reports results of an experimental study of adult acceptance of exchange of their own for alien eggs and young. Egg or nestling exchange was tried in 455 nests of 41 species of 11 families. These numbers were not enough for conclusions about any one species or family, but there were general trends. If the species' attachment responses were to the nest then it would incubate alien and imitation eggs. If the attachment responses were to the eggs, then any substitutes were abandoned. During the feeding period the nestling supplants the nest as the stimulus or signal complex. The replacement of nestlings by those of alien species was accepted by adults in 76% of the cases; no particular trends among species or families are designated. The scope of food acceptance by substituted young tends to accommodate to that of the foster parents during the feeding-rearing period.—Leon Kelso.

23. Spread-wing posturing in cathartid vultures. J. A. Kushlan. 1973, *Auk,* **90:** 889-890.—Kahl (*Auk,* **88:** 715-722, 1971) divided spread-wing postures of storks into: (1) wing-drooping posture, (2) delta-wing posture, and (3) full-spread posture. Kushlan observed all three postures in Black Vultures (*Coragyps* *atratus*) and Turkey Vultures (*Cathartes aura*).—Edward H. Burtt, Jr.

24. House Martins attracted by garden fire. D. E. Paull. 1968. *Brit. Birds,* **61**: 312.—About 30 House Martins (*Delichon urbica*) gathered 40 to 50 feet above a garden rubbish fire. Small flying insects drifted upward in the warm thermal and may have attracted the swallows. Swallows are opportunistic feeders and congregate wherever local disturbances put insects to flight. In an appended note one of the editors adds that at Azraq, Jordan, he attracted large numbers of Swallows (*Hirundo rustica*) and Sand Martins (*Riparia riparia*) to the vicinity of mist nets by firing small patches of adjacent *Juncus.*—Edward H. Burtt, Jr.

25. The anting of passerine birds and the development of this behavior. (Über das Einemsen von Singvögeln und die Reifung dieses Verhaltens.) A. Querengässer. 1973. *J. Ornithol.,* **114**(1): 96-117. (In German with English summary.)— Two types of anting behavior are defined: active, whereby the bird holds the ant in its bill and anoints wings and tail; and passive, when wings and tail are held in contact with the ground, permitting ants to climb on. There is some pattern overlap. Progressive development of the reactions in hand-reared Starlings (*Sturnus vulgaris*) and two timaliid species (*Leiothrix lutea* and *Siva cyanouroptera*) was observed. The ants used were *Formica polyctena* and *F. Pratensis.* At first ants offered were consumed by the young; then at 32 to 35 days anting was established. After 57 days age the Starlings applied ants several at a time. Anting occurred at two to nine day intervals, the act occupying several seconds to 26 minutes. There are additional details given with interesting discussion. Yet, as the keen observer, Mrs. A. R. Laskey, has noted on occasion, additional instances may be multiplied indefinitely; deeper understanding of feather physiology is needed.—Leon Kelso.

26. On Rooks' adaptations to their natural habitat. (O prisposobleniyakh gracha k prirodnoi srede.) A. Solomatin. 1972. *Byull. moskovskogo obshch. isp. prirody, otdel, bio .,* **77**(5): 65-76. (In Russian.)—Rookeries in Kazakhstan were compared with those in northern localities, finding general and intracolonial adaptations, including parasitism in nest building, local persistences in nest location and food preferences, time of adult maturity, and age patterns in populations. Each colony showed characteristics of an elementary population per the Schwartz (1969) definition, each rookery (*Corvus frugilegus*) being self-maintained as a distinct biological unit. Annually some members of a colony move into other rookeries or find new ones. Some local offspring settle nearby, serving for renewal of the rookery. Spring return of local residents is not invariable. Wintering departures go to various destinations. However, sex and age patterns in rookeries remain relatively constant, apparently effecting local self-regulation. Intra- and intercolonial contacts are maintained. Some individuals fatten in the fall but do not move southward, leaving little likelihood of population change. There are factors allowing flexibility to local environmental changes without the population itself being altered. Colony life herein effects increase of heterozygosity, affording wide adaptability, variability of age pattern, of rate of sexual maturity (1 to 3 years), varied age of pairs, occupation of colony center by stronger birds, varied winter dispersal, accelerated breeding of young in inclement years, and immigration of young into alien rookeries. Parasitism in nest building, less breeding and less vitality of offspring of younger pairs, and their abandonment of eggs and young when following nomadic adults—these are suggested as means of realizing genetic diversity along with stability. And yet some observers have seen in the species "poplar" and "birch" dwelling groups, which, in a particular park will prefer those trees, building distinctive nest types and persisting in different behavior therein.—Leon Kelso.

ECOLOGY

(See also 13, 48, 50, 59, 61)

27. Breeding sex ratios, territoriality, and reproductive success in the Red-winged Blackbird (*Agelaius phoeniceus*). C. H. Holm. 1973. *Ecology,* **54**: 356-365.—Celia Holm presents an interesting extension of what is known about polygynous mating systems (most recently summarized by Orians, *Amer. Nat.*, **103**: 589-603, 1969). Data on the sex ratio, territoriality, nest placement, and reproductive success of Red-winged Blackbirds obtained in marshes at the Turnbull National Wildlife Refuge, Washington, in 1965, 1966, and 1967 demonstrate that nesting success is primarily related to the type and density of nesting cover and that harem size is positively correlated with the number of young fledged per nest or per female. Nests in scattered cattails (*Typha latifolia*) suffered less predation and less nestling starvation than nests in dense cattails or in bulrushes (*Scirpus* spp.). If the first nest failed, females mated to males with large harems were more likely to renest than other females. Males maintained harems of up to six concurrently-nesting females, with two and three being the most common. Since the number of adult males exceeded the number of territories in which breeding success was high, a polygynous mating system is theoretically advantageous. Territorial behavior on the part of females probably limits harem size. In the Long-billed Marsh Wren (*Telmatodytes palustris*) it is limited by the extent to which the male assists in feeding nestlings (Verner and Engelsen, *Auk*, **87**: 557-567, 1970), but female Red-winged Blackbirds construct the nest, incubate the eggs, and feed the nestlings without help from the male.—Frances C. James.

28. The foraging of small populations of Yellow Warblers and American Redstarts. D. H. Morse. 1973. *Ecology*, **54**: 346-355.—In an earlier paper it was demonstrated that Parula (*Parula americana*), Myrtle (*Dendroica coronata*), and Black-throated Green (*D. virens*) warblers on small spruce-clad islands in Muscongus Bay, Maine, divided their utilization of the available vegetation vertically and maintained an interspecific social hierarchy (Morse, *Ecology*, **52**: 216-228, 1971). This paper reports that Yellow Warblers (*D. petechia*) and Redstarts (*Setophaga ruticilla*) on several larger islands divided their habitat space horizontally, setting up largely exclusive territories apparently based upon species-specific adaptiveness to certain vegetational characteristics. Yellow Warblers frequented edges and low vegetation in openings in deciduous areas. Redstarts preferred scattered tall deciduous trees or spruce growth. In those places where the species occurred together, the presence of one did not affect the utilization of the habitat by the other.—Frances C. James.

29. A comparison of winter bird populations after a decade. W. H. Rickard and B. J. Rickard. 1972. *Murrelet*, **53**(3): 42-47.—A winter bird census of a streamside forest in the steppe region of eastern Washington conducted in 1972 is compared with a similar study of the same area made in 1962. No dramatic change in the species composition or abundance is reported. The authors attribute this stability to unaltered vegetation. Three species increased (expressed as frequencies) by over 50%. These are Ring-necked Pheasant (*Phasianus colchicus*), Downy Woodpecker (*Dendrocopos pubescens*), and Audubon's Warbler (*Dendroica auduboni*). Three species recorded in 1962 but not in 1972 are Black-capped Chickadee (*Parus atricapillus*), Varied Thrush (*Ixoreus naevius*), and House Finch (*Carpodacus mexicanus*). I count only 13 species in the table for 1962 (see Rickard, *Murrelet*, **45**: 22-25, 1964) not 17 as stated in the present paper. This study is cursory at best and unfortunately was not stated by the authors as such. Their conclusions lead one to believe general ecological stability. The level of data presented is not sufficient to warrant any concluding analysis as has been implied.—M. Ralph Browning.

30. Effects of agriculture upon populations of native passerine birds of an Alberta fescue grassland. R. A. Owens and M. T. Myres. 1973. *Can. J. Zool.*, **51**: 697-713. (In English with French summary.)—This study on the effects of land use on avian populations in grasslands uses two census techniques. The activity of each bird seen was plotted on a map for each of twelve 40-acre plots, four in undisturbed areas and two each on newly mown, grazed, tilled, and fallow fields. Second, birds were counted along two 10-mile long routes, one through native grasslands and the other through mostly cultivated land. The vegetation comparisons of the 40-acre plots utilized a photographic technique.

Eight grassland species were found on the 12 plots. The Baird's Sparrow (*Ammodramus bairdii*) was least tolerant of changing conditions and was restricted to undisturbed areas. The Horned Lark (*Eremophila alpestris*) and the Vesper Sparrow (*Pooecetes gramineus*) occupied the most disturbed habitats. The roadside counts produced 58 species. Eleven occurred only on the native grassland route, and another 11 occurred only on the cultivated route. The total passerine population decreased with increasing intensity of agricultural use.

The authors review the evidence regarding the natural state of the grasslands in the buffalo and post-buffalo periods and postulate historical changes in avian populations. No grassland passerine species seems to have been eliminated by later agricultural exploitation.—Bertram G. Murray, Jr.

31. Comparative ecology of the Dunlin. (Autoecologie comparee du Becasseau Variable *Calidris alpina* (L.)) J. Vielliard. 1973. *Alauda,* **41** (1-2): 1-33. (In French with English summary).—This paper follows an earlier account (*Alauda,* **40**(4): 321-342, 1972) of the geographic variation of the Dunlin. The author reviews the feeding behavior, diet, and habitat requirements of the Dunlin and concludes that the species shows a wide range in niche utilization. The author considers the species' ability for ecological survival to be by "self adjustment" (opportunism ?) to the habitat capacity rather than evolving by ecological adaptation. Some ecological data on other Palearctic Charadrii are presented. A literature cited section includes references cited in the earlier paper.—M. Ralph Browning.

CONSERVATION AND ECONOMIC ORNITHOLOGY

32. Hope for oiled seabirds. Anonymous. 1972. *Marine Pollut. Bull.,* **3**(7): 100.—This is a news item that reports results found in the *Second Annual Report* of the Research Unit on the Rehabilitation of Oiled Seabirds at the University of Newcastle-upon-Tyne. "Past experience has been that even if rescued birds are successfully cleaned their plumage takes months to regain water repellence. During this long stay they are exposed to ailments and become tame or unadapted to the wild." Cleaned plumage remains wettable because invisible traces of oil, other contaminating matter, and most commonly the cleansing agents themselves remain strongly absorbed into the feathers. One of the detergents most favored for cleaning birds, in fact, leaves traces which are almost impossible to wash off, leaving the birds with an almost permanent wettable plumage. To make matters worse, birds in this condition do not enter the water and bathe so that the feathers become heavily soiled with fecal matter, which also causes a loss of water repellency.—Leon Kelso.

33. Danish seabird disasters in 1972. A. H. Joensen. 1973. *Marine Pollut. Bull.,* 4(8): 117-118.—According to the Danish Game Biology Station, 1972 was a particularly fateful year for seabird mortality by oil spillage with quite small amounts of oil causing unexpectedly large losses, an increasing matter over recent decades. From data taken by aerial surveys, in one incident in March 1972 along the coast of Jutland, northern Kattegat, the minimum estimated mortality was 30,000. The three main species were Eider (*Somateria mollissima*), 12,000 to 15,000; Common Scoter (*Melanitta nigra*), 10,000; and Velvet Scoter (*M. fusca*), 7,000. Species of the open sea (e.g., alcids) may disappear through oiling without leaving any indication on the shore. "As is often the case, the source of pollution was unknown, and oil patches were not observed on the sea until thousands of birds had been contaminated." The combination of dense seabird populations (over 1,000,000 around here) and extensive sea-traffic through Danish waters causes an obvious conflict of interests. Imperative is "the acceptance by shipping that even small amounts of oil released into the sea can have a very serious effect on birdlife."—Leon Kelso.

PHYSIOLOGY

(See also 59)

34. Seasonal variation of energy metabolism and thermoregulation in sedentary and migratory passerine birds. (Sezonnye izmeneniya energetskogo obmenoi i termoregulyatsii u osedlykh i migriruyushchikh vorobninykh ptits.) A. Davidov. 1973. *Ekologiya,* 4(1): 42-49. (In Russian.)—At typical winter and summer temperatures (—15° and +20° C, respectively) excess winter level of nocturnal oxygen consumption in nine species of passerines fluctuated between 60 and 120% and was not linked to migratory trends. The ratio was higher in individuals of smaller size. In sedentary sparrows, House (*Passer domesticus*) and Tree (*P. montanus*), no essential difference of metabolic energy level at equivalent summer and winter temperature levels was seen. In migrants, Scarlet Grosbeak (*Carpodacus erythrinus*) and Chaffinch (*Fringilla coelebs*), summer levels of oxygen consumption by night and at rest were higher than in winter. North and temperate latitude winter residents of Bullfinch (*Pyrrhula pyrrhula*) and Great Tit (*Parus major*) showed more stable body temperature, with less chemical thermoregulation, in both winter and summer. Bioelectric activity in breast muscles, which afforded much of the heat production, accelerated with moderate cooling in direct proportion to oxygen consumption, and below -10 °C acceleration declined. In summer heat production was decidedly higher than in winter and showed an inverse correlation to body size.—Leon Kelso.

35. Body size, conductance for animal heat flow, and Newton's Law of Cooling. M. Kleiber. 1972. *J. Theor. Biol.*, **37**(1): 139-150.—The author contends that (a) for two decades heat conductance in animals has been expressed erroneously as per gram body weight, (b) if in a cold environment heat transfer in living animals works by conduction alone, as in dead carcasses, then the ratio of basal metabolic rate to conductance indicates that the difference between body temperature and critical temperature is increasing with that of body weight proportional to the 1/4 power of body weight, and (c) this study finds that basal metabolic rate increases with its 3/4 power, but heat conductance increases with only the square root of body weight, which "may serve as an explanation of Bergmann's rule that cold climate favors big animals."

"Generally one may state that big animals can stand a cold environment with less difficulty than small animals do because the basal metabolic rate of homeotherms increases with the 3/4 power of bodyweight, whereas the conductance of their carcass rises only with the square root of bodyweight. Small animals are limited in increase of their insulation, for example, by increasing thickness of their fur as Scholander and others noted. Big animals are less limited; there seems no mechanical reason against increasing the thickness of their insulation layer to make it at least similometric, that is proportional to W 1/3.

"If the major criterion in the natural selection of homeotherms had been the thermostatic heat requirement based on conductance then we might have predicted that metabolic rate would increase with body size in proportion to the square root of bodyweight. According to the surface law it would be proportional to the 2/3 power. But measurements show that on the average the basal metabolic rate is most closely proportional to the 2/3 power of bodyweight."

Temperature regulation thus was not a decisive factor in evolution of body weight versus size. That the metabolic rate increases per a higher power than square root, even higher than 2/3 power, indicates other possible requirements, such as work power per time, may have been more dominant than heat requirement. C. Kelly and A. Smith (*Nat. Aeronautic and Space Admin., Publ. No.* 66-35168, 1966) found that chickens reared on a centrifuge with acceleration up to twice gravity showed elevated metabolic rate. On the postulate that work against gravity increases in direct proportion to body weight they predicted that the metabolic requirement for antigravity work, in basal metabolic rate, rises from 10% in a one kg fowl to 56% in another homeotherm weighing 1,000 kg. Acceleration of body mass and work against friction may be factors. Not accounted for here, however, is the existence of bird plumage, whose relative weight is known, with other complicating factors.—Leon Kelso.

36. Body temperature regulation in the Brown-necked Raven (*Corvus corax ruficollis*) I. Metabolic rate, evaporative water loss and body temperature of the Raven exposed to heat stress. J. Marder. 1973. *Comp. Biochem. Physiol.*, **45A**(2A): 421-430.

II. Thermal changes in the plumage of Ravens exposed to solar radiation. (*Ibid.*) **45A**(2A): 431-440.—Any ornithological observer first visiting the Death Valley and Mojave Desert area of the West may have been surprised at the occurrence of Ravens winging their ways here and there, not only at low altitudes but in simmering sunlighted desert heat. In a heat absorptive black plumage, how these birds can endure let alone prefer such a situation is somewhat enlightened by this study. The mideastern and Eurasian deserts have a heat tolerant representative of the species whose plumage physiology is examined here. The concise and ample information evolved is best consulted directly. It appears that the highest heat concentration is in the exterior level of the plumage, near the ends of the feathers, the lowest, at or near the skin. The mean body temperature was 39.95 °C at ambient temperatures from 30 to 38° and rose to 44.7° at ambient temperature of 50°. Fast and shallow breathing was observed at 38 and 41°. Deeper breathing at a higher temperature suggested "ventilated" air to be partly saturated. The standard metabolic rate of 4.73 cal/g per hour, measured within the thermoneutral zone (30-38 °C) rose to 7.94 to 10.14 cal/g per hour at 45 and 50 °C, respectively.—Leon Kelso.

37. Cooling rates and development of homeothermy in the Brown-headed Cowbird (*Molothrus ater ater*). 1973. C. M. Neal. *Condor*, **75**: 351-352.—Based upon cloacal temperatures taken daily on no more than 13 young cowbirds in central Ohio, Neal estimated the development of endothermy. Cowbirds do not achieve endothermy until the 10th day after hatching, later than smaller birds such as Field Sparrows (*Spizella pusilla*). This work suggests that cowbirds sacrifice early temperature control for rapid growth.—Paul B. Hamel.

38. Olfactory perception and bulbar electrical activity in several avian species. B. Wenzel and M. Sieck. 1972. *Physiol. and Behavior.*, 9(3): 287-293.—The subjects were one Crow (*Corvus* sp.), two Canaries (*Serinus canaria*), four Bobwhite (*Colinus virginianus*), three Mallards (*Anas platyrhynchos*), five Manx Shearwaters (*Puffinus puffinus*), and one Turkey Vulture (*Cathartes aura*). The odor stimuli were amyl acetate, pyridine, and trimethyl pentane. The effects were measured by recording apparatus with electrodes implanted in the nasal bulbs and elsewhere. Electrical responses showed the species perceived odors but in different degrees. There was some somatic reaction to odors showing mainly in acceleration of cardiac and respiratory rhythm, more so in species with larger bulbs, i.e., the shearwater and vulture. Electrical responses to natural odors, decaying meat, and ground fish, did not differ essentially from those to the artificial odors.—Leon Kelso.

MORPHOLOGY AND ANATOMY

(See also 54, 55)

39. Unusual venous plan in frigatebird kidneys. O. W. Johnson. 1973. *Auk*, **90**: 901-902.— In most birds the venous drainage of the kidneys is composed of left and right renal veins joining anteriorly to form the posterior vena cava, a bilaterally symmetrical arrangement. Johnson found a unique asymmetrical arrangement in three species of *Fregata*. The posterior vena cava is displaced to the right, and the left kidney is drained by two veins which cross transversely and join the circulatory pathway of the right side. The anteriormost of these vessels presumably represents the left renal vein, but the posterior vessel is of unknown homology. An attempt to discover similar conditions in other pelecaniform families was in vain because all these had the normal avian arrangement.—Robert J. Raikow.

40. The lung and air-sac system of the Common Grackle. 1972. G. P. Kloek and C. L. Casler. *Auk*, **89**: 817-825.—Latex was injected into the evacuated respiratory tracts of eight Common Grackles (*Quiscalus quiscula*), eight Cardinals (*Cardinalis cardinalis*), two Rufous-sided Towhees (*Pipilo erythrophthalmus*), and a Song Sparrow (*Melospiza melodia*). Age, sex, season, and location of capture of the specimens were not mentioned. The air-sacs, diverticulae, ventro-, dorso- and laterobronchi are enumerated and described. The anterior thoracic sacs are fused to the interclavicular forming a single large sac in all these species. A comparison of these findings with the meager literature reveals strong similarities among passeriform respiratory tracts.—Paul B. Hamel.

PLUMAGES AND MOLTS

(See also 54)

41. On color change in the Japanese Crested Ibis. A new type of cosmetic coloration in birds. Y. Uchida. 1970. *Misc. Repts. Yamashina Inst. Ornithol.*, **6**(1/2): 54-72. (In Japanese with English summary.)—Although apparently white and gray forms had long been known in *Nipponia nippon,* its scarcity restricted research. One observer suspected their permanency, suggesting the presence of cosmetic (self applied) coloration. This detailed analysis of specimens collected over many years, supplemented by captive individuals' behavior and chemical analyses and by photographs, yields a definite answer to the problem. Feather analyses accorded to none of the known types of feather change: molting, abrasion, preen oil staining, photochemical change of feather substance, nor contact coloration, e.g. iron from dusting or bath water. Under feathers surrounding the naked face, a special area was found producing "black substance" flaking off and falling from the skin as the bird rubbed its head on back and sides. This compound was collected in quantity, photographed, and used for chemical analysis ("to be published elsewhere"). Prior to the breeding season, January through February, a characteristic rubbing of the side of its head to the shoulder region was observed after bathing. This "daubing behavior" lasted 20 to 30 minutes, followed by normal preening. The darkening of the neck to shoulder region deepened as the daubing was repeated. Histological examination proved that the darkening was caused by external adherence of black substance to the proximal barbules of the normally white feather. The black substance on the feathers and that picked up after its head scratching were identical microscopically and chemically. It apparently emerged through the "feather pores" of the skin since the feathers in the black-producing area had a black ring at the level of the rachis insertion into the skin (Figs. 2, 9, and 10). Change back from dark to white plumage followed normal postnuptial molting, and neither daubing by head motion nor dropping of black substance was observed after bathing in this period. Preventing the daubing in the prenuptial period prevented the prenuptial darkening of the plumage. Ethological and hormonal implications are discussed (translation not available). Reviewer's comment: the black ring of substance at the level of feather insertion into the skin could mean movement of substance into as well as out of the body. The dark substance can hardly be a remnant of the formation or the incidental disintergation of the feathers in this case.—Leon Kelso.

ZOOGEOGRAPHY AND DISTRIBUTION

(See also 44, 56)

42. Extension of the Japanese Starling (*Sturnia philippensis*) into Primor. (Rasprostranenie yaponskogo skvortsa v Primore.) Y. Nazarov, S. Elsukov, V. Labzyuk, and O. Laptev. 1973. *Z. Zhurn.*, **52**(7): 1103-1104. (In Russian with English summary.)—First recorded in Primor by Buturlin in 1910 and not again until 1965, small resident groups of Japanese Starlings have been nesting in tree cavities of principal cities and villages from 1970 through 1972. These localities are inland, whereas in its native range the species is coastal. Although still few in numbers, there is an apparent increase both locally and in progression from south to north during this brief time. In Sakhalin and the Southern Kurile Islands of its native range it is not abundant. Does this range extension foreshadow a greater one?—Leon Kelso.

43. The Laughing Owl, *Sceloglaux albifacies* (Gray, 1844), A general survey of a near-extinct species. G. Williams and M. Harrison. 1972. *Notornis,* **19**(1): 4-19.—A summary of what little is known of the Laughing Owl, one of the two owls native to New Zealand. It has not been "officially" seen since 1914. It is agreed that "a posteriori speculations on extinction or near-extinction must always remain a largely unproductive exercise."—Leon Kelso.

SYSTEMATICS AND PALEONTOLOGY

(See also 55)

44. Evolution of the rails of the South Atlantic islands (Aves: Rallidae) . S. L. Olson. 1973. *Smiths. Contrib. Zool.*, No. 152, 53 p., 11 plates.—This interesting study is based on new skeletal material collected by the author on Ascension Island and St. Helena, as well as extensive museum collections from various South Atlantic islands. These islands have until historic times supported a number of endemic, usually flightless Rallidae. A new species, *Atlantisia elpenor*, is described from Ascension. "*Aphanocrex*" *podarces*, previously known from St. Helena, is redescribed on the basis of new material and referred to the genus *Atlantisia*. This genus previously comprised only one species, *A. rogersi* of Inaccessible Island. Since the genus *Atlantisia* is greatly expanded in the present work, a new and well-illustrated characterization of the genus is provided. Olson hypothesizes that the "Pro-Rallus" ancestors of all three *Atlantisia* species arrived on their different islands as wind-blown vagrants and independently developed flightlessness. Another new species, *Porzana astrictocarpus*, is described from St. Helena and is thought to have been derived from the widespread Old-world species *Porzana pusilla*. Olson includes the Laysan Rail (*Porzanula palmeri*) in the genus *Porzana*. Two species of flightless gallinules are also discussed.

The general phenomenon of flightlessness in rails is considered next. About one-fourth of the species are flightless, and these mainly occur on oceanic islands. The usual explanations for this situation, namely the absence of predators and lack of a need to disperse, only *allow* flightlessness to occur. These are negative factors, but there must be some positive selection factor in favor of loss of flight. Olson suggests that this factor is the energy savings achieved by the reduction of the large and metabolically active flight muscles. This is accomplished by arrested development of the pectoral region, a neotenic phenomenon involving a modification of the normal relative growth rate of this part of the body. This sort of modification for flightlessness has occurred in various groups of birds, but never so frequently as in the Rallidae. One question which is not adequately explained is why this particular family is so prone to flightlessness. Perhaps it is related to their tendency to colonize oceanic islands, but we must then ask why they do that so readily.

Storrs L. Olson has provided us with a well-written and excellently illustrated overview of a specialized and little-known avifauna.—Robert J. Raikow.

45. On the supposed genus *Petrochelidon*. A. R. Phillips. 1973. *Bull. Brit. Ornithol. Cl.*, **93**(1)9: 20.—The genus *Petrochelidon* Cabanis, 1851, is considered inseparable from *Hirundo* Linnaeus, 1758, in deference to Brooke (*Bull. Brit. Ornithol. Cl.*, **92**(2): 53-57, 1972).—M. Ralph Browning.

46. How stable is binomial nomenclature? J. Rising and F. Schueler. 1972. *Syst. Zool.*, **21**(4): 438-439.—Dwelling on bird systematics exclusively here the authors find an about 20% edition-to-edition turnover in the AOU Check-lists and no evident trend toward increasing stability. About 73% of the major changes involve generic limits, altered by expansion, contraction, or fragmentation of scope, "a desirable taxonomic activity which shows no signs of abating, but which is inhibited by the nomenclatural changes attendant upon it in the binomial system." Either enough workers feel the current instability is acceptable, or that reform is more trouble than it is worth.—Leon Kelso.

EVOLUTION AND GENETICS

(See also 44, 50, 54, 55)

47. Hybridization between *Parus melanolophus* and *Parus ater* in the Nepal-Himalayas. (Hybriden von *Parus melanolophus* und *Parus ater* im Nepal-Himalaya) G. Diesselhorst and J. Martens. 1972. *J. Ornithol.*, **113**(4): 374-390. (In German with English summary.)—Hybrids are discussed in connection to the ecological conditions of the contact zone. The authors propose that *Parus melanolophus* and *P. ater* be considered semispecies of a polytypic superspecies *P. ater*.—M. Ralph Browning.

48. The biology of the High Montane Hummingbird in the Bolivian Andes. (Zur Biologie des Hochlandkolibris, *Oreotrochilus estella,* in den Anden Boliviens.) S. Langner. 1973. *Bonn. Zool. Beitr.*, **24**(1/2): 24-47. (In German with English summary.)—Its range and biotope at 3,900 m altitude are described. During the colder months they make daily flights of 120 km and return to their preferred flowers on which to feed. Many other comparably remarkable facts are adduced in a very commendable research summary, involving more evidence of torpidity.—Leon Kelso.

FOOD AND FEEDING

(See also 16, 20, 28)

49. Pelicans air-freight their fish 100 kilometers. H. Berry. 1972. *Afr. Wild Life,* **26**(3): 120-124.—At a colony of White pelicans (*Pelecanus onocrotalus*), of an estimated 1,000 adults and 5,000 young, at Etosha Pan, the distance to food necessitated individual daily return trips of 200 km. Nesting success was about 40%, or about 2,000 reared, with a mortality of 3,000, of which about 2,000 starved. This particular nesting in 1971 was preceded by two consecutive years of total failure.—Leon Kelso.

50. Comparative feeding ecology of a tropical grassland finch (*Tiaris olivacea*). H. R. Pulliam. 1973. *Ecology,* **54**: 284-299.—Despite an apparent reduction in competition with other seed-eating finches, Yellow-faced Grassquits are less abundant on Jamaica than in Costa Rica. Field observations and seed-size selection experiments indicate that the sizes of seeds selected by grassquits on Jamaica were more variable than those selected by birds from Costa Rica. The number of habitats occupied and the morphology of the bill were the same. These results are not in agreement with the compression hypothesis of MacArthur and Pianka (*Amer. Nat.*, **100**: 603-609, 1966) which predicts that as the number of similar sympatric species decreases, the variety of habitats occupied by each will increase and the variety of foods eaten within habitats will remain constant. In studies involving mainland and island comparisons in which the variance of the bill size increases on the island, there is also an increase in the number of habitats occupied. (See for example VanValen, *Amer. Nat.*, **100**: 377-389, 1965) Pulliam concludes that factors other than competition influence the "energy budgets" of coexisting species.—Frances C. James.

SONG AND VOCALIZATIONS

(See also 57, 58)

51. Principles of acoustic transformation in calls and songs of birds. (Printsip akusticheskoi transformatsii v pozyvakh i pesne ptits.) G. Simkin. 1973. *Z. Zhurn.*, **52**(8): 1261-1263. (In Russian with English summary.)—By variously retarded playback of bird voices certain regularities of sonar transformation, or rather, transposition, of acoustic notes were revealed. These are thought to be indications of the course of evolutionary development of their acoustic communication. The transposition of note sequence in such related genera as *Turdus, Erithacus, Phoenicurus, Cyanosylvia, Luscinia, Phylloscopus, Acrocephalus, Locustella,* and *Sylvia* showed striking similarities in song patterns. Various ecologically oriented relationships were revealed. It is concluded that specific features of song have become physically correlated to body proportions as well as vocal chords. A prevalence of higher tone and harshness in morning bird song, as compared with whistling or sibilant notes in the evening chorus, is claimed and commented upon. It is also remarked that with fatigue birds' tones transpose downward in the frequency spectrum. Reduction of body size, and correspondingly, of vocal chords, may be complicated by ecological requirements, leading to vocal development independent of size. If a vocal pattern is genetically coded in part, it follows that chords, their tension and size, may evolve independently of the neural apparatus of the organism as a whole, or so it is suggested.—Leon Kelso.

MISCELLANEOUS

52. Birds caught by hookgrass. M. Daniel. 1970. *Notornis*, **17**(2): 101.—Becoming "hooked on grass" would be a common sounding phrase for these birds but not in the modern medical sense. The complicating item concerned is a genus of sedges (*Uncinia* spp.) distinguished from common bog or brookside species of the northern hemisphere only in having a small spinose structure with a small hooked tip at the end of each akene or "seed" so-called. Instances of birds caught by it and held even unto death are summarized here: Morepork (*Ninox novaeseelandiae*), Tomtits (*Petroica macrocephala*), Fantails (*Rhipidura fuliginosa*), Whiteheads (*Mohoua albicilla*), parakeets (*Cyanorhamphus* spp), and Long-tailed Cuckoo (*Eudynamus taitiensis*). W. Merilees reports deaths of *Zosterops lateralis* (*Notornis*, **16**(2): 144-145, 1969), and J. Hilton reports deaths of *Prunella modularis* (*Notornis*, **16**(4): 236, 1969). Their entanglement was with seed heads of *Uncinia* sp., which had become attached to primary, secondary, and covert feathers of the right wing. "Although the bird was still active when found it had little chance of escape as I had difficulty in freeing it (J. Hilton)." Three others entangled and drowned in water were noted. No other such examples were observed by the author among about 750 small birds seen in this area. This rather minimizes chances of bird loss by hookgrass and seed distribution of hookgrass by birds.—Leon Kelso.

53. Coots in gossamer. (Lysukha v plenu pautiny.) G. Rusanov. 1973. *Priroda*, **1973**(6): 124. (In Russian.)—Locally abundant windblown cobweb of certain "aerial spiders" for some reason was wafted downward to form a film on the surface of a pond in the Moscow area. Enough of it to form hardening cords of tissue became wrapped around the feet of 12 *Fulica atra*, thus making it impossible for them to paddle over the water or take flight. All the birds thus affected were juveniles.—Leon Kelso.

BOOKS AND MONOGRAPHS

54. Avian Anatomy--Integument. Alfred M. Lucas and Peter R. Stettenheim. Agriculture Handbook 362. U.S.D.A. 1972. 2 volumes, 750 p. $13.00 per set.—Lucas and Stettenheim have written a thorough and beautifully illustrated account of the avian integument. This work is the product of a number of years of original research and literature review carried out at the U.S.D.A. Avian Anatomy Project at Michigan State University.

Chapter 1 deals with topographic anatomy, or the description of parts and regions of the body. "Regions" are areas on the surface of a plucked bird, and are related to but not always identical to distinguishable subdivisions of the plumage. Regions of the head and body are described for the chicken, turkey, coturnix, duck, pigeon, and other species. They are illustrated by drawings of each species with the feathers removed and the regions demarcated by lines. Other drawings and x-ray photographs illustrate the projection of these regions on the underlying skeleton.

The birds studied are mainly domestic forms, and are identified by breed or variety rather then by scientific names. The authors prefer to avoid using the scientific names of the species from which the domestic forms were derived, because there is so much morphological variation among different breeds, which thus differ from their wild ancestor. Some workers avoid this problem by giving domestic forms new names, e.g. *Gallus domesticus*, but this results in a "species" far more polymorphic than any in nature, yet which may not be reproductively isolated from the ancestral form. Actually the authors manage to have it both ways, for in explaining why they do not use scientific names, they list the names which they are not using. This approach may have led them into at least one misconception. On p. 617 it is said that the uropygial glands are quite different in two "breeds" of ducks, the White Pekin and the Colored Muscovy. These are in no sense "breeds," but are domesticated forms of two very distinct species, *Anas platyrhynchos* and *Cairina moschata*, respectively.

In Chapter 2 the authors distinguish between "pterylosis," which is the "arrangement of feathers in definite areas of growth (pterylae)," and "ptilosis," the "plumage, irrespective of pterylosis," but including such aspects as the size and shape of feathers. A list of pterylae (tracts) is discussed in some detail. For each there is a brief literature review and a discussion of its extent and subdivisions. The tracts are illustrated by line drawings of a Great Horned Owl, with each feather position indicated, and by drawings of particular regions in several other species. The nomenclature is, as always, ultimately based on that of Nitzsch, as well as later workers. Major feathered regions are called tracts, in the plural, whereas subdivisions of these are called tracts in the plural or singular, and further subdivisions are called tracts in the singular. For example, there is no ventral tract as such. There are Ventral tracts, which include the Ventral cervical tract, the Pectoral tract, the Sternal tract, and the Abdominal tract. The Ventral cervical tract includes as distinguishable subdivisions the Interramal tract and the Submalar tract. Since this work is a major review and a definitive description, it will probably serve as the basis of a standardized nomenclature in pterylography, which, like other anatomical disciplines, has long suffered from the confusions of multiple terminology. Unfortunately, total acceptance of this nomenclature may not be forthcoming. There is a serious disagreement between Lucas and Stettenheim and M. H. Clench, the leading student of passerine pterylography. In her thorough study of *Passer* and related forms, Clench (*Auk*, **87**: 650-691, 1970), takes a different approach to the naming of feather tracts. She states that Nitzsch recognized nine tracts—spinal, humeral, femoral, ventral, lateral neck, capital or head, alar or wing, crural, and caudal. There has never been agreement on the meaning of the term "tract," nor on the terms applied to subdivisions of main tracts; such terms as portion, branch, region, and area have been used. Lucas and Stettenheim (p. 74) disagree with Clench regarding Nitzsch's use of the term "tract," stating that in addition to naming major feather groups as tracts, he also applied the term to some small feather groups such as the "anal tract." Thus Lucas and Stettenheim use "tract" for many small subdivisions and limited feather groups, and claim to follow Nitzsch in doing so. Clench likewise claims to follow Nitzsch, but in restricting "tract" to the largest feather groupings, and uses the term "element" to distinguish subdivisions. What may happen is that workers on nonpasserines will follow Lucas and Stettenheim, and students of passerines will follow Clench. This would make comparison between the two groups difficult. I cannot judge which system is preferable; specialists in the field will have to decide this, but in the interests of standardization hopefully pterylographers will in the near future settle on one system for universal application.

Chapter 3 deals with the pterylosis and ptilosis of domestic species. A very detailed and beautifully illustrated account is provided for the chicken, turkey, coturnix, duck, and pigeon. For each species there is a large drawing showing the dorsal, lateral, and ventral aspects of the body. Each follicle is indicated by a dot, and the borders of the pterylae and apteria are indicated by lines. In addition, for each species there are four drawings illustrating the wings in detail. A lengthy written account of the pterylosis in each species accompanies the illustrations. Chapter 3 continues with an account of the ptilosis of the domestic chicken, and in less detail, of the other species noted above. This deals with the appearance of the intact plumage. The chapter closes with a brief account of feather weight and number, based on a review of the literature.

Chapter 4 deals with the molts and plumages of domestic chickens. The molt cycle in various tracts is described in detail from original studies by the authors. These cycles are illustrated by a remarkable series of drawings showing the dorsal and ventral views of a chicken at periodic intervals. Each feather is indicated by an open circle when growing and a solid dot when mature. The appearance of four successive generations can thus be followed visually through the drawings as waves of different colors, with the different times of appearance of each generation in different tracts clearly demonstrated.

Chapter 5 provides a descriptive account of the structure of feathers. Five types are recognized (contour feathers, semiplumes, down feathers, bristles, and filoplumes) but it is emphasized that there are often subordinate and intermediate types. For each feather type there is a written description of its distribution, structure, and function. This chapter is beautifully illustrated with photographs and drawings of enlarged portions of feathers, including various types of barbs and barbules. Chapter 6 builds upon the information in the preceeding chapter to examine the feathers from different tracts of the domestic chicken, and in less detail, the more characteristic features of feather structure in other domestic forms.

Chapter 7 is concerned with the growth and color of feathers. It begins with an extensive historical review of research on feather development. This is followed by a discussion of the problem of the evolutionary origin of feathers. Basically it is a problem of whether the original function of feathers was in insulation or for flight; this is coupled with the question of what type of feather is the most primitive. The authors tend to prefer the approach of Parkes (*Living Bird*, **5**: 77-86, 1966) who favors the flight theory, but with some suggestions of their own. An important paper not cited here is that by Bock (*N. Y. Acad. Sci.*, **167**: 147-155, 1969) who favors the insulation theory. Speculation based on embryonic or other theories can be continued indefinitely, but this problem will probably never be solved unless new fossil evidence on the origin of feathers is discovered. There follows an extensive account of the embryonic development of feathers and follicles, comparing different types in various species. Excellent detailed drawings of the histology of developing feathers are provided along with the text. The chapter closes with a lengthy account of the color of skin and feathers. This is a distinct subject and could well have been set apart as a separate chapter.

Chapter 8 is devoted to feather and apterial muscles. The avian skin supports a network of smooth muscles associated with feather follicles and functioning to elevate and depress the feathers. Apteria have extensive networks of muscles associated with elastic tendons. Their function is unclear, but presumably they help to keep the skin taut. At the level of gross anatomy the arrangement of feather and apterial muscles is described and illustrated in detail for the chicken, turkey, coturnix, duck, and pigeon. This is followed by a closer look at the arrangements of muscles around individual follicles, and their vascular and nervous supply.

Chapter 9 covers the histology of the skin and its derivatives other than feathers. Detailed accounts are given of the microanatomy of the skin itself, as well as the comb, wattle, rictus, beak, cere, scales, claws, sternal bursa, and uropygial gland.

An important new idea about the avian skin is advanced in this work (p. 627-634), namely that the entire skin of the domestic fowl is active as an oil gland, with the uropygial gland being merely a specialized portion. The authors found that in various parts of the skin there is active secretion of lipid material in the basal and intermediate layers of the epidermis, the material being present in the form of intracellular secretion granules. The granules disappear in the stratum corneum, but staining shows that the lipid is present in this layer. This secretory activity is described and illustrated in the oil gland papilla, the scales and sulci of the interdigital webs, the rictus, comb, and wattle, and parts of the feather follicle. It is also stated that this occurs in the body skin, but there does not seem to be a description of this, nor what regions are involved. Lucas and Stettenheim suggest that the secretions of the uropygial gland are primarily used for the feathers, whereas those of the skin provide for the "requirements of the skin itself for sebaceous material." Unfortunately these requirements are not specified, but presumably they deal with maintaining the suppleness and water-repellency of the skin. This is an important discovery which modifies our previous idea of the structure and activity of the avian skin.

Readers interested in this topic are also referred to a paper by Matoltsy (*J. Ultrastruct. Res.*, **29**: 438-458, 1969), who reported on an electron-microscopic study of the skin of the newborn chick, and noted the presence of lipid droplets in the differentiating epidermal cells. He found that in the deeper layers of the corneum, after disintegration of the cytoplasmic organelles, the lipid remains as a central layer between the thickened cell membranes of the flattened cell. In the superficial cells of the stratum corneum the lipid is no longer visible, and Matoltsy suggests that it has spread onto the surface of the skin, performing a waterproofing function similar to the sebaceous gland secretions of mammals. As noted above, Lucas and Stettenheim demonstrated the continued presence of this lipid within the corneum, but perhaps some gets on the surface as well. Thus the lipid-secretory activity of the avian skin seems to have been independently discovered in two different laboratories at about the same time. Hopefully this discovery will stimulate new investigations into the fine structure, histology, and histochemistry of the skin in a variety of avian forms.

There is a brief description and a photomicrograph of the "sebaceous" glands of the external ear. Their epithelial layers and holocrine secretions differ from those of the uropygial gland and the skin, so they are not considered "structurally equivalent" to those glands. One group of avian integumentary glands is not mentioned in this otherwise thorough review. These are the anal glands which occur external to the cloaca in the region of contact between skin and mucous membrane, and which Quay (*Auk*, **84**: 379-389, 1967) considered integumental rather than cloacal because the surface into which they open consists of stratified squamous, and frequently keratinized, epithelium.

Because of the extent of the studies reported in these volumes, the authors have gone beyond providing the usual short Materials and Methods section, devoting Chapter 10 to a discussion of the anatomical techniques employed in this study, many of which are new or modified from existing methods. These include anesthesia and killing, gross examination techniques, x-ray methods, skeleton preparation, histological methods, and demonstration of blood vessels. An especially valuable section deals with methods of anatomical illustration, and includes designs of unique drawing devices. Anatomical researchers will find a wealth of useful information in this chapter.

Nothing in the recent literature on avian anatomy can compare with this work in scope, thoroughness, and attention to detail. The authors and illustrators have worked together to provide a masterpiece of anatomical research and presentation. The art work alone provides an education in the anatomy of the avian integument; combined with the text it forms the basic work on the subject. The price of these volumes is probably one-fourth what it would be if produced commercially, but their value is enormous. Lucas, Stettenheim, and their colleagues deserve the gratitude of ornithologists and anatomists for producing this outstanding study.—Robert J. Raikow.

55. Evolutionary Trends in the Neotropical Ovenbirds and Woodhewers, Alan Feduccia. 1973. *Ornithol. Monogr.*, **13**: 69 p. $2.00.—The Dendrocolaptidae (woodhewers) and Furnariidae (Ovenbirds) are closely related suboscine families, and the purpose of this study is to examine the question of whether they should be included in a single family as some workers have suggested. In doing this Feduccia thoroughly reviews earlier studies and examines new sources of data in the structure of the skull, the sternum, the anatomy of the foot, the tail, the syrinx, behavior, and the comparative biochemistry of hemoglobin. From these various sources he gathers 27 characters showing variation and provides a cluster analysis of their states in 30 genera. From the results he constructs a hypothetical phylogeny of the furnariids and dendrocolaptids, and presents his taxonimic decisions.

The comparative osteology of the skull is treated in some detail and is illustrated with beautiful line drawings. The typical dendrocolaptids have a sturdy, well-ossified skull with holorhinal nostrils, whereas the typical furnariid skull is more delicate and pseudo-schizorhinal. ("Pseudo-schizorhinal" means that the skull is schizorhinal but has evolved this condition independently of the similar condition seen in such nonpasserine groups as Charadriiformes. After initially making this distinction, Feduccia uses the terms interchangeably throughout the text, which negates the point of the distinction.) Some members of both families show a mosaic of intermediate conditions. The hind limb in dendrocolaptids shows various adaptations for trunk-foraging, and these are also expressed to some extent in trunk-foraging furnariids. There are differences in the syringes of the two families, but one furnariid has a woodhewer-type syrinx. The two families are generally distinguishable by the electrophoretic patterns of hemoglobins, but one dendrocolaptid shows a pattern like that of furnariids.

In preparing a phylogeny, Feduccia makes the reasonable assumption that the specialized, tree-trunk foraging habit is a derived condition within the whole assemblage. If this is correct, then the dendrocolaptids are derived from the furnariidae, and their holorhinal condition must have evolved from the schizorhinal condition in the furnariids, which must in turn have been derived from a holorhinal condition in their common ancestor with other suboscine groups. Thus the dendrocolaptid holorhiny is secondary, and perhaps to be consistent should be termed "pseudoholorhiny."

Fedducia recognizes four groupings of genera. The majority of furnariids are set apart from the subfamily Philydorinae, which most closely resembles the dendrocolaptids and from which the latter are presumably derived. The dendrocolaptids are likewise divided, for purposes of discussion, into two groups, the "strong-billed" or typical woodhewers, and several genera of "intermediate" woodhewers sharing some characters with the Philydorinae. There are two possible phylogenies of the Dendrocolaptidae. They may be polyphyletic, arising from "philydorine-like" ancestors, or monophyletic, with the intermediates simply being forms retaining many primitive characters. There is no discussion of the propriety of defining a polyphyletic group as a family or subfamily.

In his taxonomic conclusions Feduccia recommends following Sclater in placing the woodhewers as a subfamily Dendrocolaptinae within the family of woodhewers and ovenbirds, but recommends naming the family Furnariidae rather than Denrdocolaptidae because most species are overbirds rather than woodhewers. He also recommends changes in the sequence of subfamlies given by Scalter and in the placement of certain genera.

Much useful information is found in this paper, and Feduccia makes a strong case for inclusion of the woodhewers in a family Furnariidae. Ultimately though, this is a matter of taste, and another worker, given the same data, might end up with three families. The important thing is that the nature of the relationship between the two groups has been greatly clarified in the present study.—Robert J. Raikow.

56. A Field Guide to the Birds of Mexico. E. P. Edwards. 1972. Sweet Briar, Virginia, published by the author. 300 p., 2 maps, 24 col. pls., 5 3/4 x 9 in. Heavy paper, $7.50.

A Field Guide to the Birds of Mexico and Central America. L. I. Davis. 1972. Austin, Univ. Texas Press. 282 p., 48 col. pls., 5 3/4 x 8 5/8 in. Hard cloth, $10.00; flexible binding, $6.50.—Most book reviews are written promptly after publication, when the reviewer has simply read or studied them. This one, about two books already reviewed well in that way, is written after I have used the books extensively for their intended purpose. Like cook books, field guides are better evaluated after extensive use rather than from pretty pictures and seemingly rich texts. I agree in most essentials with the comprehensive reviews already written about these books by K. C. Parkes (*Auk*, **90:** 211-216, 1973) and R. W. Dickerman (*Wilson Bull.*, **85:** 106-108, 1973). The present review is not comprehensive or descriptive, and the reader must consult the above cited reviews for the complete picture.

I have used both of these field guides in two summers of field work in the Yucatan Peninsula of Mexico, plus travel to and from the U. S. border by car. From these experiences I would suggest taking the plates from both (they *fall* out of Edwards's guide anyway, or I would not otherwise suggest it), bind them or put them in an envelope and take them along with Blake's "Birds of Mexico" (Chicago, Univ. Chicago Press, 1953). The text of the latter is comparatively simple, although lacking in some ways, but what it includes is useful and blessedly spare. Keep Edwards's text handy for unhurried reference in your field quarters (why is discussed later). Use the Davis text only as a final resort because even where it is technically detailed concerning voice, one despairs in the application of the detail. Carry a copy of Smithe's "The Birds of Tikal" (New York, Natural History Press, 1966) and Land's "Birds of Guatemala" (Wynwood, Pa., Livingston Publ. Co., 1970) for help in southern Mexico, and a copy of Peterson's "A Field Guide to Western Birds" (Boston, Houghton Mifflin Co., 1961) or the Robbins et al. "Birds of North America" (New York, Golden Press, 1966) for assistance in northern Mexico. Better toss in a copy of the "Distributional Check-list of the Birds of Mexico" (Pacific Coast Avif., Nos. 29 and 33, 1950, 1957) too, since none of the others is consistently helpful in defining range, which is often indispensable with forms that occur locally and are absent over the next mountain.

Why? Why, with two brand new field guides finally available on this bird-rich country is there a need in field identification for a library of books instead of one or two? First, I think that Davis and Edwards isolated themselves from expert critical manuscript examination that a dozen ornithologists would have been happy to donate, and from recent literature on Mexican birds (especially in the case of Davis) that contains many field facts that are inexcusably absent from these guides. Perhaps I shall be accused of egotism, but I choose to use examples of their ignorance of my own researches to help illustrate the point, ignoring taxonomic matters that are a matter of opinion. On p. 176, Davis properly distinguishes between *Catharus frantzii* and *C. occidentalis* (Raitt and Hardy, *Auk*, **87:** 20-57, 1970) and then proceeds to describe what is surely the song of the former under the description of the latter, probably from field notes taken a few years ago when the two forms were considered conspecific. He does not even mention a song for *C. frantzii*, leaving the reader with the understanding, in my opinion, that it has not been described. Edwards presents the correct songs for the most part, but deals inadequately with the call note problem which we treated in detail.

With all his expertise in bird voices and with his penchant for recognizing well-marked races as full species, Davis misses a fine chance for supporting one of these through the literature. He fails to describe the clear song differences between two central Mexican forms of Red-winged Blackbird (*Agelaius phoeniceus grandis* and *gubernator*) discussed by Hardy and Dickerman (*Living Bird*, **4:** 107-130, 1965).

Davis calls the little White-throated Jay (*Cyanolyca mirabilis*) the Omilteme Jay and gives its range as "... on mt. at Omilteme, Guerrero." Yet, for 15 years the bird has been known to occur more extensively in Guerrero. Furthermore, A. R. Phillips (*Bull. Brit. Ornithol. Club*, **85:** 103-112, 1966) has extended its known range into Oaxaca, and even named a new race from that region. The latter part of the range is, by the way, the only place where someone without a 4-wheel drive vehicle has much chance of seeing the bird.

While one of the Davis book's faults is oversplitting, Edwards' failure to acknowledge marked phenotypic differences in some races of certain species makes his book difficult to employ in some geographic regions. A field student, for example, using only Edwards' book would not be able to identify by sight (although he would be puzzled to hear) *Trogon citreolus* in Campeche. The Yucatan race, *melanocephala*, of this species has a quite different tail pattern from the races figured or discussed by Edwards, and moreover has a prominent pale blue eye ring not found in the other subspecies. Davis's plate on this species saves us, but of course he treats *T. c. melanocephala* as a separate species!

Previous reviewers in the course of their comparative treatments of these two works designated Edwards' guide as useful. That is true, but I am indebted to Harold Mayfield (pers. comm.) for pointing out to me (after which I verified it dozens of times) that Edwards lacks the "Petersonian" gift for field guide writing that gives the reader, first at least, field marks that help distinguish a species from similar sympatric forms with which it might be confused. Instead, Edwards dwells at length, for example, on what are well known tyrannid characteristics. Such, descriptions as "... perching upright on low posts or wires or tops of low shrubs or tops of upper branches ... flying out to catch insects, flying considerable distances from one perch to another," are endlessly repeated for each typical flycatcher. For example, the accounts of the two *Myiozetetes* flycatchers (*M. luteiventris* and *maculatus*) are almost identical. By the time, in the field, that you get to the essential point about slight differences in color of underparts and eye stripe, the infernal bird is two kilometers away. Try the even more difficult task of identifying an ant-tanager (*Habia*) using Edwards' guide. He lists all the ways *H. gutturalis* and *rubica* are alike and, worse, still further emphasizes certain ways they are identical with italics! Thus, both are said to have a "*clear light red throat*." Italics or other methods of emphasis in field guides should always mark distinguishing features in sympatric forms.

Let me return to the two flycatchers to point out a further waste of user's patience, time, and energy, and the book's space. The characterizations of habitat are unnecessarily long for species that are simply not characterizable by habitat. *M. luteiventris* is said to be found "in rather arid to humid situations in partially open country with many scattered trees [by the way, doesn't "in partially open country" adequately suggest "with many scattered trees?"], or in edge of dense forest, or in river-edge woodland, or in scrubby but rather dense forest...." Why not say instead, "occurs in a wide variety of habitats having trees," or "not confined to a specific habitat," or "no definite habitat?"

Edwards also has some annoying characteristics of style that over a long hot period in the steaming jungles may be worth a laugh over a cold drink but interfere with rapid use in the field. No book of comparable length, I would bet, so often uses the word "rather." A given species may be described as rather large, rather common, rather secretive, and having a rather low-pitched voice. One almost gets the feeling that if the author had removed all the "rathers" and the duplicate descriptive matter mentioned above, he would have had a book of half the length and could have spent his limited private publication money on a better binding.

Moving from annoying to improper phrases, we encounter the oft-repeated one "rare *but* irregular" (italics mine). After "rare but" the reader is entitled to a reward such as "easily observed" or "conspicuous." "Rare" and "irregular" should be separated in such cases by "and," since they suggest status implying difficult to find or observe. Here, of course any experienced editor would have helped.

Now for printing and construction. The Davis book is superior in these. His book is beautifully printed (with occasional problems in blue color reproduction—a well-known headache of even the best color presses) and ruggedly constructed. My first and only copy is worn but structurally sound after two month-long trips in Mexico. My first copy of Edwards' guide had loose plates on return from the first trip. I shipped it back to the author and got a replacement with no questions asked. The second copy began to fall apart on the trip *to* Mexico without being taken out of the car (except into motels). All of the plates were loose after the first week afield. So add to the price of this book a rebinding upon receipt.

The points I have made here constitute a gloomy picture for the bird-watcher in Mexico, in comparison with the optimistic picture conjured up two years ago by the fact that there were two brand new color illustrated field guides to the birds of that country, by two outstanding field ornithologists who have devoted much of their lives to studying the birds of Middle America. Both men have made substantial contributions to our knowledge of the Neotropical avifauna, but in my opinion these books are not among them.—John William Hardy.

57. Perspectives in Zoosemiotics. Thomas A. Sebeok. 1972. Mouton, The Hague. 188 p. 32 Dutch Guilders.—Semiotics is a field that studies patterned communication. Comprising a very general body of theory it is widely applicable, but has been used much more by linguists, anthropologists, and others concerned with human communication than it has by biologists. Thomas A. Sebeok, a linguist whose early fascination with genetics left him strongly interested in biological fields concerned with the storage and transmission of information, realized by the 1960s that some of the fundamental concerns of ethology were converging with the theoretical province of semiotics. Seeing that each field had much to offer the other, he coined the term "zoosemiotics" to apply to investigations that would depend on both.

This book comprises nine essays in which Sebeok outlines ethological research on behavior involved in communication within a framework derived from semiotics. Although much ethological research on animal signalling has been physiologically oriented (considerations of "motivational states" eventually reducing to that), his approach is necessarily oriented to communication, an interactional phenomenon. His framework emphasizes six aspects of communication: first, that some individual must act as a source and select what is to be transmitted; second that this selection must be made from a code shared with another individual; third that the particular selection from this code will be physically embodied as a conventional signal that; fourth, has a referent; fifth, the signal must be carried by a channel that links the transmitting individual to the sixth component, a recipient individual. He discusses how ethologists have tended to structure their studies in terms of particular aspects—for example, grouping and comparing signals as visual, auditory, tactile, etc., effectively in terms of their characteristic channels. The structure of semiotic theory enables these component aspects of communication to be viewed in three ways differing in how they are abstracted from real events: (a) pragmatics, which deals with the whole event from the standpoint of the responses and their functions (and is difficult to the extent that "no response is ever entirely overt and any response could be wholly covert"), (b) semantics, which abstracts the signal and the relation between it and its referent, and (c) syntactics, which abstracts just the properties of codes and signals.

Sebeok explored a great deal of ethological literature (he provides a briefly annotated guide to papers and books in one chapter) and offers various general comments: the differences between analog and digital encoding and their functional divergence, the value of pheromones as "vehicles of communication into the future," a simultaneous/sequential encoding dichotomy between visible and audible signals, and others. Always concerned with linguistics and how it can profit from ethology, he has proposed dividing human communication into an anthroposemiotic component (language and dependent modes) and a zoosemiotic component (the intonations, gestures, patterned spacings, etc. that occur with or without language).

Sebeok organized and discussed his material variously for different audiences: the different papers in this volume were written for biologists, linguists, psychologists, anthropologists, and others. The topics recur as issues and concepts are examined from converging points of view. This led to a good deal of repetition, as he admits. It is not surprising in a pioneer exercise seeking to relate diverse fields, an excercise in which the author has to adjust and readjust the "filter" through which he perceives the shared subject matter. Through his efforts, however, Sebeok has become a prime mover in bringing together previously isolated scientists working on communication, and has nourished the field he named: zoosemiotics.—W. John Smith.

58. Born to Sing. Charles Hartshorne. 1973. Bloomington, Indiana, Univ. Press. 304 p. $10.00.—This book is likely to be controversial, as it deals with bird song as music, in an analogy with human music. The author is attempting to discover in animals possible precedents to man's sensitivity to music, and asserts that there should be selective advantage in enjoyment of bird song by both the singer and the recipients of the song. The major part of the book is devoted to the effort to provide measures of the development of bird song in different species, and a survey of the songs of a wide range of birds of the world in terms of these measures.

As groundwork, several explanations are first set forth as to the reasons for development of song in animals. These include the need to communicate, the ineffectiveness of visual signals, inability to communicate by odors, inability of prey to take warning from the song, having the means of quick escape from predators who might locate the singers by their song, development of efficient foraging methods that allow excess energy for singing, and a high degree of territoriality. There seems to be some redundancy and circularity in this list, but in any case the author tries to draw correlations between these factors and the level of song development shown by various species.

Both the strengths and weaknesses of the book result from the author's measures of bird song. In a well-known paper (*Auk*, **83:** 176-192, 1956), Hartshorne presented the idea of the monotony-threshold in birds. This principle states that the message content of bird song is lost if the listener's response is deadened by monotonous repetition of the same song. Accordingly, birds either develop a greater variety of songs, or they increase the pauses between songs so that the immediate memory of the receiver is allowed to fade. This topic is discussed again in this book, along with an assortment of measures of the need for song, the amount of song, the effective song season, and the degree of song development. The last named measure relies upon six parameters of song, which the author calls loudness, scope, continuity, tone, organization, and imitativeness. The problem arises in the subjectivity by which many of the variables are assessed. The discussions of these measures are insufficient for another observer to go out independently and arrive at values equivalent to those Hartshorne would determine. I have no doubt that the author tried to be as objective as possible in his evaluations of the different species, but when the criteria for measurement are poorly delimited, there is always the possibility that an observer carries his unconscious bias into the subsequent assignment of values to the variables. As the biological literature displays in abundance, the mere use of numbers does not in itself make a concept concrete and objective.

But I have said that there is strength, also, in these measures. It seems to me that there is a danger that readers will seize upon the arbitrariness that may exist in this part of the book without recognizing the ideas that underlie it all. Most discussion of bird song in the past has in fact been highly subjective, if only because song is so complex that it defies simple explanation. Trying to determine the measurable aspects of song and relate them to the birds' environment, social system, and evolutionary history would seem to be extremely desirable. Good work has already been done in this area by such persons as Falls, Marler, Lemon, S. Emlen, and the Fickens. What is needed now with Hartshorne's work is not nit-picking at what he has done, but a formalization of his approach so as to make it more highly quantified and objective.

An overall assessment of the book would then be that it should prove extremely valuable, not for the numerical ratings that bird species have received in the tables of the book, but for the stimulation of thought and study on bird song that is likely to result. If you merely want to find out how your favorite species rated, you may be disappointed in the book, but if you are a serious student of avian communication, you may consider this review to be a good recommendation. —B. Dennis Sustare.

59. Ecological and Physiological Aspects of Bird Migration. (Ekologicheskie i fiziologicheskie aspekty pereletov ptits.) R. Potapov, editor. 1971. *Trudy zool. instituta Akad. nauk USSR,* **50:** 1-244. "Nauka" Press, Leningrad. Price uncertain, about $8.00 U. S. (In Russian.)—The five papers are based on records and research carried on for years at the Rybachi station on the Courish Spit, Baltic Sea. The first paper, "Atlas of bird migration according to banding data at the Courish Spit" by N. Payevskii, summarizes trapping and banding totals from operation of the Rybachi traps from 1957 through 1967. There were 11,283 returns from 403,965 banded birds of 142 species. Recoveries from outside Rybachi totaled 2,764 of 70 species. For each species band numbers and recovery dates are listed.

The second paper, "The development of the fall migratory state in some wild passerine birds (bioenergetic aspect)" by T. Blumenthal, examines the development of the migratory state by analyzing records of 80,000 birds of the 15 commonest passerines during nesting, molt, and migratory periods. Some experiments and additional observations in more northern European areas are included. There is discussion of adaptive values and possible modes of evolution of these features.

The third paper is D. Lyuleeva's "Some features of swallow biology during migration." In one respect this is a more trenchant study. Not only are swallow migrations comparatively little investigated, but few bioenergetic studies distinguish between migrants that are granivores or insectivores. Most bioenergetic studies both here and abroad involve primarily the granivorous fringillids. As a reviewer's aside, while many species feeding on animal matter are as earthbound as any bird, how many bouyantly flying, predominantly aerial, soaring, and sailing species can be regarded as mainly granivorous, lignivorous, nucivorous, or herbivorous? The hummingbirds are admittedly very able flyers but take very concentrated foods, although of plant origin. An interesting result reported in this paper, for example, is that the House Martin (*Delichon urbica*) weighs about 20 g and expends about one kilocalorie per hour in flight, whereas the Chaffinch (*Fringilla coelebs*) weighs 22 g and expends about four kcal per hour. It is estimated that migration occupies one-half of a swallow's yearly time because of the long distances flown. Studies from 1958 to 1968 indicated that their highly specialized feeding on "aeroplankton" affords more constant compensation for energy expenditure in flights for distances as far as 6,000 km twice a year. This indicates evolutionary development for much more efficient accumulation, maintenance, and use of energy reserves. How this is accomplished requires more research.

V. Dolnik and V. Gavrilov report in "The caloric equivalents of body weight fluctuations in the Chaffinch (*Fringilla coelebs*)" measurements of energy values (caloric equivalent) for nightly, daily, and seasonal changes of body weight. The value of the nocturnal equivalent is related to the seasonal and individual state of energy reserves, and their ratio to oxidation and rate of water respired. The nocturnal caloric equivalent is correlated to the surrounding temperature in each season. The caloric equivalent of a day or series of days approximates the caloric quality of the fat and does not depend on the season or surrounding temperature. The caloric equivalent decline in body weight by day is decidedly lower and subject to many factors. The caloric equivalent and median weight of a population in a particular season (except during breeding) is constant and varies by seasons. Body weight change during transition from one season to another and during breeding shows no stable caloric equivalent. This and weight loss are intense during migration, and there is indication of but slight respired water loss during flight. Results indicate reliable preciseness in the determination of energy values of body weight fluctuations of birds in the wild and in experiments.

In the final paper, "Energy expenditure during flight in some passerine birds," V. Dolnik and V. Gavrilov calculate energy values for weight loss during flight: House Martin, 0.86 kcal/hr.; Chaffinch, 4.58; Brambling (*Fringilla montifringilla*), 4.35; Bullfinch (*Pyrrhula pyrrhula*), 5.67; and Siskin (*Spinus spinus*), 2.52. In puzzling contrast were the Swift (*Apus apus*) weighing about 40 g with an expenditure of 1.6 kcal/hr. and the Common Swallow (*Hirundo rustica*) weighing 17.8 g and expending 1.15 kcal/hr. This would suggest in addition to oxidation reduction in metabolism of food, also hydro-dehydrogenation with perhaps some internal diffusion of some lighter-than-air gas. Where is the proof that a given bird weight of 40 g on the scales assures that it carries that much weight up in the air?—Leon Kelso.

60. Bird-capture and Bird-banding. Part II. (Vogelfang und Vogelberingung, Teil II). Hans Bub. 1972. Wittenberg Lutherstadt, Die Neue Brehm-Bucherei, A. Ziemsen Verlag. (In German.)—This book is a 1972 revision of the author's 1967 work. The work has grown from 122 to 212 pages and from 115 to 200 illustrations in spite of the fact that one section (on traps using nooses and snares) has been moved to another volume. I reviewed the first edition favorably several years ago and find the second edition even better. The series of four volumes deals with all aspects of bird capture, marking, and various other techniques associated with banding. The work constitutes the most complete collection of information on devices used to capture birds; indeed it may be almost too complete for the average bander. The extensive historical accounts and details on the various parts of the world may be superfluous for the casual amateur. For the dedicated trapper bent on improving his catch, however, these volumes are a treasure-store of information. Volume II deals with large traps, such as duck "decoys" and Helgoland traps, various kinds of nets including mist nets and trammel nets, and various small cage traps in which door closure is triggered by the bird. To give an indication of the thoroughness of coverage, the section on Helgoland traps includes material from Germany, Scotland, the Soviet Union, and Sweden. A description and drawing of a Helgoland-type trap dating from 1639 is included in the account. The abundant illustrations render the book useful even to those with only a marginal command of German. Some of the reproductions are not of top quality, rendering details difficult to discern in photographs. I found the verbal descriptions of techniques at least adequate in all but a few cases, where insufficient detail left me somewhat mystified. An English translation of these volumes is in progress.—Helmut C. Mueller.

61. The Exploitation System of the Yellow-billed Magpie. Nicolaas A. M. Verbeek. 1973. *Univ. Calif. Publ. Zool.*, **99:** 1-58. $2.50.—The fine tradition of the California Zoology series is maintained with Verbeek's latest and most complete report on the Yellow-billed Mapgie (*Pica nuttali*). Essentially, the text is a review of extensive fieldwork and a concluding discussion of breeding strategies within the Corvidae.

Verbeek closely follows the annual cycle of the Yellow-billed Magpie about the Hastings Reservation in southern California. Five breeding seasons are included (1967 to 1971) with more than 700 days afield; the report is correspondingly thorough. The text is quite succinct in presenting the natural history data. Vegetation and local climate are reviewed with a short introduction.

A number of valuable contributions are evident: (1) there is a wealth of good life history data, including considerable information on territoriality, mating behaviors, incubation and brood attentiveness, foraging rates and distances, and flock/colony organization through the year. In each section Verbeek shows the magpie to be an interesting species—for example, after nesting males and females forage in different areas, and there is a complex system of roosts (six types). The author also provides good comments on the adaptive bases of the behaviors, and he sometimes directly challenges traditional thoughts on breeding strategies. I think he is quite successful in his arguments.

It is unfortunate that the inaccessibility of nests limited clutch size data, and that the food availability, at least as presented here, is sometimes subjective (e.g., Figure 16 with no scale, p. 41). Neither fault is critical, however, as fledgling data are sound and the magnitudes of the seasonal changes in food supply were quite dramatic.

Throughout, the text makes comparisons of Verbeek's results with the known biology of the Black-billed Magpie (from both European and American studies). Further, the excellent summary provides an overview of nesting and resource exploitation within the crow family. This comparative conclusion is thought-provoking and gives the reader intellectual prodding. Original contributions here include a description of relationships between nest dispersion and habitat, and between territorial systems and food dispersion in corvids. This unification of general knowledge is exemplary for others working on "single-species' natural histories.

I enjoyed the evening's reading and smiled at the appendix of individual banded birds, labelled a magpie's "Who's Who."—Charles F. Leck.

62. Linnaeana. G. Rudolph and E. Williams. 1970. Manhattan, Kansas-Kansas State Univ. Libr. Bibl. Series No. 7. 225 p.—J. L. Larson in his book, *Reason and Experience* (rev. 71, *Bird-Banding,* **43**(4): 307, 1972), stated that the literature on or about Linnaeus is so numerous and scattered as to be quite out of hand. But here we have a catalogue of a major collection of Linnaeana acquired by the Kansas State University Library. There are 1,280 entries, cross-referenced to Linnaeana in the British Museum and at the University of Kansas, which includes 183 of the 186 dissertations that Linnaeus wrote and many theses, dissertations, and printed lectures by Linnaeus' students at the University of Uppsala.

The original collector of the material was Kenneth K. Mackenzie, "a successful corporation lawyer who lived in Maplewood, New Jersey until his death of leukemia in 1934." He was also an amateur botanist and a recognized authority on *Carex.*—Leon Kelso.

63. Birds of USSR. Bibliographic Index. 1881-1917. (Ptitsy, SSSR. Bibliograficheskii ukazatel. 1881-1917.) A. I. Ivanov, editor. 1972. "Nauka" Press, Leningrad. 195 p. Price uncertain, about $3.50 US. (In Russian.)—This book acquaints us with the amount and variety of Slavic ornithological literature published in earlier ornithological years. The first of a proposed series, it lists 3,318 numbered titles arranged alphabetically by authors. Subsequently, using the preceding list numbers alone there are topical and analytical indices covering general, anatomical, physiological, ecological, economic, regional, evolutionary, and systematic subjects. The book concludes with an alphabetical list of the periodical and other bibliographic sources cited, totaling 350, with abbreviations thereof.—Leon Kelso.