Several sizes of unheparinized capillary tubes of commercial manufacture and hand-cut glass tubing were used to handle the sera; the tube sizes were varied with respect to the serum volume desired for a particular analytical technique. Glass screw-capped test tubes were used for storage containers for the serum-filled capillary tubes. A small piece of absorbent tissue saturated in a saline-sodium azide solution was included within the cap of each storage tube to provide for an indirect preservative effect and also to reduce serum dehydration.

Normally the handling of whole blood or its fractions presents little difficulty to the researcher, however such problems as sepsis, transfer loss, efficient storage, and lot separation do occur. These problems become acute when the sample volumes are small, but can be reduced significantly by using capillary tubes or larger glass tubing for storing and handling the blood fractions. The table below shows some of the capillary tube sizes being used in this laboratory and their applications to certain techniques.

The author gratefully acknowledges the assistance of Dr. Raymond D. Dillon, The University of South Dakota, and The Chapman Fund for Ornithological Research for their financial and personal help in this research.—Gerald M. Polcyn, Dept. of Biology, University of South Dakota, Vermillion, S. D. 57069.

First Harris's Sparrow banded in New Jersey. In recent years the Harris's Sparrow, *Zonotrichia querula*, has been reported with some frequency in the Eastern United States, especially during fall migration and in winter when they are seen at feeding stations. In a search of *Audubon Field Notes* and other literature the author has noted that although there are two or three sight records for New Jersey, there seem to be no previous records of this species being banded or collected in the state.

On 7 Oct. 1967, I was operating several mist nets at the Island Beach State Park, Ocean County, New Jersey, in connection with the Operation Recovery banding program. At 11:30 A. M. I netted a bird which was unquestionably a Harris's Sparrow. This individual was in full adult plumage with a complete black head; the age was further confirmed when the skull was examined and found to be completely ossified. The wing chord measured 92mm.; the bird weighed 33.7 g. and appeared moderately fat. It was seen, and identification verified, by Drs. Bertram G. Murray and Stephen T. Emlen of Cornell Univ. who were present at Island Beach that day. After being photographed in color, the bird was banded with # 59-115981 and released in good condition. This appears to be the first Harris's Sparrow banded in New Jersey.—Bruce Adams, 40 Summit Road, Riverside, Conn. 06878.

RECENT LITERATURE

BANDING AND LONGEVITY

(See also 4, 6, 7, 8, 11.)

1. Longevity of Dominican Gulls. W. J. Merilees. 1969. *Austra. Bird Bander,* **7** (3): 60-61.—Apparently there are no published longevity records for *Larus dominicanus*. The oldest listed here was still living just shy of 14 years after banding. "Of the 127 Dominican Gulls banded before the close of 1958, at least five (possibly seven if the sight records are included) have survived beyond seven years six months." (Longevity of more than 30 years has been reported in some gulls.) See review no. **6**.—Jack P. Hailman.

2. On skulling with a handlens. F. S. Schaeffer. 1969. *EBBA News,* **32** (6): 267-268.—You can't do it without one, and therein lies a warning for banders.—Jack P. Hailman.

MIGRATION, ORIENTATION AND HOMING

(See also 13, 26, 35, 36, 38.)

3. The physiology and geophysics of bird navigation. D. R. Griffin. 1969. *Quart. Rev. Biol.*, **44** (3): 255-276.—Unlike some other reviews of the bird navigation problem, this is based largely on studies of migratory species, and hence avoids the narrow focus of the reviews of pigeon homing. It starts by accepting, with some reservations, the evidence that migrants can orient well under or between layers of cloud and compensate for wind drift, and the evidence that pigeons and other species home in the strict sense of the word. Navigational mechanisms involving only the sun and the stars are insufficient to account for the observations. The discussion ranges over other cues which might be used, such as surface topography, inertial orientation, low frequency sound, air pressure, magnetic fields, the moon and planets, wind direction, and more or less organized motions in the atmosphere. Most of these seem improbable or unhelpful, but Griffin argues hard against the counter-evidence. The tone of the review is thus highly speculative, but its rationale is given in the last paragraph:

"Many recent discoveries concerning the sensory basis of bird navigation began as unsupported speculations which rigorous biologists rejected without adequate consideration. This history of surprises suggests that in dealing with problems of this kind we should entertain a broad spectrum of speculations to guide our enquiries. It may be unwise to rely as heavily as has been customary in the past on a "simplicity filter" which admits to serious attention only facts and interpretations that are already established".

In other words: reasonable ideas have not got us very far, so let's try some unreasonable ideas. It remains to be seen whether this approach will prove more fertile than the frustrating study of the minutiae of pigeon homing by rigorous biologists.—I. C. T. Nisbet.

4. Terms, studies and experiments on the problems of bird dispersion. R. Brendt and H. Sternberg. 1968. *Ibis*, **110** (3): 256-269.—First, the authors attempt to stabilize some of the terms used in various ways in the literature, including expansion, distribution, migration, dispersion, dispersal and spacing. *Dispersion* is "the location of the individual animals in space" while *dispersal* refers to "movements which lead to dispersion." A further distinction is necessary: *spacing* "is a movement forced upon a bird by external circumstance, particularly inter- and intraspecific competition, which do not allow it to establish itself in the place first selected for settlement but force it to withdraw elsewhere," while *dispersal* "is redefined as the movement of an immature bird from its birth place to its first breeding-place; or (of less frequent occurrence) of older birds from the breeding-place of one year to the breeding-place of the next year. Such movement occurs as a result of an innate mechanism leading to dispersion." These steps toward clarification are in the right direction, but probably are going to require further refinement. For instance, by "competition" the authors seem to have in mind what ecologists would call direct "interference" (since many use "competition" to refer to a population concept where a limited resource is involved and no direct interference or movement by individuals is necessarily involved). The "innate mechanism" will also undoubtedly give trouble, but here it appears to be a definition by exclusion (e.g., a mechanism not involving "competition" in their sense).

These concepts and their interactions are then reviewed, and lastly some data on bird movements are presented. *Ficedula hypoleuca* tends to disperse farther than *Parus caeruleus* and *Sitta europaea*.—Jack P. Hailman.

5. Short-term effects of weather on bird migration: a field study using multivariate statistics. I. C. T. Nisbet and W. H. Drury, Jr. 1968. *Anim. Behav.*, **16**: 496-530.—Few studies of migration have done more than acknowledge the complexity of the effects of weather, and none have investigated as many variables (19) with such elaboration as this analysis of the filmed records of migratory activity revealed on the PPI screen of a 23 cm radar set on Cape Cod, Massachusetts. This paper analyses the nocturnal spring migration throughout May 1959 and May 1961 and for 17 nights during May 1960. On 74 of the 84 nights both the northeastward movement of songbirds and the ENE movement of waterbirds were recorded.

The density of migration on all nights was measured by counting the echoes within specified segments of the PPI screen; of the songbirds in one 10° segment between the 30 and 40 nautical mile range-rings and for the waterbirds and the mixed group later in the night in a segment of 50° through the range 20-50 n. mi. The most important measures were for the songbirds, and the closest waterbirds (20-30 nautical miles), the other counts were used to assess bias in the estimation of densities. These measures were compared with 19 weather variables in the area of take-off. Reasonably good fits to a multiple linear regression model (i.e. "explaining" 25-60% of the variance) were obtained if a non-linear transformation (*e.g.*, the 10th root) of the migration density was used as dependent variable (The use of several such transformations showed that the results of the analysis was not very sensitive to the choice of transformation.) Similar non-linear treatment of the weather variables, while desirable, would require inconveniently large quantities of data. The weather variables incorporated, either explicitly or in combination, all those included in earlier studies, and comprised 13 describing the weather preceding and during take-off, and six the changes in the preceding 24 hours. Migration density was significantly correlated with high and rising temperature, low and falling pressure, low but rising humidity and the onshore (southeast) component of the wind velocity. Migration of songbirds was slightly suppressed by rain, but no other weather variable was significant. Migration was correlated both with the weather at the time of take-off, and with changes in the preceding 24 hours. At least for songbirds, migration tended to be sparsest in the few days before full moon, but not during periods of cloudy weather. A computer experiment showed that the observed behavior was very close to the optimum for predicting high temperatures, high clouds and lack of rain at the birds' destination on the following day. The authors are at pains to point out that significant correlations permit inferences only about association and not about cause and effect.

Experimental correlations of weather variables and *Zugunruhe* have revealed only long-term effects. It seems that confinement to a cage blocks the short-term effects described in this field study. The authors suggest that, at present, field studies are the only way to investigate the short-term effects of weather variables, but it is clear that future work must uncover more information about the performance of individual birds and there is scope for more attempts at experiments under controlled conditions, as well as more field studies in areas far from the coast and with different weather patterns.—Jeremy J. Hatch.

6. Dispersion and dispersal of the Dominican Gull in Wellington, New Zealand. R. A. Fordham. 1968. *Proc. New Zealand Ecol. Soc.*, **15:** 40-50.—Over the past 25 years the Dominican Gull (*Larus dominicanus*) has increased markedly in the southern part of the North Island, New Zealand, the six largest colonies near Wellington multiplying 2-11 times during this period. An aerial count in Autumn, 1965, recorded over 12,000 of these birds in the Wellington area. Similarly to the situation described for other gulls in other parts of the world, this increase is attributed to the sources of food provided by the human population in the vicinity. During the nonbreeding season a heavy concentration of birds frequent settled areas, particularly at artificial feeding sites (dumps, slaughter houses, etc.), with densities much lower elsewhere.

Though feeding and resting groups form daily in the same sites, participants do not all come from the same breeding colonies or roosting sites, nor do they always remain together for the period of a day. Rather, records of marked gulls suggest that at least some may visit several resting and feeding sites during a day. Intraspecific aggression may result in individuals being driven from a group; it may thus provide the impetus for the observed mixing.

Numbers of different age classes differed in feeding and resting sites throughout the year, with a tendency during the nesting season for breeding birds to visit the nearest sites. Percentages of young at feeding sites were higher than at resting sites, suggesting (though not proving) that they spend a greater portion of their time foraging than do adults. No simple correlation was noted between percentages of young and flock size.

The average recovery distance of first-year birds was only slightly greater than for older birds (16.8 vs. 14.4 miles for records not made in the natal colony). Movement from banding sites was restricted and showed no clearly directional pattern. There was only very limited dispersal to the South Island and only limited movement from there to the study area.

This population of Dominican Gulls is considerably more sedentary than colonies of Great Black-backed and Herring gulls (*L. marinus* and *L. argentatus*) in northern Europe. Other papers suggest that many populations of the Dominican Gull are quite sedentary, while those in rigorous climates (Falkland Is., South Shetlands, western Antarctica) are migratory. See also reviews **1** and **4**.—Douglass H. Morse.

7. Transatlantic migration of juvenile Sooty Terns. W. B. Robertson, Jr. 1969. *Nature*, **222** (5194): 632-634.—Since 1959, about 130,000 Sooty Tern chicks have been banded on the Dry Tortugas in the Gulf of Mexico. So far 28 have been recovered in West Africa between Sierra Leone and Spanish Guinea, all between 3 and 25 months after banding. Other recoveries suggest that the juveniles spend July and August in the Gulf of Mexico, migrate along the south coast of the Caribbean in September and October, and cross the Atlantic between October and December; they appear to straggle back to the western Atlantic from their second to at least their sixth year. Adults, however, do not migrate far: 16 of 18 recoveries were in the Gulf of Mexico or the Florida Straits.

Long-distance migrations of tropical seabirds have rarely been reported, but are difficult to demonstrate without large-scale banding. Robertson suggests that the primary biological function of the migration in juveniles is to avoid competition with the adults, for space on the colony or food nearby. While it certainly has this consequence, two other possible functions are suggested by Robertson's own discussion. First, by migrating the juveniles avoid at least one and one-half seasons of hurricanes, which are known to be a hazard to them in the post-fledging period. Second, the Gulf of Guinea is probably the richest feeding-area in the tropical Atlantic. Perhaps, therefore, the primary biological function of the migration may be simply to take the birds to the best area. The pertinent question is then why the adults do not migrate there also, and its likely answer is that they do not have time for the two-way journey before the colony is reoccupied in January. On this alternative view, intraspecific competition (for nest-sites) would be invoked to explain the adults' sedentariness, rather then the juveniles' migration.—I. C. T. Nisbet.

8. A nutcracker migration. (Migratsiya kedrovok.) M. Lebedeva. 1969. *Okhota i okhotniche khozyaistvo* (Hunting and game management), **1969** (11): 24, 25. (In Russian.)—The fate of Eurasian Nutcrackers (*kedrovka*), *Nucifraga caryocatactes*, leaving their native areas for varying periodic westward irruptions has long been open only to speculation. "No one has ever seen them on a homeward flight." . . . "the nutcracker flies away from the taiga and in its turn dies out in places where it is forced to winter." wrote Formozov in his now classic paper: "The crop of cedar nuts, invasions into Europe of the Siberian Nutcracker (*Nucifraga caryocatactes macrorhynchos*) and fluctuations in numbers of the squirrel," (*J. Anim. Ecol.*, **2**: 70-81, 1933). Whether they were absorbed into local populations, perished, or tried to get home at all was uncertain. Some voyagers on the 1968-1969 invasion were received at a few west Russian and European banding stations, were ringed, and the results thereof, if not a major triumph of bird ringing activity, at least indicate how penetrative into mystery it can be. Their westward movement spread over June to mid-October, 1968. But even in late August and early September a return movement was under way as shown by banding returns. For example, one of a group banded at Finland's Aland Island station 12 August - 10 September was recovered near Novosibirsk, over 2,000 miles homeward, 16 December 1968. Others were taken near Moscow and at other points southeastward of their band source. The author suggests that the return journey was difficult, that many perished. Of 169 ringed at Russian stations, 7 were found dead, 9 were shot by hunters who noted their unusual tameness, and 2 were weak enough for capture. Other remarks: After arrival westward the Nutcrackers moved about in small family-sized groups or solitary. Note also the next two reviews.—Leon Kelso.

9. Observations on the summer and fall invasion of Nutcrackers (*Nucifraga caryocatactes*). (Beobachtungen und Untersuchungen zur Invasion des Tannenhähers.) S. Sperling. 1969. *Ornithol. Mitt.*, **21** (2): 25-28. (German.)—They began arriving late July to early August, 1968, in Esthonia, Sweden, Denmark, Czechoslovakia, Netherlands, Belgium, Luxembourg, Schleswig-Holstein, Lower Saxony, Westphalia, Hesse, and the Baltic coast, advancing from Siberia on a wide front. Unusual modes of feeding were observed: they hawked insects from stumps in meadows or haystacks in fields. In their stomachs were found remnants of mice, frogs, May beetles, earthworms, snails, ants, white pine seeds, berries, and beech nuts. When city-fed they took sunflower, hemp, and flax seeds, and acorns, and were repeatedly seen breaking into hornets' nests. Intriguing is the question: what triggers the early arrival: actual food shortage, lack of food to store, preseasonal perception of a coming hard winter, or what?—Leon Kelso.

10. The Siberian Nutcracker in Switzerland. (Sibirische Tannenhäher in der Schweiz.) G. Machler. 1969. *Vogel Heimat,* **39** (4): 74-76. (German.)—In 1968, earliest seen at Hamburg 2 August; in Belgium and Netherlands by mid-August, and later on, in England.—Leon Kelso.

11. On the autumnal migration of the Chiffchaff in the Schwäbische Alb (S. W. Germany). (Über den Herbstzug des Zilpzalps (*Phylloscopus collybita*) auf der Schwäbischen Alb (SW-Deutschland.) P. Berthold and A. Berthold. 1968. *Vogelwarte,* **24**: 206-211. (In German, English summary.)—To test a possible alternative to continuous daily trapping during fall migration the results of 10 years employment of the latter method are compared with data obtained from 6 years of records of the Chiffchaff trapped only on Tuesdays, and 1 year of data from more intensive trapping of this species. By all 3 methods the mean migration date was the same, September 13th. It is recommended that these alternative methods be tried on other species which are more difficult to observe. —Leon Kelso.

POPULATION DYNAMICS

(See also 6, 10, 15, 23, 24, 29, 59.)

12. The buffer effect and productivity in tit populations. J. L. Brown. 1969. *Amer. Nat.,* **103** (932): 347-354.—Brown is concerned that the relationship between density-dependent effects, specifically territorial behavior, and productivity has not been interpreted entirely correctly in the literature. He sets up the following hypothetical situation: assume that there are two adjacent habitats, one rich and one poor with regard to potential productivity of a species of bird (productivity in this paper being defined as the product of the reproductive rate per female and the density of females). In this species territories are freely compressible above some fixed lower limit, which is smaller in the rich habitat than in the poor one. The species being considered prefers the rich habitat. First, the rich habitat will be filled with individuals, this being level 1 of the model. Next, the poor habitat is filled, with the model then being at level 2. If still more individuals appear and remain, they are unable to maintain territories and form the category of floaters. The situation represents level 3.

For examples of what he wishes to discuss, Brown draws from data upon population dynamics in the Great Tit (*Parus major*). A buffer effect has been described in these populations where in two adjacent habitats, one considered more favorable than the other by the tits, variation in population density over a period of several seasons differs much more in one habitat than the other. The less favorable one, where the high variability occurs, thus is said to buffer the other, essentially absorbing the overflow from the more favorable when it occurs. The mechanism responsible for maintaining the upper limit of density has generally been considered to be territorial behavior.

It is Brown's contention that earlier workers on the buffer effect and others have given the impression that territorial behavior, by preventing some individuals from breeding in the mixed wood, has made the productivity of the forced-out individuals and of the population as a whole lower than it would have been if there were no limit to the density of breeding pairs in the mixed wood. He also indicates that this conclusion has made its way into some introductory ecology texts and in general is "fairly widespread". This charge of Brown's was of considerable interest to me, because I have never held such a position as the one that he claims to be widespread. Hence I reread the major sources cited by Brown in this regard (Kluyver and Tinbergen, *Arch. Neerlandaises Zool.*, **10**: 265-287, 1953; Glas, *Arch. Neerlandaises Zool.*, **13**: 466-472, 1960). At the same time I reviewed 14 of the newer elementary and intermediate ecology texts on my bookshelf. Though I do not claim that this represents an exhaustive search, it suffices to say that the idea is not a common one in these texts. Seven of these 14 texts suggested that breeding populations might be limited by territoriality, as did the two research papers; I maintain this is not the same as Brown's charge of their conveying the impression that the "productivity of these individuals and of the population [is] lower than it would have been were there no limit to the density of breeding pairs in the mixed wood". The other texts either did not discuss territoriality in detail or did not interpret its role in density-dependence.

Brown then proposes an optimum mix; that is, the percentage of individuals at different densities that should nest in both habitats in order to maximize the number of young produced. In this paper he is only concerned with productivity; however, it is questionable whether this is an entirely meaningful line of inquiry to follow, since selection should exist for optimizing the level of production rather than necessarily maximizing it. There appears to be no evidence to suggest that maximal and optimal levels are synonymous in this case. Brown constructs a model for determining the optimal mix. The basis is from two observations of density and survival in Great Tits by Perrins. Brown considers these both to represent rich habitats and initially connects them in a figure comparing survival and density with a straight line, the validity of which is open to question, particularly since it will later go into calculations that will determine the optimal mix for the tit population. He further bases his rationale for this decision upon Perrin's statement that he thought the two habitats had equal initial food sources. Brown is constantly critical of the dearth of adequate information upon this topic, yet he utilizes these equally fragmentary bits for his argument.

In order to support the idea of an optimum mix; i.e., that it is more advantageous for some individuals in populations at Level 2 to spread out into adjacent habitats than to remain in the preferred habitat, it is necessary to demonstrate that individuals in the sub-optimal habitat contribute to the offspring of the population as a whole; that is to say, their young sometimes breed in optimal habitat. Similarly this idea depends upon young raised in optimal habitats sometimes breeding in sub-optimal habitats. Brown thus devises an exchange ratio: the number of young moving from favored to unfavored habitat over the number moving from unfavored to favored habitat. He devises an equation to calculate this measure (young moving from favored to unfavored/young moving from unfavored to favored = net reproductive rate in favored/net reproductive rate in unfavored), which, as he says, may be modified by several factors. This equation is applied to data gathered by Kluyver upon Great Tits. He feels that these data support his argument and allow the hypothesis that the net reproductive rate in the two forests did not differ.

In conclusion, Brown feels that his considerations suggest that productivity, at least in the Great Tit, is not limited by territorial behavior, but rather may be maximized by it. In reference to this statement it may again be pointed out that Brown is very critical of the inadequacy of data supporting the concept of a buffer effect; nevertheless, he constructs an alternate interpretation largely upon three pieces of data.—Douglass H. Morse.

13. The Fulmar 'wreck' of 1962. B. S. Pashby and J. Cudworth. 1969. *Brit. Birds*, **62**(3): 97-109.—From 27 Jan. to 15 April 1962, 849 dead or dying fulmars (*Fulmarus glacialis*) found along Britain's east coast were victims of a severe gale which had swept eastward across the North Atlantic from Davis Strait to the North Sea. Subsequent northerly, then easterly, winds over the southern North Sea drifted the birds to England.

The authors hypothesize that wind-whipped seas made planktonic food unavailable to fulmars in the storm's path and that storm-curtailed fishing operations removed an alternative (and probably heavily used) food source. Birds weakened from lack of food were then blown eastward.

Respondents to a questionnaire had difficulty matching categories of plumage color with those of the authors, the reliability of breaking up continua semi-objectively being what it is. Fisher, the referent for the authors' classification, is slightly misquoted on the difficulty of color phase identification: "due to a lack of unanimity among field-ornithologists as to what constitutes a dark Fulmar" should read "due to lack of unanimity among field-ornithologists as to what constitutes a dark fulmar" (Fisher, J., *The Fulmar*, London, p. 266, 1952.) .Nevertheless, it was apparent that the storm deposited on British shores many "dark" phase birds normally found farther north and west. Most birds were of the local "double-light" variety. Because of (a) the highly mobile nature of the species, (b) the great area affected during the storm's travels and (c) the storm's occurrence during the non-breeding season, little valid distributional information about the various color phases of the fulmar can be inferred from the figures reported.

Simultaneous wrecks on Swedish and Danish coasts are summarized. It is noted that many wrecks may occur at high latitudes yet go unnoticed for want of winds of the proper direction to drift casualties to observers.

Maps depicting the distribution of wrecked birds will be missed by those not intimately acquainted with the geography of England's southeast coastline.—Thomas C. Grubb, Jr.

NESTING AND REPRODUCTION

(See also 23, 59, 68.)

14. Nest-site and evolution of polygamy in European passerine birds. L. von Haartman. 1969. *Ornis Fenn.*, **46**(1): 1-12.—Like *Homo sapiens*, most bird species are monogamous, or at least serially monogamous in successive breeding seasons. As in human beings, polyandry (one female with several mates) is very rare in birds. Polygyny, on the other hand, is widespread in certain avian species, and may be of the harem type or successive monogamy within one breeding season. (See also the following review and no. **19.**)

Reviewing the literature for polygyny in European passerines, von Haartman finds little correlation with scarcity of food, as has been suggested as the ultimate factor. Rather, species that nest in holes or build domed nests are frequently polygynous, probably because of these factors: (1) the safe nest obviates the need for the male standing guard; (2) the safe nest allows slow development of the young, hence less pressure on parental feeding, again making the male's presence less necessary; and (3) the restricted availability of nest sites (for hole-nesters, not dome-builders) might play a role, although it is difficult to see how.

Oh, the dangers of a sheltered home!—Jack P. Hailman.

15. On the evolution of mating systems in birds and mannals. G. H. Orians. 1969. *Amer. Nat.*, **103** (934): 589-603.—This paper is in many respects strikingly similar to the one reviewed immediately above, except this one is somewhat broader in outlook and less complete in evidence. There is an opening historical discussion, dating from Darwin's interest in the problems of sex-ratios and female choice in his theory of sexual selection, and then some evidence contrary to Wynne-Edwards's interpretations in terms of group selection. The paper's purpose is then stated as trying to account for the diversity of mating systems in terms of natural selection *per se*, and a general model is constructed.

Preconditions for mate-choice are acceptance of a mate precludes acceptance of another, and rejection of a potential mate does not lead to lack of breeding (i.e., other potential mates are readily available). The first precondition is met by females of virtually all species and by many males, but the second is more complicated. Since production of gametes requires more energy in the female than in the male, females can produce relatively few ova, males many sperm. Males can thus afford to mate with many females, more or less indiscriminately, without undue energetic strain. Females, however, maximize their reproductive potential by choosing as mates the "fittest" males; the choice may be based on the quality of the male's territory as well as characteristics of the male that correlate with his fitness. This means, as a start, that polyandry will be rare, and polygyny will be commoner, but the latter will occur only under conditions in which it is to the female's (as well as the male's) selective advantage.

In general, monogamy would be the female's best strategy, she choosing the fittest male holding the best territory for rearing the young. However, as males holding the best territories are mated, there comes a point at which the female is more likely to rear offspring by becoming a second mate to a male with good territory than by accepting an unmated male with a poor territory: the "polygyny threshold" (J. Verner and M. F. Willson, *Ecology,* **47**: 143-147, 1966). The threshold is reached sooner in populations with relatively high densities in relation to available quality habitat. Polygyny is thus favored by low mortality during the non-breeding part of the cycle and large differences in the quality of habitat occupied by the species. It will also be favored when the role of the male in reproduction is minimal, the effect being greatest when his only responsibility is insemination.

From this model, a number of specific predictions are made. (1) Polyandry should be universally rare, as mentioned above. (2) Monogamy should be rarer in mammals than birds, because the male's role in reproduction is so minimal in the former group in which the young are nourished on the mother's milk initially. Only in carnivores, where capture of adequate prey may require the male, while the young are developing, would monogamy be expected frequently. (3) Polygyny should be more common in precocial than altricial birds, where the male's role in bringing food is reduced in the former. (4) Polygyny in altricial species is to be expected in marsh-nesters, due to the habitat quality being quite diverse. (5) Polygyny should be more common in species nesting in early successional habitats for similar reasons. (6) Polygyny should be commoner in species where feeding areas are widespread but nesting sites restricted, since the quality of the male's nesting territory is thus not so important. (7) Polygyny and promiscuity should be more prevalent in species in which clutch size is adapted to factors other than feeding abilities of the parents (e.g., predation). There is reasonably good evidence that all of these predictions hold as a first approximation.

Polygyny carries with it certain consequences, such as increased sexual dimorphism, a high competition for quality territories, and hence a floating population of unmated males. This in turn leads to slower maturation on the part of males, as substantiated by some evidence, and as contrary to the predictions from Wynne-Edwards's complex theory of population regulation through group selection.

This is a stimulating paper, not only providing a number of clearly-drawn testable predictions, but also inherently containing enough information for many more predictions than those drawn.—Jack P. Hailman.

16. Helpers at the nest in Australian passerine birds. C. J. O. Harrison. 1969. *Emu,* **69**(1): 30-40.—The phenomenon of having conspecifics not the parents helping to feed the young seems more prevalent in Australian birds than in other avifauna, though the reason for this is unknown. Unlike helpers discovered by Skutch in Central America, the Australian helpers do not appear to be younger birds incapable of breeding. A review of Australian helpers precedes an incomplete argument on the evolution of this phenomenon.—Jack P. Hailman.

17. A reconsideration of Horsfield Bronze Cuckoo depositing its eggs by using the bill. C. J. O. Harrison. 1969. *Emu,* **69**(3): 178-181.—All sorts of reports find their way into the literature on as interesting a bird as a nest-parasite, such as *Cuculus basalis.* The reasoning goes that some, particularly domed, nests of the host species are too small for the female cuckoo to enter and lay her egg, so she lays on the ground and deposits the egg into the nest with her beak. It's probably nonsense; but the parasite may indeed remove a host egg with her beak, thereby giving source to the rumor.—Jack P. Hailman.

18. Some features of postembryonal development in birds of the southeastern Karakums. (Nekotorye osobennosti postembrionalnogo razvitiya v ptits yugo-vostochnykh Karakumakh.) Z. V. Artamanova. 1969. *Z. zhurn.,* **48**(11): 1706-1705. (In Russian, English summary.)—Observations were made on 72 young in 42 nests allotted among 7 species of passerines: Streaked Scrub Warbler, *Scotocerca inquieta*; Desert Sparrow, *Passer simplex*; Black Wheatear, *Oenanthe picata* (in covered nests); Lesser Whitethroat, *Sylvia curruca*; Booted Warbler, *Hippolais caligata*; Rufous Bush Robin, *Cercotricha galactatotes*;

and Desert Finch, *Rhodospiza obsoleta* (in open nests), finding that young of the open-nesting species attained highest growth acceleration on the third day or later, after some period of acclimatization to the exposed conditions. Covered-nest species, sheltered from direct climatic impact, showed maximum growth acceleration the first day, slowing up thereafter. Comparison of general growth rate before appearance of feathers found it higher in sheltered nesters. The young of *Sylvia* and *Cercotricha* hatched at a more advanced stage of development, the ear passages being already open; in other species the latter opened only by 4th to 8th days. Many notes were recorded on comparative growth rates of remiges and rectrices. Thus, in the Desert Sparrow the former grew 4, and the latter 5, times faster than the general body growth rate.—Leon Kelso.

BEHAVIOR

(See also 8, 12, 16, 23, 24, 39, 42, 45, 61, 65, 67, 70.)

19. Size of breeding colony related to attraction of mates in a tropical passerine bird. N. E. Collias and E. C. Collias. 1969. *Ecology*, **50**(3): 481-488.—The Village Weaverbird (*Ploceus cucullatus*), is a polygynous, colonial, tree-nesting species. In Senegal, where this study was made, these weavers are more typical of moist savannas and irrigated rice fields than arid savannas; they appear not to occur in unbroken topical rain forest. In dry areas man's grazing animals eat and trample much of the weaver's nesting material (primarily grasses and sedges), and there this species is rare around villages. In moister country adequate nesting material exists about villages, and the species is common. Large colonies usually utilize taller nesting trees than small colonies, but if a tree is over 2 m tall it may be used. Palms are favored in relatively moist areas, and acacias usually are utilized where it is drier.

Large colonies (over 25 nests) usually contained more females than males; smaller ones usually contained a preponderance of males. Factors possibly involved in attracting females preferentially to large colonies included the large number of birds present, the number of nests present (built by the male), and the size of the colony tree. Calculations indicated that females were attracted very little or not at all by colonies consisting of 3 or fewer males. In small colonies an average of 3.1 nests were built per male; in large colonies, 4.7. There is a suggestion that the number of females attracted is more closely related to the number of males than the number of nests present. Calculations however suggest that in addition to the minimum of 3 males, it is necessary to have a minimum of 8 nests in order to attract and hold females effectively. In order to attract females the nesting tree has to be fairly large; however, the number of females cannot be predicted by the height of tree.

Other possible factors resulting in differences in attracting females are then considered. All males in the colonies were in adult plumage and thus the variable of first-year birds was not introduced into the study. However, within the framework of the study it is impossible to say how large a percentage of first-time breeders was present. The abundance of adequate nesting material did not appear to differ in the vicinity of large and small colonies, and food supplies appeared always to be more than adequate during the period of the study. Though colonies in small trees would appear most vulnerable to predation, particularly by snakes, almost all of the data were gathered before nestlings hatched; hence, it is felt that predation factors should have a minimal effect upon attracting females. However, the possibility that females would have a predisposition to avoid vulnerable areas, possibly one reinforced by selective pressures, is not considered in the paper.

It is concluded that social facilitation forms the most satisfactory explanation for the success in attracting females to large colonies.—Douglass H. Morse.

20. Impaling behaviour of the Loggerhead Shrike, *Lanius ludovicianus* Linnaeus. C. Wemmer. 1969. *Zeit. Tierpsychol.*, **26** (2): 208-224.—A total of 14 hand-reared birds was given various clever gadgets to play with. The birds use four primary movement patterns (downstroke, upstroke, head-jerk and pull) to effect impaling, removing and dismembering of prey. Some minor movements of the head (extention, retraction, rotation) also are used in the behavior. Crotches and spikes in various angles were provided along with lizards or cut meat in various tests and observations.

In one study, meat was attached to a weight so that the force a shrike can pull could be measured. Ignoring the weight of the meat and the friction of the apparatus, the shrike can pull with a power of more than 400,000 erg/sec. (6.4 x 10^{-5} horsepower). A display directed toward persons or shrikes is interpreted as an appeasement movement evolved from "displacement impaling." Impaling movements develop in set order, but do not appear in the young birds until after other coordinated movements of feeding and cleaning (e.g., bill-wiping, head-shaking). In early attempts at impaling the various movements have no set sequence, and impaling attempts are inaccurate in orientation. Consistent success occurs in most birds with practice by about 30-40 days, but required 107 days in one case. Regardless of kind of experience, birds appear to recognize a vertical spike immediately as an object upon which to impale prey. Hunger has the effect that might be expected: really hungry birds eat rather than impale; really full birds pass up the prey. In choice situations using birds reared with various kinds of impaling devices, most used the rearing device, although there was consistent attraction to a long vertical spike (and birds reared with such a device used it almost exclusively). This is a nice study.—Jack P. Hailman.

21. Behaviour of the Cattle Egret *Ardeola ibis*. D. Blaker. 1969. *Ostrich*, **40**(3): 75-129.—Despite the interest generated in this species due to its unexpected arrival in the New World a couple of decades ago, there does not seem to have been a previous study of its behavior in any detail (but see review no. **23**). This long paper is a good classic ethogram, based on observation and film-analysis. Maintenance activities are described first, and we discover such tidbits as wingflap-rate in flight (198 times per minute, on the average). Other topics include comfort movements, feeding, and rate of predation by captors.

The section on displays is longer, beginning with agonistic postures and movements (although the author avoids the former word as too ambiguous). For each of the major displays there is a description, followed by a summary statement (mainly hypotheses) about the "causation" (stimuli and factors that control the performance), function and evolutionary origin of the behavior. There are notes on vocalizations as well. The displays have clear counterparts in displays of other herons, and the monograph by Meyerriecks (*Nuttall Ornithol. Club Monogr.* **2**, 1960) is frequently cited for comparisons.

A section on non-breeding behavior includes daily cycles, and monthly degree of association with large mammals (lowest in October, the breeding season). Figure 17 is a graph of flock sizes, based on 190 flocks associated with mammals and 156 flocks not so associated. The modal size is one bird (about a quarter of the "flocks") with a nearly monotonically decreasing percentage as the flock size increases. The mean size for associated flocks is only about half that for unassociated ones (4.24 vrs. 7.99 birds/flock). The means, however, seem grossly misleading, since the modes are identical (single birds) and the medians for both sets of data fall between groups of three and four birds. The mean size of the *un*-associated flocks is greatly influenced by a few flocks with between 100 and 200 individuals (associated flocks never exceeding 50 birds). I was so intrigued with this question of flock-size that I "backwards accumulated" the data and plotted the cumulative distribution in the manner of a demographic survivorship curve on semi-log paper. The straight-line distributions for both groups suggest that flock size is a "random" (Poisson) function (*i.e.*, there is neither a tendency to flock nor to disperse evenly) up to sizes of about 15 birds. Within this range there are no differences between associated and unassociated groups (as the modes and medians also show), so the interesting question is whether the few extremely large flocks of unassociated birds represent a real phenomenon or merely a statistical sampling bias.

Breeding behavior is next described, including color changes and the formation of colonies. There are bits of detailed data (such as a temporal record of displays between a pair for 40 minutes, the number of building-items brought to the nest each day in relation to laying and hatching, timing of incubation reliefs, and so on).

Finally, the behavior of the young birds is described. Along with the usual information is included a report of brief experiments on the effect of bill color in releasing the begging responses of young to cardboard models. Yellow (the parental color) is greatly preferred over some other colors presented, which unfortunately did not include white. Whether the response is based on color or brightness, however, is tangential to the author's interest of finding a functional interpretation of the black beaks of the young themselves, which beaks turn yellow only at two to three months of age. He speculates that the black beak prevents the young from possibly delivering injurious thrusts at one another. His conclusion that the heron's preference is "far more marked than those in *Larus argentatus*" has no basis at all (particularly considering that Blaker gives no specifications of his color stimuli beyond the names "black", "yellow" and so on). The discussion ignores the most closely controlled studies in gulls (including my own) and even fails to cite Weller's (*Wilson Bull.*, **73:** 11-35, 1961) study with models in the young Least Bittern (*Ixobrychus exilis*), which first showed young birds of this group peck at yellow beaks in preference to black.

There are some notes on the development of displays and social interactions, including some nest-swap experiments to see if parents recognize their own young (they do easily). This is a qualitative "first-study" of an extremely widespread species, which although it offers no surprises, provides a solid base for more detailed quantitative studies.—Jack P. Hailman.

22. Giant Cowbird solicits preening from man. R. Payne. 1969. *Auk*, **86:** 751-752.—Interspecific heteropreening is uncommon among birds, but is practiced by cowbirds. Payne reports on a captive, solitary male Giant Cowbird, *Psomocolax orizivorus*, at the Fort Worth Zoo which frequently offers the invitation to preening display to humans. Payne was the first human to respond to the display by scratching the bird's offered head. Whenever he stopped, the cowbird solicited more preening. Payne suggests that this bird was hand-reared by a Peruvian, sold to the zoo, and now, in the absence of its host species, it redirects the "host-appeasing preening display" to humans.

Payne is misinformed when he states the invitation to preening display is never offered to another cowbird. Selander and LaRue (*Auk*, **78:** 473, 1961) report that Brown-headed Cowbirds, *Molothrus ater*, do rarely offer the display to a conspecific, and we see it frequently in a captive, homospecific group of 20 Brown-headed Cowbirds at the University of Wisconsin. Possibly the intraspecific importance of this display has been overlooked.—George E. Wright.

ECOLOGY

(See also 7, 8, 10, 12, 14, 15, 16, 19, 27, 38, 50, 51, 52, 58, 59, 60, 65, 68, 70.)

23. A study of the ecology of four species of herons during the breeding season at Lake Alice, Alachus County, Florida. D. A. Jenni. 1969. *Ecol. Monogr.*, **39:** 245-270.—In spite of their interesting breeding biology, relatively few quantitative studies have been made upon American herons. Most impressions are the result of extrapolation from a number of European investigations. Jenni's paper is the result of a study upon 4 species near Gainesville, Fla., including perhaps the only detailed study yet published upon the Cattle Egret (*Bubulcus ibis*) in North America (see review no. **21** for another study). Snowy Egrets (*Leucophoyx thula*), Little Blue Herons (*Florida caerulea*), and Louisiana Herons (*Hydranassa tricolor*) were also studied. Most of the data presented in this paper were gathered during the 1960 nesting season, though observations were also made in 1958 and 1959.

Most of the study was conducted upon a colony located on floating islands in Lake Alice. All 4 species built their nests mostly in low red maple, buttonbush, and elder growth. No species showed significant tendencies to nest by itself, and nesting territories were defended interspecifically as well as intraspecifically. Individuals coming into the colony would establish a territory as close as possible to the territories already existing. Since after courtship and pairing the area defended about a nest will decrease, density of nests increases as the season progresses, and late nesters take up the now-undefended patches within the colony. In spite of their tendency not to sort out into one-species groups, there were slight interspecific differences in nesting heights, species of vegetation used, and parts of the vegetation in which nests were located. Nests were made largely of sticks gathered within the heronry where available, but from other areas about the lake after the immediate supply failed. Snowy Egrets obtained a large percentage of their sticks from the heronry floor and retrieved sticks that fell from their nests. Little Blue Herons almost never picked sticks up in this way, and areas under their nests often were littered with sticks. Whenever old nests were available they generally were used in this colony. Cattle Egrets took 2 days longer (over 6 days) than the other species to build their nests. These nests were sturdier and more complete than those of the other species before eggs were laid, and as a result many fewer eggs were lost by this species. While Cattle Egrets had slightly smaller clutch sizes than the other 3 species, mortality was much lower, with a resulting greater survival to the age of 2 weeks (and presumably later). All 4 species incubate after the first egg is laid, with hatching being asynchronous. There was considerable mortality of eggs and nestlings of Snowy Egrets, Little Blue Herons, and Louisiana Herons through the age of 2 weeks in 1960 (25.4-28.1%), which was mostly the result of loss by apparent starvation of last-hatched young and next-to-last hatched to a lesser extent. This well-known phenomenon apparently resulted in well-nourished survivors. The low mortality of Cattle Egret nestlings during the 1960 season suggests that the food supply of that species was abundant; that of other species may have limited their success, judging from the starved young. Other sources of mortality were minor in comparison. Data from this study are compared with others available on clutch size for these species, and Jenni finds suggestions of an increase in clutch size with increase in latitude, though data are few and some possible contradictions exist. The presence of alligators in the lake apparently prevents racoons from reaching the colony.

Food items given to the young were determined by analysis of freshly regurgitated pellets. They reveal striking differences, which in general appear to reflect the feeding behavior and areas foraged by the adults. Snowy Egrets and Louisiana Herons fed their young mostly on fish. In the case of the Snowy Egret, these were shallow-water species, primarily mosquitofish and least killifish; Louisiana Herons fed their young mostly upon deeper-water fish, especially flagfish. Little Blue Herons were fed mostly on amphibians, and Cattle Egrets upon orthopterans. The Cattle Egret fed largely with cattle, capturing insects that they flushed. No good evidence exists for their alleged habit of picking ticks from grazing animals. Late in the nesting season Little Blue Herons fed more frequently in grasslands. The difference in food of the different species would act to limit possible competition. In addition to differences in species of food items taken, when prey items taken upon occasion by more than one species of heron were analyzed, it was noted that they often differed in size. This may in part reflect changes in habitat utilization by individuals of prey species as they increase in size.

Thus this paper provides a large number of data upon the breeding ecology of American herons, including the first large-scale study of Cattle Egrets and their relationships with other small herons. Jenni feels that Cattle Egrets have exploited an essentially vacant niche, one in part created by the cattle industry. The literature coverage in this paper is extensive, and data upon American species are continually compared with those from the more thoroughly studied European species. Several interesting problems are raised that would make excellent topics for future study.—Douglass H. Morse.

24. Movements and flock stratification within a population of Blackcocks in Scotland. R. J. Robel. 1969. *J. Anim. Ecol.*, **38** (3): 755-763.—This study makes use of telemetry equipment to study home range and mobility of Blackcocks (*Lyrurus tetrix*) at different seasons. Data were obtained upon the areas utilized, how frequently they were used, and the social patterns of the birds in flocks and leks. The telemetry equipment allowed daily fixes to be made on individuals, so that their mobility could be estimated. Home ranges and areas of concentrated use (areas where 75% of the observations were made) were calculated. The home ranges of 7 birds varied from 302.9 to 688.6 ha; areas of concentrated use from 48.2 to 151.1 ha. There was no close correlation between the two measures, though the area of concentration always was considerably smaller than the total home range. Distances between locations on successive days were relatively constant for 6 of the birds (averages of 292 to 399); the seventh (then only juvenile) had a much longer average distance (516 m).

With a nucleus of transmitter-equipped birds and other marked birds it was possible to obtain information upon the stability of flocks. Flocks were quite unstable during autumn and winter, changing constantly in size, with individuals often participating in a number of different group configurations during this time. Stability increased during the spring. Then two groups of male birds could be distinguished, ones that participated in leks and ones that did not at this time. Though the latter group was so wary that it could not be studied in detail, it contained several juveniles.

Counts of lek-performing males have been used as an index to the size of populations of Black Grouse. In this study only 30 to 40% of the males participated in leks. If this figure varies, then the inadequacy of the measure may be seen. However, it should be pointed out that this figure may represent the portion of the male population contributing the gene pool, though critical information on this question is lacking.

Being of a preliminary nature, this paper raises several other questions that it cannot answer. Some of these are, "Does the non-lek group act as a reservoir? How does mortality compare in the two groups? Are the data representative of other lek-formers?" It does, however, demonstrate the great assistances that telemetry equipment can provide to field studies. While due to the short time span of the study (8 months) much of the most important information presented is of an anecdotal nature, (the author was on sabbatical leave) it points to questions that need to be answered.—Douglass H. Morse.

25. Avian niche size and morphological variation. M. F. Willson 1969. *Amer. Nat.*, **103**(933): 531-542.—No conclusions are reached in this paper. Willson is concerned with the possible use of morphological characters as a means of measuring niche sizes in birds. Since on the whole fewer species are present in the north temperate area than tropical lowlands, one hypothesis states that niche size in the former would be larger, due to the absence of more species. If this is so, maximum exploitation might take place by an increased morphological variation of members of a population, as in their mouthparts. An alternative hyopthesis states that where a large number of potential competitors exist, variability should be enhanced, in order to maximize efficient use of the rather restricted possibilities Willson sets out to test these countering hypotheses. For data she uses length, depth, and width of bills of north temperate and tropical lowland birds.

Her results show no statistically significant differences in variation of bill dimensions in the two areas, leaving a wide variety of possibilities open. These include potential sampling problems, the possibility that bill size may not directly reflect niche size, and the possibility that niche size may not be a critical parameter reflecting species diversity. It is too bad that she did not choose to clear up some of these problems rather than to publish so prematurely. Her means of sampling (in acknowledgements = "rummaging") appears so haphazard that one wonders whether she could have hoped for more than she obtained. No convincing rationale appears for her techniques. And the rapidly growing literature in this area is be ginning to produce relevant information that was not consulted. While theoretical biology is a legitimate area in itself (Levins, *Evolution in Changing Environments*, 1968), it does not leave open the option for one to expound when data are readily available.—Douglass H. Morse.

26. The wintering of Kites in Scania, Sweden. (Gladans *Milvus milvud* övervintring i Skåne.) Staffan Ulfstrand. Henrik Johansson. 1969. *Vår Fågelvärld*, **28:** 107-115. (English summary.)—Recent reports brought about this investigation into the Kite's migratory status. From having been overwhelmingly migratory, the Kite has now become primarily a wintering species. Thus in the winters 1958-59 to 1965-66 Kites were found wintering in southernmost Scania in numbers ranging from five to 38 individuals, quite a large percentage of the estimated Swedish kite population. The birds mostly drew their support from garbage and slaughter house offal and spent their nights in communal roosts.—Louise de K. Lawrence.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(See also 31, 51, 65.)

27. Land use and bird fauna on shores in southern Sweden. T. Larsson, 1969. *Oikos*, **20**(1): 136-155.—This study evaluates the effect of cessation of grazing at the water's edge or near water upon the status of breeding birds. Effects of drainage and cutting of marsh hay upon breeding birds are considered more briefly. As a result of changes in agricultural procedures, large areas of wet lands along lakes and rivers are no longer being utilized in southern Sweden. In this study several areas in different stages of succession following grazing were censused during the years of 1966-68. Special attention was paid to species that are mainly bound to moist habitats influenced by grazing. In succession most of these areas proceed to herb stage, then to bushes, and finally to deciduous forest.

The number of breeding species is usually greater in ungrazed areas. A total of 23 species was found in grazed study areas; 38 in the ungrazed. Since some patches of habitat within the former areas are too wet to graze, the true diversity in grazed areas may not actually be as high as it appeared. Most species from the grazed areas are not found regularly in the ungrazed parts. Dunlins (*Calidris alpina*) were totally confined as breeders to heavily grazed areas. Only this species and the Sky Lark (*Alauda arvensis*), Meadow Pipit (*Anthus pratensis*), and Yellow Wagtail (*Motacilla flava*) bred in the most heavily grazed areas. The Chaffinch (*Fringilla coelobs*) and four sylviid warblers (*Phylloscopus trochilus, Sylvia communis, Locustella naevia,* and *Hippolais icterina*) were restricted to ungrazed areas.

In addition to grazing, hay formerly was cut on marshy meadows, which have now become revegetated, especially by the reed, *Phragmites*. Sources of pollution stimulating eutrophication have apparently further increased the growth and distribution of *Phragmites*. Drainage schemes about lakes of the region also seem to have created more favorable *Phragmites* habitat then they have destroyed. These extensive beds support a very low bird diversity, though certain species favor this environment, such as the Sedge Warbler (*Acrocephalus schoenobaenus*), Reed Bunting (*Emberiza schoeniclus*), and Marsh Harrier (*Circus aeruginosus*). The latter is especially favored by increases in *Phragmites,* since it requires extensive continuous beds of this vegatation, rather than only scattered clumps.

These changing schemes of land use have resulted in noticeable decreases in species that were well-adapted to utilizing wet grazing land, but appear responsible for marked increases of certain other species. In many cases other authors have attributed increases in range of certain species to changes in climate: for the Grasshopper Warbler (*Locustella naevia*), an increased spring temperature; for the Great Crested Grebe (*Podiceps cristatus*), Water Rail (*Rallus aquaticus*), Moorhen (*Gallinula chloropus*), Coot (*Fulica atra*), and Reed Warbler (*Acrocephalus scirpaceus*) a drying up of Asian breeding localities. Larsson suggests that these authors have tended to overlook man's alteration of the landscape as a factor of major importance in these changes of status.—Douglass H. Morse.

28. Avian dissemination of sweet cherry in woodlands. (Die Verbreitung der Vogelkirsche in den Waldern durch Vögel.) F. J. Turcek. 1968. *Waldhygiene,* **7**(5): 129-132. (In German, English summary.)—Field studies in spruce forests of the Slovakian Central Mountains found that fecal-dropped seeds of *Prunus avium* averaged 18 per meter square of forest floor, with a median of 7 seedlings or a mean density of 327 seedlings per hectare. Densest dispersal was within 50 m of the parent tree. The Jay (*Garrulus glandarius*) and Blackcap (*Sylvia atricapilla*) were among the chief distributors. The importance of sweet cherry to the forest ecosystem, wildlife management and commerce is discussed.—Leon Kelso.

CONSERVATION AND ENVIRONMENTAL QUALITY

(See also 59.)

29. The Corn Bunting in Scania, Sweden, 1965-1968. (Kornsparvens *Emberiza calandra* i Skåne 1965-1968.) Krister Hjalte. 1969. *Vår Fågelvärld,* **28:** 124-129. (English summary.)—Prompted by the virtual disappearance during the 1950s of this formerly abundant species, the investigator sought to establish by means of road censuses in four study areas its present status. The records show that in the province of Scania the Corn Bunting reached an all-time low in the latter part of the 1950s. Thereafter a partial recovery took place. The present census revealed a yearly average of about 50 singing males on territory altogether in the four areas.

The Corn Bunting belongs to the fields and open agricultural areas. The existence of meadowlands and pastures where it prefers to place its nest is an important factor in its choice of habitat. Hence the use of poisoned bait and pesticides and decreased cattle breeding can so change the environment as seriously to influence the occurrence of this species.—Louise de K. Lawrence.

PARASITES AND DISEASES

30. Cutaneous diseases of wild birds in Britain. D. K. Blackmore and I. F. Keymer. 1969. *Brit. Birds,* **62**(8): 316-331.—A useful report, covering two dozen species. Cutaneous lesions of avian pox was the most frequent disease, infectious bacterial diseases least common (apart from staph infections of foot wounds). There were a number of cases (including 23 in one species and 32 in another) of "miscellaneous conditions of uncertain etiology", thus emphasising how much is to be learned about avian diseases.—Jadk P. Hailman.

31. Arthropod parasites on the Starling, *Sturnus vulgaris* L., in southwest Virginia. W. G. Mitchell and E. C. Turner. 1969. *J. Econ. Entomol.,* **62**(1): 195-197.—More notable for new or better methods of removal of parasites from plumage for study. Between 22 May 1964 and 4 May 1965 one hundred Starlings were collected and examined for external parasites; 15 species of insects and 22 species of acarine mites were collected. "In addition to the medical and veterinary importance of arthropods carried on starlings, mention should be made of the plant pests also carried in this matter. . . . Considering the medical, veterinary and horticultural importance of insects carried on starlings, studies on effective control methods for starlings may prove to be of great benefit." Anyone planning such control work if only for economics would do well to review the history of the, largely futile, previous attempts that ornithology has witnessed over the past 3 decades.—Leon Kelso.

PHYSIOLOGY AND PSYCHOLOGY

(See also 3, 40, 41, 43, 44, 45, 62, 65.)

32. Spherical urine in birds: petrography. R. L. Folk. 1969. *Science,* **166:** 1516-1519.—No, this has nothing to do with grafiti. We were all told in our ornithology courses that among homeotherms, only birds and Dalmatian dogs secreted uric acid; it's in everything I've ever read on the subject (which is not much, admittedly). The virtues of excreting uric acid are extolled in Welty's textbook (*The Life of Birds,* Saunders, 1962) and other such references. This viewpoint is all wet.

Folk looked at the urine of a large number of birds (unfortunately identified by such appelations as "sea gull"), using many modern techniques, such as high resolution, polarizing microscopy, electronmicroscopy and so on. The urine consists of little balls, with a single structural axis, and possibly of spiral structure. "According to the biological literature, the white part of a bird dropping consists largely of uric acid, and uric acid is almost insoluble in water and dilute mineral acids (1 part in 10,000). However, I found that the spheres were very rapidly soluble even in household vinegar . . .". Several fascinating photos accompany the article, including one labelled "Dropping from unidentified bird, Oregon; Jane Gray, collector." If our collective legs are not being pulled, this is one of the most interesting Folk-tales to circulate in a long time.—Jack P. Hailman.

33. Dynamic analysis of avian drinking response. D. J. and F. J. McFarland. 1968. *Med. and Biol. Engineering,* (6): 659-668.—"The drinking response of the water deprived pigeon [Barbary Dove, *Streptopelia risoria*] is analyzed by means of feedback theory. The techniques utilized include limiting the rate of water injestion in an operant situation, interrupting the drinking response for a specified interval, and altering the salinity of the drinking water. The results indicate that the drinking response is basically an exponential function of time, the time-constant being determined by the gain of an injestion mechanism and independent of the absorption constant. The amount of water injested is attenuated as a function of injestion rate, and a thirst-threshold is thought to be responsible for this" (author's abstract). When biophysical and engineering techniques and apparatus are applied to ornithological problems the terminology employed is often not entirely comprehensible to non-physicist readers.—Leon Kelso.

34. Owls, and how they hear. (Sovy, kak oni slyshat.) V. D. Ilichev. 1969. *Okhota i okhotniche khozyaistvo,* **1969**(8): 16, 17. (Russian.)—The large, asymmetrical outer ear (illustrated) is characteristic of the nocturnal, carnivorous species such as the Long-eared and Barn Owls. Their prominent aural skin folds, specialized aural feathers, and more developed facial disks, and even unsymmetrical skull effect keener hearing and more precise location of prey. Insectivorous owls, especially the Spiny-footed Owl, *Ninox scutulata,* which are often diurnal, in catching prey make use of vision; they have lesser facial disks, and small aural apertures which are not bordered by prominent folds. See review no. **57**.—Leon Kelso.

35. Fat contents and flight-range in some shorebird species. (La détermination du contenu lipidique at de la capacité de vol chez quelques espèces d'oiseaux de rivage (Charadriidae et Scolopacidae).) R. McNeil. 1969. *Can. J. Zool.,* **47**(4): 525-536. (English abstract.)—Twelve species of shorebirds were studied on the north coast of Venezuela. The fat contents of the birds were better correlated with visual estimates of fat-class than with total weight. Nevertheless measurements of total weight give fair estimates of flight-range. Expressing the weight of fat as a percentage of the lean dry weight, only a small proportion of the birds collected exceeded 60%, but a few contained as much as 140%. Using Raveling and Lefebvre's equation for in-flight metabolism, the flight-range of these last birds is estimated as about 1200 miles. Unfortunately the records are not dated.—I. C. T. Nisbet.

36. The mechanics of bird migration. C. J. Pennycuick. 1969. *Ibis,* **111**(4): 525-556.—In two earlier papers (*J. Exp. Biol.,* **49:** 509-526, 527-555, 1968), Pennycuick has made a detailed experimental and theoretical study of flapping flight in the domestic pigeon. This paper generalizes the results to other species and uses them to estimate power consumption and flight-ranges of migrants.

The power expended by a flying bird is conventionally divided into three components. The *induced power* is that required to support the bird against gravity by deflecting the oncoming air downwards: this power decreases with increasing air-speed and is relatively easy to calculate, given a bird's weight and dimensions. The *parasite power* is that required to overcome the drag on the body and increases rapidly with increasing air-speed (according to the cube of the speed). For precise estimates it should be measured in a wind-tunnel, but reasonable figures can be obtained by scaling the pigeon data. The *profile power* is that required to overcome the drag on the wings, and is very difficult to calculate or measure for a flapping wing. In the pigeon it comprises one-half to two-thirds of the total power expended, and for the purposes of calculation Pennycuick extends this ratio to other bird species. He stresses that this is only "as good a starting point as any" but it is in fact a very rough approximation for birds of different wing-action, and his warning tends to be overlooked later in the paper, especially when he applies the results to condors and house-flies (*Musca domestica*).

For all birds there is a value of the air-speed at which the power output is a minimum: this speed should increase in proportion to the one-sixth power of the body-weight. However, if the air-speed is increased above this value the bird gains more in terms of ground covered per hour than it loses in power expenditure: hence the speed at which it expends least energy per mile is greater, about 1.8 times the speed for minimum power. Pennycuick suggests, reasonably, that migrating birds will probably fly at about the latter speed (which ranges from 18 m.p.h. for a warbler to 47 m.p.h. for a goose). In a bird whose weight is changing (e.g. by consuming fat) this optimum speed varies as the square root of the weight, and the corresponding power output varies as the 3/2 power of the weight. On mechanical grounds, however, the power output of the flight muscles can only increase in proportion to the 2/3 power of the weight: hence large birds have only a small reserve of power and cannot carry heavy loads. The range achieved in still air should depend mainly on the ratio of the initial weight to the final weight, and is otherwise independent of the size of the bird except through the effective lift-drag ratio, which is somewhat larger in large birds. Considering birds which set out with a load of fat equal to their lean weight, the range of a hummingbird (lift-drag ratio = 4.1) in still air is predicted to be 1400 miles, that of a warbler (L/D = 6.5) as 2300 miles. The range should be independent of the height of flight, but high-flying birds should cruise at a higher speed and expend correspondingly more power. Flying high is nevertheless advantageous because it facilitates cooling.

This is an impressive study, but its generality is somewhat misleading: it describes only those birds which fly like pigeons. What is missing from the theory is specialization to long-distance flight. This probably accounts for its failure to predict outstanding performance for obviously specialized species such as falcons, swifts, shorebirds and cuckoos. Pending actual measurements on these groups, I shall continue to regard the last two, on observational grounds, as extreme long-distance migrants.—I. C. T. Nisbet.

37. Age dynamics of "red blood indices" in several avian species. (Vozrastnaya dinamika pokazatelei krasnoi krovi u nekotorykh vidov ptits.) E. S. Lysov. 1969. *Z. Zhurn.*, **48**(11): 1748-1750. (In Russian, English summary.) —Age changes in the respiratory function of the blood during bird growth are reflected in change of oxidation levels. Gas transport to the tissues by blood depends mainly on its hemoglobin and erythrocyte content. The hemoglobin index and number of erythrocytes per cubic mm were calculated at Leningrad University for 9 species: Kestrel, *Cerchneis tinnunculus*; Great Spotted Woodpecker, *Dendrocopos major*; Carrion Crow, *Corvus corone*; Spotted Flycatcher, *Muscicapa striata*; Pied Flycatcher, *M. hypoleuca*; Song Thrush, *Turdus ericetorum*; Redwing, *T. musicus*; Fieldfare, *T. pilaris*; and Starling, *Sturnus vulgaris*. Comparison of data taken on day of hatching and at time of leaving nest found no pronounced specific differences, and that during nest life hemoglobin index increased about 160% and erythrocyte count per cubic mm, about 315%. It is noted that the above applies to altricial species only.—Leon Kelso.

38. Ecotypic variation in the non-breeding season in migratory populations: a study of tarsal length in some Fringillidae. S. Fretwell. 1969. *Evolution*, **23**(3): 406-420.—Traditionally emphasis is placed upon the adaptation of birds to their breeding grounds, often to the neglect of the circumstances encountered during the rest of the year. While undoubtedly the problems encountered during the nesting cycle are formidable for a number of reasons, there is no *a priori* reason to assume that they will place the only selective pressures upon individuals. Obviously both the migratory and wintering periods have to be considered also, though work upon problems in these periods is infrequently attempted in comparison to that conducted during the breeding season. It is axiomatic that individuals' observed adaptations will combine a balance of compatible compromises allowing their successful passage through the different seasons and different situations.

Using tarsus length as a convenient measure, Fretwell tests a relevant problem upon a group of fringillids wintering in North Carolina; namely, whether there is a correlation of morphology and habitats utilized. In an interspecific comparison he finds definite trends: tarsus length is directly correlated with body weight and inversely correlated with tendencies to perch and scratch. Habitats differ in the frequencies of seeds that can be obtained by these two methods. He then goes on to test these ideas upon 3 species (Savannah Sparrow, *Passerculus sandwichensis*; Field Sparrow, *Spizella pusilla*; and Song Sparrow, *Melospiza melodia*) shown by the first examination to be of an intermediate nature in their foraging behavior; that is, ones showing tendencies both to perch or to scratch on the ground when feeding. When individuals of each of these 3 species are investigated, it is shown that they conform to the same criteria as did the different species in the multi-species tests: individuals with long tarsi tended to feed in areas where most available food was obtained by perching, those with short tarsi usually fed on the ground and scratched frequently.

In attempting to analyze these findings Fretwell proposes two possible mechanisms that would account for the observed situation, "random" habitat selection and "adaptive" habitat selection. In the former, individuals spread out over available habitats randomly, and differential mortality occurs with the survival of particular morphological characteristics depending upon their coincidental "fit" with the habitat that they wander into. I feel that this term (random habitat selection) is a misnomer in the sense that the term habitat selection usually is used. Here the environment rather than the individual does the selecting. Adaptive habitat selection involves individuals seeking out areas that result in their "best" survival.

A third and last section of this paper is entitled, "Some theoretical considerations". Fretwell sets up a theoretical situation which insists upon random mating and complete migration, the former in particular probably representing a rather unrealistic situation. If his random habitat selection occurs, then one type of individual is favored. The others would either be eliminated, or in the situations that might be experienced, would exist as a genetic load of varying strengths. In the case of adaptive habitat selection there should be selection for different morphological types in different habitats. If resources were limited it would be advantageous not to overcrowd any habitat, since this would reduce fitness; thus, it may be advantageous under such circumstances for individuals to settle in suboptimal areas. Fretwell then goes on to consider the ways by which a genetic system in a species could accommodate the adaptation to more than one habitat. A number of possibilities are considered and it is concluded that systems favoring evolution (and retention) of variance, including polymorphism, should be selected for in a situation where a variety of environmental situations may be encountered. Sexual dimorphism has in some cases been utilized. Wide variances in some island species suggest that in the absence of competition species will broaden their morphological spectra. This may further act in preventing colonization at a later time by another species.—Douglass H. Morse.

39. Structural and functional adaptation to display in the Standard-winged Nightjar (*Macrodipteryx longipennis*). C. H. Fry. 1969. *J. Zool.*, **157**: 19-24.—While this caprimulgid is quite common for most of the savanna region, Senegambia to Uganda and Eritrea, its biology is little known. This account is based on 17 evenings of observation and some anatomical observations. On males in nuptial plumage the 2nd primary (counting outwards) is elongated as much as 45 cm, with vanes on only the distal 3rd. Commonly regarded as a decorative feature they trail behind the bird in non-breeding season flight; are elevated to as much as 45° in breeding season flight, and in display flight they are held almost vertically. When perching, contrary to prevalent opinion, the standards are never in vertical position. The curvature of the calamus is such that rotation by associated muscles flexor digitorum superficialis, with f. carpi ulnaris, and a previously undescribed muscle would elevate the feather. A well-drawn illustration shows unnamed fatty bodies at the base of the latter. It is also believed that air flow gives it additional lift. The standards are cast at start of postnuptial molt, but replacement growth is so slow that they are not mature until the following breeding season. But shortly before the latter time does the calamus bend by differential growth "so that the elongated feather projects outwards rather than backwards." The species is an open ground nester showing some polygamy with "loose pair-bond." There is a bibliography of 7 titles.—Leon Kelso.

40. Distribution and structure of Herbst bodies in shorebird bills in relation to food-searching. (Anordnung und Bau der Herbstschen Körperschen in Limicolenschnabeln im Zusammenhang mit der Nahrungsfindung.) G. Bloze. 1968. *Zool. Anz.*, **181**(5-6): 313-355. (German.)—Of 17 genera studied those forms finding food by sight or hearing (Ring Plover, Lapwing, and Oystercatcher) have Herbst bodies arranged in a single series along the length of the bill in its dermis proper. In those using the cactile sense chiefly, even the shallow probers, there are bony alveoles on the bill, in the walls of which are many Herbst bodies. The more specialized probers (Scolopacinae) have hundreds of alveoles concentrated around the end of the bill. Among the various shorebird genera these alveoles show a definite correlation in number and location to the degree of food specialization. There is a bibliography of 91 titles. See also review no. **43**.—Leon Kelso.

41. The operative mechanism of the avian iris (a comparative morpho-functional study). (Der Bewegungsapparat der Vogeliris, Eine vergleischende morphologische—funktionelle Untersuchung.) H. Oehme. 1969. *Zool. Jahrb.*, **86**(1): 96-128. (In German.)—As observed in 150 species of 18 orders the bird iris has both smooth and transversely striate muscle fibers. The smooth, radial and circular are of the contractile element of the muscular epithelium in the outer layer of iris pigmented epithelium. The striate, like the smooth, are of ectodermal origin; some are radial, some circular. All the striated are inter-connected, forming syncytes. Most of the iris musculature expands and contracts the pupil, but the peripheric element of the striated serves accommodation by controlling the crystalline lens shape. On development of muscle fibers and their arrangement in the iris 3 avian species groups are distinguished, of which but a few species are described and figured in detail. Both iris and ciliary musculature are supplied by nerves consisting of sensory parasympathetic and sympathetic fibrils. There are 13 figures and a bibliography of 31 titles.—Leon Kelso.

42. Olfaction in the Rallidae (Gruiformes), a morphological study of thirteen species. B. G. Bang. 1968. *J, Zool.* (formerly, *Proc. Zool. Soc. London*), **156:** 97-107.—Birds are often cited as having no sense of smell and "contradictory experiments since Audubon (1931) have long discouraged the study of olfaction as a factor in avian ethology." However an olfactory receptor system is demonstrable in all bird species studied so far; of the brain the olfactory bulb to cerebral hemisphere ratio varies "15 fold"; from 3% in chickadees to 37% in Snow Petrels, the mean for all available Rallidae being 23%. The nasal structures are evidently adapted to "instant and effective odor reception" as reflected in skull structure. Of especial interest are the cell systems in the latero-nasal glands and their ducts, the olfactory nerve cells with their supporting cells, Bowman glands and their ducts. There is a bibliography of 27 titles.—Leon Kelso.

43. Ultrastructure of cutaneous sensory Herbst and Gandry bodies in the Mallard. (Ultrastructure dea corpuscles sensoriels cutanes de Herbst et de Gandry chez le Canard.) R. Saxod. 1969. *Arch. anat. microsc. et morphol. expmntl.*, **57**(4): 379-400. (French, English summary.)—Contains numerous microscopic details of the structures providing avian tactile and to some extent sonar vibratory perception, perhaps. There is a bibliography of 44 titles. See also review no. **40**.—Leon Kelso.

44. Specific morphological features of the avian eye (as exemplixed by families Laridae and Sternidae). (Vidospetsificheskie morfologicheskie osobennosti glaza ptits (na primere semeistva Laridae i Sternidae.) M. I. Braude. 1969. *Z. zhurn.*, **48**(10): 1517-1525. (In Russian, English summary.)—Structure and position of the eye in relation to the skull was examined in 4 gull species: Common, *Larus canus*; Herring, *L. argentatus*; Black-headed, *L. ridibundus*; and Little, *L. minutus*; and 3 of terns: Common, *Sterna hirundo*; White-winged Black, *Chlidonias leucoptera*; and Black, *C. nigra*; by the Oehme (1962) method. The gull eyes showed a smaller aperature angle, less protuberant cornea, and less sensitivity to light, gull eyes being more conditioned to daylight activity than those of terns. The Common Tern differed little from the gulls in these respects.

The Black Terns showed adaptation to lower level illumination, they performing their food search flights at a greater height. In terns the optic axis plane is set at a more acute angle to the linear axis of the skull, their field of binocular vision being 50-70°; that of the gulls being 20-30°. There is a bibliography of 34 titles.—Leon Kelso.

45. Central elements of the acoustic system of birds: 1. Auditory nuclei of the medulla oblongata. (Tsentralnye otdely slukhovoi sistemy ptits: 1. Slukhovye yadra prodolgovatogo mozga.) V. D. Ilichev, L. I. Barsova, and G. R. Taksa. 1969. *Z. zhurn.*, **48**(10): 1507-1516. (In Russian, English summary.)— The cell structure, form and size of cochlear nuclei, with the number and density of nerve cells, were examined on successive sections of the brain stem in 30 species of birds of 11 orders. A comparison of cellular features with the species' ethology and ecology brought out a strong correlation to mode of sonar location of prey, and the advantages of binaural perception of sound source for owls and harriers. The neurons of all cochlear cell nuclei are larger and more numerous in owls than in other birds, and are less densely grouped. This is somewhat the case with the harriers (*Circus* spp.) which, while diurnal, use sonar location in capturing small rodents. The total neurons in the "olivarius" center of owls, Eagle and Long-eared, for example, is about 11,000; in anatids 3,000, in passerines 2,000, and in pigeons much less.—Leon Kelso.

46. A study of the egg shells of the Gaviiformes, Procellariiformes, Podicipitiformes and Pelecaniformes. C. Tyler. 1969. *J. Zool.*, **158**: 395-412.—This paper presents the results of Professor Tyler's ongoing work on the anatomy of the avian egg shell. After detailed comments on the structure of the egg—using histological and plastic embedding techniques—Tyler summarizes the variability observed throughout the four orders, and from these data he draws some systematic conclusions.

The species of *Gavia* are all very uniform in egg-shell structure. Unexpectedly, the families of the Procellariiformes show no important differences from each other. Tyler notes that the Procellariiformes and Sphenisciformes, two orders having presumed relationship, have quite different kinds of eggs. Two other orders of uncertain affinities, the Podicipitiformes and Gaviiformes, have distinctly different egg shell structures. Tyler found that the Phaethontidae were easily separable from the other Pelecaniformes but that the remaining families of the order were similar in egg anatomy.

Tyler's work is extremely interesting and important. It is to be hoped that new techniques will be developed which will allow finer resolution of infraordinal relationships. More knowledge about the adaptive significance of the differences in egg shell structure would also be welcome. In the meantime, Tyler is providing us with a series of fine studies and I hope he continues them—Joel Cracraft.

47. Osteology of *Pedionomus torquatus* (Aves: Pedionomidae) and its allies. W. J. Bock and A. McEvey. 1969. *Proc. Royl. Soc. Vict.*, **82**: 187-232.—"The goal of this study is to present a comparative description of the skeletons of *Pedionomus*, *Turnix* and *Ortyxelos* as a foundation for further taxonomic work." It can be stated right off that the authors have successfully attained their goal by presenting a wealth of anatomical data about these little-known birds. Their descriptions and comparisons of the skull are especially detailed; those of the postcranial skeleton are somewhat less meticulous but adequate for the purposes of the paper. Bock and McEvey found that the skeletons of *Turnix* and *Ortyxelos* are very similar and differ in only a few characters. Brief comparison with other charadriiform (but curiously not gruiform) birds allowed the conclusion that *Turnix* and *Ortyxelos* do not belong in separate subfamilies, let alone separate families. *Pedionomus*, on the other hand, was found to be quite distinct osteologically from *Turnix* and resembled the latter only in the leg elements. The authors reason that if the differences between *Pedionomus* and *Turnix* "prove to be modifications in the two functional units of the cranium and the flight apparatus, these modifications would be major ones that cannot be treated causually." Bock and McEvey emphasize that any taxonomic decision is difficult without further comparative work with other nonpasseriform families, but for convenience they recommend recognition of two families, Turnicidae and Pedionomidae, within the Turnices. A discussion on the definitions of palatal and nostril types is also presented. It can be noted that the illustrations (by Mrs. Frances Jewel) are excellent and will be useful for subsequent investigators.

I was disappointed that comparison of the Turnicidae and Pedionomidae with other nonpasseriform families was essentially absent. We still lack solid evidence as to the ordinal relationships of these two families. Nevertheless, the authors have provided an important paper that should facilitate future comparative work.—Joel Cracraft.

48. A numerical study of the wing and leg muscles of Lari and Alcae. G. E. Hudson, K. M. Hoff, J. Vanden Berge, and E. C. Trivette. 1969. *Ibis,* **111:** 459-524.—This paper represents another contribution by Professor Hudson and his students to the study of wing and leg myology and its role in higher category systematics. The techniques follow their earlier work on the Galliformes. Basically, two numerical methods are employed: (1) characters are "weighted" and the results are expressed as cumulative scores of difference, and (2) all characters are considered equal in weight and values are expressed as correlation coefficients. The authors attach greater weight to the presence or absence of muscles (rather than quantitative differences) and to muscle proportions of greatest relative magnitude (a complete explanation of their working methods is not given in this paper but in Hudson, *et al, Amer. Midl. Nat.,* **76:** 1-73, 1966).

The first part of their paper reviews the anatomical variations observed in the wings and legs of the Lari and Alcae. Fairly large sample sizes were used, and this section contains a considerable amount of valuable information. The last part is the discussion and conclusions, which are based primarily on the numerical results contained in 28 pages of tables and 6 pages of graphs. In the hierarchical arrangement of the taxa, the authors do not differ significantly from the 1960 check-list of Wetmore. The authors place the skuas and jaegers in a subfamily within the Laridae, whereas Wetmore recognizes a separate family for these birds. The Alcidae remain in a distinct suborder.

It is interesting to note that the only unique characters found in the Stercorariidae as compared to the other Lari were minor variations in the development of sesamoids in two tendons. Furthermore, almost all differences between the skuas (*Catharacta*) and jaegers (*Stercorarius*) are simply those of muscle size. No wonder the "numerical figures (Tables 8 and 9) indicate that *Catharacta* and *Stercorarius* are closely related . . . ." The Rynchopidae (skimmers) are different from the other Lari but the numerical scores are slightly closer to the Sterninae. Here the authors lose some faith and "consider this evidence inconclusive and believe this slight similarity to terns might well be a matter of convergence. It seems unlikely that the remote ancestors of *Rhynchops* were terns." This type of reasoning undermines much of what the authors are trying to accomplish. What are the criteria for differentiating between relationship and convergence given the same numerical value? Their argument would seem to suggest considerable dependency on previous taxonomic opinion in evaluating their numerical scores. Even accepting their results as indicating that the skimmers are more closely related to the terns than to other Lari, it does not follow that the ancestors were terns (or even ternlike).

The vast majority of their myological characters are minor variations in origins and insertions, muscle length or width, presence or absence (or degrees of development) of sesamoid bones, and so forth. If it can be assumed that these types of variation can easily arise independently between phyletic lines, then these features become worthless as taxonomic characters. Thus, the total lack of functional analysis of their characters reduces one's confidence in the results. Only the most general functional statements are made, and the validity of these can be seriously questioned in the absence of any supporting evidence. For example, (p. 485) the "considerably shortened muscle mass in the forearm . . . of the Lari . . . appears to be a functional adaptation reducing weight of the wing, correlated with the buoyant type of flight involving a slow wing beat and light wing loading." Or (p. 487), "several myological features of the pectoral limb in auks appear to be clear-cut adaptations for meeting the mechanical requirements of underwater flight." Finally (p. 488), "The following [myological characters] are obviously features designed to improve efficiency in auks for diving and swimming under water. . . ." I am afraid one must remain skeptical about the above conclusions until much more is known about joint structure and function, the detailed fiber arrangement of the muscles, the physiological make-up (e.g., whether twitch or tonus) of the muscles, the activity sequences and forces generated by the muscles, and simply how these birds fly, swim, and walk.

The great value of Hudson's work is not the taxonomic conclusions but the anatomical data he gathers. Unfortunately, very little of this can be interpreted functionally because the internal anatomy (fiber length, arrangement, angle of pinnation, etc.) of the muscles is not described.—Joel Cracraft.

MORPHOLOGY AND ANATOMY

(See 2, 25, 69, 70.)

PLUMAGES AND MOLTS

(See 18, 39.)

ZOOGEOGRAPHY AND DISTRIBUTION

(See.lso 64, 66.)

49. On the Bering bridge problem (Zum Problem der Beringia-Brücke.) L. A. Portenko. 1968. *Bonner Zool. Beitr.*, **19**(3-4): 176-180. (German.)—The history of the Bering land connection theory is reviewed, to which the author's, based on avifaunal studies, are added. The avifauna of the Bering Strait area apparently consists of: (1) circumpolar species not having distinct subspecies on either side; (2) circumpolar species having Asian and American subspecies; (3) distinct and analogous species in the palearctic and nearctic; with some having a large range on one side, and a very limited one on the other. It is suggested that the so-called bridge was a group of islands of varying size, shape and continuity; and that the theory of a constant "Bering Bridge" is not sufficiently grounded. According to *Botanicheskii Zhurnal*, No. 10, 1969, this paper was presented at a general conference on the biotics of the Arctic Oecan and its bordering lands, and occasioned a keen discussion. Commentators held that while the new suggestion appeared sound for birds it was not adequate for fresh water fish distribution.—Leon Kelso.

50. Birds of South America. C. C. Olrog. 1969. In: *Biogeography and Ecology in South America* (E. J. Fittkau, *et al.*, eds.), vol. 2, pp. 849-878. Dr. W. Junk N. V., The Hague.—This short paper divides South America into "life zones" and "habitats" and then lists the kinds of birds found in each. Although this paper gives a general review of the South American avifauna, many of the statements (e.g., (p. 849) the endemic families are "to be regarded as relicts of ancient faunas," or (p. 852) "Avian families are rarely represented in the tropical and subtropical zones by different genera, but generally by different species and subspecies.") are in need of further discussion and quantification. Compared to other contributions in the volume on different groups of organisms, this paper comes off poorly; as an example, his analysis could have included a discussion of numerous ecologically interesting subjects including species diversity gradients, endemicity patterns (briefly mentioned), among others. Included are seven plates of bird silhouettes (showing up to 136 figures on a single plate!) representing birds of the different habitats; these plates contribute little to the paper and would have never been missed.—Joel Cracraft.

51. The birds of Iceland. (Les oiseaux d'Islande.) M. de Ridder. 1969. *Les naturalistes Belges*, **50**(2): 10-125. (French.)—This is a substantial altho pop-science article; a note of particular interest is that there are found about 250,000 Common Eider nests annually, yielding 18-19 gms of down per nest; annual export thereof is about 4,000 kg. It speculates on the warming of the climate because only in recent years have the following taken up residence there: Black-headed Gull, Lesser Black-backed, Herring, and Common Gulls, Short-eared Owl, Shoveller Duck, and English Sparrow, while the Dovekie population has sharply declined.—Leon Kelso.

52. Winter avifauna of the Kustanai Steppes, northern Kazakhstan. (Zimnyaya avifauna kustanaikikh stepei, severnyi Kazakhstana.) V. F. Ryabov and Yu. A. Samorodov. 1969. *Byull. moskovskogo obshch. isp. prirody, otdel. biol.*, **74**(5): 42-49. (In Russian, English summary.)—On observations covering 4 winter seasons, 1962-1966, comparative lists of regular, irregular and rare winter residents are given. Wintering habits and habitats are described. The resulting picture is quite similar to that which may be found in the U. S. shortgrass plains area: regular winter residents 35, irregular 12, and rare 12. As here the Horned Lark, *Eremophila alpestris,* is the principal inhabitant of the sparsely vegetated or bare ground areas, but it shares the habitat with 2 other Larks, the White-winged, *Melanocorypha yeltoniensis,* and the Field, *Alauda arvensis.*—Leon Kelso.

53. The Great Spotted Cuckoo found in Sweden for the first time. (Skatgök *Clamator glandarius* för första gången i Sverige.) Stig Jacobsson, Kjell Wallin. 1969. *Vår Fågelvärld,* **28:** 102-106. (English summary.)—On 29 July 1968 a Great Spotted Cuckoo in juvenile plumage was observed on the west coast of Sweden. It was identified by three ornithologists and filmed and photographed for the record.—Louise de K. Lawrence.

SYSTEMATICS

(See also 47, 48.)

54. The evolution and systematics of bee-eaters (Meropidae). C. H. Fry. 1969. *Ibis,* **111:** 557-592.—The family Meropidae contains 24 species distributed throughout the paleotropics. Because the systematics of the family is based mainly on two short papers by H. von Boetticher, this long review is particularly welcome. C. H. Fry's study is the result of four years' work on the ecology of African species and an examination of museum specimens; the literature on the ecology and behavior of bee-eaters is also summarized. This is not a taxonomic paper in the strict sense, although taxonomic conclusions are drawn, but principally a discussion of the evolutionary pathways within the family. According to Fry the Meropidae probably originated in the forests of southeastern Asia, spread across the Indian subcontinent through forests, and then reached Africa where they speciated in the extensive open-country habitats. This speciation went in two main directions: toward small sedentary and large migratory species.

Fry discusses the general morphological characteristics of each species, their distribution pattern, and their ecological relationships (when known) with sympatric species. These data comprise the great bulk and value of the paper, and a number of interesting questions are raised about the ecological and behavioral interactions of closely related species. For example, *Nyctyornis amicta* of southeastern Asia is the only species in the family with marked sexual dimorphism in plumage. Obviously, the behavior and ecology of this species should be compared with other species to see what factors may have influenced the evolution of this dimorphism. Fry discusses competitive interactions between sympatric species but unfortunately quantitative data are not yet available. Because of their dependency upon a rather specific food source (all feed largely on venomous Hymenoptera), bee-eaters might be a good group to look for examples of behavioral, ecological, and morphological character displacement.

Fry bases his conclusion of a southeastern Asia origin for the family on the presence there of two forest species of *Nyctyornis* which he considers the most primitive genus of the family. The two species of *Nyctyornis* have relatively "unspecialized" food and feeding behavior and have much darker plumages than most other bee-eaters. Because there are at least two African species (*Melittophagus mulleri* and *Bombylonax brewri*) which Fry considers as primary forest bee-eaters, a nonsoutheast asian origin for the family probably should not be ruled out. Thus, since sexual monomorphism is widely distributed throughout the family, it would appear to be a primitive character for the group. It follows that sexual dimorphism in *Nyctyornis amicta* would suggest this species is representative of a derivative condition rather than being primitive. It may be that *Nyctyornis* has undergone rapid evolution in relatively Recent times in response to invasion of a forest habitat.

The above comments do not detract from Dr. Fry's fine work. All ornithologists (indeed, any vertebrate zoologist) interested in birds of the world or Old World zoogeography will want to read this paper.—Joel Cracraft.

55. On the systematic position of the Screamers (Anseriformes, Anhimidae): evidence from immunological analysis of crystalline lens protein composition. (O sistematicheskom polozhenii palamedei (A., A.). (Dannye immunologicheskogo analiza belkovogo sostana khrustalika glaza.) H. Gysels. 1969. *Z. Zhurn.*, **48**(8): 1202-1206. (Russian, English summary.)—Electrophoretic and immunodiffusion tests on lens proteins of a series of Galliformes, Anseriformes and *Chauna cristata*, place the latter, wherein an embryonic lens component persists into the adult stage, intermediate to the 2 orders, but closest to the swans, *Cygnus*.—Leon Kelso.

56. The relationship of the flamingos as indicated by the egg-white proteins and hemoglobins. C. G. Sibley, K. W. Corbin, and J. H. Haavie. 1969. *Condor*, **71**: 155-179.—This paper is divided into two parts. The first is a review of the previous opinions on the relationships of flamingos, and the second presents the results of starch-gel electrophoresis of egg-white proteins and hemoglobins and of ion-exchange column chromatography and one-dimensional, thin-layer electrophoresis of hemoglobin tryptic peptides. The authors do an admirable job in reviewing all of the pertinent literature on the flamingos. They discuss previous classifications, fossil history, anatomical evidence, evidence from parasites, life histories, and behavior. The main conclusion from their long analysis seems to be that none (or at least, very little) of this evidence is clear-cut, but that it tends to support a flamingo-ciconiiform relationship slightly more than a flamingo-anseriform relationship.

Several problems are associated with their interpretation of these data. First, it is somewhat unfair to imply that no "valid conclusions" can be reached using the available data unless they are prepared to present a critical discussion of the different characters (*i.e.*, one must look for more than just a consensus). Second, it is no surprise the authors were unsuccessful in finding clear-cut demonstration of a particular relationship when they were merely "summing" characters on either side of the argument (*i.e.*, flamingo-ciconiiform or flamingo-anseriform affinity) rather than looking for shared characters that were inherited from a common ancestor.

A much more important problem exists, not only with portions of this study but with any systematic paper which attempts a review of previous work. This is the unintentional (and sometimes uncritical) acceptance of earlier opinions (especially those confirming one's own ideas) and, what may be worse, the reinforcement of these opinions. A clear example is their statement (p. 159) "Possibly the only valid conclusion to be drawn from the fossil evidence is that the flamingos, the ciconiiforms, and the anseriforms were derived from a common ancestor. . . ." The fossil record simply shows no such thing! It does little good to review the fossil literature and to make strong statements about this material when comparative studies have never been undertaken.

Turning to the molecular portion of the paper, the authors have presented some interesting and significant results. Starch-gel electrophoresis of egg-white proteins yielded more similar patterns in the flamingos and ciconiiforms than in flamingos and anseriforms. No conclusions were reached using hemoglobin starch-gel electrophoresis because each of the three groups was more or less distinct. To this (admittedly) inexperienced eye, the patterns of *Phoenicopterus ruber* were quite similar to those of *Anser fabalis* and *Branta canadensis*, although there were slight differences in mobility. Unfortunately, the authors did not discuss this.

The authors next deal with tryptic peptides of the hemoglobins. Using the technique of ion-exchange chromatography the positions of the peaks (not the heights) are the basis of comparison. The chromatograms figured by the authors are apparently only a small portion of the originals, and they state that it is difficult to make precise comparisons using the former. The figures (3 and 4) fully substantiate their conclusions that (1) the intrafamilial patterns are more similar to each other than are the interfamilial patterns, and (2) the patterns of the flamingos, ciconiiforms, and anseriforms are generally more similar to each other than any are to other nonpasseriform families (in this case, Gaviidae, Laridae, and Phasianiadae). After study of the complete chromatograms the authors conclude that the flamingos are closer to the ciconiiforms than to the anseriforms. Figures 3 and 4 do not support this conclusion, but the authors claim that *Ardea* and *Phoenicopterus* have at least 17 tryptic peptides in common whereas *Anas* and *Phoenicopterus* have at least 14 peptides in common.

The authors next discuss thin-layer electrophoresis of hemoglobin tryptic peptides. They believe that "a detailed comparison of the thin-layer electrophoretic patterns is not trustworthy," but they point out that the flamingo shares 12 peptides with the heron and only eight with the duck.

The results of the thin-layer electrophoresis of the tryptic peptides of ovalbumin are especially convincing. The flamingos are clearly much more similar to herons than to ducks.

After examination of all the evidence the authors conclude that the flamingos should be treated as a suborder, Phoenicopteri, within the order Ciconiiformes.

Professor Sibley and his colleagues have provided a most useful summary of one of the more interesting systematic problems of the higher categories.—Joel Cracraft.

EVOLUTION AND GENETICS

(See 14, 15, 16, 38, 54.)

FOOD AND FEEDING

(See also 6, 9, 20, 21, 23, 26, 34, 40, 70.)

57. Hunting, feeding and vocalizations of the Great Gray Owl. (Jakt, matning och läten hos lappuggla *Strix nebulosa*.) Jens Wahlstedt. 1969. *Vår Fågelvärld*, **28**: 89-101. (English summary.)—Three pairs of Great Gray Owls were studied intensively in northern Sweden. Their main hunting area was a rather constricted open part of muskeg not far from the nest. This area was shared by a pair of Ural Owls (*Strix uralensis*) and Hen Harriers (*Circus cyaneus*). No marked agonistic behavior was observed except when trespassing occurred too close to the nest. At the time the area supported peak populations of small rodents.

The male hunted mostly at night but also occasionally in the daytime. (See review no. **34**.) He provided the nestlings with most of their food, either feeding indirectly by transferring the prey to the female who fed the young, or later as the nestlings developed directly. When brooding ceased, the female's main activity consisted of watching the nest and this duty sometimes took priority over feeding the young. At the age of about three to four weeks the owlets were able to leave the nest and began climbing around in the nest tree. For a time they continued to use the nest as a refuge when they became frightened and at night.

Nine different calls and noises were recorded, one mechanical the bill snapping, and the rest vocal for the male, and six for the female. Excellent photographs illustrate the article; one in particular, a front view of the hunting male,is impressive.—Louise de K. Lawrence.

58. Predation by Song Thrushes *Turdus ericetorum* (Turton) on the snails *Cepaea hortensis* (Mull.) and *Arianta arbustorum* (L.) near Rickmansworth. R. A. D. Cameron. 1969. *J. Anim. Ecol.*, **38**(3): 547-553.—There has been much interest in the effect of birds as selective factors upon different morphs of land snails. Cameron's study reports upon the frequencies of the different morphs of the snail *Cepaea hortensis* and the apparently monomorphic *Arianta arbustorum* at the anvils of Song Thrushes. Samples indicate that *Cepaea* was most often taken during the summer, *Arianta* in the winter and early spring. Since *Arianta* has a more northern distribution than *Cepaea*, Cameron assumes that it will be more active (and hence more conspicuous) in the winter than *Cepaea*. While this appears to be a reasonable assumption, no data are presented to support it. They presumably could be gathered quite readily to test this hypothesis. Although selective predation upon different morphs of *Cepaea* might be expected to change with the season due to changes in background color, no significant differences occur in percentages of different morphs taken in winter and summer samples. Such a difference was only approached in the pink unbanded morph (P = 0.105).

These data suggest that strong visual discrimination for different snails is not occurring in this population of Song Thrushes. If indeed these data can be directly compared with the important studies of Cain, Clarke, Sheppard, and others, the possibility of different responses by different populations of Song Thrushes opens an area for detailed analysis.—Douglass H. Morse.

59. The ecology of the partridge. III. Breeding success and the abundance of insects in natural habitats. T. R. E. Southwood and D. J. Cross. 1969. *J. Anim. Ecol.*, **38**(3): 497-509.—This is the third and last of a series of papers by Southwood and his co-workers on the ecology of the Partridge (*Perdix perdix*) in England. It measures breeding success in different habitats (ratio of young to old) and attempts to account for the factors responsible for it.

To accomplish this task, extensive sampling of the arthropod fauna was conducted, using both sweep-net and suction apparatus collection techniques. While considerable variation may be noted between the two methods, consistency is generally shown. Herbicides used in cereal crops reduced the abundance and biomass of arthropods markedly, probably due to the absence of other species of plants.

A rather similar insect composition was found in the samples and in gut contents of young partridges, though due to difficulties of obtaining specimens only six were captured with food in their crops. In general it appears that they feed on the most abundant arthropods. Some of the more agile forms were underrepresented in chicks' crops. Attempts were made to determine the distance (*d*) that a chick had to travel to obtain an adequate amount of food each day (calculated to be 5.5 g wet weight of arthropods for a 7-day chick). Since difficulties were experienced in measuring the efficiency (*e*) of searching, this factor was not separated from distance, and the figure calculated was *de*. These calculations are almost certainly underestimates of the distance required, but even if *e* varies (thought to be about 0.5), differences between habitats should exist. Assuming *e* to be 1, a partridge in an unsprayed barley field (weedy) would walk 163 m to obtain 5.5 g of wet weight of arthropods, and in a sprayed barley field, 557 m, or over 3 times as much. Natural grasslands require less foraging than unsprayed barley (101 m), while other unsprayed agricultural habitats were intermediate (uncut grass, 174 m; grass/clover ley, 254 m).

Breeding success was directly correlated with the abundance of arthropods, and its effect was calculated to be almost six times as influential in this regard as the mean daily hours of sunshine in June. Together, nearly 94% of the variation in breeding success was accounted for by these two variables. One might argue that hours of sunshine and insect abundance are not totally unrelated factors.

Southwood and Cross then comment upon the population density of the Partridge and its controlling factors. It is presumed that numbers may naturally be regulated by density-related emigration in late winter, but that density-dependent shooting masks any self-regulatory tendencies. High breeding densities are associated with adequate spring cover; thus, modern agricultural practices would result in low numbers of Partridges. Large monocultures result in fewer hedgerows, and the use of herbicides reduces the diversity of plant species within a cultivated area.

This study documents the important differences that moderately subtle man-made environmental changes may have upon the status of a species.—Douglass H. Morse.

60. Food consumption of diving ducks wintering at the coast of south Sweden in relation to food resources. L. Nilsson. 1969. *Oikos,* **20:** 128-135.—This paper deals with the winter habitat and food selection of three species of diving ducks: Greater Scaup (*Aythya marila*), Tufted Duck (*A. fuligula*), and Common Goldeneye (*Bucephala clangula*). The standing crop of food items is also calculated and its decrease during the winter determined (70% and 40% from September to April in two different years). By calculating the amount of food taken daily by a known number of birds (based upon a fairly limited sample of stomach contents), Nilsson estimates what part of the effect is caused by the foraging of these birds (responsible for $5 \pm 2\%$ of the decrease).

While much of the feeding area is covered with eelgrass (*Zostera*), all three species are largely carnivorous, feeding principally upon bivalve mollusks. The Scaup fed principally upon blue mussels (*Mytilus edulis*) and a much smaller percentage of the small clam, *Macoma baltica.* Tufted Ducks fed heavily upon cockles (*Cardium*). Diets varied seasonally in the Tufted Duck, the only species for which stomach contents were available for over one part of the year, with mussels and hydrobiids becoming important food sources at times. Comparable data do not exist for the Scaup, since specimens were only taken in March and April. Only one Goldeneye stomach was obtained. Of the three species, only the Goldeneye remained during the entire winter, with the other two species moving as the water in adjacent resting ponds froze. Goldeneyes are diurnal feeders; Scaup and Tufted Ducks are nocturnal feeders.

Attempts to calculate the impact of animals foraging in a habitat always are subject to considerable degrees of error, which compromises their value somewhat. This study is no exception, and the relatively sparse quantitative information upon the amounts and types of food taken by the three species make a precise determination impossible. Nevertheless, it seems apparent that in neither winter of the study was food absolutely limiting. Though the always important question of whether it was in sufficient abundance to allow individuals to obtain required amounts in the available time was not specifically considered, the data imply that opportunities for gathering the food were adequate. In spite of the apparent availability of food, considerable differences were noted in the areas where the different species foraged and in the foods that were taken. These observations raise the interesting questions of why such marked differences existed, and why with a considerable excess of food additional individuals did not winter.—Douglass H. Morse.

61. Jays recovering buried food from under snow. D. Salfeld. 1969. *Brit. Birds,* **62**(6): 238.—Since the peanuts were buried before the three-inch snow, apparently the *Garrulus glandarius* use other than surface landmarks to find their caches. An appended comment by P. O. Swanberg indicates birds can find buried food in up to a foot and a half of snow.—Jack P. Hailman.

SONG AND VOCALIZATIONS

(See 57, 62.)

PHOTOGRAPHY

(See 57, 63.)

BOOKS, MONOGRAPHS AND RECORDINGS

62. ***Bird Song: Acoustics and Physiology.*** Crawford H. Greenewalt. 1968. Smithsonian Institution Press, Washington D. C. 194 pp. 2 phonograph records enclosed in pocket. $12.50.—This lucid and profusely illustrated book recounts at length the author's intricate analyses of bird songs in a search for inferences about the acoustical and physiological characteristics of birds which was, in his own words, "in a sense a scientific detective story". Most recent studies of bird song have used the Sonagraph and Greenewalt gives a useful discussion, which should be studied by all users, of that instrument's values and its limitations which are mostly due to the briefness of many bird notes. For most of his analyses he relied upon an oscilloscope, high-and low-pass filters, wave analyzer and period counter. He provides convincing evidence, much of it in the form of overlapping notes that are not harmonically related, for the presence of two, and only two, acoustical sources that are (at least often) independently controllable. From a review of the literature he concludes that these sources are the two internal tympaniform membranes, and rejects the external tympaniform membranes because they are too thick and the semilunar membrances because they have no directly associated musculature, and both are too variable. However, it is not clear why there should be only one mechanism for all bird vocalizations, indeed there is experimental evidence suggesting that the external membranes are the sound source in chickens (two papers by W. B. Gross, *Poultry Sci.*, **43:** 1005-8 and 1143-4, 1964).

Those notes which have negligible harmonic content are described as whistled notes and it seems that for any species there is a threshold frequency above which whistled notes occur and below which there are harmonics. This was confirmed by studies of Glissandi in several species. In principle any bird is potentially capable of singing in both the harmonic and the whistled domain, although few do so extensively. Arguing from the premise that many birds appear to be able to activate their two acoustical sources separately and independently and the ability to modulate frequency or amplitude or both is available for either source, Greenewalt rejects theories that liken avian vocalization to a musical instrument (i.e. close coupling of source and resonator) or to the human voice (selective filtration from a wide harmonic spectrum). He concludes that the trachea does not significantly alter the frequency or the modulation of the sounds produced at the source. In the summary an experimental test of this hypothesis is proposed; in such a test I found that some calls of Laughing Gulls (*Larus atricilla*) in $He/0_2$ show a shift in frequency of half to three-quarters of that predicted by a simple resonator hypothesis. This suggests that resonance is indeed unimportant, and that the $He/0_2$ alters the vibration of the membrane, as Greenewalt suggests on p. 184.

There is a lengthy discussion and illustration of various kinds of modulation; almost all is source-generated even for talking birds which seem to require no special sound-producing mechanisms. There are also inferences of frequency and time perception from observed performance. It seems that birds may match humans in perception of frequency differences ($\triangle f/ f \times 10^3$ is 2 to 5) but a bird's temporal resolution is probably much finer at about 5 msec (Pumphrey had earlier suggested 10 x better than humans; this figure is about 100 $\times$).

The two 7-inch phonograph records are for manual play and consist of more than 60 bird songs corresponding to sonagrams and oscillograms in the text (five also at one-eighth normal speed), examples of artificially produced modulations, of the simultaneous use of the two acoustical voices and of a variety of talking birds. The book contains so much information about so many species that it is a pity there is no index; at the very least the Alphabetical List of Bird Names (Appendix 1, page 189) could have page references. Furthermore, I would find such an alphabetical list easier to use if it were arranged so that, for example, the jays were listed consecutively rather than separately under Blue, Grey and Green.

This book will be a stimulating source of ideas to many, for Greenewalt has not only pioneered methods that will be especially useful for untangling the details of sounds that are involved in, for example, individual recognition but also made challenging suggestions about the means of sound production, some of which can readily be investigated experimentally.—Jeremy J. Hatch.

63. ***The Pictorial Encyclopedia of Birds.*** Jan Hanzak. 1967. Crown Publishers Inc., N. Y. 582 pp. 1120 photographs, 45 in color. $10.00.—This collection of very nice pictures with fact-packed supercaptions was written, published, and copyrighted in 1965 in Czechoslovakia. The author is apparently a well-known ornithologist in that country. He delivered a paper on the Great Crested Grebe at the Third Ornithological Congress at Brno in the 1950s and has published a number of papers in scientific publications behind the Iron Curtain since.

The *Encyclopedia of Birds* has been translated into French and German as well as English. The Crown edition gives no credit to the translator but lists Bruce Campbell as editor and Ned R. Boyajian as American consultant. It gives individual acknowledgment for black and white photography but not for photographs in color.

I am sure many persons with an interest in birds will enjoy owning this book, but it is not by any means a must for an English-speaking ornithologist's library. A number of American and English books have more beautiful and adequate illustrations and much, much more information about the birds of the world and fine bibliographies where the *Encyclopedia* has none.—Elizabeth S. Austin.

64. *Thorburn's Birds.* James Fisher (ed.), introduction and new text. 1967. Ebury Press and Michael Joseph Ltd., London. 184pp., 82 plates in color, 2 endpaper maps. 50s.—Anyone who enjoys beautiful pictures should be glad that James Fisher apparently believes what his countryman, John Keats, said long ago:

> "A thing of beauty is a joy forever:
> Its loveliness increases;"

Thorburn's plates are so delightful that cheap reproduction does not obliterate their charm. I for one am very grateful to James Fisher for making them available once more with his own fine text giving the status and distribution of each species of "British Birds" today. The American who is unfamiliar with Archibald Thorburn's paintings can learn something about the man and his art from his obituaries in *Brit. Birds* (**29** (6): 172, 1935) and in *Ibis* (**6** (1), 13th Ser.: 205-207, 1936). The few words in *Auk* (**53** (1): 129, 1936) mention the one work in which Americans have met Thorburn's illustrations, William Beebe's *Monograph of the Pheasants.*

James Fisher's introduction to *Thorburn's Birds* is a short biography of the artist's professional life, followed by Fisher's excellent selected bibliography of works on British birds, with each book in which Thorburn was involved marked by a dagger—an amazing number of daggers appear on the pages. The maps of England and of the world are both well suited to their purpose.—Elizabeth S. Austin.

65. Life at high latitudes, as exemplixed by birdsi (*Zhizn v vysokikh shirotakh, na primere ptits.*) S. M. Uspenskii. 1969. "Mysl" Publishing House, Moscow. 464 pp., 44 figures, 38 tables, bibliography of 616 titles. 2 roubles, 4 kopecks (about $4.75 U. S.) (In Russian).—In addition to many substantial articles on the ecology of polar vertebrates, this author's previous works— *Bird Bazaars of Novaya Zemlya* (*Ptichi bazary Novio Zemli*, 1956), *Birds of the Soviet Arctic* (*Ptitsy sovetskoi arktiki*, 1958), illustrating and describing nearly all arctic and circumpolar birds, and *At the Borderline of Life* (*Na predele zhizni*, 1959), a vignette of arctic animal life based on a summer long sojourn of the author and a party of botanists, geologists and meteorologists on Bennett Islands at 77° north lattitude—abundantly reinforce his authority for this book. It is appropriately dedicated to Aleksander F. Middendorff, and along with the magnum opus of that premier arctic continental explorer: *Expedition to North and East Siberia* (*Puteshestvie na sever i vostok Sibiri*, 1869), and Pleske's *Birds of the Eurasian tundra* (1928), forms a triumvirate of great Russian tours de force on the arctic avifauna.

How ecological elements shape the evolution, ethology, and economics of the avifauna might serve as a summarizing statement for the book.

Curiously this and another tour de force of recent date (*Species and speciation* (*Vid i vidoobrazovanie*, 1968) by Zavadskii, reviewed elsewhere in this journal) overlap in treating the same topics but by different approaches. The present author, duly impressed by Bergmann's law and other variation cline manifestations, takes up that as a major element in speciation in high latitude life (Chapter 1). Zavadskii, likewise concerned with speciation dynamics but oriented to the literature of botany and entomology, all but ignores the main vertebrate "laws" and rules and dwells at length on population pressures and structures, overpopulation, genetics, and paleontological evidence. Both books conclude with attempts to assure the public of the value of their species to economic welfare. Both have large up-to-date bibliographies.

Following the foreword the book is divided into 2 parts, each with its lengthy introductory historical passage, and 15 chapters. In part 1 on the arctic habitat and its effects, Chapter 1 is on the temperature regimen, first noting common arctic features, turns immediately to their apparent boreal effects, e.g. larger size per Bergmann's law. But this latter is not manifested regularly throughout the Eurasian north, which occasions some theoretical discussion, regarding coloration, internal and physiological adaptations (again noting that extreme low temperatures do not evoke higher metabolic rate nor more rapid "fuel burning" as expected); distributional, nesting, incubation, and growth relationships to temperature are discussed.

Ch. 2, on the snow cover, is a major topic for an area mostly near or north of the arctic circle, but here it is elaborated briefly, there being a book on it by Formozov, and that recently translated into English.

Ch. 3 on climatic fluctuations and anomalies is perhaps the one of broadest biological significance. Hourly, daily, seasonal and annual weather changes are more abrupt and severe in the arctic, sometimes halting the reproduction of a whole sectional fauna, but beyond that to be considered is the apparent gradual warming of the northern hemisphere over the past half century, as marked by the shift northward of bird range boundaries; this is here annotated for 52 species. In some places the tree limit has been advancing onto the tundra at a rate of 200 to 700 meters per year. This has altered even the nesting, migration and molts of birds and small mammals, and affected human agriculture. On the other hand, elsewhere around Iceland and northward a cooling over the recent 10 years has been reported.

Ch. 4 on the hydrologic pattern, deals with glaciated areas, ocean currents, temperature and salinity of marine waters, and also the distributional pattern of inland waters as related to bird life.

Ch. 5, on solar radiation as related to daily, reproduction, and migration cycles, and Ch. 6, on other abiotic environmental factors under the headings of winds, soils, and relief, provide much detail and discussion on those factors and the avifauna.

Ch. 7, on birds as members of arctic and subarctic biocenoses, deals with foods and food relationships, food chains and their simplicity in the arctic, and the reverse effect of birds on the land vegetation and the organic chemical content and production of plankton in marine waters.

Ch. 8 discusses periodicities as related to avian cycles including migration (arrival and departure), breeding, and molt.

Ch. 9 analyzes the problematic "arctic animal" as a "life form", as exemplified by the arctic avifauna.

Part 2, Distribution and dispersal of birds in the Soviet Arctic, analyzes the more minute ecological aspects, defining the main landscapes and biotopes: of the latter, gravelly and sandy shores, meadows, sedge and cottongrass swamps, tussock tundra, hummocky tundra, willow patches, coastal banks, dry lichen or moss-lichen tundra, elevated bogs, patchy tundra, gravelly tundra, stony detritus and rock cliffs, and cultivated landscape biotopes being defined.

Ch. 10, on avifauna of the central arctic, requires the notation that hundreds of miles north of the arctic circle, even in winter, occur 100 km. long areas of open water, or "polyns" to which some arctic waterfowl, particularly alcids, gulls and eiders, migrate northward rather than southward; Ivory, Fork-tailed, Kittiwake, Herring and Glaucous Gulls, and Common Eider are the more frequent. Only the Ivory Gull breeds and spends all its life within the remote central arctic, nesting on snow or ice, and is the species most frequently observed by trans-polar aviators. The Black Brant regularly migrates across it from Siberia to Alaska and back.

Ch. 11, on avifauna of the arctic, desert zone (arctic proper), besides details of that fauna, draws comparisons with that of the Antarctic. Ch. 12 on the tundra zone, or subarctic, finds it the main habitat of 9 endemic genera: *Calidris*, *Plaectrphenax*, *Calcarius*, *Clangula*, *Branta*, *Somateria*, *Stercorarius*, *Rhodostethia* and *Nyctea*. Ch. 13, on avifauna of cultivated areas, finds these evoking strong adaptability in arctic species. Ch. 14 compares ornithogeographic features of the arctic and subarctic, and but briefly integrates the mass of Russian information on tundran ecology with that of the forest-tundra transition zone. Fifteen "landscape areas" are defined on basis of avifauna.

Ch. 15, on economic values, discusses surveying and conservation of waterfowl and the large marine bird colonies, with special discussions for the eider down industry, ptarmigans for sport hunting, and bird protection in general. The lengthy and valuable bibliography, and a table of contents in English conclude the book, which is very conveniently sized to fit in an ordinary coat pocket.

As a whole the text hews strictly to the arctic and its avifauna, only incidentally touching on forest or mammal ecology, the Slavic literature on both of which is enormous.—Leon Kelso.

66. ***The Birds of Pamir-Alaya.*** (*Ptitsy Pamiro-Alaya.* A. I. Ivanov. 1969. "Nauka" Publishing House, Leningrad division, Leningrad. 448 pp. 83 figs., 2 tables, bibliography of 211 titles. 4 roubles, 20 kopecks (about $8.50 U. S.) (In Russian).—A report on the birds of a part of this area, which is a maze of mountain ranges southeast of Tashkent extending about 800 miles east-west by 350 miles north-south, was reviewed in *Bird-Banding,* **38**(4): 336, 1967 (Birds of the Pamirs. R. L. Potapov, *Trudy zool. inst. akad. nauk,* **39:** 1-119, 1966.) and those details apply to this book. This author has 40 years of field work in this area to his credit, as well as authorship of a key to USSR birds, and a book on birds of Tadzhikstan. Little less harsh than the arctic for bird life are such high mountainous areas ("the roof of the world" these have been called) which are extremely arid as well as cold. There is a foreword, unexpectedly introduced by a quotation from Robert Cushman Murphy to the effect that just when birds of a region are becoming "well known" then their real study is not finished but just beginning. There follows a chapter on the history of local ornithological exploration to date, showing some localities have been more favored or accessible for collectors than others, and that resident ornithologists are very few. Then a chapter on physical features is followed by an annotated systematic list of the 370 species admitted, 213 of which are breeders. While for such an area this species' total is not large, 36 of them are Falconiformes, equaling the number of Fringillidae, and not far short of the shorebird total, 45. Other avifaunal distinctions are 4 species of sandgrouse, and the very peculiar Sicklebill Snipe (*Ibidorhyncha struthersi*). Each species account begins with a statement on status, followed by a citation of all known localities and dates of observations and collections, with any additional life history information that may be new. A review chapter defines 5 local areas and the prevalent species of each; discusses the winter avifauna, 184 species, 94 of which are permanent residents to which the many deep mountain valleys give shelter; and describes in detail local migration, which, for high montane species, is chiefly altitudinal or vertical, as in our Rocky Mountains. The bibliography, and indices of Russian and Latin names conclude the volume. The blue cloth binding and printing are better than in most bird books. Most of the figures are well-reproduced black and white photographs, about equally divided between individual birds and their habitats, the latter showing extremely picturesque scenery, as might be expected in a region having locales of such exotic connatation as Samarkand and Dushanbe.—Leon Kelso.

67. The Transition from Dependent to Independent Feeding in the Young Ring Dove. R. P. Wortis. 1969. *Anim. Behav. Monogr.,* **2** (Part 1), 54 pp.—Experimental studies on the factors influencing the development of behavior in birds are still few, apart from an extensive literature on the phenomenon of imprinting. In fact, Wortis cites almost all such studies in a three page bibliography! After introduction and methods sections, there are four chapters with data on how the young *Steptopelia risoria* switches from being fed "cropmilk" by the parents to pecking at grain to feed itself. The emphasis of the study is on how the parent birds help to bring about this behavioral transition.

The introduction points out briefly the futility of the nature-nurture controversy, particularly the assumption that a young bird has "innate" motor patterns and then "learns" how to direct these patterns to appropriate objects such as food. The steps of analysis of behavioral ontogeny are then reviewed with appropriate examples from feeding in young birds: determine the stimulus elements that elicit the behavior, uncover physiological mechanisms, study effects of previous experience, study effects of the timing of occurrence of stimulus-events during ontogeny, study the effects of alterations in the behavior of individuals with whom the subject interacts, consider the adaptive significance of the behavior, and then summarize into a coordinated model of development. After this there is a brief review of previous studies of the transition from dependent to independent feeding in birds, and then a brief review of the development in young ring doves.

The second chapter is essentially the methods section for the study. One is impressed, if by nothing else, by the adequate numbers in the sample sizes of most experiments. It is shocking how many studies being published currently draw rather sweeping generalizations from one or two animals, even though they be carefully observed.

Chapter 3 (and the two following it) present the results. The general strategy is to provide two-week old, hungry squabs with foster parents whose own squabs were of various ages in relation to the squab being tested. In this way, the effect of the parent upon weaning from regurgitation-feeding to independent pecking at grain could be assessed. A test situation had two parts: squab and adult divided by a glass partition so that visual and auditory, but not tactile communication was allowed, and then free contact between the birds.

Regurgitation movements of the parents, as seen through the glass partition, stimulated some pecking by squabs, but actual contact was a far more effective stimulus. When the foster parent had young squabs of its own, it fed the experimental squab more, and this decreased the number of independent feeding movements. It is interesting to note that foster parents with old squabs did more feeding on grain themselves (despite the fact that their own food has nothing to do with feeding the young on crop milk, and that their food was always available on an *ad lib* basis). This suggests that the social stimulation of actual feeding movement is important in the development of independent feeding by the squabs. In fact, if the experimental squab begs, foster parents with young squabs tend to feed it by regurgitation, whereas foster parents with older squabs engage in a good deal of pecking at grain (thus providing the social stimulation). The findings are well analyzed statistically, so that no uncertainties concerning the reliability of results are left in the mind of the reader. Chapter 5, in which correlations of behavioral sequences were analysed by computer, is nicely summarized in the diagrams of figure 4 (p. 38).

The final chapter (6) is a sort of interpretative summary of the results and a statement of Wortis's hypothesis on the ontogeny of independent feeding behavior in Ring Dove squabs. She notes that the squab pecks around the beak of the parent and then inserts its own bill and opens it within the parental beak in order to be fed crop-milk. Then, when the squab is older, its attempts to feed while the parent is pecking at grain will direct the squab's own responses toward the grain. She also notes that ". . . bill-opening and closing movements probably have an earlier association during the hatching period when the squab's bill is used to break out of the egg" which is true, though the implication that the hatching behavior has an effect on later experience seems speculative. At least I could find no effect in gull chicks experimentally deprived of the hatching experience (*Behav. Suppl.*, **15,** 1967).

This is a simply excellent study, which should be read by all those interested in avian behavior. The monograph serves as a good model for future studies of behavioral ontogeny.—Jack P. Hailman.

68. Natural History of the King Rail. Brooke Meanley. 1969. *North Amer. Fauna*, No. 67. 37 figs., 108 pp. ($.60 from Superintendent of Documents, Washington, D. C.)—Few if any members of the family Rallidae have been given extensive monographic treatment. Because of the secretiveness of most rails, facts regarding their life history and behavior are especially welcome. Therefore, the information about one of our larger species of rails contained in this publication is most valuable. One can hardly help but envy the author's intimacy with his elusive subject. He treats at length the ecology, breeding activity, feeding behavior and development of the King Rail (*Rallus elegans*), with shorter essays on systematics, migration, plumages, mortality, hunting, and trapping methods. The author draws to a great extent on his rich field experiences although he states early in the text that he has "attempted to bring all information on the King Rail together into a monographic treatment". Despite the patent merit of the work, it falls somewhat short of this goal. The omission of several pertinent and accessible references is forgiveable, but more serious is the failure of the author to cite in the text or bibliography no less than four important papers of his own authorship, although information from them is usually to be found somewhere in the text. Thus one's modesty may prove a hindrance to future researchers.

Nevertheless, it is most gratifying that Meanley has assembled his extensive knowledge of this bird and presented it here. Repeatedly emphasized is the King Rail's adaptability to food, habitat, and other environmental factors. To anyone accustomed to thinking of rails as sedentary birds, the 1,000 mile flight of one banded King Rail may seem remarkable (p. 13). Students of behavior will doubtless be amazed or amused at the accounts of incubating rails that progressively raised their nests above rising water levels by adding more nest material (p. 60). Also of interest are the descriptions of calls given by night-migrating birds. Under systematics, Meanley briefly summarizes some of what is known about the interactions between King and Clapper Rails (*R. longirostris*) and adroitly avoids coming to any conclusions in this complex matter by starting a new chapter—unquestionably a wise move. The few errors of omission are far overshadowed by the wealth of material presented and this publication is certain to become a basic reference for anyone interested in the biology of rails.—Storrs L. Olson.

69. Osteology and myology of the head and neck of the Pied-billed Grebes (*Podilymbus*). Richard L. Zusi and Robert W. Storer. 1969. *Misc. Publ. Mus. Zool., Univ. Mich.*, no. 138, 49 pp.—This is a straightforward, and well done, descriptive anatomical study. The dissections are based mainly on the Pied-billed Grebe, *Podilymbus podiceps*, with comparative discussion using the Giant Pied-bill, *P. gigas*. In the description of the head muscles the authors have employed what I believe is a most useful technique—they have named the aponeuroses, and in so doing it is unavoidable to emphasize the fiber arrangement of the muscles. My only reservation is that they used Roman numerals for all aponeuroses, and it may have been more informative to use different notations for aponeuroses of origin and insertion. In any case, I strongly recommend that more anatomists follow their lead.

The authors intend this to be a foundation for further studies on the grebes, and I hope they provide us with additional comparative studies in the near future. —Joel Cracraft.

70. Adaptations for locomotion and feeding in the Anhinga and the Double-crested Cormorant. Oscar T. Owre. 1967. *Amer. Ornithol. Union Ornithol. Monogr.*, No. 6, 138 pp. Price $3.50 ($2.80 to AOU members).—"This investigation is a contribution to knowledge of the ecology and anatomy of the Anhinga and the southern race of the Double-crested Cormorant. . . ." It is clear, however, that the author intends this study to be much more, namely an attempt to provide a functional morphological explanation of the differences in adaptation of these two closely related birds. Furthermore, he believes that this comparative anatomical approach will "be of value in determining the degree of their relationship." Is he successful? Well, partly. But it depends at what level—general of specific—you wish to look for this success.

Owre has organized his study around the anatomical portion, and the ecology (in this case, general field observations) is used as supplementary information in forming functional interpretations. Thus, the paper is divided into (a) aerodynamics and the wing, (b) the tail, (c) the leg, (d) the head, and (e) food. There is a concluding section in which systematic recommendations are made.

Owre convincingly shows that the anhinga and cormorant are perfect subjects for a study of comparative adaptation. The anhinga moves slowly through the water, stalking prey, which is then captured by piercing. The cormorant is better adapted for pursuit of fish and catches its prey by grasping with the bill rather than piercing. Unlike the cormorant, the anhinga is modified for an arboreal habitat. The bird climbs, using its feet and neck, and perches often on small limbs. The cormorant climbs clumsily and prefers broader perching surfaces. The anhinga has a noticeable soaring flight, whereas the cormorant flaps continuously. Thus, these striking differences provide an excellent opportunity to study the functional anatomical basis of adaptive differences.

It is at this point that an impasse is reached, because the quality of the functional analysis is central to providing a sound explanation of the adaptive differences in these birds. Has Owre provided an adequate functional analysis? Regretfully, I do not believe he has. Owre's presentation, written in the 1950's, is not a significant advance over the studies of Miller on the Hawaiian Goose, 1937) or of Fisher (on the cathartid vultures, 1946). An incorporation of elementary information about muscle physiology and bone-muscle biomechanics (available in the 1950's) would have greatly enhanced his conclusions. Because the problems of Owre's functional analysis are by no means restricted to his study, but are common to many recent papers, I want to discuss a few difficulties of this approach.

First, without high speed motion picture analysis (or some method of electrical measurement) it is impossible to known exactly what individual skeletal elements are doing. Unaided visual observations (Owre's method) of birds feeding, swimming, walking, and so forth are simply not adequate to record the movements of bony elements. Make no mistake, these kinds of data are essential for a good functional analysis. Thus, Owre presented no data supporting the statement (p. 101) "During swimming there is but slight motion of the femur." In fact, I would expect there to be important differences in the arc of motion of the femur and in its angular velocity and acceleration in birds that locomote as differently as do the anhinga and cormorant. And being able to measure precise movements of bony elements is extremely important in investigating muscle function. Owre's dichotomy of flapping (cormorant) *versus* soaring (anhinga) flight is probably too simple to allow meaningful comparisons of wing-muscle function.

Second, Owre's assumption (following previous workers) that muscle volume can be used as an index to muscle force is not true in many (most?) situations. Owre points out (p. 41) that "Differences in volume may not necessarily indicate greater ability or force of movement of skeletal elements, of course, since synergistic action, muscle shape and location, differences in origin and insertion, etc. modify function." This statement is quite correct but he omits numerous characteristics that are just as important (if not more) in determining muscle function. The force which a muscle can generate is proportional to the cross-sectional area of the fibers, not to the volume of the muscle. Thus, two muscles can have equal volumes but generate totally different amounts of force if there is a difference in angle of pinnation or fiber arrangement. Differences in either of these characters would result in different numbers of fibers and hence different forces. If Owre had demonstrated that the same muscles in the anhinga and cormorant have the same fiber arrangement, then his data on volume would take on greater significance. But even given the above information we still cannot see the end of the tunnel. Most workers, including Owre, make the implied assumption (at least this is what I read in their discussions of individual muscles) that muscle function is manifested primarily as a shortening and consequently as a movement of two bones toward each other. This is not necessarily true. As a muscle contracts (is stimulated) it may be stretching and not shortening. For example, in the hindlimb of birds nearly all of the leg muscles function at some time during a walking (or swimming) cycle to resist motion of the element(s) to which they are attached. In some cases, e. g., postural muscles, this may be the major function and not shortening. Owre occasionally touches on this subject but does not amplify it. Also, speed of muscle shortening is correlated with fiber length (not force generated, although this may influence the torque produced and hence angular acceleration of a bony element)—another factor worth investigating in these birds.

Third, Owre assumes (e.g., p. 44) that a proximal insertion of a muscle means a greater speed of flexion whereas a more distral insertion means greater "power" but slower speed. Such a statement has little or no validity unless a discussion of the torques produced, angular acceleration, centripetal and tangential forces, and masses being moved are included.

Finally, Owre, like most other workers, presents no data on joint structure and function. Without information about the ligaments and joint capsule statements such as (p. 12) "a greater degree of lateral movement of the coracoid is possible in the Anhinga since that portion of the bone articulating within the sulcus of the sternum is less curved than that of the cormorant," cannot be verified. Furthermore, a correct functional interpretation of some muscles depends in part on knowing what is happening at the joints.

All of Owre's functional observations are based on the study of preserved material, which itself greatly influences the results. The amounts and kinds of motion of joints and muscles are reduced considerably in preserved material.

The section dealing with the head is particularly disappointing. The muscles were not studied in detail (admitted by Owre) and might best have been eliminated. The figures of the wing and leg are adequate, but those of the head were reduced too much and the details are lost. I found it peculiar that he would include the discussion of the M. depressor mandibulae with the neck muscles rather than with the jaw muscles. Moreover, he omits any discussion about the possible role this muscle might play in protraction of the upper jaw. The section on the head was especially poor in that he did not use any of the recent papers on cranial kinesis (e.g., those of Zusi, Bock, Simonette) and consequently his analysis suffers. Indeed, the most recent paper cited in this monograph is 1962, which indicates that little effort was made to incorporate recent advances since it was written, over 10 years ago.

Now, in light of the above comments, does this mean Owre's functional analysis is wrong? No, it does not. The anatomical correlations he made with different modes of life **may** be functionally significant, but insufficient evidence prevents us from making a decision. Owre has done a great deal of work, and he is to be congratulated. Further studies of these birds would be most welcome, and some of the information I mentioned above could be gathered without much additional effort.

Owre recommends that the anhinga and cormorants be placed in separate families, and he believes his study supports this conclusion. Since there is no given level of morphological divergence that signifies family rank taxa, I cannot agree. If he had made the argument that the morphological divergence between these two groups is as great as among the other families of the order, then he would have made a stronger case. But this was a study of morphological adaptation and not of systematics; the latter will have to await a comparative study of the order.—Joel Cracraft.

NOTES AND NEWS

We note with pleasure the addition to the review staff of Joel Cracraft, a research fellow in the Department of Ornithology at the American Museum of Natural History in New York. He will specialize in anatomy, paleontology, higher-level systematics, and zoogeography.

A substantial increase in our printing rates was effective with the January issue. We do not expect to have to reduce the size of issues, nor will we increase dues and subscriptions at the moment. The best way to minimize increases in dues and subscriptions is to increase our circulation further. Anything our readers can to to mention *Bird-Banding* to potential new members or subscribers will help both our readers and the journal. The cost of separates and of extra whole copies for authors have also increased.

As this issue goes to press, we are able to offer quicker than normal publication time for some papers. We have been getting a good flow of papers, but the long issues at present can use several sizeable papers per issue.

The Manomet Bird Observatory is completing its first year of permanent operation, with a continuing banding program and a growing involvement in educational work. A small skin and egg collection and a rapidly expanding library of books, journals and reprints, together with the completion of the banding laboratory, have added to the usefulness of the facility. Inquiries about membership and the use of the Observatory should be addressed to the Director, Manomet Bird Observatory, P. O. Box O, Manomet, Mass. 02345.

Prices and availability of NEBBA mist nets are as stated in the October,