RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

NEW JOURNALS

1. Bird Watcher's Digest. 1978. Issued bimonthly by Pardson Corp., P.O. Box 110, Marietta, OH.—It is unclear if the articles printed in this journal are reprinted, are condensations of newspaper articles, or articles rewritten for this digest or perhaps combinations of the above. The first issue (Sept. 1978) contains 32 articles of which two were written by naturalists, one by a wildlife biologist, one by a science writer and the rest by newspaper or free lance writers. The stated aim of the journal is to present "the best journalistic feature writing on birds and bird watching currently appearing in newspapers on this continent . . . ." It also includes articles about birders. A variety of bird groups and geographic areas are covered in the articles.

The responsibility for accuracy must rest with the original author(s) although the editors can perhaps catch some inaccuracies. I mention errors because they are perpetuated by reprinting. A case in point is an article in which a journalist erroneously reports two species of owls unprotected in the state of Pennsylvania. All owl species are protected by both federal and state law in the Keystone state.

The journal appears to be printed on newspaper stock.—Richard J. Clark.

2. Birding News Survey. Premier issue, Fall 1978. Issued seasonally by Avian Publications, Inc., P.O. Box 310, Elizabethtown, KY 42701.—This "Reader's Digest" of the birding world is intended to supplement Rickert's (also editor of *Birding News Survey*) "A Guide to North American Bird Clubs" (see review **83,** *Bird-Banding,* **50:** 95, 1979). It also reprints or publishes condensations of articles from birding and wildlife publications from various parts of North America. Content of the articles center around where to go or field identification of birds. Contents, which will probably vary from issue to issue, included the following for the issue reviewed: identification, field techniques, photography, habitat conservation, attracting birds, bird finding, Florida rare bird alert, ornithological history, birding vacations, club ideas, and a selected ornithological events calender. The last named section lists events for the up-coming season along with dates, locations and contacts, all listed by state.

There is a suggestion that birding and ornithology are used synonymously: e.g., the article reprinted in "the growth of American ornithology" section points out that in 1772, Thomas Jefferson indicated 109 endemic bird species for the United States and then cites the ABA for the most recent (1977) tally of species recognized for North America north of Mexico. It may seem superfluous to make a distinction between the art of birding and the science of ornithology, but, I think it is well to keep them in mind.

A 2½-page article dealing with a bird alerting system in Florida devotes 1½ pages to the names, addresses, and telephone numbers of members of that system. This poses the question of whether the reprinted article should have been reprinted *in toto* or might more logically have had the names edited from the original article. It seems that few people outside of Florida are going to be interested in that information. A stated editorial policy for the journal and complete citation information for reprinted and condensed articles would seem to be in order. The latter would allow a person to go back to the primary source of the article with ease. There is almost enough information given that a person interested in joining a bird club sponsoring a specific journal publishing a particular article could do so; however, the reader is directed to "A Guide to North American Bird Clubs" for more information.

The articles are well duplicated on a good grade of paper and cover topics dealing with a broad geographic range. The particular issue reviewed suggests this journal will probably be of interest to well traveled birders and those interested in bird conservation, among others.—Richard J. Clark.

BANDING AND LONGEVITY

(See also 75, 87, 88)

3. Natural longevity, as determined by plumage variations, in Ayres' Eagle *Hieraetus dubis*. L. H. Brown and P. R. A. Davey. 1978. *Bokmakierie,* **30**(2): 27–31.—Due to the extreme polymorphism of the species, individuals could be identified and followed for their life spans in two areas, monitored for 28 and 10 years respectively. Reproduction was below replacement level (the species lays a single egg). The authors suspect that one young was killed and eaten by one of its parents.—C. J. Ralph.

4. Five years of bird ringing at Otayama Bird Observatory from 1973 through 1977. N. Abe et al. 1978. *Miscel. Rpts. Yamashina Inst. Ornithol.,* **10**(1,2): 142–171. (In Japanese with English summary.)—A rather complete account of the numbers (22,559 birds of 65 species) and timing of fall migrants (of 24 species) is given. The authors speculate about the effects of local weather patterns and habitat preferences on the timing of some migrants.—C. J. Ralph.

5. New Zealand Dotterel banding report number one. H. R. McKenzie. 1978. *Notornis,* **25**(3): 186–194.—The New Zealand Dotterel (*Charadrius obscurus*) was studied by color banding, 87 birds being marked in 1950–1977. The species is not entirely sedentary, as was once suspected. Major movements (up to 90 mi) seem to be undertaken by immatures. A female bred in her first year, and a male was still breeding at 26 years.—J. R. Jehl, Jr.

MIGRATION, ORIENTATION, AND HOMING

(See also 4, 51, 56, 81, 86, 87)

6. Second-order statistical analysis of directions. E. Batschelet. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton (eds.). p. 3–24. Heidelberg, Springer-Verlag.—The statistical methods used in analyzing orientation data are not very sophisticated, but for the last several years the practice of computing a mean direction from a sample of mean vectors has bothered some researchers working on problems in bird orientation. This was particularly true of the statistical analyses of data gathered on the ability of birds to use magnetism in establishing a migratory direction. In many of these studies the resultant directions of orientation on individual nights were not significant, but when a grand resultant vector of the individual nights was computed (a second-order statistical analysis), it showed statistically significant orientation. How could insignificant nightly vectors contribute to a significant seasonally appropriate resultant vector?

Batschelet's paper gives several "legitimate" ways of conducting second-order statistical analyses. Circular samples of equal size are first reduced to their respective mean vectors, resulting in a sample of mean vectors (second-order sample). To test for concentration, Kolmogorov's test of goodness of fit may be used. Because second-order samples are essentially bivariate, Hotelling's T^2 test may be applied if the sample shows normality. If not, an alternative nonparametric test can be applied, and Batschelet recommends a linear correlation technique. The paper ends with a consideration of the comparison of two independent second-order samples. This paper is a valuable contribution to the array of statistical tests that are available for the analysis of directional data, and the tests should be used in all future papers requiring second-order statistical analyses.—Sidney A. Gauthreaux, Jr.

7. Sensory mechanisms for animal orientation—can any new ones be discovered? M. L. Kreithen. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton (eds.) p. 25–34. Heidelberg, Springer-Verlag.—In the last few

years many new sensory capabilities have been discovered in homing pigeons. Homing pigeons can apparently detect polarized light, ultraviolet (UV) light, barometric pressure changes, magnetism, and atmospheric infrasound (0.1 to 10 Hz). In this paper Kreithen discusses three of his experiments as case studies of how barriers can be crossed in exploring avian sensory capabilities, and he offers some tentative explanations of why earlier experiments failed to show what is now "easy to accomplish." The three experiments are his on polarized light, ultraviolet light, and atmospheric infrasound. Although his paper is quite interesting and offers ample encouragement to those of us who want to know the real array of sensory capabilities in birds, nowhere in his paper does he discuss the demonstrated utility of the newly discovered sensory capabilities. It makes me reflect on some statements by Niko Tinbergen in his 1951 book, "The Study of Instinct"—we must distinguish between the perceived and the effective stimuli. The former are the subjects of sensory physiologists; the latter are studied by ethologists.—Sidney A. Gauthreaux, Jr.

8. Sensory mechanisms related to homing in pigeons. J. D. Delius and J. Emmerton. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton (eds.) p. 35–41. Heidelberg, Springer-Verlag.—Like Kreithen's paper (review no. **7.**), the authors examine several sensory mechanisms they feel are related to homing in pigeons. They report that besides having a well-developed vestibular system, pigeons possess a gravity and inertia sensitive system mediated by displacement of the viscera. The viscera thus function in a manner analogous to otoliths and are presumed to stimulate mesenteric mechanoreceptors. Pigeons had considerable difficulty in learning to distinguish an oblique cross from a vertical/horizontal one projected on the pecking keys of a Skinner box, but the authors suggest that this may be adaptive in terms of food gathering. Perhaps a pigeon spontaneously aligns its head to enable a good bill grip on randomly oriented grains. Further support for sensitivity to changes in barometric pressure is presented, and the results indicate that homing pigeons can detect altitude changes of at least 20 m. Instrumental conditioning experiments designed to demonstrate magnetic sensitivity were unsuccessful, but those designed to examine the ability of pigeons to detect and orient to polarized light were successful. Similarly, evidence that pigeons can perceive and discriminate ultraviolet light is presented. Finally the authors report that based on their electrophysiological work, the plurality and complexity of olfactory projections found in the pigeon's forebrain are surprising. The latter work of course supports to some extent the evidence originally presented by Italian researchers on the ability of pigeons to use olfaction in their homing flights.—Sidney A. Gauthreaux, Jr.

9. A role for the avian pecten oculi in orientation to the sun. J. D. Pettigrew. 1978. *In* "Animal Migration, Navigation, and Homing," K. Schmidt-Koenig and W. T. Keeton (eds.) p. 42–54. Heidelberg, Spring-Verlag.—The function of the pecten has been the subject of considerable debate. Most would agree that it has a nutritive role, but Pettigrew draws on the views of D. Griffin (that it might play a role in migration), E. Menner (that it casts a shadow), and H. Barlow (that it blocks intraocular light rays scattered from the sun's image) and proposes an orientation function. By using a scale model the author shows that the pecten is precisely placed to produce a sharply defined shadow on the field of light scattered within the eye when the sun disc (rather than direct rays from the sun itself) is imaged on one edge of the retina. The sharpness of the shadow, its extended linear contour, its proximity to the image of the horizon, and its position within the area of highest retinal resolution facilitate precise indirect observation of the sun. According to Pettigrew the use of the pecten in the proposed manner would have several advantages: avoidance of photic damage to retina, the sun is brought in close relation to the horizon and both can be viewed in the same retinal region, and the sun's trajectory could be estimated. Thus the pecten could be used in the manner of a sun compass, sundial, or sextant. The paper presents an interesting idea and hopefully will stimulate experimental work to see if the idea is indeed operational.—Sidney A. Gauthreaux, Jr.

10. Spring migration patterns in the German Bight, studied by radar and results of trapping and visual observations on Heligoland. (Untersuchungen zum Verlauf des Frühjahrszeuges über der Deutschen Bucht nach Radarstudien und Fang- und Beobachtungsergebnessen auf Heigoland). J. Jellmann and G. Vauk. 1978. *J. Ornithol.,* **119**(3): 265–286.—Radar observations of migration during the spring of 1971 through the German Bight were compared to visual observations and the results of trapping at Heligoland. Radar data were collected from 0800 to 2400. Several patterns of migration were evident. During early April, heavy, broad-front migrations of Starlings (*Sturnus vulgaris*) and thrushes moved from SW to NE. These birds showed an activity peak at 0800 and a second, smaller, peak at 2000. A similar heavy broad-front movement occurred in early May for insectivorous passerines. However, they had the highest peak between 2000 and 2100. As a result, although good quantitative agreement occurred between the intensity of migration observed by radar and visually in April, little agreement was found for the May movement. In both cases there was a good qualitative agreement on the passage of migrants, shown by a changing species composition at Heligoland. Because the Heligoland station is located on an island, one would not expect many nocturnal migrants to land there during the course of a night's migration. On the other hand, diurnal migrants might be attracted to the island near sunset, rather than risk being over open water at night. Heavy nocturnal W to E movement (mostly waterfowl and waders) also occurred during April. Passerines that winter in Great Britain also may have been involved. Narrow, ribbon migration ("Bandzug") (probably insectivorous passerines) S to N occurred in late April and early May. The authors found good agreement between visual observations, banding records, and radar data on migratory movements that consisted of diurnal migrants or water birds. Although good agreement was found regarding the species composition of nocturnal movements, visual techniques and banding greatly underestimated the number of migrants aloft at night. As stated above, this is probably because the field station is located on an island.—Robert C. Beason.

11. Activities of caged *Emberiza schoeniclus* exposed to different artificial temperatures. T. Nakamura, O. Kurosawa, and S. Shinkai. 1978. *Miscel. Rpts. Yamashina Inst. Ornithol.,* **10**(1,2): 119–126. (In Japanese with English summary.)—The authors confined three groups of five Reed Buntings each to ambient temperatures of 23°, 15°, and 8°C, and monitored their Zugunruhe from March through January. An increase in weight occurred in all groups in the spring, but not significantly in the fall. An increase in Zugunruhe in both seasons was found at 23°C; at 15°C only in the spring; and at 8°C no increase was shown.—C. J. Ralph.

POPULATION DYNAMICS

12. Estimation of population density of the Common Vole in Poland: an analysis of owl pellets. K. Cabon-Raczynska and A. Ruprecht. 1977. *Acta Theriologica,* **22**(25): 349–354. (In English with Polish summary.)—Analysis of owl pellets is used to study mammalian population dynamics. Density of the Common Vole (*Microtus arvalis*) over its Polish range invites closer inspection relative to its mass irruptions and the damage wrought. On the basis of 804 pellet samples of *Tyto alba* and *Strix aluco* from all of Poland, estimates of relative areal densities were drawn. "A sample of pellets consisted of a single collection from one owl roost." Average population density was elaborated through mapping by quadrants of 2,500 km^2. Mean density values were graded as: 0–19% low, 20–39% medium, 40–59% high, and over 60% very high. Western and southwestern areas had high densities of voles. In the remaining areas higher densities were confined to local scattered sections, or "territorial enclaves." Most of the Polish range was favored by medium and low densities. The authors state that their methods depict as close a picture of vole density as may be gained either by a questionnaire or by direct counts of the rodents. Density of voles was maximal on fertile soils, and minimal in forests.—Leon Kelso.

13. Studies on the line transect census method of the woodland bird populations. I. An analysis of diurnal change of the census effectivity. M. Yui. 1978. *Miscel. Rpts. Yamashina Inst. Ornithol.*, **10**(1,2): 70–81. (In Japanese with English summary.)—The author investigated the effectiveness of censuses at different times of day in determining numbers of individuals. During the breeding season the number of individuals recorded dropped about 40% after the morning peak (from about 0400 to 0600). For the rest of the day until sunset at about 1900, the numbers were remarkably stable. Further, the relative dominance values (percent occurrence) showed no significant decline during the course of the day. These data, if confirmed, might encourage workers to expand the period during the day for censusing from the traditional first few hours of the day. However, the author found that during the nonbreeding season the birds censused could be divided into two groups, one showing a marked circadian pattern in relative dominance (mostly migrants and corvids) and the other (resident small passerines and woodpeckers) with no such pattern. Further work along this line of inquiry is needed especially as bird censuses become more and more important in formulating political policy.—C. J. Ralph.

14. White Island—volcanic activity and bird life. K. Wodzicki. 1978. *Notornis*, **25**(3): 195–197.—White Island, a small island in the Bay of Plenty, N.Z., has been subject to volcanic activity since December 1976. In August 1977, the gannet population was about one half as large as in 1947, and no landbirds were present (formerly eight species were not uncommon). Apparently volcanic ash has destroyed prey species. An excellent opportunity to gather data on recolonization awaits.—J. R. Jehl, Jr.

15. The effect of observer variability on bird census results obtained by a territory mapping technique. A. Enemar, B. Sjöstrand, and S. Svensson. 1978. *Ornis Scand.*, **9**(1): 31–39.—With the phenomenal increase in the number of both long-term and ad hoc, site-specific, bird censuses being conducted, the need for critical evaluation of census techniques seems all the more apparent (review no. **13**). This paper is one of the few efforts to determine the nature and extent of inter-observer reliability in censuses of breeding woodland passerines. The technique used here is that of territory mapping, in which encounters (contacts) with birds along transects in a finite sample area are plotted on maps, several replicates are conducted, and clusters of contacts on a composite map are circumscribed and assumed to denote movements of individuals within territories.

Four different but experienced observers independently ran 10 replicate censuses in the same plot in each of two breeding seasons. Potentially complicating factors, such as time of day, weather conditions, and time spent censusing, were standardized as much as possible, leaving observer variability as the primary source of bias. The relationship between census results and the actual population was not investigated.

Using the number of contacts as the data set for measuring observer variability, no significant differences were found among observers for species or combinations of species for which the number of contacts was roughly 100 or greater. The relationship between number of contacts and variability among observers was examined in more detail by regressing number of contacts on the coefficients of variation among observers. Ten contacts yielded a coefficient of 10 whereas 50 contacts yielded a coefficient of 5. This relationship is nearly identical to the expected result for a binomially distributed variable. Unfortunately the probable interaction between number of replicate censuses and number of contacts is not mentioned, leaving the regression open to possible misinterpretation. For example, a larger sample plot combined with fewer replicate censuses should result in a higher coefficient of variation, despite potentially similar numbers of total contacts. The authors do not address the problem of the optimal number of replications here.

Observer reliability between years was also analyzed. Pairwise correlations among observers for direction and magnitude of population change between successive years ranged from 0.65 to 0.88 for number of territories and 0.66 to 0.83 for number of contacts. All correlations were statistically significant.

The only noteworthy weakness of the paper is occasional faulty sentence structure and word choice that leads to confusion, especially in discussions of statistical applications.

Similarly, it is sometimes not immediately obvious which variables are being referred to in references to sample size, correlation, and the like. But, overall, the study is a careful one and should be a useful reference for investigators concerned with censusing populations characterized by territory-like spacing systems.—Marshall A. Howe.

NESTING AND REPRODUCTION

(See also 3, 27, 34, 40, 41, 42, 44, 54, 60, 83, 85, 87, 89)

16. A pulse-position-modulated multichannel radio telemetry system for the study of the avian nest microclimate. P. Howey, R. Board, and J. Kear. 1977. *Biotelemetry,* **4**(4): 169–180.—This multichannel system was developed to monitor the environment of birds' nests continuously. Probes to measure temperatures at six points, relative humidity, light and egg positions, together with a transmitter and power supply, were contained in a fiberglass shell, having the shape, size and weight of the species' egg being tested. The sensory egg was placed in the nest at completion of a clutch and not removed until the young hatched. A low-power "transponder" was used to relay signals as far as two mi to a data-logging system in the laboratory. Thus, more and more electronic refinement is being used.—Leon Kelso.

17. The temperature cycle of egg incubation of the Little Owl in Moldavia. (Temperaturnyi rezhim inkubatsii yaits u domogo sycha v Moldavii.) N. Zubkov. 1978. *Izvest. Akad. Nauk Moldavskoi SSR., Ser. Biol.,* **1978**(4): 88–90. (In Russian.)—At two nests of *Athene noctua* electrothermometric recordings measured heat, mainly of the nest cavity floor. Average maximum temperature during early incubation was 26.4°C, during the latter half, 29.1°. Average minimum temperature was 21.8°C and 25.6°C respectively. The rate of egg shifting and rotation in the nest, by the female, varied from 0.5 to 5.0 per hr. As the temperature outside the nest dropped, incubation persistence rose, and at midday temperatures it rose as in other bird species. The sequence of hatching of 3–5 young corresponded to that of egg deposition. Average time of incubation was 28 days.—Leon Kelso.

18. Breeding strategies in birds of prey. I. Newton. 1977. *Living Bird,* **16:** 51–82.—Newton examines variations within the order Falconiformes in egg size, clutch size, laying intervals, duration of incubation, nestling and fledgling periods, age at first breeding, and frequency of breeding. He then comes to the unremarkable conclusion that birds of prey are really no different than most other birds in their reproductive strategies. The concepts of *r*- and *K*-selection seem to apply well to raptors: large body size, long life span, delayed breeding, low fecundity, and extended periods of parental care are correlated as well in raptors, as a subset, as they are in the class Aves as a whole. Newton's entire thesis, although few would argue with it, is actually based on very little data and a lot of generalities borrowed from other workers. His information on raptor breeding biology comes almost exclusively from the north temperate zone and his sample of species is composed of a highly heterogeneous assemblage of birds that scavenge, or actually pursue and capture such diverse prey as insects, fish, reptiles, mammals, and birds. It would have been interesting to examine more closely the variations in breeding strategies that parallel the diverse diets encompassed in this group. Although Newton notes that rodent-eaters lay larger clutches than bird-eaters, which, in turn, have larger clutches than insect or reptile-eaters, he discusses very little about these trends and sticks to the safe ground of discussing breeding correlates of body size.

In the end, this paper has little new to offer, except to demonstrate that, at least in their breeding strategies, birds of prey are just like other birds.—Stanley A. Temple.

19. Recent observations of the Short-tailed Albatross *Diomedea albatrus* on Torishima. H. Hasegawa. 1978. *Miscel. Rpts. Yamashina Inst. Ornithol.,* **10**(1,2):58–69.—This paper reports on visits to this active volcanic island which is the only known breeding

ground of this extremely rare bird. The author estimates about 40 pairs in the 1976–1977 and 1977–1978 seasons, and fledging of only 15 young in the 1976–1977 season. Replacement of a tall protective grass with a shorter species (and feral cats) are suggested as factors in the continued low population and poor reproductive success. Urgent conservation measures are needed to preserve this now-neglected species. The lone adult now in residence at Kure Atoll, Hawaii, may indicate that a transplant for foster parenting might be successful.—C. J. Ralph.

20. The energy value of the yolk reserve in a North Island Brown Kiwi chick. B. Reid. 1977. *Notornis,* **24**(3): 194–195.—An egg 126.9 × 78.3 mm, with a calculated fresh weight of 435–440 g hatched a chick that, while wet, weighed 351.3 g. At death, after 37 hr, its weight was 290.5 g. Surface moisture on the newly hatched chick was about 15–25 g so the decrease in biomass while the chick was alive was 35 to 45 g or about 1 g/hr. Postmortem examination showed a yolk sac of 86.5 g which was 43.55% water and 56.45% solids with an energy value of 18.34 kilojoules (5.38 kcal) per gram wet or 32.5 kilojoules (7.76 kcal) per gram dry weight. "The very close agreement between the proportion of solids and relative energy values of yolk would indicate that the composition of the yolk changed very little during embryonic development."—Leon Kelso.

21. Incubation temperatures of the North Island Brown Kiwi (*Apteryx australis mantelli*). B. Rowe. 1978. *Notornis,* **25**(3): 213–217.—Kiwi eggs weigh approximately 20% as much as the adult male, which is responsible for incubation. Egg temperatures were recorded by telemetry (surface 37°C, core 35°C). Kiwis do not turn their eggs, perhaps because they nest in burrows, and the author suggests that the unusual activity of the embryo may compensate for this. An egg was hatched artificially, without turning, in 71 days.—J. R. Jehl, Jr.

22. Cannibalism in the Barn Owl (*Tyto alba*). (Le cannibalisme chez l'Effraie, *Tyto alba.*) H. Baudvin. 1978. Nos Oiseaux, **34**(370): 223–231. (In French.)—The article discusses the benefits of incubation beginning with the first egg, and adult behavior relative to the diversity of nestling ages. Normal development of 6–10 young during a period of 3 weeks requires the capture of 30–40 small rodents per night. In the event of food shortage, most of the prey is received by the older young. The younger may go without food for 2–3 nights, after which they weaken and die. The female may dismember the dead and feed the remnants to the surviving young. Yet never does it kill off the younger. Not once were adults seen dismembering dead nestlings that had started to feather out. The author presumed that their weight (about 250 g) exceeds that of the potential prey. In the years 1972–1977, mortality of young by cannibalism varied from 7 to 32%. A correlation between precipitation and the rate of cannibalism was found: 1% mortality per 20–23 mm precipitation during five nestling months. They found 40 instances of verified or presumptive cannibalism around Dijon, south France. Incidentally, our own *Otus asio* cannibalizes its young during periods of extended precipitation.—Leon Kelso.

23. Studies on the breeding biology of warblers: on the choice of nest sites by Blackcaps (*Sylvia atricapilla*) in spruce (*Picea abies*) forests. (Brutbiologische Studien an Grasmücken: Über die Nisplatzuahl der Mönchsgrasmücke *Sylvia atricapilla* in Fichten—*Picea abies*—Wald). P. Berthold. 1978. *J. Ornithol.,* **119**(3):287–297.—The Blackcap shows a consistent choice of nest site under different conditions within spruce forests. Average nest height varied from 0.8 m to 2.2 m, whereas the average forest height varied from 1.7 m to 12.7 m. Blackcaps nest in spruce forests of all ages, and spruce trees are the preferred nest site, especially for early nests.—Robert C. Beason.

24. Boundary layers of bird eggs: do they ever constitute a significant barrier to water loss? C. R. Tracy and P. R. Sotherland. 1979. *Physiol. Zool.,* **52:** 63–66.—The answer

is "probably never" as assessed from predictions generated by means of a mathematical model consisting of semiempirical equations. Conductance of water across eggshells increases with size of the egg (see review no. **54**) while boundary layer conductance decreases. Boundary layer conductance is always greater than total conductance except in (theoretical) eggs greater than 10 kg. An important conclusion is that movement of air around eggs should not significantly affect the rate of water loss.—C. R. Blem.

25. Pajaro's plovers. J. Warriner and R. Warriner. 1978. *Pt. Reyes Bird Observatory* **45:** 4–5.—This brief popular account summarizes some general results of a study of the movements and breeding biology of the Snowy Plover (*Charadrius alexandrinus*) in California. Despite the folksy presentation, some interesting tidbits of insight into the mating system of the species are included. Cases of simultaneous polygyny, successive polygyny, successive polyandry, maintenance of two territories by a male, parental desertion of chicks, and egg-rolling are described. Most intriguing was a record of a chick banded on the Pajaro dunes (Monterey Bay) found the following spring some 150 mi inland at Mono Lake and then returning to Pajaro after an apparently unsuccessful nesting attempt. This raises interesting questions about the degree of genetic isolation of populations of shorebirds that are allopatric during the breeding season but sympatric in winter.—Marshall A. Howe.

BEHAVIOR

(See also 8, 11, 25, 65, 70, 75, 87)

26. Territorial Spacing of the New Zealand Falcon (*Falco novaeseelandiae*). N. C. Fox. 1978. *Notornis,* **25**(3): 203–212.—New Zealand Falcons are year-round residents on their territories, which are spaced by aggression and not by availability of nest sites. Home range in open country (15 km^2) is much smaller than in forested areas (189 km^2).—J. R. Jehl, Jr.

27. Reproductive behaviour of the Black-throated Diver *Gavia arctica*. S. Sjölander. 1978. *Ornis Scand.* **9**(1): 51–65.—This is one of the few studies of the breeding behavior of *Gavia arctica* in the English language. Based on observations of breeding pairs in both Alaska and Sweden, it is a rather cursory and largely non-quantitative account. Eight vocalizations are described (sonograms for 7) along with 17 visual displays or posturings, many accompanied by line diagrams. A situational analysis provides useful information on the probabilities of displays occurring in various social contexts. Empirical evidence suggests that the male determines the choice of nest site. Incubation period is 27 to 29 days and young achieve flight between 62 and 72 days. The parent–young bond deteriorates rapidly at this time, but sibling bonds persist and the young remain in the parental territory until autumn migration. Except for vocalizations, displays and breeding biology of this species do not differ strikingly from those of other loons.

The most interesting behavioral pattern of loons is the daily ritual in which both territorial breeders and nonbreeders gather in one spot, circle, display, dive, and catch fish. According to this paper, participation in such rituals is compelling enough to induce both members of a pair to abandon recently (age unspecified) hatched young for as long as two hours! Disappointingly, however, no light is shed on the function of these gatherings. The author considers communal fishing to be the function, rather than social courtship suggested by others, but no convincing evidence or adaptive explanation is presented. For the time being it remains an intriguing and problematical ingredient of loon breeding biology.—Marshall A. Howe.

28. Discrimination learning without short-term memory: dissociation of memory processes in pigeons. W. S. Maki. 1979. *Science,* **204:** 83–85.—This complex experiment suggests that, in the domestic pigeon, the relation between short-term memory and long-term memory (true learning) may be more a matter of statistical correlation than of direct causation.—C. H. Blake.

ECOLOGY

(See also 18, 48, 70, 72)

29. Connections between predatory birds and mammals and their prey. J. Groszcynski. 1977. *Acta Theriol.*, **22**(30): 399–430. (In English with Polish summary.)—This review draws attention to Polish studies of owl pellets from *Strix aluco* (492 pellets), *Asio otus* (1675), *Tyto alba* (1286), *Buteo* spp. (1321), and *Buteo buteo* (1235). On the basis of their analysis the authors conclude that even if predators could briefly modify the density of their prey, they would be unable to maintain reduced density among prey populations. The occurrence of mass irruptions of voles (*Microtus arvalis*) in the study area is the best proof of this. The difference in the reproductive potential and biomass of predator and prey is so great that predators are unable to affect variations in the number of prey in the censuses examined. This is particularly so since the pronounced increase in the vole population takes place during the luxuriant development of foliage, which hinders the foraging of the predators.—Leon Kelso.

30. Habitat selection and interspecific territoriality among the sylviid warblers of England and Sweden. M. L. Cody. 1978. *Ecol. Monogr.*, **48**(4): 351–396.—This paper extends the research Cody published with Walter (*Oikos*, **27:** 210–238, 1976) on habitat selection and species interactions in warblers. In the present work, Cody studied 3 species of *Phylloscopus*, 6 *Sylvia*, and 3 additional species. In Part I of this work, Cody measured vegetation density at each of 10 height categories above the ground and analyzed these data using step-wise discriminant function analysis to define habitat preferences of the various species and canonical variables to define interspecific habitat segregation. With the resulting statistical constructs, Cody showed that the same habitat criteria are useful in describing habitat selection of individual species in both England and Sweden but that the exact habitat niche selected by any particular species varies in the two countries according to what other species are present. Moreover, within a given country and habitat patch, the species present could only be predicted accurately about two thirds of the time. This level of accuracy indicates that these species show some flexibility in their habitat selection criteria and that factors other than just vegetation profile are likely to be important in defining separations.

In Part II, Cody presents mapped out territories of various species of warblers and reports on observations of behavioral interactions between the species that occupy these territories. The results here complement those referred to above by showing that certain species, either singly or in pairs, are interspecifically dominant and able to preclude occupancy by less dominant species of the latters' preferred habitat regions as defined above. Cody also reports data on insect densities at different foliage heights and percentages of foraging time spent at different foliage heights which further elucidate his results by indicating complementarity of foraging heights among some coexisting species and diffuse competition among others. Finally, he presents a few sonograms and suggests that, although the warbler calls remain quite flexible in most species, there is apparent convergence in many cases and vocal interactions may well determine the outcome of interspecific encounters.

Cody's analysis is thorough, right down to his final list of suggestions for further study. The major regret I had was one shared by Cody: two of the species in his analysis were represented by only one territory and for four additional species the sample size was only 3 to 7.—A. John Gatz, Jr.

31. Foraging strategies, diversity, and seasonality in bird communities of Appalachian spruce-fir forests. K. N. Rabenold. 1978. *Ecol. Monogr.*, **48**(4): 397–424.—This MacArthur-like study of foraging behavior of the "arboreal foliage-gleaning insectivore guild" of spruce-fir forests in North Carolina and Maine is adapted from Rabenold's dissertation research at UNC Chapel Hill. In it are given quantitative descriptions of the foraging sites as defined by 10 vertical and four horizontal subdivisions of a tree and foraging techniques as defined by eight behavioral patterns for each of six species found

in both study areas and an additional five species found in the north. Rabenold reports three major results. (1) In all cases, bird species that occurred in both NC and ME were more generalized, i.e., foraged in a higher diversity of sections of the tree and used a higher diversity of foraging techniques, in the relatively depauperate south than the more species-rich north. (2) The total foraging niche space, both in terms of area and behavior, was the same or smaller in the north than the south. (3) The "extra" species in the north were squeezed in by having a variety of new generalist species overlap widely with the specialized core species present in both the north and south. Rabenold suggests all his results might best be explained by considerations of optimal foraging theory. Higher food levels in the north, which he documents, allow specialization there and more species than the lower food levels present in the south which necessitate generalization. The study is thorough and relates field observations to ecological theory.—A. John Gatz, Jr.

32. Energy balance and hypothermy in the Siberian Jay during the winter season. (Energeticheskii balans i yavlenie gipotermii u kukshii v zimnii period.) A. Andreev. 1978. *Ekologiya,* **1978**(4): 65–72. (In Russian.)—Andreev found that under experimental conditions the metabolic rate of *Perisoreus infaustus* increases little with decreasing air temperature. He considered the result logical in light of extrapolation in the realm of "bioenergetic equivalence." The lack of change in metabolic rate may be conditioned by reduced motor activity and lower nocturnal body temperature. Records and observations in the wild indicate that reduction of subsistence energy is the sole mode of maintaining energy balance and individual survival in extremely severe winters of −60° C. In summary, it was noted that in winter the "kuksha" loses no definite body weight. Energy exchange was more balanced in nature than in experiments. Energy expenditure recorded in the laboratory evidently corresponded to energy expenditure in nature. Also considered are morphological and behavioral adaptations to reduce energy requirements (dense and long plumage, food storage in fall, well developed sublingual salivary glands) along with physiological adaptations such as less motor activity and hypothermy. Such may be regarded as elemental adaptations enabling the Siberian Jay to overwinter in northern latitudes.—Leon Kelso.

33. Energy content of spiders and insects on branches of spruce (*Picea abies*) in winter; prey of certain passerine birds. R. Norberg. 1978. *Oikos,* **31**(2): 222–229. (In English with English and Russian summaries.)—Surveys rarely afford a close comparison of predation and abundance. This is one of those rare surveys. A research team collecting from spruce limbs in Sept.–Oct. and Feb.–March in southwest Sweden found 19 species of spiders and various species of insects. Spiders of the Family Thomisidae were most common (35–45% of individuals). One species, *Philodromus aureolus,* constituted 35–39%. Generally the birds, *Certhia familiaris, Parus montanus, P. cristatus, P. ater,* and *Regulus regulus,* chose prey without regard to taxonomy. In fall the energy content per gram dry mass was 24.0 for spiders, 21.7 for Psocoptera, and 22.0 for Curculionidae. In winter energy content per gram dry mass declined 5.8% in spiders. If this reduction represents metabolism of stored fat only "the corresponding reduction of dry mass per spider would be 8%, and the reduction of energy content per spider, 13%," much more than in autumn.—Leon Kelso.

34. Competition between the Great Tit *Parus major* and the Pied Flycatcher *Ficedula hypoleuca*: an experiment. T. Slagsvold. 1978. *Ornis Scand.* **9**(1): 46–50.—Pied Flycatchers arrive in the spring after Great Tits have begun nesting. Both species nest in similar cavities. In this study the only cavities available were artificial nest boxes. Shortly after the flycatchers arrived, all boxes not occupied by tits were made uninhabitable (by "various," largely undescribed methods). This situation led to a shifting of song posts by many male flycatchers to the vicinity of tit nest boxes. Of eight interspecific aggressive encounters observed, the flycatcher was the aggressor in six. No indication of the outcomes is given. Numerous inspections of tit nests by flycatchers were observed, but only two of

the 40 tit nests (including nine Coal Tits [*Parus ater*] curiously not mentioned in the title) were successfully usurped.

The objective of the study appears to be a straightforward, practical assessment of the potential effects of limited forest habitat on populations of flycatchers and tits. In this case the flycatchers are clearly at a competitive disadvantage in securing nest sites already occupied by tits. A previous study is alluded to, in which all nest holes were blocked from both flycatchers and tits until the flycatchers arrived. Unfortunately the results are not described and no evolutionary implications are discussed.—Marshall A. Howe.

35. Regularity, randomness, and aggregation in flowering phenologies. R. W. Poole, B. J. Rathcke, and F. G. Stiles. 1979. *Science,* **203:** 470–471.—This is a criticism by the first two authors of a paper by Stiles (*Science,* **198:** 1977) and rejoinder by Stiles. The criticism assumes a growing season for each species of plant pollinated by hummingbirds and the relation of peak flowering dates and excludes the period October to January. Stiles found only a short nongrowing season around the beginning of December. Normalization is an essential part of the statistical treatment by Poole and Rathcke, but the process may obscure significant features of the distribution. Stiles points out that the concept of an annual "growing season" does not generally apply in the tropics where each plant species may have its own growing season, related to wet and dry seasons.—C. H. Blake.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(See also 12, 13, 15, 83, 88)

36. A possible method of protecting grape crops by using an accoustical device to interfere with communication calls by Silvereyes. T. A. Knight and F. N. Robinson. 1978, *Emu,* **78:** 235–236.—Damage to grapes by *Zosterops lateralis* has long been a problem to grape growers in southern Australia. On the assumption that increasing numbers of these birds are attracted by the calls of birds first foraging in a vineyard, an attempt was made to jam the birds' communications by broadcasting in the vineyards a sound covering the frequency range of the birds' calls. Substantial reduction in damage to the grapes was achieved.

Take heed research workers and administrators, much need exists for imaginative research such as that done by Knight and Robinson if we are ever to clear from our dinner tables food contaminated with chemical pesticides and repellents.—Paul A. Stewart.

37. Damage to loblolly pine by winter roosting blackbirds and Starlings. J. W. Hardy. 1978. *Proc. Ann. Conf. Southeast. Assoc. Fish & Wildl. Agencies,* **30:** 466–470.—This paper reports a case in Georgia where the droppings of a roosting congregation of blackbirds and *Sturnus vulgaris* killed 96% of the loblolly pine (*Pinus taeda*) on the 2 ha of a 4-ha plot which these birds used most heavily for roosting. The total damage to the stand was estimated at $103.60. Based on soil samples and general appearance of the stand, it was concluded that damage to the trees resulted from excessive deposits of soluble salts in the droppings of the birds and from mechanical breaking of the tree branches.

Because every farmer is aware of the hazards to plant growth associated with excessive use of soil fertilizers, further research to demonstrate this point seems superfluous. Meaningful research on the problem of fecal deposits of large roosting congregations of blackbirds and Starlings might properly be directed at determining what management of the birds' roosting behavior is needed to attain maximum tree growth. In my experience the birds can be induced easily to change roosting locations with appropriate harassment. With the fertilizer delivered and spread by the birds, a few hours spent to assure its proper spreading may be a small cost to pay for fertilization of a pine plantation.—Paul A. Stewart.

CONSERVATION AND ENVIRONMENTAL QUALITY

(See also 2, 19, 57, 59, 82, 83, 88)

38. An experiment in determining optimum feeding frequency for hand rearing Great Bustard chicks. (Ein Experiment zur Ermittlung der optimalen Futterungsfrequenz bei der Handaufzucht von Grosstraupenkukuken (*Otis tarda* L.). R. Hutterer. 1977. *Egretta,* **20**(2): 21–76. (In German with English summary.)—While hand rearing two Great Bustard chicks some experiments were conducted to determine optimum feeding frequency for the first few days after hatching. Best results followed a feeding frequency of one per daylight hr. Longer intervals led to retarded weight gain, and irregular activity, shorter intervals resulted in overfeeding and "overstrain of the digestive tract."—Leon Kelso.

39. Crisis at Mono Lake. R. M. Stewart. 1978. *Pt. Reyes Bird Observatory,* **44:** 7–8.—This short article and conservation plea points out some of the unique features of Mono Lake, whose water level has been severely lowered during the past 40 years (and especially since 1970) by water diversion for Los Angeles. This highly alkaline lake has no fish but has a productive planktonic community. An island threatened by receding water levels has the second largest breeding colony of California Gulls (40,000 birds). The lake is used by tens of thousands of migrating Wilson's and Northern phalaropes, and nearly 750,000 Eared Grebes have been estimated on a single day in August. The lake could be an extremely critical resource for some of these species.—Marshall A. Howe.

40. Productivity of Ospreys in Connecticut-Long Island increases as DDE residues decline. P. R. Spitzer, R. W. Risebrough, W. Walker, R. Hernandez, A. Poole, D. Puleston, and I. C. T. Nisbet. 1978. *Science,* **202**(4365): 333–335.—After the curtailment of DDT usage in North America, there was an expectation that certain populations of raptors that had declined during the DDT era would recover their numbers. This paper reports on just such a recovery—the first documented for a North American raptor—in the populations of *Pandion haliaetus* of coastal southern New England. Nesting success of these Ospreys has increased significantly since 1973 and is now approaching levels recorded before 1950. Simultaneously, DDE and dieldrin residues have declined in unhatched eggs. The important conclusion of this paper is that the regional decline of New England's Ospreys was due primarily to low reproductive success caused by residues of DDE, a problem that was remedied by the ban on DDT usage.—Stanley A. Temple.

41. On the biology and behavior of Armstrong's Sandpiper on Sakhalin Island. (O biologii i povedenii okhotskogo ulita [*Tringa guttifer*] na ostrove sakhalin.) V. Nechaev. 1978. *Zool. Zhurn.,* **57**(5): 727–737. (In Russian with English summary.)—The Okhotsk ulit (*Tringa guttifer*) (so termed in preference to the more ponderous English name) is a rare and apparently endangered species listed in the avian "red book" of far eastern USSR and Japan. On north Sakhalin it inhabits the marshy shores of lagoons among open stands of larch. The aggressive males performed display flights and whistled loud trills during June. All five nests found were set in forks of larch branches 2.3–4.5 m high and were built of larch twigs laced with beard (*Usnea*) lichens. The 4-egg clutch was laid in early June. The eggs were bluish green with pale gray to dark brown spots. Both sexes incubated. Hatching occurred in mid-June. For 1–2 days the adults guarded the chicks which foraged along the shore of lagoon inlets. The natal down resembled that of the Redshank (*T. totanus*). Feeding and other behavior at nesting locales are described. In sum the Okhotsk ulit appears to be a relict species of fragmented distribution and low numbers, compared to the Redshank and other shorebirds with which it associates. The author recommends that present breeding grounds be charted and protected.—Leon Kelso.

PHYSIOLOGY

(See also 7, 8, 20, 21, 24, 32, 78, 79)

42. Plasma calcium as an indicator of reproductive condition in female Blue Grouse. S. J. Hannon. 1979. *Can. J. Zool.*, **57**(2): 463–465.—Hannon recognized the need for a reasonably inexpensive, rapid and accurate method of determining the reproductive status of laying and prelaying wild female *Dendragapus obscurus*. In this note, she reports success in that total plasma calcium (determined by an atomic absorption flame emission spectrophotometer) was highly and positively correlated with both the weight of the oviduct and the diameter of the largest ovarian follicle in 137 hens. Low calcium level alone could be used to distinguish birds of greater than nine days preovulation from those closer to ovulation, and the combination of low calcium level and presence of a brood pouch distinguished postlaying hens from both of the other two groups.—A. John Gatz, Jr.

43. Functional maturation of the salt gland of the goose. I. H. Zucker, R. C. Huskey, C. E. C. Haack, and J. P. Gilmore. 1979. *Comp. Biochem. Physiol.*, **62A:** 627–630.—The nasal salt gland of the domestic goose (*Anser anser*) is functional at an early age (five weeks) and its capacity to secrete a salt load decreases with age. Young geese secreted larger volumes and sodium concentrations after artificial NaCl loads than did adults. Circumstantial evidence indicates that young geese are also capable of excreting a substantial proportion of a salt load by renal mechanisms.—C. R. Blem.

44. Environmental cues influencing the breeding biology and circulating levels of various hormones and triglycerides in the Cape Cormorant. H. H. Berry, R. P. Millar, and G. N. Louw. 1979. *Comp. Biochem. Physiol.*, **62A:** 879–884.—The reproductive biology of *Phalacrocorax capensis* was studied through one annual cycle at a breeding site on the Namibian coast. The title of this paper is somewhat misleading because environmental cues are only superficially considered, whereas much attention was given to gonadal weights and hormones, the thyroid, pituitary, triglyceride levels, and breeding activity. A wealth of physiological and morphometric data are contained here. The authors only superficially analyze the data and judging from the amount of information they have to offer, this may have been an excellent approach. A more intensive analysis would be profitable and it would be particularly informative if the authors could include some indication of specific reproductive activity (i.e., nesting, egg laying, feeding young) along with their extensive tracking of physiological variables.—C. R. Blem.

45. Brain temperature in Pigeons: effects of anterior respiratory bypass. M. H. Bernstein, I. Sandoval, M. B. Curtis, and D. M. Hudson. 1979. *J. Comp. Physiol.*, **129:** 115–118.—The postulated countercurrent mechanism in the *rete mirabile ophthalmicum* requires the potential for cooling venous blood draining the cranial areas so that heat can be exchanged in the *rete* with warm arterial blood arriving from the core of the bird. This study attempted to identify the cranial sites of evaporative cooling and focused on three areas with moist surfaces: the buccopharyngeal cavity, nares, and eyes. When evaporation from the buccopharyngeal cavity was prevented by a tracheal cannula bypass, the brain-body temperature difference (0.7°C) during heat stress was not significantly altered from control levels. When both the buccopharyngeal cavity and nares were sealed in the bypass animals, the brain remained an average of 0.4°C lower than body temperature. Only when all three areas were sealed off did brain temperature equal or exceed body temperature. The data indicate that evaporation from eyes and nasal and buccopharyngeal cavities is correlated with a reduction in brain temperature below body temperature during heat stress. The study did not resolve whether this differential was actually due to the countercurrent mechanism or to the formation of a heat sink in peripheral areas for heat loss from internal brain structures.—Cynthia Carey.

46. Role of the *rete mirabile ophthalmicum* in maintaining the body-to-brain temperature difference in Pigeons. D. L. Kilgore, D. F. Boggs, and G. F. Birchard. 1979. *J.*

Comp. Physiol., **129:** 119–122.—Brains of homeotherms are less resistant to thermal variation than are other tissues, but little is known about mechanisms that may prevent fluctuation of brain temperature during thermal stress. The *rete mirabile ophthalmicum,* an arterial-venous network of vessels between the orbit of the eye and the external auditory meatus, has been postulated to play a role in the regulation of brain temperature during heat stress. This study shows that brain temperatures of control, sham-operated, and birds with partial blockage of arterial flow remained about 1°C lower than core body temperature during heat stress. When the major arterial supplies to the *rete* are completely blocked, brain temperature averaged 0.36°C above core temperature. The study does not actually demonstrate a countercurrent heat exchange between the arterial and venous components of the *rete,* but rather assumes that differences between brain and body temperature during heat stress indicate that warm arterial blood could exchange heat in the *rete* as it comes in close proximity to venous blood draining areas of the head cooled by evaporation. A critical experiment is needed to show temperature differences in the arterial and venous components of the *rete* to confirm this assumption.—Cynthia Carey.

47. Osmolality and volume factors in salt gland control of Pekin Ducks after adaptation to chronic salt loading. H. Deutsch, H. T. Hammel, E. Simon, and C. Simon-Opperman. 1979. *J. Comp. Physiol.,* **129:** 301–308.—Since the capacity for extrarenal salt excretion by the supraorbital gland in birds was discovered by Schmidt-Nielsen and coworkers, the nature of the stimulus for initiation of secretion and the location of the receptors controlling activity of the salt gland have not been fully established. This study asks whether tonicity or volume or both provide appropriate stimuli for secretion by the salt gland. In a series of elegantly designed experiments, ducks adapted to fresh water or to NaCl concentrations were subjected to step-wise plasma salt loading by intravenous infusion. The salt-adapted ducks were able to balance NaCl input with output, primarily by salt gland secretion. The excretory capacity of non-adapted ducks was insufficient to deal with the loading; 42% of the salt load was retained and blood osmotic pressure increased accordingly. Stimulatory effects of various hypertonic solutions confirmed the role of tonicity receptors in stimulating salt gland secretion in both adapted and non-adapted ducks. However, infusion of hypertonic NaCl solutions that were hypotonic to salt gland secretions implicated the existence and influence of volume receptors in stimulating salt gland activity. The location of such receptors was not found.—Cynthia Carey.

48. The significance of ground effect to the aerodynamic cost of flight and energetics of the Black Skimmer (*Ryncops nigra*). P. C. Withers and P. L. Timco. 1977. *J. Exp. Biol.,* **70:** 13–26.—*"The Kite flew just above the ground, majestically extending its wings, when suddenly it stopped in mid-air, as if it had fallen into deep thought on life's tedium."* ("The Steppe," by Chekov). *"When these prodigies do so conjointly meet, let not men say 'These are their reasons, they are natural'."* ("J. Caesar," by Shakespeare). These classic words may be as meaningful as those uttered in this article. The phenomenon exists; that is its reason. The kinetics and aerodynamics of flapping and gliding flight were examined relative to the significance of ground effect in the foraging and daily energy budget of skimmers. Ground effect is defined as an increase in lift and a decrease in drag of an aerofoil close to the ground. Duration of up and down stroke in wing movements here is similar to that of other birds. The wing beat frequency was 3.1 s^{-1} and flight velocity was 9.1 ms^{-1}. The wing stroke was markedly asymmetric, mostly above the body plane. Beats were irregular and of low amplitude in skimming. Flight velocity was 10.3 ms^{-1}. Induced, parasitic, and profile power were calculated as in Tucker (1973) in absence of ground effect. Ground effect reduced induced power requirements, hence total power for flapping flight, and thus to reduce glide angle and sink velocity during gliding. The lower mandible drag was 10^{-4} N, insignificant relative to total aerodynamic drag of 0.4 N. The ground effect markedly enhanced foraging efficiency and energy balance.—Leon Kelso.

49. The plasma proteins of some albatrosses and petrels as an index of relationship in the Procellariiformes. P. C. Harper. 1978. *N.Z.J. Zool.,* **5:** 509–548.—No fewer

than 29 species (from the New Zealand region) were sampled, or about one third of those in the order; species from the four procellariiform families were represented: 4 albatrosses (2 genera), 21 petrels (7 genera), 1 diving petrel, and 3 stormpetrels (3 genera). Gathering the blood samples from 427 birds during 31 visits to petrel colonies in 3 years, represents an admirable amount of work given the normal difficulties in trying to reach seabird breeding sites. Acrylamide gel electrophoresis and immunoelectrophoresis were used in the comparisons. Although measurements of gels and statistical techniques were described in the lengthy methods section (8 pages), statistical treatments were not presented in the text.

Harper "tested" for age, sex, seasonal, and population variation in the samples, but ignored the subspecific level and left it for the reader to decide what was meant by subgeneric, generic, subfamilial, and familial differences and similarities in the data. His discussion of the six *Puffinus* shearwaters sampled illustrates the problems this caused. The gels of *P. bulleri* and *P. assimilis* showed several distinct differences from each other and the other four species. The author than concluded as "probable," using Sibley's (*Peabody Mus. Nat. Hist. Bull.*, **39,** 1970) three intuitive categories of opinion (highly probable, probable, and possible), that *P. assimilis* should be in a separate genus but that *P. bulleri,* although "a distinctive species undoubtedly related to the other shearwaters, but not closely so," should remain in the genus. In regard to two other shearwaters for which he had seemingly adequate samples, *P. gavia* and *P. huttoni,* long the subject of controversy over whether they are subspecies or distinct species, the author made *no comment whatsoever* regarding their relationship. Their gels, though, are the two most similar ones of the 29 illustrated, including even those of the four *Pachyptila* species studied. Species in the latter genus are the most difficult to separate in the entire order, regardless of the criteria or techniques employed.

Although one must agree with the author, Sibley (1970) and others, "that no single line of inquiry into phylogenetic taxonomy can produce absolute answers," it seems that Harper should have: (1) first presented his electrophoresis data; (2) then pointed out what relationships were suggested by them (using the "highly probable," "probable," and "possible" categories); and (3) then discussed these "conclusions" in light of data from other workers or from the use of other taxonomic tools. Instead, as in the shearwater example above, it was difficult at times to determine upon what data he based his conclusions, what conclusions could be drawn from his data, and how he went about placing conclusions into the three categories of opinion. For example, under "highly probable" he discussed several relationships at different taxonomic levels involving *Procellaria,* but most of his hypotheses seemed to be based on non-electrophoretic data. Additionally, to what extent his data supported or negated these data was not clear. Also, he discussed several relationships for species not sampled (e.g., *Bulweria, Halobaena, Calonectris,* and several others). Such speculations were beyond the scope of the paper. Objectivity should have been (and perhaps was) used to form some hypotheses from the voluminous data in this paper, but where and to what degree it was used was not always readily discernible.—David G. Ainley.

50. Circadian clock in culture: N-acetyltransferase activity of chick pineal glands oscillates in vitro. C. A. Kasal, M. Menaker, and J. R. Perez-Palo. 1979. *Science,* **203:** 656–658.—Isolated chick pineals were maintained in culture with adequate oxygenation up to some 108 hr. Before removal of the glands the birds were kept on a 12:12 LD cycle and the glands were cultured in constant darkness (DD). The amplitude of NAT activity was less than that of live chicks, decreased with time, and varied slightly from a strict 24-hour period (see review no. **52**).—C. H. Blake.

51. Birds fly, why can't I? T. H. Maugh II, 1979. *Science,* **203:** 1230.—Mammals at high altitudes hyperventilate with an increase of pH in the blood and reduction of blood flow to the brain, resulting in pain and even in death of brain cells. Barbara R. Grubb in Schmidt-Nielsen's laboratory at Duke has now shown in *Anas platyrthyacos* (sic) *domesticus* (sic) that with hyperventilation and a pH of 8 the blood flow to the brain is almost normal. The cardiac output is now being studied.—C. H. Blake.

52. Circadian rhythm of serotonin N-acetyltransferase activity in organ culture of chicken pineal gland. T. Deguchi. 1979. *Science,* **203:** 1245–1247.—Pineals of ducks raised for 10 days on LD 12:12 were removed and cultured in darkness. In general, the peak of NAT activity occurred around midnight. The amplitude was lower for those killed earliest in a light period. Activity in the cultured glands was greatly reduced by exposure to light. Peak activity was delayed by holding the glands on ice a few hours before transfer to the culture medium. Cycloheximide or actinomycin D prevented the nocturnal rise in activity (see review no. **50**).—C. H. Blake.

53. The Oilbird: hearing and echolocation. M. Konishi and E. I. Knudsen. 1979. *Science,* **204:** 425–427.—Griffin in 1954 showed that the Oilbird (*Steatornis caripensis*) uses sonar to navigate in total darkness. The authors used both captive birds and field observations. They showed by evoked potentials in the forebrain auditory nucleus and in the cochlea that the peak sensitivity is at 2 kHz and the ear is insensitive above 6 kHz. Sonar is not used when there is enough ambient light to enable the birds to avoid obstacles. The clicks used in darkness have maximum amplitude near the beginning with dominant frequency of about 2 kHz. Field observations using plastic disks showed the first signs of avoidance with one 20 cm in diameter and all birds avoided 40-cm disks. The rate of clicking increased as a bird approached an obstacle.—C. H. Blake.

54. How bird eggs breathe. H. Rahn, A. Ar, and C. V. Paganelli. 1979. *Sci. Amer.,* **240**(2): 46–55.—Briefly, oxygen diffuses inward through pores in the shell and carbon dioxide and water diffuses outward through the same pores (see review no. **24**). The quantities involved are carefully adjusted by the number and size of the pores. The text states that these pores are the result of "imperfect packing" of the columnar calcite crystals which form the shell proper. The scanning electron micrograph of a pore suggests that the pore is formed around some sort of core which is later eliminated. The uptake of oxygen (in chicken) rises slowly for about 10 days and steeply for the next four days, and then levels off for the rest of incubation. The gas content of the shell membrane is almost identical with that of the air cell. Water is lost at a constant rate amounting in the end to 15% of the initial egg weight regardless of species. The pore area, pore length, and oxygen conductance vary with the egg mass. The authors show that oxygen pressure in the air cell before internal pipping averages (for many species) about 105 torr versus 150 torr in the atmosphere.—C. H. Blake.

MORPHOLOGY AND ANATOMY

(See 9, 48, 62, 63, 70)

PLUMAGES AND MOLTS

(See also 62, 87)

55. The moult of the Garden Warbler in the northeast Leningrad Region. (Linka sadovoi slavki (*Sylvia borin* Bodd.) na severo-vostoke leningradskoi oblasti.) V. Muzaev. 1978. *Vest. Leningradsk. Univ., Biol. Div.,* **1978**(9): 7–11. (In Russian with English summary.)—The molt of the Garden Warbler portrayed by areal analysis of plumages of 345 adult and 657 juveniles trapped from 1968 through 1975. These were obtained along the northeastern boundary of the species' breeding range which extends 5,300 km across northern Europe and Asia. Thus *Sylvia borin* is one of the most wide ranging migrants of the genus. Adults showed no molt within the breeding portion of their range. The postjuvenal molt starts in July and is preceded by emergence of down and contour feathers on pterylae previously bare. The postjuvenal molt lasts 30–35 days. Remiges and rectrices are not replaced at this time. Of 657 young, 356 (54.2%) were in median or terminal stages of molt. Those in terminal stages of molt were trapped in late September when migration had begun.—Leon Kelso.

ZOOGEOGRAPHY AND DISTRIBUTION

(See also 14, 81, 86)

56. Birds on the north coast of the Sea of Ariake. I. Seasonal changes in number of species and individuals on the representative birds. N. Kawaji, S. Shiraishi, and H. Hayaski. 1978. *Miscel. Rpts. Yamashina Inst. Ornithol.,* **10**(1,2): 82–93. (In Japanese with English summary.)—On the basis of counts of migrant waterfowl and shorebirds in one area, the author, perhaps somewhat rashly, proposes routes for these migrants.—C. J. Ralph.

57. Distribution of the North Island Kokako (*Callaeas cinerea wilsoni*): A review. R. B. Lavers. 1978. *Notornis,* **25**(3): 165–185.—The North Island Kokako, formerly widespread on North Island, New Zealand, is now much reduced as a result of deforestation, and populations persist only in some areas of native forest. These small and discontinuous relict populations are subject to rapid elimination, and since the species is sedentary immigration is unlikely. A good review, with extensive appendices of recent and subfossil distribution.—J. R. Jehl, Jr.

58. The Cattle Egret in New Zealand in 1977. B. D. Heather. 1978. *Notornis,* **25**(3): 218–234.—Cattle Egrets arrive in New Zealand in April and leave in November, migrating across the Tasman Sea to Australia. First recorded in 1963, approximately 300 were counted in August 1977, but no evidence of nesting has been obtained.—J. R. Jehl, Jr.

59. Patterns of Pelagic Distribution of Seabirds in Western Lancaster Sound and Barrow Strait, NWT. D. Nettleship and A. J. Gaston. *Occas. Pap.* **39,** Canadian Wildlife Service. 39 p.—Five aerial surveys in August–September 1976 were conducted to determine distributional patterns and foraging ranges of breeding seabirds in the important Barrow Strait-Lancaster Sound area. This area, bounded on the south by northern Baffin Island and Somerset Island, and on the north by southern Devon Island and Cornwallis Island, includes tiny Prince Leopold Island, a major breeding area for Black-legged Kittiwakes (*Rissa tridactyla*) (172,000), Northern Fulmars (*Fulmarus glacialis*) (60,000), Thick-billed Murres (*Uria lomvia*) (58,000), and Black Guillemots (*Cepphus grylle*) (4,000). Seasonal and daily movements are documented and can be correlated with the ice conditions and probable concentrations of arctic cod, the major food fish. The paper represents the solid fieldwork we have come to associate with Nettleship and his colleagues. Yet, basically, it is an Environmental Impact Report, not a finished piece of research. It was prepared in anticipation of commercial exploitation of mineral resources, and uses the typical speculative phraseology of such reports: "could alter the distribution . . . ," "might cause shifts in feeding areas . . . ," "could result in food failure . . ." etc.

There is clearly a need to make data from the burgeoning "gray literature" of environmental surveys available to a wider audience. But to publish in finished format what the authors acknowledge is a preliminary report makes me wonder whether the motives of the CWS might be more political than scientific.

The environmental movement has often undermined its own credibility by overinflating the value of the data base on which it operates. Its success or failure will ultimately depend on hard data that can be convincing to voters, and not on slick covers.—J. R. Jehl, Jr.

60. Steller's Sea Eagle on Kamchatka. (Tikhookeanskii orlan [*Haliaeetus pelagicus*] na Kamchatke.) E. Lobkov. 1978. *Zool. Zhurn.,* **57**(7): 1048–1053. (In Russian with English summary.)—Lobkov estimates that 480–580 pairs of this eagle nest in a zone 15–30 km from the sea shore on rocky ledges. They are most numerous along river canyons, one pr/1.5–2 km, or on seashores one pr/8–10 km. Nests are built on tree tops or on coastal crags. There are 1–3, usually 2 eggs per clutch. In winter they lead a now sedentary, now nomadic life. They show a preference for open unfrozen waters rich in fish. Their diet is predominantly salmonid species and sea refuse. The nesting season is prolonged, with

egg laying in early April to late May. Coastal flights pass along the shore in late March and April, and in fall through late October and November. In six years of observations the fates of seven broods were recorded. Fewer than 1 nestling per nest were fledged. However, the present situation of the species is rated as "satisfactory."—Leon Kelso.

SYSTEMATICS AND PALEONTOLOGY

(See also 49, 66, 68, 69, 71, 76)

61. An analysis of genome divergence of ratite and carinate birds by DNA molecular hybridization method. (Issledovanie divergentsii genomov beskilevykh i kilegrudykh ptits metodom molekulyarnom gibridizatsii DNK.) A. Lomov. 1978. *Biol. Nauki,* **1978**(10): 29–32. (In Russian.)—The nucleotide sequence of nine birds in eight bird orders was determined by nucleic acid fractional replication. The series: *Rhea americana, Ardea cinerea, Tadorna ferruginea, Gallus domestica, Tetrao urogallus, Fulica atra, Columba livia, Larus argentatus, Corvus monedula,* was small but confirmed greatest affinity of the one ratite (Rhea) to the galliform (domestic fowl). As in other efforts to resolve classification problems through chemical genetic methods, this study is too fragmentary to be conclusive.—Leon Kelso.

62. Feathers of *Archaeopteryx:* asymmetric vanes indicate aerodynamic function. A. Feduccia and H. B. Tordoff. 1979. *Science,* **203:** 1021–1022.—In flying birds the primaries and secondaries have the inner vane notably wider than the outer. In *Archaeopteryx,* at least the primaries are asymmetric in the same way. The authors show that this same condition is present in flying rails but, in some flightless forms, such as *Gallirallus australis,* the primaries are symmetrical. The conclusion is that *Archaeopteryx* had a wing designed for gliding, even if not for powered flight.—C. H. Blake.

63. The systematic affinities of sandgrouse, Pteroclididae. J. Fjeldså. 1976. *Vidensk. Meddr. dansk naturh. Foren.*, **139:** 179–243.—In this paper Fjeldså argues that a phyletic line arose within the Charadriiformes which gave rise first to the Glareolidae, then to the Pteroclididae, and finally to the Columbidae. He finds sandgrouse to be closely related to the Charadriiformes. Although his method of presenting evidence may have been acceptable 20 years ago, with the recent advances in methods of estimating phylogenetic history, it is inadequate for a modern work. Fjeldså makes no attempt to establish that the Charadriiformes, Pteroclididae, and Columbidae are more closely related to each other than to all other birds. Since there is considerable uncertainty about the relationships among the higher orders of birds, a study that convincingly argued that the Charadriiformes and Columbiformes are closely related would be a major contribution. Although Lowe (*Ibis*, **1923:** 276–299, 1923) and I have found evidence suggesting a relationship between the Turnicidae and the Columbiformes, this is ignored by Fjeldså.

Even if Fjeldså had made a case for a close relationship between charadriiform and columbiform birds, his study does not adequately report the evidence he used to determine the relationships among them. A basic data matrix is not presented, nor is it possible to reconstruct one from the text. He does not specify exactly which species he examined nor the distribution of character states among them. Precise character states are seldom defined; instead of character state trees he presents diffuse arguments of trends.

In several cases the evidence presented is wrong or incomplete. For example, Fjeldså states that in coursers and sandgrouse *N. pterygoideus* penetrates a slit in part O of *M. pterygoideus.* This is a misinterpretation of the work of P. J. K. Burton (*Trustees of the Brit. Mus.* [*Natural History*], 1974), who illustrated the condition for *Pluvianus,* but did not illustrate the condition in the other species placed in the Glareolidae. In fact, the course of *N. pterygoideus* is between parts M and O of *M. pterygoideus* in *Glareola, Stiltia, Cursorius,* and *Rhinoptilus* (Burton, pers. comm.). Fjeldså claims that the sternum of coursers is dovelike, whereas that of waders is different. I found wide variation in the shape of the sternum of charadriiform birds; the sternum of *Jacana, Tringa solitaria, Philomachus, Calidris temminckii,* and others all resemble and "anticipate" the sandgrouse sternum as much as

does that of *Cursorius*. Fjeldså claims that the lack of coracoid foramina links sandgrouse and coursers, but he could not have examined many specimens if he came to that conclusion. The foramen is lacking in some specimens of *Charadrius*, as Zusi and Jehl (*Auk*, **87:** 760–780, 1970) have pointed out, is present in *Glareola*, absent in *Cursorius*, and variable within species of *Rhinoptilus* as I have reported (*Trans. Zool. Soc. Lond.*, **34:** 263–345, 1978). It is present in all specimens of a large series of *Rhinoptilus* in the Royal Ontario Museum.

The section on downy plumage is unconvincing. The contention that the downy plumage pattern is "very conservative" is unsubstantiated. I am struck by the similarities of the downy chicks of *Oreopholus* and *Bartramia* (the latter, although a curlew, does not resemble the young of other curlews) and those among the downies of some grouse, hemipodes, and phalaropes. Overall similarity is not enough to indicate phylogenetic relationship. I am especially distressed by the representation of the downy plumage of *Cursorius* and *Rhinoptilus*. Fjeldså's figure is based (at least in part) on the figures of G. L. Maclean (*Ostrich*, **41:** 215–216, 1970) and A. C. Kemp and Maclean (*Ostrich*, **44:** 80–81, 1973). The figures of these authors show the plumages of the three species they illustrate to be quite different; furthermore, none of them resembles Fjeldså's.

The osteological figures are too small and rough to illustrate properly the characteristics discussed in the text. In Fig. 2 the three illustrations are unlabeled even though they are referred to as a, b, and c in the text; the bottom illustration is unfinished. Figure 4 is too crude to substantiate the author's arguments.

The branching pattern given in Fig. 16 is not quite supported by the characters Fjeldså places on it. As shown, some of the characters claimed to be "most worthy of attention" are homoplastic. Hennig would never approve.

My criticism of this paper is harsh because I think studies of this kind are important. I am disappointed that the author had the opportunity to further our understanding of the phylogenetic relationships of birds, but failed. My overall impression is that he decided what the relationships had to be and then set out to prove them rather than objectively analyzing the evidence. On a more positive note, new evidence and suggestions for further work are presented. The major contribution of this paper will be its stimulation to others.—Joseph G. Strauch, Jr.

64. On the specific distinction of the Indian Sparrow. (O vidivoi samostoyatelnosti indiskogo vorobya [*Passer indicus Jard. et Selby*].) V. Yakobi. 1979. *Zool. Zhurn.*, **58**(1): 136–137. (In Russian with English summary.)—Recognition of this Central Asian, migratory form as a variety of the common House Sparrow (*Passer domesticus*) has been disputed since 1948. This note suggests the sparrow's predilection to collisions with airplanes (three instances at Uzbekistan airports) as a specific character. By contrast no records exist for House Sparrows colliding with planes in over 900 local cases.—Leon Kelso.

EVOLUTION AND GENETICS

(See also 61, 77)

65. Predation and the evolution of social mimicry in birds. C. J. Barnard. 1979. *Amer. Nat.*, **113:** 613–618.—Social mimicry has been defined as interspecific character convergence in morphology, coloration, voice, or any "trait" used in signalling. It is found most frequently, and is most striking in its precision, in tropical species that travel in mixed-species flocks. Early discussion of the evolutionary importance of the phenomenon emphasized mimicry's importance in facilitating interspecific communication (e.g., Moynihan, *Evol.*, **22:** 315–331, 1968). In this short communication, Barnard suggests that in many cases mimicry might be explained better as an antipredator mechanism. He offers three plausible predator mediated evolutionary pathways to convergence and mimicry. (1) Since many avian predators appear to prefer "odd" prey, members of a minority species in a mixed flock would be at a disadvantage, unless they looked enough like commoner associated species to "fool" important predators. (2) Given distasteful or poisonous bird species, social mimicry could be nothing more than simple Batesian or Mul-

lerian mimicry, a possibility Barnard feels has too often been ruled out without test. (3) Vocal convergence on similar and equally ventriloquial alarm calls would often be expected in species associating in mixed flocks. In such flocks, single species often travel in discrete, monospecific subgroups. In such circumstances, members of a species with less efficient ventriloquy would stand a greater risk of being eaten, and selection would favor vocal convergence. Barnard's reasoning appears consistent, his hypotheses are interesting, and he does offer predictions to test them.—William M. Shields.

66. Bird flight: how did it begin? J. H. Ostrom. 1979. *Amer. Sci.*, **67:** 46–56.—This is an eloquent statement of Ostrom's cursorial (up from the ground) theory of the origin of bird flight, which is contrasted with Walter Bock's arboreal (down from the trees) theory. The cursorial theory required a quadruped to evolve into a facultative biped and finally an obligate biped. At the same time the forelimbs elongate and acquire longer and longer "scales" (=quills) on their trailing edges.

I find some fundamental problems of definition. The fact that an animal is terrestrial does not imply that it is cursorial (a runner); it may be merely ambulatory (a walker). In either case it may be a quadruped or a biped. The fact that an animal may go from one point to another by gliding does not imply that it will necessarily evolve powered flight. Only two groups of vertebrates have probably evolved powered flight: birds and bats. Powered flight by pterosaurs is possible but not proven.

Ostrom stresses the point that only birds have developed two separate locomotor systems, wings for flight and legs for other locomotion. This may be incidental. Certainly true swifts and hummingbirds use the hind limbs in the most limited way for locomotion, as is also true of bats. This is, of course, a secondary development. If *Archaeopteryx* was, in fact, ambulatory or cursorial, that might also have been a secondary development. It must also be kept in mind that the nestling Hoatzin (*Opisthocomus*) is aboreal and quadrupedal.

Ostrom gives (Fig. 10) a proposed reconstruction of *Archaeopteryx* as a cursorial bird using the wings to capture insects. This requires the wings to be greatly elongated, compared to a coelurosaur. Admittedly reconstruction of the wing feathering from the specimens or from illustrations of them is hazardous, but I would prefer the Parkes' reconstruction (Fig. 5), and as an ex-entomologist he would not want to hunt agile insects with a clap-net.

Finally, Ostrom follows Clark (1977) in inferring that hovering or very low speed flight requires minimum power. If this were true there would be no reason for hummingbirds to have the relatively most powerful flight muscles. Few other birds seem to hover at all and then only briefly and clumsily. It is well-known that the speed of a plane that requires minimum power is well above stall speed. From long observation I conclude that no bird undertakes prolonged, purely flapping flight at a speed much less than 20 mph. The question is still open.—C. H. Blake.

67. Evolution in the introduced New Zealand populations of the Common Myna, *Acridotheres tristis* (Aves: Sturnidae). A. J. Baker and A. Moeed. 1979. *Can. J. Zool.*, **57**(3): 570–584.—The regional differentiation in the past 100 years since the Myna was first introduced to New Zealand from Asia via Australia was examined by measuring 27 skeletal features and body weight on 307 adult birds. Besides the possibility of obtaining information on rates of evolution of such characteristics, the authors recognized the possibility of analyzing patterns to the evolution and possibly determining whether these characteristics showed clinal or random variation. Their results showed that 17 of the 28 features varied locally in males whereas only 13 of the 28 varied in females and only 8 of the varying features were common to both sexes. Moreover, univariate tests showed no trends to the variation observed. However, Baker and Moeed performed generalized discriminant function analysis and thereby showed the southernmost and oldest populations to be the most divergent of the New Zealand populations and the northern young populations to be similar to one another. Patterns to multivariate variation were analyzed by regressing factors from a morphological factor analysis on factors from a factor analysis

of environmental variables. These results showed statistically significant regression coefficients between factors that varied between the two sexes: for males a significant relationship was found between morphometric factor I and climatic factor I and between morphometric factor II and climatic factor II whereas for females this first relationship did not obtain but rather one did occur between morphometric factor III and climatic factor III.

In spite of these differences between sexes in results and in spite of the absence of univariate trends in their results, Baker and Moeed still "conclude tentatively that the mynas in the New Zealand isolate are in the early stages of adaptive differentiation." I feel that even a tentative conclusion along these lines is premature because no hypothesis is even advanced, let alone supported by evidence, as to what particular adaptations are given by the observed variations. Indeed, the size trend of variation in males is just the opposite to that expected by Bergmann's rule and thus contrary to the large number of adaptive explanations that have been offered for size trends in the past. It seems to me much more appropriate at this point not to preclude the possibility of random variation due to founder effect until more information has been gathered. Such an interpretation certainly makes the paper no less interesting while at the same time increasing its objectivity.—A. John Gatz, Jr.

68. Geographical isolation and morphological and habitat differentiation between birds of the Kimberly and the Northern Territory. J. Ford. 1978. *Emu,* **78**(1): 25–35.—A broad and interesting discussion of the various habitat factors that have resulted in speciation and subspeciation in northwestern Australia.—C. J. Ralph.

69. Hybridization between the white-vented and black-vented forms of the Black-faced Woodswallow. J. Ford. 1978. *Emu,* **78**(3): 105–114.—*Artamus cinereus* is a widespread, fairly sedentary Australian species. The author studied two races (*albiventris* and *melanops*) in an area of contact in northern Queensland, concluding that hybridization is extensive. He presents an interesting assessment concerning the probability that the races diverged during the last glacial period.—C. J. Ralph.

70. Dominance, survival, and enzyme polymorphism in Dark-eyed Juncos, *Junco hyemalis*. M. C. Baker and S. F. Fox. 1978. *Evol.,* **32:** 697–711.—Baker and Fox offer a stimulating blend of laboratory, aviary, and field data on how genetics, ecology, and behavior interact in controlling sociality of wintering Dark-eyed Juncos. With 6 of 18 putative loci polymorphic, and an average individual heterozygosity ($\bar{H}$) of 5.3%, genetically, the winter population resembles a typical avian breeding population. With respect to basic genetics, the authors found little significant variation in allele frequencies from year to year at one site, or from site to site in one year. But their conclusion of little differentiation among winter flocks ($F_{ST} = 0.00814$) is weakened by their demonstration of at least weak heterotic selection which would reduce F_{ST} even in the face of significant subdivision. Their suggestion of a heterozygote advantage is consistent with their observation of a significant positive association between heterozygosity and probability of being socially dominant. In line with previous hypotheses, the advantage of dominance appears to result from increased survivorship, especially in food-limited flocks. In an attempt to explore the causal relations in this system, Baker and Fox performed a series of correlational analyses. They showed a positive correlation between dominance and wing length, which covaried with body weight and bill length (all a function of sex), and no correlation between dominance and tarsal length, bill width, and surprisingly, hood darkness. Similar analyses indicated that aviary survival was predicted with decreasing accuracy by dominance rank, genotype, body weight, sex, bill dimensions, hood darkness, and tarsal length. Baker and Fox's convincing conclusion was that the main factors controlling dominance, and therefore survival, in wintering flocks of Dark-eyed Juncos were genotype and body size, the latter closely correlated with sex. Although somewhat discursive, their discussion manages to integrate much of their data into a relatively complete picture of evolutionary

connections of social dominance. This work may best be perceived as a pioneering attempt at "holistic" population biology. It is important in its own right, and also because it offers a worthy model for future work.—William M. Shields.

71. The Dodo and the tambalacoque tree. A. M. Owadally and S. A. Temple. 1979. *Science*, **203:** 1363–1364.—Owadally disputes the coevolution of the Dodo (*Raphus solitarius*) and the tambalacoque (*Calvaria major*) proposed by Temple (*Science*, **197:** 885, 1977) on the basis of (1) the tree is in upland rainforest where no Dodo fossils have been found; (2) small woody seeds found in the Mare aux Songes and possibly assisted in their germination by the Dodo are from a different lowland tree; (3) the Forestry Service has germinated *Calvaria* seeds without using birds but the method is not stated; (4) there are young trees less than 300 years old. Temple replies that early explorers found Dodos in the uplands where there are no alluvial deposits to contain fossils; the Mare aux Songes deposits also contain *Calvaria* seeds; the Forestry Service has secured germination by artificial abrasion of the endocarp; the age of the *Calvaria* trees cannot be accurately determined.—C. H. Blake.

FOOD AND FEEDING

(See also 18, 22, 29, 31, 33, 38, 48, 60)

73. The uneven sex ratio of voles in the food of *Aegolius funereus* and *Strix aluco*. M. Lagerstrom and I. Hakkinen. 1978. *Ornis Fenn.*, **55**(4): 149–153. (In English with Finnish summary.)—The pressures exerted on prey by surplus foraging and storage in owl nests is considered here. The prey included 96 *Clethrionomys glareolus* and 191 *Microtus* spp. captured by Tengmalm's (*Aegolius funereus*) and Tawny owls (*Strix aluco*) at Pirkanmaa, southern Finland. The results coincide with previous studies that found higher raptor-inflicted mortality among males than females, for both *Clethrionomys* and *Microtus*. There were 424 surplus prey (390 or 92% voles) at 26 *Aegolius* and 18 *Strix* nests.—Leon Kelso.

74. Water Rail fishes through thin ice (Wasserralle fischt durch dünne Eisschicht). P. Petitmermet. 1978. *Ornithologische Beobachter*, **75**(3): 171.—A Water Rail (*Rallus aquaticus*) wintering in Switzerland caught small fish by standing on thin ice and jabbing the bill through the ice at the fish passing beneath.—Marshall A. Howe.

SONG AND VOCALIZATIONS

(See also 53)

75. Neighbor-stranger discrimination by song in male Blue Grouse. J. B. Falls and M. K. McNicholl. 1979. *Can. J. Zool.*, **57**(2): 457–462.—At least nine species of passerines can discriminate between the songs of their neighbors and the songs of birds that do not have adjacent territories (strangers). Falls and McNicholl document a similar capability in a nonpasserine species, the Blue Grouse (*Dendragapus obscurus*), by using tape recordings of the "hooting" of 13 individually marked male birds which had known territories. Playback equipment was set up near the boundary of a territory and a series of calls was played: either stranger-neighbor-stranger or neighbor-stranger-neighbor. The difference in order of presentation did not alter the fact that every male always responded more strongly to a stranger's hooting than to that of a neighbor. Because many differences were noted in intensity of response to the recordings, it is important that Falls and McNicholl had an objectively based response scale with six possible ratings. With these numerical ratings and their statistical analysis of the ratings, there can be no doubt that at least this one nonpasserine species should join the list of passerines that can distinguish among the calls of at least some individual conspecifics.—A. John Gatz, Jr.

76. Signal acoustics of the Siskin (*Spinus pinus*) (Akusticheskaya signalizatsiya chizha, *Spinus pinus* (L.)). M. Zablotskaya. 1978. *Byull. Mosk. Obshch. Isp. Prirody, Biol. Div.*, **83**(4): 36–54. (In Russian with English summary.)—Here in detail are the physical features of the many recognizable Siskin calls, including frequencies, energy distribution, general scope of spectra, types of frequency modulation, overall length of signals, their internal structure, and velocity of signal front. Calls were taped and analyzed on oscillograms. Included are four plates illustrating 17 calls. "The Siskin lexicon includes at least 21 calls, most of them polyfunctional." Further discussed are acoustics of the American *Spinus lawrencei, S. psaltria,* and *S. tristis,* wherein is found a clearer relationship of *S. pinus* to these American species than to *Carduelis carduelis* which shows no vocal resemblance.—Leon Kelso.

77. Song dialects as barriers to dispersal in White-crowned Sparrows, *Zonotrichia leucophrys nuttalli*. M. C. Baker and L. R. Mewaldt. 1978. *Evol.*, **32:** 712–722.—The evolutionary causes and consequences of avian song dialects have been much debated on theoretical grounds. Nottebohm (*Condor,* **71:** 299–315, 1969) was the first to suggest that dialects might function to reduce gene flow and so maintain local adaptation. Baker and Mewaldt provide one of the few empirical studies bearing on this topic, and offer the first direct support of Nottebohm's hypothesis.

From 1966 to 1974, White-crowned Sparrows living at Point Reyes, California, in a narrow band of coastal scrub habitat about 5 km long, were intensively marked and recaptured. The study area encompassed the range of two distinct dialect populations and the narrow boundary zone between them. Analysis of juvenile dispersal, without regard to dialects, produced typical philopatric distributions of dispersal distances separating birth and breeding sites (male $\bar{x}$ = 555 m, n = 198; female $\bar{x}$ = 614 m, n = 173). Using these data, the authors constructed a theoretical model of White-crowned Sparrow dispersal which followed a gamma probability distribution. With the model, and an arbitrary grid superimposed on the study area, they were able to generate the number of individuals expected to cross any grid line during dispersal. This expectation was based on the number of young fledged at all distances from the line in question, the probable distances they would travel, and the probability that each would travel toward that line. The model accurately predicted crossovers for most of the study area (e.g., at two such lines, the observed/expected was 52/47 and 86/84). At the line corresponding to the dialect boundary, the model grossly overestimated crossovers (i.e., 5/26). Baker and Mewaldt infer from the discrepancy that the dialect boundary acts as a barrier to juvenile dispersal. They also offer further evidence supporting this conclusion, noting that within 500 m of the boundary only 30%, rather than the expected 50%, of the juveniles move towards the boundary. Finally, they showed that a greater proportion of birds disperse parallel to the grid within 500 m of the boundary than at greater distances.

Their discussion of the factors that may have produced this natal-dialect assortative dispersal is both interesting and informative. Their demonstration of the extraordinarily limited interdialect dispersal (about 0.00168 of a population per generation), resulting from this behavior is an important illustration of the danger of assuming that birds, because they can fly, are normally panmictic species.—William M. Shields.

78. Heterochronous development of avian hearing during ontogeny. (Geterokhroniya razvitiya slukha ptits v ontogeneze.) T. Golubeva. 1978. *Zhurn. Evol. Biokhim. i Fiziol.,* **14**(6): 589–596. (In Russian with English summary.)—This electrotelemetric research exceeds modernity in recording responses of the ossicles of the undeveloped ear to the chirps in the immature embryo in the yet to be hatched eggs. In this work eggs of *Corvus monedula, Larus canus,* and *L. argentatus* were the subjects. There are six graphs and sonograms of amplitude frequencies of microphonic cochlear potentials during incubation. Particular attention was directed to maximum sensitivity levels during embryonic growth. The author found that shifts in the frequency range of chirps corresponded closely to spectra of parental feeding signals. The microphonic fluctuations of the Jackdaw embryos were less abrupt than those of the gulls.—Leon Kelso.

MISCELLANEOUS

79. Can Animals Help to Predict Earthquakes? Shen Ling-huang. 1978. *Earthquake Info. Bull.,* **10**(6): 231–233.—For years there have been requests for records of avian responses to earthquakes. Several may be in print of which this may be representative. The Tangshan (China) quake, magnitude 7.8, on 28 July 1976 provoked the collection of 2,093 animal responses in and around Tangshan. Animal responses reached a climax during the 24 hr preceding the quake. In 1968, a biological behavior observation station for earthquake prediction was founded. Feral pigeons were the main organism. There are some 100 sensory neurons between tibia and fibula in the pigeon leg. During a 4.0 quake, 50 pigeons with severed neurons were nonresponsive while 50 controls were startled and took flight. The author suggests that by recognizing and recording unusual animal behavior systematically prediction of potentially destructive quakes may be possible, especially if behavioral observation is combined with other methods of prediction. Possibly an instrument can be constructed to duplicate avian awareness functions. Such an instrument would directly monitor the physical signals coming from the earth and provide quake predictions without the need to observe animal behavior.—Leon Kelso.

BOOKS AND MONOGRAPHS

80. Animal Communication by Pheromones. H. H. Shorey. 1976. New York, Academic Press. 167 p. $18.00.—Chemical communication among animals of the same species, we are assured, is widespread and occurs throughout the animal kingdom. In fact in many diverse groups of animals (with some notable exceptions including birds and higher primates), chemical communication appears to be the major channel for exchange of information. A notable exception cited in this book is Leach's Petrel (*Oceanodroma leucorhoa*). There have been such reports before but this is the first (known to the reviewer) admission of a bird to pheromone status in a book on chemical communication. The single avian citation among 726 citations is: Olfactory navigation to the nesting burrow in Leach's Petrel (*Oceanodroma leucorhoa*). T. C. Grubb. 1974. *Anim. Behav.,* **22:** 192–202. The much discussed and chemically involved topic of avian "anting" is omitted here as elsewhere.—Leon Kelso.

81. Birds of Grady County, Georgia. H. L. Stoddard, Sr. (R. Komarek and R. L. Crawford, eds.) 1978. Tall Timbers Res. Stn. Bull. 21. 175 p. (No price given.)—Herbert L. Stoddard, Sr., died in 1970, leaving a large number of bird notes and a longer, undated manuscript on the birds of Grady County, Georgia. Grady County had been his home almost continually since 1924. Komarek and Crawford have edited the manuscript minimally, incorporating the additional notes, and have added a needed bibliography, an extensive list of voucher specimens, and tallies of Christmas bird counts made in the county by Stoddard. The result is a pleasing, somewhat uneven, narrative account of the avifauna of a relatively poorly studied region in southwestern Georgia. As intended by the editors, the book is a tribute to the vitality and field skills of the author rather than as a current statement about the birds of the area.

The chief values of the book lie in the compilations of arrival and departure dates of many species and in the frequent insights into the personality of Herbert Stoddard. The 223 species' accounts (by my count, there is no Table of Contents) usually include extreme dates and extreme abundances noted during the 40 years of fieldwork on which the manuscript is based. Additional notes may include mention of subspecies, habitats, unusual behavior, and other observations. The accounts have no consistent internal organization, an annoying feature that prohibits comparisons of relative abundance and other aspects of the biology of the various species. Several of the accounts are disjointed, perhaps because they were edited by other than the original author. In reference to the Starling (*Sturnus vulgaris*), for example, we are told that large winter flocks are "beginning to make serious inroads on the supply of small winter fruits" upon which smaller birds depend for food. This statement is followed by the apparent contradiction that "Starlings are no more numerous now in our area than they were 40 years ago." These inconsistencies are

easy to overlook, however. They are outnumbered by other accounts that are vivid in style, such as the Mockingbird (*Mimus polyglottos*), and the Cooper's Hawk (*Accipiter cooperii*); or provide valuable information, as Brown Thrasher (*Toxostoma rufum*), Tufted Titmouse (*Parus bicolor*), and Bobwhite (*Colinus virginianus*). Stoddard's insight into the management and biology of the Red-cockaded Woodpecker (*Picoides borealis*) was early and prophetic. Most memorable of all are the accounts in which we see Stoddard not only as a keen naturalist but as a partial, human observer as well. His account of hunting Turkeys (*Meleagris gallopavo*) on p. 40 is such an insight, as is the proud declaration about House Sparrows (*Passer domesticus*) that "Eradication by shooting was so successful that now I can no longer list the species during the annual Christmas Bird Count," and his response to the late winter singing of American Robins (*Turdus migratorius*).

"Birds of Grady County, Georgia" is intended to be neither an up-to-date summary of knowledge of that avifauna nor a model of a modern quantitative faunal work. It is a useful contribution of biological and historical information gathered by an outstanding naturalist who, from time to time, allows us a glimpse of himself.—Paul B. Hamel.

82. A Birdwatcher's Guide to the Eastern United States. A. M. Geffen. 1978. New York, Barron's/Woodbury. 346 p.—I must admit that I did not read this "complete directory to birding areas east of the Mississippi" from cover to cover. It is not that kind of a book! Three main sections (the Northeast, Southeast and North Central States) include a chapter for each state in that region. The chapter discussion begins with a reference map for those birding areas of the state included. Following that is a brief general description of some of the birding "hotspots" of the state. National parks, forests, and wildlife refuges are discussed with information on the location of the administrative office and its address and telephone number. A brief history, description of facilities, and habitats are included. Also noted are the hours of operation, available educational programs, and the primary bird species (those unusual or local to the area, and those rated as "abundant, common or uncommon" by the specific preserve).

A bibliography follows, listing state bird books, regional books and others of possible interest to birders. Related publications and their mailing addresses are listed. However, a few journals are omitted, e.g. *Alabama Birdlife, Delmarva Ornithologist, Loon* (MN), *Kentucky Warbler, Maine Audubon News, Mississippi Kite,* and *North American Bird Bander.* EBBA News which was incorporated into the *N. A. Bird Bander* in 1976 is listed. A listing of related organizations and addresses follows and finally an index (of bird species) is provided. A spot check revealed few typographical errors and the omission of Brett and Nagy's (1973) "Feathers in the Wind" for the Hawk Mountain Sanctuary in Pennsylvania. An index of the birding areas probably would have facilitated use of this directory. It has a few nice line drawings by Peter Hayman.

The book should be a useful tool for pertinent educational institutions and is reasonably priced so interested individuals might afford it.—Richard J. Clark.

83. The California Condor, 1966–1976: a look at its past and future. S. R. Wilbur. 1978. *N. A. Fauna,* No. 72, 136 p.—This is the first major review of the biology of the California Condor (*Gymnogyps californianus*) since Koford's 1953 monograph, and it is both disappointing and disturbing to see how little has been added to our knowledge of this endangered species in the intervening 23 years. Wilbur presents equivocal evidence for the existence of two subpopulations, one in mountains of the coastal range and the other in mountains of the interior, but makes a more convincing case for there being predictable seasonal movements within the population. The range of the condor population has apparently remained unchanged in recent decades, but the size of the population has steadily declined. The conclusion that recent declines result from inadequate reproduction and recruitment seems correct but is supported by limited field observations. It remains unclear whether poor reproduction is the result of nonbreeding, reproductive failures, or merely a severely limited number of potential breeders. Furthermore, the relative roles of inadequate food supply, environmental contaminants, and disturbance cannot be properly assessed. The result is that conservation efforts have not been focused on the specific

factors responsible for the condor's problems. Supplemental feeding programs, habitat preservation, and public education have not reversed the decline in the condor population but may have slowed it to an unknown degree. Perhaps the most useful features of this publication are its extensive bibliographies which include much unpublished information on condor sighting and its appendices on the impacts of collecting and shooting.

Unfortunately the California Condor may have received too much protection. It seems that early admonitions about disturbing condors have limited recent research on the birds so much that essential information about condors has not been collected. One hopes that the time has not passed for the types of active conservation efforts that Wilbur presents as a set of options. However, Ricklefs (*Aud. Conserv. Rep.*, **6,** 1978) addresses the condor problem more forcefully. (see review no. **89**).—Stanley A. Temple.

84. Field Guide to the Birds of the Eastern Himalayas. S. Ali. 1977. New York, Oxford Univ. Press. 265 p., 37 col. pls. Price 80 rupees (but in U.S., $15.50).—This book encompasses a portion of eastern Nepal, also Bhutan, northeastern India (Sikkim and Arunachal Pradesh), and some contiguous terrain south of these areas. Elevation varies from many peaks over 6,000 m high down to extensive lowlands. The higher country has relatively few bird species, but lower down is found a rather bewildering assortment of woodpeckers, babblers, flycatchers, leaf warblers, finches, and so on. Only two Anatidae and six Charadriidae are found in the whole area—such is the barrier effect of the Himalayas. Of the 536 species included, 336 are well illustrated in color. Species' accounts cover "Size," "Field Characters," and "Status, Habitat, etc.," and the plate captions, which include useful aids, are keyed to the text. The author's obvious command of his subject and his ability to turn an apt phrase project to the reader a confidence in the material presented. Those of us who may never ride a yak or listen to a bird voice "reminiscent of a distant coppersmith hammering on his metal, or the time-pips of All India Radio," can at least extend our horizons vicariously by perusing this well-produced book.—Ralph S. Palmer.

85. Long Point Bird Observatory 1976 Annual Report. 1978. Long Point Bird Observatory, P.O. Box 160, Port Rowan, Ontario, N0E 1M0, Canada.—Because of the great diversity and high quality of the work sponsored by the observatory, the report is reviewed as a monograph. The annual report includes observations of the migration seasons (observation of 17 species notable) with a lighthouse "kill" of 352 individuals of 51 species occurring in six nights, banding totals (10,913 individuals of 145 species), recoveries (8 including 1 foreign), longevity records (3 species: Mallard *Anas platyrhynchos* 11–3 [11 yr, 3 mo], Saw-whet Owl *Aegolius funereus* 4–3 and Common Grackle *Quiscalus quiscula* 8–1), and nest records (305 records for 21 species). In addition five publications originating from the observatory and/or its staff are listed.

Preliminary progress reports give the reader an idea of the type of research being conducted at the observatory and include status of the Piping Plover (*Charadrius melodus*), Tree Swallow (*Iridoprocne bicolor*) nesting and productivity, Black Tern (*Chlidonias niger*) breeding biology, age ratios of fall migrants, a breeding bird census and the results of tests for St. Louis encephalitis antibodies in birds caught at Long Point (271 individuals of 12 species tested, with 8 species showing positive results). Also in progress was a Master's Thesis study on the present vegetative communities of the Long Point peninsula, changes in them since 1700 and identification of processes altering the above.

In addition to the active research program a chairman's and executive director's report indicates an active educational program. Also included is a report on a "birdathon" with a form for pledging dollars for each species recorded by Pierre Burton on a Memorial Bird Count, funds to go to the LPBO.—Richard J. Clark.

86. Impacts of Transmission Lines on Birds in Flight. M. L. Avery (ed.). 1978. U.S. Fish and Wildlife Service FWS/OBS 78/48. 151 p.—The proceedings of a workshop funded by the U.S. Departments of Interior and Energy, consist of seven invited papers, reports of five working groups on various facets of the problem, a summary, and a com-

mon listing of literature cited. The workshop assembled ornithologists, wildlife managers and representatives of electric utilities to determine whether collisions of birds with transmission lines were a serious problem, what general advice could be offered to those making decisions on the location and design of transmission lines, and what information was needed to make this advice more precise. Among the invited papers Gauthreaux's "Migratory behavior and flight patterns" gives a concise current overview of migration phenomena, including geographical distribution, seasonal and daily timing, direction and routes, altitude, and weather influences, with primary reference to North American migrants. Thompson's "Transmission line wire strikes: mitigation through engineering design and habitat modification" surveys the factors influencing probability of strikes, the various mitigating or avoidance techniques in use and the practical considerations that govern application of these techniques. The remaining invited papers describe actual case histories, impact assessments, and the design of transmission lines. Working groups reported on behavior, habitat, mitigation, management options, and research priorities. The concensus was that "power lines have not been proven to be a general hazard to bird movements" but that in a limited number of cases under specific circumstances adverse effects could be expected and, with appropriate study, predicted. These effects can be minimized by planning the location of transmission lines to avoid areas where collisions would be frequent and mitigated by attention to design of the lines and management of the rights-of-way. Biologists will have to generate more convincing data on the extent of the problem before electric utilities will voluntarily alter route selection priorities in view of the considerable costs involved. The report is virtually error-free and published a scant seven months after the workshop.—Warren B. King.

87. Prairie Ducks: A Study of their Behavior, Ecology and Management. L. K. Sowls. 1978. Lincoln, University of Nebraska Press (reprint of 1955 edition). 193 p. Cloth $11.50, paper $3.50.—The reprinting of this book after 23 years attests to its high demand. The contents are identical to the original, although the margins have been reduced, leading to a smaller book. A definite shortcoming is the lack of an up-to-date introductory statement. The preface by H. Albert Hochbaum, written in 1955, is not dated, and will mislead many readers into thinking it reflects his present views. This report of a field study conducted on the Delta Marsh in Manitoba in the late 1940's deals with a multitude of questions about waterfowl during the nesting season. That was an era in which little was known about the behavioral ecology of ducks and when basic waterfowl research was at an exciting stage of rapid growth. This is evidenced by the author's often anecdotal handling of a great number of subjects, many of which are still topical today. The text is nicely written and easy to read. Some readers might be critical of several passages in which "the survival of each species" (p. 81) type arguments are used, but such arguments are rare. The emphasis of the report is on basic breeding biology and deals with the problems of individual birds coping with their environment. This is one of the earliest studies in which data from individually marked birds were considered through a single breeding season and between consecutive years. The "dabbling ducks" are thoroughly covered with emphasis on the Mallard (*Anas platyrhynchos*), Pintail (*A. acuta*), Gadwall (*A. strepera*), Blue-winged Teal (*A. discors*), and Shoveler (*A. clypeata*). One wonders why the cost of color reproduction was given to an irrelevant photograph of Redheads (*Aythya americana*) on the cover of the paperback edition instead of preserving the fine original painting of Pintails by Sir Peter Scott. Some of the topics include: migrational homing, home range, habitat selection, nesting phenology, nesting behavior, breeding season mortality, renesting, hen and brood behavior, and fall behavior. In my view, the most valuable parts, still of interest, are those dealing with homing and renesting. This is still a useful book for practicing scientists, waterfowl managers, students, and laymen. Researchers that have not read it recently will be pleasantly surprised at the topics covered and the insight reflected in Dr. Sowls' analyses. Although not attractive in appearance, the paperback is a bargain. Certainly many waterfowl enthusiasts will be happy to learn that "Prairie Ducks" is available again.—Bruce D. J. Batt.

88. Report of the Advisory Panel on the California Condor. R. E. Ricklefs (ed.). 1978. *Aud. Conserv. Rep.*, No. **6,** 27 p.—Despite all efforts made in its behalf, the California Condor (*Gymnogyps californianus*) has continued to decline toward extinction. Concern over the apparent inadequacy of existing conservation efforts prompted the National Audubon Society and the American Ornithologists' Union to select a panel of avian biologists—myself among them—to review the condor's situation and recommend changes that would correct deficiencies in ongoing and proposed recovery programs. This publication is the report of the panel, whose recommendations include: expanding the goals of the present California Condor Recovery Plan to provide for a population of several hundred condors that are widely distributed geographically; increasing condor numbers by capturing and propagating in captivity a large proportion of the present population; preserving large tracts of suitable habitat into which captive-produced condors can be released; greatly intensifying research efforts into the basic biology of condors and the factors causing their decline; and establishing a panel to review, on a continuing basis, the progress of the condor recovery effort. The report's most—but certainly not only—controversial recommendation concerns captive propagation and the conclusion that this approach offers the only hope for increasing the number of condors. This is the first time that this conclusion and recommendation have been made, without reservation, by an influential group. The fact that the National Audubon Society and A.O.U. both quickly endorsed the panel's report enhances its importance and sets the stage for some major debates and decisions over the future direction of programs to preserve the California Condor.—Stanley A. Temple.

89. Studies of Seabirds at Prince Leopold Island and Vicinity, Northwest Territories. Preliminary Report of Biological Investigations in 1975. D. N. Nettleship. 1977. *Can. Wildl. Service Progress Notes,* No. **73.** 11 p.—Prince Leopold Island, in Barrow Strait off the northeastern tip of Somerset Island, northeastern Canada, harbors significant breeding populations of *Fulmarus glacialis, Rissa tridactyla, Uria lomvia,* and *Cepphus grylle* and a scattering of *Larus hyperboreus.* This study determined breeding phenology, population, breeding habitat utilization, food preferences, and production of these species in 1975, all summarized or tabulated briefly in this preliminary report. The first three species declined 40–60% between 1958 and 1975; no explanation is offered. The likelihood of gas pipeline construction and operation, zinc mining, and deep-water drilling for oil in the general area makes this study an important source of baseline data from which to measure changes in population or productivity. Future studies will determine precise feeding areas and use of the marine habitat, as well as annual variation in population parameters.—Warren B. King.