RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

BANDING AND LONGEVITY

(see also 27)

1. A summary of waterfowl banding accomplishments in Canada, 1918–1978. K. L. Newell and F. G. Cooch. 1980. Can. Wildl. Serv. Prog. Note 106, 38 p.—This paper maps the banding locations of the 1.93 million waterfowl banded in Canada over the last 60 years. The bandings in each province and territory are tabulated for 38 species and 2 varieties and mapped for 34 species and 2 varieties. About 61% of the 1.93 million were banded in Saskatchewan, Manitoba, and Alberta. The Mallard (*Anas platyrhynchos,* 526,104), Blue-winged Teal (*A. discors,* 368,168), Pintail (*A. acuta,* 230,058), and Lesser Snow Goose (*Chen hyperborea,* 201,688) comprised 69% of all waterfowl bandings. This report should be useful to Canadian waterfowl banders.—Richard M. Zammuto.

2. Ring recoveries of Finnish Wood Pigeons (*Columba palumbus* L.) and Stock Doves (*C. oenas* L.). L. Saari. 1979. Finnish Game Research 38:17–30.—About 10% of all nestlings ringed were recovered (see review **20**), mainly from hunter kills in winter. Finnish Wood Pigeons migrate to France, Spain, and Portugal, and Stock Doves migrate to Germany, Austria, and France. Wood Pigeon nestlings had a life expectancy of 2.3 years and Stock Dove nestlings had a life expectancy of 1.5 years. Life tables were constructed from the recovery data.—R. B. Payne.

3. Hawk Cliff Raptor Banding Station: Eighth Annual Report 1978. M. and D. Field. 1980. Ont. Bird Band. 13:2–29.—There were 2,273 individuals of 15 species of raptors banded at this banding station in 1978, a 37% decline from 1977. The authors, in pondering why, noted that the number of Sharp-shinned Hawks (*Accipiter striatus*) observed had declined by about 45%. They did not note that this corresponded with a similar 47% declination in the numbers of Sharp-shinned Hawks banded. One is left wondering if there was a similar decline in other species observed because data for numbers observed are not given for previous years. It is perhaps coincidental that their efficiency, i.e. numbers banded per hours of effort, was down by the same percentage (37) but this certainly must be a contributing factor. The authors imply that the trappers and banders are also responsible for observing and recording and this suggests they could make their operation more efficient by seeking volunteer observers. It would make the data more valuable as a population index because of the more consistent manner of data collecting, etc. Other noteworthy information included a male American Kestrel (*Falco sparverius*) apparently incubating, an American Kestrel clutch of 7 eggs, the recovery of a male Sharp-shinned Hawk in Guatemala 3 years after its 1975 banding, and the capture and banding of a piebald (partial albino) Red-tailed Hawk (*Buteo jamaicensis*).—Richard J. Clark.

4. Recovery of California's first captive-produced, wild-fostered Peregrine Falcon. 1980. E. V. Johnson. N. Am. Bird Band. 5:14.—This is a brief account of the 1977 nesting season activities at Morro Rock eyrie. The falcons' eggs failed to hatch, in early May, so two Prairie Falcon chicks were placed in the nest to keep the adults active and in the area. These were replaced later with two Peregrine Falcon chicks from Tom Cade's captive breeding program at Cornell University. In the course of rearing the young, the male disappeared (found dead, presumably the victim of a shotgun) and the female was the sole provider. She refused to forage out of sight of the eyrie and as a result the smaller male chick died. Through supplemental feeding by the nest observer, the adult was able to rear the larger female chick. The female chick, which was banded, was found dead 16 months later and 200 miles southeast of its fledging site.—Richard J. Clark.

MIGRATION, ORIENTATION, AND HOMING

(see also 59, 61)

5. The case for magnetic sensitivity in birds and bees (such as it is). J. L. Gould. 1980. Am. Scientist 68:256–267.—This is a long and careful summary of the evidence for the ability of some animals (elasmobranch fishes, homing pigeons, honey bees) and many bacteria to sense or respond to a magnetic field (see reviews **6** and **7**). It is not necessarily shown that the direction of the magnetic lines of force or that the polarity of the field can be detected. As to pigeons, homing is a matter of training and selection. In general they use contact navigation and sun position, but when the sun is obscured the magnetic field comes into use. However, magnetic storms and anomalies can interfere with a homer's magnetic navigation. [Varian pointed out long ago that vertical electric transients in the atmosphere could outweigh the magnetic field.]

The author discusses in some detail the various kinds of magnetized substances and their possible significance as detectors. DeGaussing has been tried with little result. "DeGaussing should affect only a detector that distinguishes magnetic polarity—north from south—and neither bees nor pigeons seem able (or willing) to make this distinction."

We need to recognize what has not been shown. First, although pigeons and bees contain crystals or grains of magnetite (Fe_3O_4) it has not been shown how any response of those grains to the external magnetic field or changes in it are sensed (see review **7**). Second, it has not been shown that pigeons can sense the direction of the magnetic lines of force and hence perform actual compass navigation. A true migrant would have to select a proper initial magnetic direction but would also have to adjust for the change in variation of the compass as it proceeded.—C. H. Blake.

6. Is the homing pigeon's map geomagnetic? B. R. Moore. 1980. Nature 285:69–70.—Moore succinctly surveys the major evidence indicating that homing pigeons possess solar and geomagnetic compass abilities, i.e. can obtain directional information from cues provided by these cosmic influences. Researchers are currently intrigued by demonstrations that have produced evidence of possible magnetic detectors in birds and the idea that the geomagnetic fields of the earth may provide animals with positional cues in addition to directional cues, i.e. a map as well as a compass. Because the strengths of the horizontal and vertical components of the earth's magnetic fields vary systematically between the equator and the magnetic pole, detection of these variations could offer an avian migrant a bicoordinant map, albeit a rough one.

Past experiments by Schmidt-Koenig demonstrated that when pigeons whose diurnal rhythms have been phase shifted are released outside, they orient as if the sun's position corresponded to the degree to which their rhythms have been manipulated and correct for the apparent movement of the sun at an average rate of 15°/h. For instance, when pigeons with diurnal rhythms retarded by 6 h are released away from home at noon, they tend to react to the sun's azimuth as east and to err by orienting 90° to the left of the home direction. Yet pigeons, even phase shifted ones, can home on heavily overcast days, suggesting the operation of an alternate directional mechanism, which in view of Keeton's elegant studies of pigeons with magnets attached to them may well be magnetic. The search for a magnetic sensory detector seems to be homing in on new breakthroughs, as recent investigations by Walcott and colleagues and by Presti and Pettigrew (see review **7**) have detected concentrations of magnetite (Fe_3O_4) in the heads and necks, respectively, of pigeons. The electron spin of one of the Fe ions in the magnetite molecule is opposite that of the other two, yielding a net magnetic effect. The tendency of magnetic dipoles set up in these molecules to orient toward alignment with the earth's field could potentially provide a migrant with a means of obtaining compass and map information. Ultimately electrophysiological tests will be needed to establish the validity of and to unravel the workings of the magnetic receptors for which evidence is currently being unveiled and ideas advanced.

As indicated from experiments and studies of orientation during natural magnetic anomalies and storms, avian responses to geomagnetic cues are proving to be quite sensitive and exceedingly complex. As Moore contends, the time has come to seriously con-

sider that the pigeon's map is geomagnetic, though it is also increasingly important for workers in this highly conceptual, technologically sophisticated, and rapidly moving field to maintain focus on the redundancy of multiple cues and their sensory integration and not to become hypnotized nor polarized in searches for unitary mechanisms and explanations.—W. A. Montevecchi.

7. Ferromagnetic coupling to muscle receptors as a basis for geomagnetic field sensitivity in animals. D. Presti and J. D. Pettigrew. 1980. Nature 285:99–101.—Scientists studying the orientation and navigational abilities of animals are excited about recent demonstrations of the presence of magnetic material in honeybees and homing pigeons (see review **5**). This paper, the third such scientific documentation, reports the presence of permanently magnetic material in the neck musculature of pigeons (*Columba livia*) and migratory White-crowned Sparrows (*Zonotrichia leucophrys*). The phenomenon may be widespread among avian migrants, as the authors report that they have also detected appreciable inducible magnetic remanence in the Western Grebe (*Aechmophorus occidentalis*), Pintail (*Anas acuta*), and Tree Swallow (*Iridoprocne bicolor*). Most of the reproducible magnetic remanence detected in the pigeons and sparrows was located in the neck, particularly in the complexus muscle and associated fascia. The black magnetic material, which was found in diffuse patches in the musculature and embedded in muscle fibers, was at times associated with transparent orange crystals, as has been the case with the magnetic material found in pigeons in the only other documentation of this sort (Walcott et al. Science 205:1027–1028, 1979). Diffuse remanence was also spread rather uniformly throughout the skull, though in contrast to the recent findings by Walcott et al. (1979) of concentrations of magnetic material in small innervated tissue between the dura and skull, no such concentrations were found.

The authors propose that geomagnetic sensitivity may arise via the coupling of the magnetic material to sensory structures in the neck, such as muscle spindles which are acutely sensitive to stretch and which could be activated by the torque exerted on the magnetic grains from the earth's geomagnetic fields. This exciting idea leads to the implication that muscular motion may be requisite for detection of magnetic stimuli and opens the door for a host of electrophysiological investigations. If geomagnetic sensitivity is linked with muscular movement, the failure of previous investigators to condition the cardiac responses of *immobile* pigeons to magnetic stimuli takes on a new light. Consistent with this idea, in previous experiments pigeons trained to discriminate the presence or absence of an earth strength magnetic field accompanied successful discriminations with fluttering and flying activity. Finally, in view of the fact that human dowsing activities involving the rapid movement of a forked stick are associated with relatively small changes in the local magnetic field, the authors round out the article with the intriguing speculation that the slight movement of wrists or forearms needed to deflect the dowsing instruments could conceivably arise from magnetically sensitive muscle receptors. This paper offers substantive evidence for novel views of geomagnetic sensitivity. On reading the article one cannot help but raise questions, and without doubt this paper will have immense heuristic significance. After having one's curiosity stimulated by indications of magnetic material in many other bird species, one comes away with the sharp impression that a great deal of work in this area is about to flourish in the scientific literature.—W. A. Montevecchi.

POPULATION DYNAMICS

(see also 2, 3, 20, 24, 57)

8. Distribution and population changes in the Wandering Albatross (*Diomedea exulans*) at South Georgia. J. P. Croxall. 1979. Ardea 67:15–21.—Since the population of Wandering Albatrosses at South Georgia was estimated in the 1960's, 15 additional breeding sites have been located. Most have very small populations. In 1978/79 the breeding population was about 2,370 pairs, in this essentially biennially breeding species where only about 20% of pairs breed in successive seasons, for an overall total of about 4,280 pairs. In the two most important breeding areas, decreases of 19.2% over 15 years to 2,580 pairs and 28.7% over 21 years to 300 pairs have occurred. These declines are probably unre-

lated to egg collection by whalers. As other albatrosses at South Georgia are not decreasing in numbers, it is difficult to suggest ultimate factors responsible for the decline.—C. M. White.

9. Population changes for waterways birds, 1974–1978. J. H. Marchant and P. A. Hyde. 1979. Bird Study 26:227–238.—The Waterways Bird Survey is a national census in Britain of birds in riparian habitats, and employs methods of data collection (belt transects) essentially similar to its counterpart, the Common Birds Census, which covers farmland and woodland. This report, the first summarizing W.B.S. data, presents results pertaining to population changes for seven species also covered by the C.B.C., five species not otherwise monitored, and ten relatively scarce species that required combination of W.B.S. and C.B.C. data for meaningful estimates. Data for species monitored by both surveys were compared, and overall population trends were similar in both accounts. Surveys such as the W.B.S., with its emphasis on a particular habitat that is especially susceptible to pollution and other forms of environmental degradation, may be most effective at identifying birds that are adversely affected by human activities.—Scott R. Robinson.

10. Distribution and breeding biology of raptors in the Thelon River Area, Northwest Territories, 1957–1969. E. Kuyt. 1980. Can. Field-Nat. 94:121–130.—Kuyt supplies previously unavailable data on the population dynamics of the Peregrine Falcon (*Falco peregrinus*), Gyrfalcon (*F. rusticolus*), and Rough-legged Hawk (*Buteo lagopus*) in the Thelon River system of the Northwest Territories. Populations of the Gyrfalcon and Rough-legged Hawk show no consistent trend between 1957 and 1969. The number of Peregrine Falcons remained relatively constant from 1957 to 1963, but then declined, a decline that has continued through at least 1975 when only one nest site was occupied (Fyfe et al., Can. Field-Nat., 90:228–273, 1976). The decline is probably not the result of human disturbance which is minimal and should have affected other raptors. Organochlorines are the suggested cause. The Peregrine, the only migrant raptor nesting in the Thelon system, is contaminated in its southern quarters. Although highly probable, the explanation is unsupported by data from this study. Kuyt has no measurements of chemical contamination, no measurements of egg shell thickness, and his few data on reproductive success indicate no change in clutch or brood size per breeding pair. Despite the lack of data, this paper fills an important gap in our detailed knowledge of the population dynamics of the Peregrine Falcon.—Edward H. Burtt, Jr.

11. Surplus yearlings and the regulation of breeding density in Blue Grouse. F. C. Zwickel. 1980. Can. J. Zool. 58:896–905.—Zwickel and his co-workers have studied population regulation in Blue Grouse (*Dendragapus obscurus fuliginosus*) for more than a decade and recent data indicate that interpretations published earlier must be changed. It now appears that twice as many or more yearlings exist as are needed to replace adult birds that die from one breeding season to the next. The surplus birds apparently are intermingled with the breeding residents, but are so secretive as to become catchable only after removal of other members of the population. The problem of defining the behavioral interactions that lead to adult-yearling and yearling-yearling interactions remains to be investigated.—A. John Gatz, Jr.

12. Second tour of inspection of Quebec heronries, 1978. J. L. DesGranges and P. Laporte. 1979. Can. Wildl. Serv. Prog. Note, 105, 12 p.—This paper reports the 2nd-year's data of a 10-year plan to monitor nesting, population numbers, and eggshell thickness in Quebec heronries. Thirty-four of the 120 known heronries in Quebec were visited in 1978. The number of occupied nests decreased in the Outaouais (−48%), Laurentian (−11%), St. Lawrence estuary (−28%), and Magdalen Island (−33%) regions, but increased in the Eastern Township (+137%) and Gaspé regions (+27%). Overall, the number of platforms and occupied nests decreased in 65% of the heronries when compared to 1977 data, but a substantial increase in these parameters for several heronries caused a net increase of 16% for the survey as a whole. Clutch size averaged 4.0 ± 0.2 SE and average number of young per successful nest was 2.24 ± 0.6 SE. Effects of toxic substances (PCB's

etc.) on Quebec herons were considered minor since eggshell thickness did not differ from previous studies.—Richard M. Zammuto.

13. The Co-operative Breeding Bird Survey in Canada, 1979. G. H. Finney, P. Cadieux and E. Silieff. 1980. Can. Wildl. Serv. Prog. Note, 111, 16 p.—This paper reports the number of breeding birds observed during 1979 on 229 40-km roadside routes across Canada. The 40 species recorded in the greatest numbers per route are tabulated for each of 6 regions: Maritime Provinces, Central Ontario and Central Quebec, Southern Ontario and Southern Quebec, Southern Prairie Provinces, Central Prairie Provinces, and Southern British Columbia. The 10 most common species are tabulated for Northern British Columbia and Terra Nova National Park, Newfoundland. Annual changes for the mean number of birds observed per route are tabulated for each species in each region. Overall, breeding bird populations decreased on most every route throughout the country when compared to the 1978 survey. The American Goldfinch (*Carduelis tristis*), Common Flicker (*Colaptes auratus*), and Song Sparrow (*Melospiza melodia*) have continued a statistically significant decline across Canada in recent years.

This paper is part 11 of a continuing series of annual reports which began in 1970. A summary report emphasizing the data collected from 1966–1975 was published in 1978 (Erskine, **The First Ten Years of the Co-operative Breeding Bird Survey in Canada,** Can. Wildl. Serv. Report 42, 1978). A total of 382 routes have been surveyed across Canada since 1966.—Richard M. Zammuto.

14. Feeding ecology of the Barn Owl (*Tyto alba*) in the Netherlands. (Voedsloecologie van de Kerkuil (*Tyto alba*) in Nederland.) O. DeBruijn. 1979. Limosa 52:91–153. (In Dutch with English summary.)—This is a significant paper on the ecology of the Barn Owl. Data on food (pellet analyses) span the years 1929–1977; more than 92,000 pellets were examined. Small mammals accounted for 96% of the prey, birds 3%, and amphibians 1%. Six species, of the over 50 identified, made up 90% of the prey; two, a shrew and a vole comprised 68%. On a biomass basis the vole is probably the most important food item since it is twice as heavy as the shrew. The owl showed a typical cyclic response to vole abundance in "vole plague" areas. Poor years were characterized by non-breeding while in good years clutches had 8–10 eggs and some second clutches were recorded. In years of "poor" food abundance only 14–16 of the 50 traditional nesting sites in a specific study area were occupied and produced 40–45 young while in "good" food years, 26–29 territories were occupied producing 105–120 young.—C. M. White.

NESTING AND REPRODUCTION

(see also 12, 14, 31, 32, 39, 45, 51, 65, 77, 80)

15. Breeding biology, moult and survival of Lesser Sheathbills (*Chionis minor*) at Marion Island. A. E. Burger. 1979. Ardea 67:1–14.—Lesser Sheathbills were studied at Marion Island in the sub-Antarctic. All breeding adults held territories in penguin colonies; virtually all food eaten by adults and their chicks was obtained from penguins, mostly by kleptoparasitism. Sheathbills bred when food from penguins was most freely available. The minimum age of first breeding was three years and there was a surplus of potential breeding adults. Ninety-four percent of all clutches had 2 or 3 eggs. Apparent causes of mortality were starvation, inclement weather, and predation by Sub-Antarctic Skuas (*Catharacta antarctica*) and feral cats (*Felis catus*).—C. M. White.

16. Growth of Rhinoceros Auklets and Tufted Puffins, Triangle Island, British Columbia. K. Nermeer and L. Cullen. 1979. Ardea 67:22–27.—Growth of young Rhinoceros Auklets (*Cerorhinca monocerata*) and Tufted Puffins (*Lunda cirrhata*) varied between species and years. Weight increments of both species were significantly reduced at times of poor reproduction and sub-optimal feeding conditions. While the Tufted Puffin suffered a nearly complete reproductive failure in 1977 because of an apparent food loss, the auklet was able to shift its diet to another common species and had good reproductive success. An exchange experiment demonstrated that the species could raise each other's

young and that the exchanged young adopted the diurnal and nocturnal feeding patterns as well as the growth forms of the foster species. Weight gain in the chicks was more related to feeding rates of the adults than to inherent growth patterns of the different species.—C. M. White.

17. Breeding Biology of the Little Owl. D. Glue and D. Scott. 1980. Br. Birds 73:167–180.—The Little Owl (*Athene noctua*) is found across Europe north to Denmark, but was introduced to Britain and has become accepted as a characteristic member of the avifauna of rural southern Britain. This report based on 549 cards submitted to the BTO's Nest Records Scheme between 1939 and 1975 is an example of how informative the activities of many, assuredly amateur, contributors can be. Little Owls breed in farmland, woodland, gardens, heaths and moors, wet lands, and occasionally in coastal areas. The nest site is usually a hole about 3 m off the ground in oak, ash, fruit trees, willow, elm, or beech trees. Males begin active territorial singing during mid-winter, although this activity is in full swing in March. The authors point out the need for more intensive study of banded birds to authenticate the impression that pair bonding and site-tenacity appear strong. The laying period is highly synchronized and represents the shortest breeding season of any species of owl breeding regularly in Britain. Only the female incubates. Incubation lasts for 28–33 days. Only the female feeds newly hatched young; from the 14th day until fledging (at 30–35 days) the male also feeds the nestlings. Average clutch size is 3.6 eggs; the average brood size is 2.4 young. Dispersal occurs within 4 or 5 weeks.—Patricia Adair Gowaty.

18. Breeding biology of Orchard Orioles in a new population in Manitoba. S. G. Sealy. 1980. Can. Field-Nat. 94:154–158.—Orchard Orioles (*Icterus spurius*) have recently colonized the Delta Beach Ridge on the southern shore of Lake Manitoba. The initial invasion involved small numbers of birds with first year males outnumbering older males. By the third year only older males bred along the ridge, although a few first year males were seen. The paper also contains details of the Orchard Oriole's reproductive biology.—Edward H. Burtt, Jr.

19. Variations in measurements among White Pelican eggs and their use as a hatch date predictor. J. B. E. O'Malley and R. M. Evans. 1980. Can. J. Zool. 58:603–608.—Eggs lose water during incubation. The regularity of this water loss allows one to predict a hatching date based on the specific gravity of the egg (weight in air/0.500 length·maximum width^2). O'Malley and Evans predicted hatch dates for White Pelicans (*Pelecanus erythrorhynchos*); their mean error was only 0.4 days for estimates of entire subcolonies and 2.8 days for individual eggs. However, the authors urge caution in the use of this method both because of the potentiality of disturbing the birds greatly during the sampling and because errors for single predictions included values much higher than the means indicated above.—A. John Gatz, Jr.

20. On the breeding biology of the Wood Pigeon (*Columba palumbus* L.) in Finland. L. Saari. 1979. Finnish Game Research 38:3–16.—Local breeding distribution, breeding season, habitats, and survival of eggs and young were determined from field observations, specimens collected, and analysis of nest record cards. The breeding season is prolonged, from April until September. Nest record cards indicate a peak of breeding in May, but the analysis of crop glands of specimens collected indicate the highest proportion of breeding birds in August. At least 60% of the nests failed, but only 6% of those nests in which at least one egg hatched failed (see review **2**). Human disturbance causing desertion was the main disruptive factor.—R. B. Payne.

21. Fecundity of the Black-headed Gull (*Larus ridibundus*) in a colony in the Forez Plaine (Loire, France). [Fécondité de la mouette rieuse (*Larus ridibundus*) dans une colonie importante de la Plaine du Forez (Loire, France).] J.-D. Lebreton and P. Landry. 1979. Le Gerfaut 69:159–194.—Nesting production was sampled for three years in a colony of about 2,000 pairs, using counts of young in families and estimates of numbers from recaptures of banded chicks. The authors developed several techniques of stratification for their heterogeneous data. Production per adult pair varied from year to year, from

1.4 to 2.3 young fledged, with years of lower production being years of heavy rains and a high water level. Rains affected the gulls by chilling birds, disrupting the behavior of adults, and flooding the nest sites.—R. B. Payne.

22. Sociobiology of Bank Swallows: reproductive strategy of the male. M. D. Beecher and I. M. Beecher. 1979. Science 205:1282–1285.—*Riparia riparia* uses a mixed reproductive strategy (MRS). Two essential conditions for a male MRS exist in this species: (1) living in large social groups and (2) low synchronization as to nesting-cycle state. The male forms a pair bond with and protects a female and also copulates promiscuously with other receptive females. Females are receptive before and during egg-laying. Males remain sexually active until well into the stage of nestling feeding. Mated males will attempt "rape" of guarded females while their mates are incubating. The authors suggest that the MRS maximizes the males' inclusive fitness. I find no clear statement that the described behavior aids the survival of the species.—C. H. Blake.

23. Breeding of the Sandwich Tern *Thalasseus sandvichensis* on the Arguin Bank, with a brief survey of winter distribution (1st part). [Reproduction de la Sterne Caugek *T. sandvichensis* Lath. sur le Banc d'Arguin (Gironde). Aperçu de sa distribution hivernale.] P. Campredon. 1978. L'Oiseau et la R. F. O. 48:123–150. (In French.)—Campredon presents results of observations on a colony of 2,800 pairs of Sandwich Terns on an island in the Arcachon Basin on the Gascony coast of France. First noted in 1966, nesting in the colony was irregular until 1974, after which time breeding numbers of terns rapidly increased. Data are presented on timing of arrival, believed to be coincident with that of the sand eel, *Ammodytes tobianus*; establishment and density of nests; clutch size; fledging; food of the young; and other aspects of the breeding biology of this tern. The paper contains useful descriptive information.—Paul B. Hamel.

24. Effect of a cold spell on birds in northern Finland in May 1968. M. Ojanen. 1979. Ornis Fennica 56:148–155.—Cold temperatures and heavy snow persisted for four days in late May at Oulu, Finland. By the third day 3,000 birds were found dead, and an estimated "several hundreds of thousands" probably died in the western part of the province. A few species appeared scarce later in the year, but census data over many years were not available for comparison. Bird species that had already established territories formed flocks during the cold, and many birds became easy to approach; the weaker birds could be caught by hand. Nearly all nests of the smaller species were unsuccessful.—R. B. Payne.

25. On the breeding of the Pine Grosbeak *Pinicola enucleator* in NE Finland. E. Pulliainen. 1979. Ornis Fennica 56:156–162.—Pine Grosbeaks are migrants in Lapland, arriving in February and early March and laying in late May and early June. In 37 nest records, nests were built mainly in spruces. Eggs were laid at 1–2 day intervals, the incubation period was 13–15 days, and the nestling period was 13–17 days. Young fledged from about a third of the clutches. The most important predators were Siberian Jays (*Perisoreus infaustus*). The Pine Grosbeaks nest mainly on the south sides of the conifers where the branches are longer and more leafy and where it may be more difficult for the jays to find them.—R. B. Payne.

26. The Kingfisher. (Goluboi zimorodok.) A. D. Numerov and Iu. V. Kotiukov. 1979. Priroda 1979(6):69–73. (In Russian.)—Kingfishers (*Alcedo atthis*) banded and retrapped in a 5-year study in the USSR's Oka State Nature Reserve returned to the same riverbank burrows annually. Females could be distinguished from males by the pale lower mandible and less bright plumage; yearling birds from adults, by their generally less conspicuous coloration. Both male and female excavated the 30–100 cm burrow, incubated the clutch of 6–7 nearly spherical (20 mm diameter) eggs, and fed whole, successively larger fish to the growing young.

The number of young leaving the nest averaged 62% of the number of eggs laid, a lower reproductive potential than previously attributed to this kingfisher. Many pairs had two clutches each season, but the second clutch was less productive.

Banding revealed that 35% of breeding males aided more than one (once 3) female

with incubation and feeding young. If a male died, he would be replaced quickly by a previously unmated male. If the burrow of a monogamous pair was destroyed, the male and female moved to a new site together. If one burrow of a trio was destroyed, that female alone moved, and the male stayed with the other female in her intact burrow. The displaced female either formed a trio with a pair at the new location or acquired a mate from the non-breeding males.—Elizabeth C. Anderson.

BEHAVIOR

(see also 21, 26, 49, 55, 73, 74, 77, 80)

27. Description of the social behaviour of the Magpie (*Pica pica*). G. Baeyens. 1979. Ardea 67:28–41.—A description of social behavior of Magpies was based on a 5-year study on a resident color-marked population. An ethogram is presented, wherein postures, movements, vocalizations, and feather positions are discerned and their combinations in different contexts are described. Aggression, escape and submission, pair-formation, and pair-maintenance are dealt with separately.

The differences in behavior between adults and juveniles and between males and females indicate that sex can be distinguished on behavioral criteria in spring. Juveniles can be told from adults by relatively less white in the first primary feather (about ½ of feather) while adults have more than ¾ of the feather white. Social interactions in "ceremonial" gatherings usually originate as conflicts between territory owners and individuals attempting to establish a territory or between two of the latter.—C. M. White.

28. Territorial behaviour by prairie pothole Blue-winged Teal. G. R. Stewart and R. D. Titman. 1980. Can. J. Zool. 58:639–649.—This paper establishes the existence of both non-overlapping territories and defense displays in a breeding population of Blue-winged Teal (*Anas discors*). Observations of 11 pairs of individually marked birds resulted in an average of 40 sightings each and sufficient data to calculate sex-specific time budgets for each of three phases in the breeding season. Averaged over the three phases, males devoted 2.3% of their time to aggressive interactions. Threats were most common at the beginning and end of the territorial period and rushes were the most common display at all other times. A peak in pursuit flights occurred at the time of nest initiation. Interpretations are offered for the adaptiveness of the various behavioral patterns observed.—A. John Gatz, Jr.

29. The sexual bond in the Marsh Warbler, *Acrocephalus palustris*. F. Dowsett-Lemaire. 1979. Le Gerfaut 69:3–12.—Of 120 color-banded males that were followed, five were bigamous with two females nesting on the same territory or (four of these cases) on two separate territories which were established before or during the laying by the first female. Three other males were temporarily bigamous, but one of the two females did not lay. In one of these the nonlaying female nevertheless built three nests within 11 days before each nest fell over and she disappeared. Ten additional males established a second territory in habitat that appeared suitable for breeding. The nests of bigamous males were less successful than the nests of monogamous males.

Desertion was common with one member of the pair leaving its mate before the nesting cycle was completed. Males were three times more likely to desert than were females. Desertion does not pay, as the males that desert produce fewer young in the breeding season.

Males visited a neighboring female when her mate was absent, especially in the few days before the female laid the eggs when she was actively mating. Females did not welcome their visitors and were indifferent or chased away the intruding male. No matings outside the pair bond were noted. The male visited a neighboring female whether or not he himself had a mate. One male apparently lost his chance of breeding by settling next to a pair that already was incubating—the new male escorted the female whenever she was relieved at the nest by her mate, following her, and giving a sexual display. Her mate came to tolerate the cohabiting relationship but came close to losing her when she moved onto the new male's territory the day after a predator took her young. However, she moved back with her old mate the next day, and the new male sang actively for several

hours on his own territory. The male did not attract a female of his own, perhaps because he had so seldom sung, and song is important in pair formation in this species.—R. B. Payne.

30. Avian flocking in the presence of a predator. T. Caraco, S. Martindale and H. R. Pulliam. 1980. Nature 285:400–401.—The time budgeting of scanning, feeding (including search, handling) and conspecific interference activity was monitored among individual Yellow-eyed Juncos (*Junco phaeonotus*) in different-sized (1, 3–4, 6–7) flocks under natural conditions and in the presence of a trained Harris Hawk (*Parabuteo unicinctus*) which when released in the study area perched in trees and stooped over the juncos. Solitary juncos scanned more and fed less than individuals in flocks under both conditions. When the hawk was present, all juncos (regardless of flock size) scanned more, and the average flock size was significantly larger. These interesting results suggest that an individual's probability of survival during increased frequency of predatory attack increases in larger flocks and that predator pressure may influence flock size via its effects on the time budgeting of the activities of individual birds. In view of these findings it would be informative to study how the hunting strategies and success of predators vary as a function of prey flock size.—W. A. Montevecchi.

31. Communal nesting. (Obshchestvennoe gnezdo.) V. P. Belik. 1979. Priroda 1979(7):99. (In Russian.)—Trees are so few on the Russian steppe that abandoned Magpie (*Pica pica*) nests (built as hollow spheres) are readily taken over by other birds. In Rostov Region, USSR, 4 species were observed using one old Magpie nest simultaneously. In one year a pair of small falcons modified the nest into upper and lower chambers. In the next year a kite (*Milvus* sp.) moved into one chamber, and a pair of Starlings (*Sturnus vulgaris*) into the other. Between them dwelt 3 pairs of Tree Sparrows (*Passer montanus*) and a pair of House Sparrows (*P. domesticus*). That the House Sparrows should live next to a raptor was considered rare, though characteristic for Central Asia generally, but the Starlings' presence was counted even more unusual.—Elizabeth C. Anderson.

32. Relatedness and inbreeding avoidance: counterploys in the communally nesting Acorn Woodpecker. W. D. Koenig and F. A. Pitelka. 1979. Science 206:1103–1105.—*Melanerpes formicivorus* nests in groups of one (perhaps rarely more) male and one to several females. Females may remain in the natal territory but do not breed as long as their presumed (or known) father is a member of the group. Inbreeding is avoided by adherence to three rules. (1) A female in her natal group does not breed as long as a male reproductively active at the time of her birth is still a member; (2) if a female emigrates, she breeds; (3) birds disperse alone or in unisexual sets only. The authors do not draw a further inference: a male is recognizable as an individual by permanent, distinctive characteristics. I regard this last point as necessary.—C. H. Blake.

33. Interspecific relations of sympatric Wheatears. 2. Behavioral aspects of coexistence in closely allied species. (Mezhvidovye otnozheniya simpatricheskikh vicov kamenok (*Oenanthe*, Turdinae, Passeriformes). 2. Povedenicheskie aspekty sosyshchestvovaniya blizkikh vidov.) V. Ivanitskii. 1980. Zool. Zhurn. 59(5):739–749. (In Russian with English summary.)—Continued study of interspecific interactions of Wheatears in comparatively arid South Tuva constitutes a challenge in various respects (see review **41**). Five species from one genus reside in a restricted area of little variability. They maintain widely overlapping territories. *Oenanthe isabellins* was absolutely dominant and *O. pleschanka* absolutely subordinate. *O. oenanthe* dominated *O. deserti*. No reversals of dominance were observed in 450 interspecific encounters. The hierarchy rested on definite discrimination of individuals of discrete species. Specifics of aggressive behavior (frequency and duration of boundary conflicts, and diversity of displays) corresponded to the rank of each species in the interspecific hierarchy. Discussed in detail are the problematic role of arrival time, and density of mixed populations relative to stabilization of relations between coexistent species.—Leon Kelso.

ECOLOGY

(see also 14, 22, 30, 33, 43, 46, 64, 65, 66, 70, 77, 78, 82)

34. Winter habitat use by White-tailed Ptarmigan in southwestern Alberta. P. W. Herzog. 1980. Can. Field-Nat. 94:159–162.—The distribution of White-tailed Ptarmigan (*Lagopus leucurus*) is dictated by the availability of willow (*Salix* spp.) buds and twig tips on which the ptarmigan browse. When snow buries willows in an alpine cirque, the ptarmigan move to the lower subalpine forest or stream courses. Limited data indicate that adult males are more apt to remain in the alpine cirque than females or subadults. Whether adult males exclude subadults and females or the latter groups seek the protection and more abundant food of lower elevations is not clear.—Edward H. Burtt, Jr.

35. Avian community structure of six forest stands in La Mauricie National Park, Quebec. J. L. DesGranges. 1980. Can. Wildl. Serv. Occas. Pap. 41, 34 p.—This paper reports bird species diversity and density for six habitats (white birch (WB), balsam fir (BF), sugar maple-yellow birch (SM-YB), mixed (MIX), red spruce (RS), and white spruce (WS)) in various stages of succession.

The number of territorial males was determined by the spot-mapping method. About 93% of the bird population could be assessed by the fourth visit to each habitat and 99.8% by the 10th.

The WB, BF, SM-YB, MIX, RS, and WS habitats had 27, 27, 24, 37, and 30 species, and 125, 146, 103, 124, and 123 individuals respectively, per 9.3 ha. The Ovenbird (*Seiurus aurocapillus*) was dominant in the WB, BF, and MIX habitats at 25, 19, and 17/9.3 ha respectively, the Golden-crowned Kinglet (*Regulus satrapa*) in the RS and WS at 14 and 15/9.3 ha respectively, and the Black-throated Blue Warbler (*Dendroica caerulescens*) in the SM-YB at 20/9.3 ha. In general, bird species of the WB and SM-YB habitats were either common or rare while those of the BF, MIX, RS, and WS contained species with average populations.

Deciduous stands were mainly frequented by insectivores who fed in flight (Tyrannidae) and on tree trunks (Picidae, Sittidae, Certhiidae), coniferous stands by omnivores (Corvidae, some Fringillidae) and insectivores who fed at the canopy level (Vireonidae, some Parulidae), and the white birch stand by species who fed on the ground (Troglodytidae, Turdidae, some Fringillidae).

Plant physiognomy, not the composition of plant species, affected the composition of bird species in each stand. Increased physiognomy was associated with increased invertebrate biomass, increased avian diversity and density and the latter stages of ecological succession. In short, thicker foliage produced more insects and a greater proportion of birds.

The amount of energy (biomass) an individual took from its environment is tabulated for each of 50 species. A new diversity index is offered.—Richard M. Zammuto.

36. A preliminary catalogue of bird census plot studies in Canada, part 4. A. J. Erskine. 1980. Can. Wildl. Serv. Prog. Note 112, 26 p.—This paper reports avian densities at 142 census plots for five habitat types across Canada (50% from Quebec province). The broad-leaved forest, conifer forest, marsh and bog, open land, and urban habitat contained 24, 98, 6, 3, and 11 census plots respectively, and the mean number of males per census plot was: 465, 710, 1,025, 565, and 518/100 ha respectively. The Red-winged Blackbird (*Agelaius phoeniceus*) was responsible for 70% of the 1,025 males/100 ha in the marsh and bog. Individual species densities are given for several of the most common species at each census plot.

This report is part 4 of a series which began in 1971. A summary report emphasizing the data presented in the first 3 parts of the series was published in 1977 (Erskine, **Birds in Boreal Canada: Communities, Densities and Adaptations,** Can. Wildl. Serv. Report, 41, 1977). A total of 462 plots has been censused across Canada (Prince Edward Island excepted) since 1929.—Richard M. Zammuto.

37. The development of the breeding populations in several species of birds in the Lauwerszee area in eight years following reclamation. (De Ontwikkeling van de

Broedvogelbevolking in het Lauwerszeegebied sinds de Afsluiting in 1969 T/M 1976.) M. R. Van Eerden, J. Prop and K. Veenstra. 1979. Limosa 52:176–190. (In Dutch with English summary.)—Following the draining of seawater from land there is a slow process of desalination of the land and the vegetation still shows aspects of salt marsh communities 8 years later. Two groups of bird species can be differentiated according to their pattern of colonization of reclaimed lands. The primary species colonized the area within one or two years. Species such as the Avocet (*Recurvirostra avosetta*), Black-headed Gull (*Larus ridibundus*) and Common Tern (*Sterna hirundo*) showed a shift in breeding site from the edges to the center of the area. Secondary species arrived following the development of vegetation structure. Species in this group include the Lapwing (*Vanellus vanellus*), Black-tailed Godwit (*Limosa limosa*), and Ruff (*Philomachus pugnax*). The development of natural meadows created suitable breeding habitat and increased food supply. Lapwings are to a large extent dependent on small insects and spiders that occupy such vegetation. The Black-tailed Godwit uses the vegetation mainly as cover while breeding and feeds on freshwater mud flats.—C. M. White.

38. Food and foraging behavior of the Snares Fernbird. H. A. Best. 1979. New Zealand J. Zool. 6:481–488.—Island birds are usually thought to have broader foraging niches than comparable mainland species. *Bowdleria punctata caudata* apparently supports that notion. On the Snares Islands, a small (less than 500 ha) island group 150 km S of South Island, New Zealand, the species shares the insects with only three other endemic landbirds. This interesting article documents the Fernbird's food as ranging in size from less than 1 mm (mites and beetles) to about 3 cm (marine amphipods). Most interesting were the foraging sites and methods. The methods included hanging upside down on tree limbs, grasping and then shaking dead leaves with the feet to flush insects, flycatching, stalking sitting flies, flaking bark, lifting fallen leaves with a foot and peering underneath, and long searches into petrel burrows (up to several minutes). Unusual foraging sites included shore debris, floating kelp, recumbent sea lions (fur seals, however, were intolerant of the attention), and even burrowing beneath accumulated leaf litter ("the concealed bird's position was marked by a small, trembling hummock of leaves from out of which material was ejected vigorously"). On the "mainland," South Island, the Fernbird typically inhabits a dense cover of reeds, fern, and scrub growing near or in wet areas. On the Snares they inhabit all the dense forest, as well as other areas. A unique behavior perhaps enables some birds to, at times, keep warm in this subarctic climate. Occasionally, a bird interrupted its foraging atop a sea lion and "snuggled down to rest in the thick, heavy mane of a bull . . . ." This good solid descriptive study should help persuade most people that interspecific competition, which is much lower on islands, is one of the major driving forces in determining the foraging niches of bird species.—C. J. Ralph.

39. Ecological notes on the ecology of the Rustic Bunting in the Leningrad Region. (Materialy po ekologii ovsyanki-remeza (*Emberiza rustica* Pall.) v leningradskoi oblasti.) T. Rymkevich. 1979. Vestnik Leningradsk. Univ., Biol. Ser. 1979(3):37–47. (In Russian.)—From 1972 to 1975 Rymkevich observed Rustic Buntings (*Emberiza rustica*) from spring arrival to fall departure. In all 437 were trapped during migration. Eighteen young and 6 adults were observed in aviaries. Replacement nesting was proved by banding. Complete post-nesting molt covered 50–60 days. Shrubby wetland habitat was favored. Males gathered material but took no part in nest building. Nest sites were usually elevated sphagnum or sedge hillocks. Dry stems and grass leaves were the building material. Egg-laying was in early May and both sexes incubated. They alternated by day but the female persisted at night. Sitting periods by day averaged 50 min. Only females bore brood patches. Incubation lasted about 11 days. Most nests fledged 4–5 young. Newly hatched young had closed eye and ear openings, that opened on the third day. Adults brooded young for 5 days. Both adults visited young 3–7 times per hour. They foraged several meters from the nest. Young could leave the nest at 7 but usually stayed 9–10 d. After fledging they lingered in the territory within 100 m. At the approach of danger they dropped to the ground. At 14–15 days they were on the wing. Soon after dispersal most young left the parental territory. The peak of fall flight was mid-September. The two nesting cycles covered about 90 days as verified by banding. Of 374 trapped on fall migration only 11

were adults. Most adults renewed the whole plumage during postnuptial molt.—Leon Kelso.

40. Strip transect sampling and analysis for avian habitat studies. R. N. Conner and J. G. Dickson. 1980. Wildl. Soc. Bull. 8:4–10.—This paper describes a less expensive, less time-consuming method to measure relative differences in bird population size when a precise, accurate census is not feasible. A step-by-step methodology for the recommended strip transect is described. Comment is made regarding optimal study area selection, field data sheets, transect length and width, time of day and year, type of weather, rate of traverse, number of transect counts, type and number of observers, and statistical treatment to make the best estimate for a variety of circumstances.—Richard M. Zammuto.

41. Interspecific relations of sympatric Wheatears. 1. Ecological competitive prerequisites and spatial structures of mixed populations. (Mezhvidovye otnozheniya simpatricheskikh vicov kamenok (*Oenanthe*, Turdinae, Passeriformes). 1. Ekologicheskie predposylki konkurentsii k prostranstvvennaya struktura smeskannoi populyatsii.) V. Ivanitskii. 1980. Zool. Zhurn. 59(4):587–597. (In Russian with English summary.)—Long ago Bergtold's book on Colorado birds was chided for the consistent use of "Wheateater" for the genus *Oenanthe* and the same fault occurs here. *O. oenanthe, O. isabellina, O. deserti* and *O. pleschanka* are the species concerned (see review **33**), prevalent in gravelly steppes, montane slate plateaus, dry arroyos, cliffs, and outcrops extending up to the alpine zones of southwest Tuva. Serious attention is given to the works of western ecologists, particularly Murray, Rice, and Cody, with discussion of competition and interspecific territoriality. Consumption of prey was very thorough, so as to permit close spacing of nests.—Leon Kelso.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 40, 56, 71)

42. Rational strategies for the control of Queleas and other migrant bird pests in Africa. P. Ward. 1979. Phil. Trans. R. Soc. Lond. B 287:289–300.—Numbers of Queleas (*Quelea quelea*) increased with increasing food supplies, and more food for them is being made available as more grain is grown in their range. Consequently, these birds pose an increasingly serious problem to grain farming in Africa. Efforts in 16 African countries to control them result in annual killing of as many as a billion Queleas. However, Ward reported that analysis of recoveries of banded birds indicated the maximum control attained did not change the expected annual mortality rate and costs of control thus cause additional economic loss without reducing crop loss. Recommendations of scientists against killing the birds are largely ignored by organizations and persons assuming responsibility for solution of the problem.

The killing of Queleas in Africa appears to be another case where the chief beneficiaries of the program are the persons paid for materials and labor used in prosecution of the program. It may work a little like the old-time bounty system where wise entrepreneurs reared unwanted animals for the purpose of collecting bounty payments.—Paul A. Stewart.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 3, 4, 8, 9, 10, 12, 20, 57, 70)

43. Effects of recreational use of shorelines on breeding bird populations. R. J. Robertson and N. J. Flood. 1980. Can. Field-Nat. 94:131–138.—The construction of access roads, electric lines, and lakeshore cottages significantly increased the amount of edge without significantly reducing foliage height diversity or canopy density. Surprisingly, the increased edge had no effect on species diversity. The authors suggest that the increase in edge in disturbed habitats favored a few characteristic edge species (e.g. American Robin, *Turdus migratorius,* Northern Oriole, *Icterus galbula*) that became abundant, while populations of many species remained unchanged. Those few "forest" species (e.g. Yellow-throated Vireo, *Vireo flavifrons*) that withdrew to undisturbed tracts were replaced by

species dependent on human disturbance (e.g. Barn Swallow, *Hirundo rustica*). Thus the number of species was relatively unaffected, but the distribution of individuals among the species became uneven in disturbed habitats, thereby reducing the diversity index (H′).

These results indicate that low density recreational development that maintains forest canopy and understory has little effect on avian diversity. However, despite the low level of disturbance, some species (e.g. Yellow-throated Vireo) are severely affected and less careful development would have a far greater effect not only on isolated "forest" species, but also on species diversity. As we seek to develop land for recreational use, more studies of this kind will be needed if we are to understand our impact on the ecosystem.—Edward H. Burtt, Jr.

44. Uptake and clearance of petroleum hydrocarbons by the Glaucous-winged Gull (*Larus glaucescens*) and the Mallard Duck (*Anas platyrhynchos*). E. H. McEwan and P. M. Whitehead. 1980. Can. J. Zool. 58:723–726.—Birds were fed a gelatin capsule containing labelled petroleum. Almost half of the oil was excreted. That portion of the tritiated hydrocarbons taken up by the plasma and tissues was detoxified in most nonrestrained birds within 24 h although restrained birds were somewhat slower in processing the petroleum hydrocarbons. These species seem quite capable of metabolizing single small doses of oil.—A. John Gatz, Jr.

45. Changes of eggshell thickness in Belgian birds of prey. C. Joiris, J. Dejaegher, and K. Delbeke. 1979. Le Gerfaut 69:195–210.—Eggshell thickness was measured and eggshell weights were determined in museum and private collections. Most species underwent a decrease in shell thickness after 1950, particularly the Sparrowhawk, *Accipiter nisus* (20%); Peregrine, *Falco peregrinus* (18%); Hobby, *F. subbuteo* (13%); and Goshawk, *A. gentilis* (7.9%). The owls changed less and the insectivorous Honey Buzzard, *Pernis apivorus* and Kestrel, *F. tinnunculus* have not changed in eggshell thickness. The decreases in eggshell thickness in Belgium were probably due to organochlorine pesticides.—R. B. Payne.

PHYSIOLOGY

(see also 5, 6, 7, 19, 44, 81)

46. Fat and protein metabolism and mortality in the Coot (*Fulica atra*). J Visser. 1978. Ardea 66:173–183.—Thirty Coots (*Fulica atra*) were taken during mild weather conditions in August–February 1974 and 1975. In February 1976, 12 Coots were collected during a cold spell. The weights of three body components (fat, protein and water) of all birds were determined. Coots collected in February 1976 ("starved") were significantly lighter than those collected during the August–February period in 1974 and 1975, and the differences are said to be a function of harsh environmental conditions in 1976. The "starved" birds had lost a considerable amount of fat, but also some protein.

The body composition of "normal" and "starved" Coots in relation to dry weight shows remarkable differences. The decrease in dry weight in "normal" birds is coupled with a distinct decrease in fat weight. This correlation is less pronounced in the "starved" birds because most of the fat reserves in this group were already used up. The decrease in protein is more pronounced in the "starved" than in the "normal" birds.

Wing length was the only available measure of size applied in this study. The loss of fat and protein proved to be related to the size of the birds. When bad environmental conditions prevail, large birds lose more fat than small birds, but their percentage loss is smaller due to the large fat reserves of the long-winged birds in normal condition. The conclusion is that, due to limited fat reserves, short-winged birds run out of fat and use up an appreciable part (46%) of their protein reserves. Therefore, mortality due to bad environmental conditions can be expected to be related to body size.—C. M. White.

47. Sexual differences in the brain. A. P. Arnold. 1980. Am. Sci. 68:165–173.—Such differences have been studied in the rat and in more detail than in the Zebra Finch (*Poephila guttata*). Several structures known to be connected with song production are larger in the male than in the female (see review **53**). In particular, area X of the lobus parolfactorius is larger and prominent in the male and wanting in the female. Neither castration

of adult males nor androgen administration to adult females alters the size of the regions to any great degree. Canaries react somewhat differently. Cell size in the significant regions also shows sexual difference. The number of cells taking up tritiated testosterone differs similarly. Electric microstimulation shows a higher threshold and later response by syringeal muscles in the female.—C. H. Blake.

48. Comparative respiratory functions of blood in some passerine birds. J. Palomeque, L. Palacios and J. Planas. 1980. Comp. Biochem. Physiol. 66A:619–624.—This paper surveys hematological parameters, hemoglobin oxygen affinity, and Bohr effect in 16 species of 9 families and provides a useful summary and bibliography to the general area of passerine hematology.—C. R. Blem.

49. The lipoid secretion by epidermis of bare skin from the head of the Indian White Ibis, *Threskiornis melanocephala*. G. Menon, R. Shah, and M. Jani. 1979. Misc. Repts. Yamashina Inst. Ornithol. 11:128–131. (In English.)—During maturation certain avian species shed the plumage of the head and neck which are left bare. Current histological analysis of deplumed skin showed a high concentration of melanin, absence of plumage follicles, and a lipid content higher in the epidermis than in the dermis. Lipid synthesis is rapid in the bare skin of head and neck. The authors suggest that these areas of skin are functionally like holocrene glands. Their oily surface restricts over-soaking on the one hand and abrasive wear on the other. Pigmentation of bare skin may be interspecifically communicative in that it develops only in mature birds. "This observation also underscores the fact that such modifications . . . are of more common occurrence than was hitherto suspected. The role of pigmentation of the bare skin in social life of these birds cannot be overlooked, considering that some areas of skin are not colored black when they were feathered in the subadults."—Leon Kelso.

50. Infrared thermographic measurement of peripheral temperature in the Humboldt Penguin (*Spheniscus humboldti*). [Mesures de temperatures peripheriques par thermographie infra-rouge chez le Manchot de Humboldt (*S. humboldti*).] B. Despin, Y. Le Maho, and M. Schmitt. 1978. L'Oiseau et la R. F. O. 48:151–158. (In French with English summary.)—Infrared thermographs were made of two Humboldt Penguins exposed to 22°C temperatures both before and after the birds were cooled by being fed frozen fish or ice. Before cooling the birds were panting and radiating considerable heat from flippers and feet (14–18° above ambient temperature, and 6–8° above the temperature of the remainder of the body). Upon internal cooling, temperatures of the extremities were reduced to those of the remainder of the body. These effects were immediately obvious in the thermographs, indicating that the technique is a useful one for monitoring thermoregulation by undisturbed birds.—Paul B. Hamel.

51. Water-vapor conductance of Black-billed Magpie (*Pica pica*) eggs collected along an altitudinal gradient. T. L. Taigen, G. C. Packard, P. R. Sotherland, T. J. Boardman and M. J. Packard. 1980. Physiol. Zool. 53:163–169.—Conductance of magpie eggs to water vapor is a function of the number of eggs in the nests at the time of collection and the analyses indicate that conductance may be related to the order in which an egg is laid. A statistical relationship suggests that conductance is related to altitude of the collection site, but the authors conclude that the correlation is probably spurious. This is an interesting paper not only for its conclusions, but also for the clear, logical, and sophisticated analyses.—C. R. Blem.

52. Intercellular adhesion: coconstruction of contractile heart tissue by cells of different species. A. C. Nag and M. Cheng. 1980. Science 208:1150–1152.—There seems no limit to what can be done with birds. Embryonic chick and rat myocardial cells were dissociated. The chick cells were labelled with tritiated thymidine. After incubation of a mixture of the two sorts of cells, contractility was observed. Autoradiographs showed adhesion between rat and chick cells.—C. H. Blake.

53. Hormone-induced sexual differentiation of brain and behavior in Zebra Finches. M. E. Gurney and M. Konishi. 1980. Science 208:1380–1383.—The avian song system depends on discrete neural systems which are better developed in the male (see review

47). In *Poephila guttata* 17β-estradiol (E_2) and 5α-dihydrotestosterone (DHT) can stimulate the enlargement of these portions of the brain in the female to the extent that she will engage in courtship and song. The greatest effect is produced by E_2 at hatching followed by DHT as an adult.—C. H. Blake.

MORPHOLOGY AND ANATOMY

(see 5, 47, 66)

PLUMAGES AND MOLT

(see also 27, 49)

54. The duration of the flightless period in free-living Mallard. M. Owen and R. King. 1979. Bird Study 26:267–269.—Female *Anas platyrhynchos* in Britain remained flightless during the molt for 32 days, and males for 34 days.—Scott R. Robinson.

55. Interaction between posture, color, and the radiative heat load in birds. L. Lustick, M. Adam, and A. Hinko. 1980. Science 208:1052–1053.—The experimental material was patches of plumage (attached to skin) from breast and back of adult *Larus argentatus*. The body was simulated by a water reservoir at 36.7° ± 0.4°C. The maximum uptake of heat is at 90° angle of incidence. The color of the feathering has maximum significance at this same angle, darker colors absorbing more heat than lighter ones.—C. H. Blake.

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 2, 8, 10, 17, 18, 22, 34, 41, 66, 75, 76, 83)

56. The Grey Lag Goose (*Anser anser*) in the north Caspian. (Seryi gus na severnoi Kaspii.) V. Vinogradov. 1979. Byull. Mosk. Obshch. Ispyt. Prirody, Biol. Div. 84:66–72. (In Russian.)—In autumn about 100,000 geese traverse the Volga Delta and about 70–80% winter outside the USSR. The future of these migrant geese rests on increased vegetable growth in game reserves and hunting areas of Azerbaijan (see review **71**). Two definite populations of geese are recognized in the Caspian. They differ in climate preference, productivity, time of nesting, and departure.—Leon Kelso.

57. Populations, movements and wintering areas of Thick-billed Murres (*Uria lomvia*) in eastern Canada. A. J. Gaston. 1980. Can. Wildl. Serv. Prog. Note 110, 10 p.—This paper reports present Thick-billed Murre population size for offshore eastern Canadian and adjacent waters using banding recovery and survey data. The total breeding population was estimated at 4.6 million, a decrease of over 50% in 20 years (1961 = 10 million). About 55% of the breeding population breeds in Canadian waters. Nine colonies make up 83% of the breeding population. About 0.7 chicks/pair/yr were produced. Survival of young to yearling age was estimated at 30%. Recovery distributions suggested that Canadian Murres are concentrated north of 49° latitude in early winter, shifting thereafter to more southern waters. Most Murres from Greenland waters spend winters south of 68° latitude. About 66% (4 million) of all Thick-billed Murres of the western Atlantic winter off Newfoundland. Migration north usually begins in late March but depends upon the time pack ice melts. Other migratory route phenologies with respect to numbers and age specificity are discussed in detail.—Richard M. Zammuto.

58. Pelagic birds in the South Atlantic Ocean and at South Georgia in the austral autumn. J. R. Jehl, Jr., F. S. Todd, M. A. E. Rumboll, and D. Schwartz. 1979. Le Gerfaut 69:13–27.—Bird distributions and numbers were noted on two transects by sea between the tip of South America and South Georgia in March and April 1977. Wandering Albatross (see review **8**) that were color-marked at the nest at Bird Island were observed feeding all along the rich feeding area, 1,000 miles from their nests.—R. B. Payne.

59. The wintering and migration of Palaearctic passerines in Rwanda. J.-P. Vendeweghe. 1979. Le Gerfaut 69:29–43.—Field observations made over 10 years in Rwanda,

Central Africa, showed seasonal occurrences, relative numbers, and habitats used by Palaearctic passerines to be much like those of the Kampala region in Uganda, but with some species' differences. Great Reed Warblers (*Acrocephalus arundinaceus*) are scarce in Rwanda, and Nightingales (*Luscinia megarhynchos*) and Barred Warblers (*Sylvia nisoria*) are unknown. Collared Flycatchers (*Ficedula albicollis*) are abundant in autumn passage, and Olivaceous Warblers (*Hippolaius pallida*), European Golden Orioles (*Oriolus oriolus*), and Red-throated Pipits (*Anthus cervinus*) are more abundant as wintering birds in Rwanda.—R. B. Payne.

60. A Lesser Black-backed Gull (*Larus fuscus*) in French Guyana. (Un goéland brun (*Larus fuscus*) en Guyane Française.) P. Devillers. 1979. Le Gerfaut 69:79–80.—An immature seen on 25 May 1978 at Kourou is apparently the first record of the species for the continent of South America. Others have been recorded on Aruba, and small numbers migrate along the east coast of North America.—R. B. Payne.

61. The occurrence of the Short-eared Owl (*Asio flammeus*) on the Belgian coast. (Het voorkomen van Velduil (*Asio flammeus*) aan de Belgische Kust.) J. Van Gompel. Le Gerfaut 69:83–110.—Owls are most numerous along the coast during spring and fall migration. In winter, 50 to 100 owls remain in the area. The owls are uncommon as breeding birds with four records before 1970 and one confirmed and 13 less-documented nesting records since that time.—R. B. Payne.

62. Winter censuses of waterfowl in Algeria. (Repartition geographique et importance numerique des anatidés hivernants en Algérie.) P. Jacobs and B. Ochando. 1979. Le Gerfaut 69:239–251.—Counts made in 1977 and 1978 in different regions of Algeria are summarized. The lake complex of El Hala and the marshes of La Macta are particularly important for wintering ducks.—R. B. Payne.

63. Melodious Warblers in southern Belgium: their identification. (Hypolaïs polyglottes dans le sud de la Belgique: leur identification.) P. Devillers and J. A. Terschuren. 1979. Le Gerfaut 69:269–274.—Two territorial Melodious Warblers (*Hippolais polyglotta*) were located in Belgium. Other local records are reviewed. The species is expanding northwards and may colonize Belgium in suitable habitats. Among other field marks a good way to distinguish Melodious and Icterine warblers (*H. icterina*) is the shape of the wing—the primaries are shorter in the former, extending no more than ¼ of the total length of the wing beyond the end of the secondaries.—R. B. Payne.

64. Changes in land bird populations on the Krunnit Islands in the Bothnian Bay, 1939–77. E. Helle and P. Helle. 1979. Ornis Fennica 56:137–147.—The islands are 11–21 km off the Finnish mainland at 65°25′N, 25°00′E, and the birds are mainly migrant passerines. Censuses by line transect were made in six years, and less complete censuses were made in five others. The islands were protected from cutting and grazing during this period, and the changing vegetation has affected the bird life. The number of nesting land birds declined by a third, but the number of species and the species diversity (H′) increased. Excluding the Willow Warbler (*Phylloscopus trochilus*), the number of forest birds has remained more or less constant. There has been a change in species due mainly to the loss of northern species and the northern expansion of more southern species, both over the total time of the censuses and from year to year with increasing spring temperatures.—R. B. Payne.

65. The Desert Sparrow. (Pustynyi vorobei.) A. V. Grazhdankin. 1979. Priroda 1979(11):96–98. (In Russian.)—Little is known about the Desert Sparrow (*Passer simplex*) in the USSR, including its exact distribution and hence its numbers; it is considered rare. It lives in the Karakum Desert and is met also in the Kyzylkum Desert (southeast of the Aral Sea) in sandy areas where acacia trees and saxaul bushes are scattered. The species is notable for inconspicuousness: its plumage is plain and dull, it is not very vocal, and when the trees in which it nests are in leaf, the nest (constructed of grasses and often with an entrance around the tree limb or trunk, to keep out blowing sand and hot summer wind) is hard to find. It feeds largely on seeds and derives much of its water from them.

It is largely sedentary. Though fairly tame, it does not live near settlements.—Elizabeth C. Anderson.

SYSTEMATICS AND PALEONTOLOGY

(see also 68)

66. Allopatric speciation in the hummingbird genus *Trochilus*. (Allopatrische Artbildung bei der Kolibrigattung *Trochilus*.) K.-L. Schuchmann. 1978. Ardea 66:156–172. (In German with English summary.)—The endemic Jamaican hummingbird species *Trochilus polytmus* is differentiated into two taxonomically distinct populations. The subspecies *scitulus* is confined to the eastern end of the island, while the other, *polytmus*, occurs widely over the rest of Jamaica. Both populations contact each other from Port Antonio at the northern coast along the Blue Mts. and the John Crow Mts. to the Morant River in the southern lowlands.

Ecological, morphological, and ethological data were gathered. The author concluded that *polytmus* and *scitulus* must be regarded as separate species because of: (1) preference for climatically different habitats, (2) morphological differences, (3) strikingly different display, (4) different structure of the song and territorial call, and (5) absence of definite hybrids in the contact zone.

The main characteristic difference of *polytmus* and *scitulus* is the color of the beak. In *scitulus* the beak is completely black, whereas in *polytmus* the proximal part of the beak is red ranging to pure black at the tip. The amount of red increases with age and therefore cannot be regarded as a reliable criterion of hybridization.—C. M. White.

67. Subspecific variation of Stuhlmann's Double-collared Sunbird, *Nectarinia stuhlmanni*, around the Albertine Rift. A. Prigogine. 1979. Le Gerfaut 69:225–238.—The species complex of African montane Double-collared Sunbirds was recently reviewed by Clancy and Irwin (Durban Mus. Nov. 11(20):331–351, 1978), who recognized five species instead of the two species *N. afra* and *N. chalybea*. Prigogine has examined additional material from the east-central African complex including the forms *stuhlmanni, chapini, graueri,* and *schubotzi* from the western rift area. On the basis of similarities in measurements of wing, tail, bill, and the red chest band, he concludes that the four forms are probably conspecific. Clancy and Irwin had recognized *stuhlmanni* as a distinct species based on its long bill, but some *chapini* from west of Lake Tanganyika have a bill nearly as long as *stuhlmanni*. Prigogine suggests that all four taxa be considered subspecies of *N. stuhlmanni* and not (for the last three) of *N. ludovicensis*. Unfortunately the sample sizes were small and not all available museum specimens were examined, particularly for the forms outside the region of this rift, so the opinions expressed about species' limits and relationships are necessarily tentative.—R. B. Payne.

EVOLUTION AND GENETICS

(see also 32)

68. An old Belgian record of *Parus "pleskii."* (L'ancienne capture liégeoise de *Parus "pleskii."*) R. Potvliege. 1979. Le Gerfaut 69:275–277.—A tit closely resembling the hybrid tits *Parus caeruleus* × *P. cyaneus* from the USSR was identified from an 1878 specimen taken in Belgium. Together with two recently described hybrid tits from the Netherlands, the Belgian specimen extends into western Europe the range of hybrids, formerly known only from central and east Russia. Frank and Voous (Limosa 42:201–205, 1969) noted that a hybrid caught in the Netherlands in 1968 was likely a migrant—*P. cyaneus* breeds in Russia and is only an occasional migrant or vagrant in western Europe. The hybrid complex is of species interest because Vaurie (Am. Mus. Novit. 1833, 1957) Noted that the proportion of hybrids has apparently decreased over the past century, suggesting evolutionary selection against species hybridization.—R. B. Payne.

FOOD AND FEEDING

(see also 14, 15, 16, 34, 38, 65, 66, 82)

69. The nutritive values of rowan-berries, *Sorbus aucuparia* L., for birds and mammals. E. Pullainen. 1978. Aquila, Ser. Zool. 18:28–32.—Feeders were distinguished as "generalists" and "specialists." The former swallowed berries entire. The latter, *Loxia* spp., *Pyrrhula pyrrhula,* and *Pinicola enucleator,* drew seeds from the berries so as to extend the food supply when overwintering in northern Fennoscandia. "It seems that it is just this high sugar content which attracts many bird species to feed on rowan berries when they are available in autumn and winter." Their attraction is such that many, especially thrushes, postpone migration in order to use this food resource. However the fabled Rowan Tree, honored in song and story, for example in *Dr. Zhivago* by Boris Pasternak, is favored by birds according to local soils and tastes. In our locality birds let it rest unconsumed until the winter is nearly over.—Leon Kelso.

70. Food of Merlins nesting in young conifer forest. J. Watson. 1979. Bird Study 26:253–258.—Merlins (*Falco columbarius*) were observed at two nest sites in northern England in an area recently planted in conifers. Although these Merlins nested in the young forests, unlike the more typical open-country nesting habitat, they hunted almost exclusively in adjacent moorland under 250 m elevation. Data on prey brought to the nest and nearby plucking posts indicate that over 94% of the Merlins' food was obtained in open country, which constituted less than 20% of the surrounding area. The author argues that continued afforestation will deplete the available hunting area for Merlins and will cause their population to diminish.—Scott R. Robinson.

71. Food habits of the Grey Lag Goose and trophic links to their biomes on the Volga Delta. (Pitanie serogo gusya i ego tropicheskie svyazi s fititsenosami delty Volgi.) S. Chernyavskaya and V. Vinogradov. 1978. Byull. Mosk. Obshch. Ispyt. Prirody, Biol. Div. 83(6):18–25. (In Russian.)—The diversity and abundance of food for the Grey Lag Goose (*Anser anser*) reaches maximum in late summer, an important conclusion of this 15-year study. Introduction of foreign food plants is unnecessary. Five to six thousand days of observation showed no significant changes in the vegetation of the delta.—Leon Kelso.

72. A comparative study of the food régime of a forest population of Tawny Owls (*Strix aluco*). [Etude comparative du régime alimentaire d'une population forestière de chouettes hulottes (*Strix aluco*).] E. Delmée, P. Dachy and P. Simon. 1979. Le Gerfaut 69:45–77.—Regurgitated pellets of ten pairs of Tawny Owls in a forest at Oignies, Belgium, were collected over 15 years and the diet determined from the identified remains. The owls took mainly small rodents (55% of diet items) and shrews (32%) with a few moles, frogs, and birds. Occasionally they took other small mammals, young trout, dung beetles, and earthworms. Little seasonal variation was noted, but in years of low populations of small rodents the owls took more shrews. The diet was similar to that in other Belgian woods and other western European countries, though in certain woods with higher densities of small birds, the owls take proportionately more birds.—R. B. Payne.

SONGS AND VOCALIZATIONS

(see also 53, 66)

73. The call of the King Penguin (*Aptenodytes patagonica*) and its evolutionary significance. (Le chant du manchot royal (*Aptenodytes patagonica*) et sa signification évolutive.) M. Derenne, P. Jouventin, and J.-L. Mougin. 1979. Le Gerfaut 69:211–224.—Quantitative analysis of the audiospectrograms of King Penguin calls indicated sexual dimorphism and also less variation within an individual than among individuals. However the calls were less individualistic than in the Emperor Penguin (*Aptenodytes forsteri*). The authors suggest that the difference reflects a species' difference in social behavior, with King Penguins being more strongly territorial and so less in need of an individually distinctive call to recognize the mate. Experiments with normal and modified tape-recorded calls indicated that adults can distinguish both between their mating partner and

other adults and also between their own and other chicks by the differences in the timing of the calls.—R. B. Payne.

74. Duetting and vocal recognition by Aldabra White-throated Rails *Dryolimnas cuvieri aldabranus*. C. R. Huxley and R. Wilkinson. 1979. Ibis 121:265–273.—Vocalizations vary individually and such variation appears to afford individual recognition between mated birds. Duet vocalizations are not temporally coordinated and most often are correlated with pre-copulatory behavior. Duetting may also function in pair-bond maintenance and territorial defense. A review of literature on duet vocalizations of Rallidae is included.—Cynthia Carey.

BOOKS AND MONOGRAPHS

75. Arctic Summer, Birds in North Norway. R. Vaughan. 1979. Anthony Nelson, Ltd. Shropshire, England. 152 p.—I long to see the Arctic, and Richard Vaughan has increased my longing with his all too brief account of a summer excursion to Norway's Varanger Peninsular at the northern tip of Europe. The book is a travelogue organized broadly by habitats. However, Vaughan opens with an overview of his trip that underscores the change from majestic pine-spruce forest near Stockholm to the rock-strewn fells of the Varanger Peninsular. He describes the people and villages of the peninsula concluding the first two chapters by urging better ecological practices for the peninsula's inhabitants. Vaughan devotes the remaining nine chapters to birds, their nests, nesting habitats, ecology, and behavior. His limited descriptions are fascinating, but too brief; I constantly wished for more detail.

The book is abundantly illustrated with Vaughan's beautiful photographs. The color photographs are particularly vivid. The publishers along with Vaughan are to be complimented for a tantalizing book, excellently produced.—Edward H. Burtt, Jr.

76. The Birds of the Western Palearctic, Vol. II. S. Cramp and K. E. L. Simmons (eds.). 1980. Oxford University Press, Oxford, England. 695 p., 30£ ($85 US).—The subtitle of this work, Handbook of the Birds of Europe, the Middle East and North Africa, gives more specific information on the geographic area of the birds treated by this reference work. It includes all Europe, the Middle East to Turkey, Iraq, and Jordan, and Africa to about 19°N. This volume covers Hawks through Bustards and includes endemic, accidental (e.g. Red-shouldered Hawk (*Buteo lineatus*), American Kestrel (*Falco sparverius*), American Coot (*Fulica americana*), Sandhill Crane (*Grus canadensis*) and American Purple Gallinule (*Porphyrula martinica*)) and introduced (e.g. California Quail (*Lophortyx californicus*), Bobwhite (*Colinus virginianus*) and Turkey (*Meleagris gallopavo*)). There are about 100 species included in the work. Full treatment of a species includes: field characters (many color plates), habitat, distribution (range maps), population, movements, food, social pattern and behavior, voice (numerous sonograms), breeding (cyclegrams), plumages, bare parts, molts, measurements, weights, structure, and geographical variation. Also included are 16 pages of color plates showing the eggs of various species.

There are some errors, e.g. pagination in the table of contents is incorrect for the following "Corrections to Volume I" (687 should read page 689), "Indexes; Scientific names" (689 should be 691), "English names" (691 should be 693), "Noms français" (692 should be 694) and "Deutsche Namen" (692 should be 694). The names of each species are given in the above languages as well as Dutch, Russian, Spanish, and Swedish. Although a glossary of "scientific terms" is advertised on the dust cover, I failed to locate it unless this refers to the index of binomials. Also the 34 pages of colored plates showing eggs and accompanying legends are injected into the 17 pages of very concise references. These are very minor points compared to the wealth of information that has been packed into the 695 pages of this very easy-to-use reference. I found the discussions of behavior and field characters excellent.

The taxonomy follows that of Voous' List of Recent Holarctic Bird Species (BOU, London, 1977) which places the diurnal raptors in two orders, i.e. Accipitriformes (includes Accipitridae and Pandionidae) and Falconiformes (Falconidae). The rationale for this scheme, i.e. "relationships between different higher taxa are uncertain, and whole

assemblage probably polyphyletic" may be a bit brief for those accustomed to the more traditional scheme of a single order, the Falconiformes.

It is described as being "an indispensable work of reference for the professional scientist [this reviewer agrees] and for the ever-growing body of amateur ornithologists . . . ." The latter will have to be very serious to afford it.—Richard J. Clark.

77. Breeding Biology of the Egyptian Plover, *Pluvianus aegyptius*. T. R. Howell. 1979. Univ. Calif. Publ. Zool. 113:1–76.—Studies of the adaptations required of birds living in hot environments are Dr. Howell's forte; this one is of a courser which inhabits tropical African river bottomland where air temperatures exceed 45°C in the shade. In Howell's words, "The EP [Egyptian Plover] is of special interest because its distinctive egg-burying, ventral-soaking and nest-wetting, and chick-burying are highly developed, species-specific characteristics involving stereotyped behavior patterns, all of which are essential to reproductive success." Unlike other Glareolidae, *P. aegyptius* nests on sand and gravel islands exposed in rivers during the dry season. Although this habit affords protection against mammalian predators, it causes new problems—the islands are sparsely vegetated, heat is intense, and suitable sites are at a premium. The evolutionary consequences are intriguing. The plovers focus on the reduction of thermal stress, cryptosis for protection against predators, and territory maintenance. By burying eggs in sand and wetting the nest frequently, egg temperatures are lowered during the day, loss of water from inside the eggs is reduced, and nests are concealed. Young up to three weeks old are also buried. The eggs are small for a charadriiform, but a long incubation period apparently allows newly-hatched chicks to be quite precocious. Adults are remarkably conspicuous, ironic considering the risks from aerial predators, but apparently important for social signals used in territorial conflicts. Howell also reviews earlier research and lore on the EP, and gives a good account of foraging, social behavior, and vocalizations. The discussion speculates on how the EP's unusual nesting habits might have evolved, both with respect to other birds and to the stressful environment where *P. aegyptius* lives. Overall, this is a comprehensive and fascinating account that admirably accomplishes what Howell set out to do.—Brian A. Harrington.

78. Feeding Ecology and Niche Differentiation in Goshawk (*Accipiter gentilis* L.) and Sparrowhawk (*Accipiter nisus* L.). P. Opdam. Drukkerij Presikhoof, Ruitenbergloan 29, Arnhem, The Netherlands. 91 p., paper, price not given, obtainable from Rijksenstituut Voor Natuurbeheer, Leersum-Uasteel, Broehhuizen, The Netherlands. (In English with Dutch summary.)—This represents the collected papers of Paul Opdam, brought together in one volume, with J. Thissen, P. Verschuren and G. Muskens co-authoring some of the Goshawk material. There are seven chapters of which three have been previously published in European journals. (A seventh chapter consists only of a Dutch summary.) Chapter 1 is an introduction to the overall theme of the study, which is to test Gause's principle and to compare the feeding ecology of these raptors to see if intra- and interspecific differences in body size are correlated with differences in food. Chapter 2 describes the feeding ecology of a population of Goshawks on either side of the Dutch-German frontier over the 1969–1973 period. This paper was previously published in J. Ornithol. (118:35–51, 1977). Perhaps the salient finding was that while at least 72 identifiable species showed up as food, the bulk of the remains consisted of only five species. These latter species were related to an environment created by modern man's agricultural practices and the breeding and racing of homing pigeons. Twenty-two species were recorded as prey items only once in the four-year study. The Goshawk population discussed is one of the most dense in Europe which is again correlated with a landscape managed intensively for agriculture.

Chapter 3 (previously published in Ardea 66:137–155, 1978) treats Sparrowhawk feeding ecology in a fashion similar to that of the Goshawk in Chapter 2. The proportion of prey from three different categories (field, village, and forest species) are compared for each season. Like the findings on Goshawks, although over 100 prey items were identified, only nine species made up about 70% of the food items. Chapter 4 (previously published in Ardea 63:30–54, 1975) then brings together data from both studies to present a comparative picture of sex, species, and temporal differences between them in sympatric

areas that tend to lead to both intra- and interspecific partitioning of resources. For example, in winter the family Turdidae made up less than 10% of the Goshawk food but over 20% of the combined Sparrowhawk food, while within the Sparrowhawks, males took only 6% of their food fare from Turdidae while in females over 58% of the food consisted of Turdidae. On the other hand, the family Columbidae made up less than 1% of the Sparrowhawk food and 70% of Goshawk food. Female Goshawk take of Domestic Pigeons (*Columba livia*) was only 21%, while that species made 40% of male Goshawk food. Opdam concluded that each accipiter "group" (each sex by species) occupied a somewhat different niche, with intraspecific overlap more extended than interspecific overlap. The niche-breadth decreased under poor (in winter) food conditions.

The new material in the publication comes in chapters 5 and 6 and apparently represents a heretofore unpublished analysis by Opdam. Chapter 5 is titled "Niche utilization in coexisting accipiter species." He raises several questions regarding the number of accipiter species that can coexist and whether the "accipiter niche" space in western Europe is sufficiently occupied that a third species cannot also coexist with the two there. The Levant Sparrowhawk (*A. brevipes*) comes closest geographically to being a third accipiter in western Europe. The main purpose of his discussion is not to solve any problems relating to his question, but to indicate fields of research wherein these questions might be answered.

For some of the analysis in this chapter, prey items are classed into 13 size groups. Unfortunately we are not told what the size groups are other than that size groups 3–4 correspond to the weight of male Sparrowhawks, group 6 to the weight of female Sparrowhawks, and group 10 to the weight of male Goshawks. Some prey sizes are exploited 2–3 times more than others, and those most heavily used correspond to the weight of that accipiter sex that catches it. Opdam suggests that certain-sized prey might include many species of high vulnerability and that the frequency of that size class in the food items simply outnumbers the low vulnerability species and thus accounts for the correlation. Plotted values of the mean body weight of the two western European and largest and smallest North American accipiter against mean body weight of their respective prey fit a straight line. The middle-sized North American accipiter (Cooper's Hawk, *A. cooperi*) deviates from this line, suggesting to Opdam that mean prey size is also governed by factors other than size of the predator. Finally Opdam suggests that the reason only two accipiters are sympatric in western Europe, while three are in North America, is that in North America the distribution of birds weighing up to his size class 8 differs from Europe in such a way that the niche-space of *A. nisus* can be occupied by two species, i.e. *A. striatus* and *A. cooperi*. His discussion of coexisting accipiters in other parts of the world is provocative especially as concerns the tropics.

The final chapter is entitled "Sexual size dimorphism and feeding ecology in birds of prey with special reference to Goshawk and Sparrowhawk." Three general categories of theories on sexual dimorphism are broached, namely, (1) niche differentiation hypothesis, (2) ethological function hypothesis, and (3) hypotheses emphasizing energetic advantages for efficient foraging during reproduction. These hypotheses each incorporate the main questions of: Why do the sexes differ in size? Why do the species differ in the amount of dimorphism? Why is the female the largest? Opdam's discussion on the niche-differentiation hypothesis, for accipiters at least, concludes it is unlikely that for Goshawks and Sparrowhawks food will regularly be in short supply during the breeding season, whereas during winter limited food may cause competition and reinforce size differences. His analysis supports the conclusion that bird-eating accipiters show the greatest dimorphism, and reptile, amphibian, or insect eaters least. Twelve forms of predominantly bird-eating accipiters had an average sexual dimorphism index of 15.8%, 12 forms with mixed-prey choices an index of 12.4%, while six species of predominantly reptile, amphibian, insect, or small mammal eaters an index of 8.5%. Opdam then points out problems or exceptions to the three main hypotheses centered around the ethological function proposals for dimorphism and the four main hypotheses that argue for an energetic benefit to sexual dimorphism.

In concluding, he postulates that for *A. nisus* and *A. gentilis*, and perhaps the entire genus *Accipiter*, the following four processes determined dimorphism: (1) intraspecific

competition for food resulting in sexual size differences, (2) interspecific competition for food to help set limits to the amount of dimorphism, (3) different mortality rates resulting from intraspecific niche differences also helping to set limits to the amount of dimorphism, and (4) energetic factors setting limits to the amount of dimorphism. The one glowing error is the spelling of tung for tongue, but this volume is certainly a contribution to the library of any falconiformiphile.—C. M. White.

79. Memoirs of an Ornithologist. (Zapiski Ornitologa.) K. A. Vorobev. 1978. Nauka Press. 255 p. Second edition. (In Russian.)—*A hunter's album, A sportsman's sketches, A sportsman's notebook, Memoirs of a sportsman, Notes of a hunter, Sketches from a hunter's album*; the various translations of the title suggest a person of great fame and historical importance. In a continuing spate of ornithologists' autobiographies, the present recollections are those of K. A. Vorobev, eminent explorer and author of **Birds of Ussuriland** and **Birds of Yakutiya.**

There is a foreword "A life devoted to birds" by V. Flint. A dedication to S. I. Ognev follows, then "Explorations in the Central Soviet and in the Volga Delta." Then the recollections become quite specific: "My first expedition" (an engaging outdoor narrative), "In Yaroslav forests," "In the Volga Delta," "In mountains and deserts of mid-Asia," "In Atreka floods and in the Ai-Der canyon (of Kopet Dag)," "In western Bafkhize," "In Tedzhen tugas," "A trip to Tyan-Shan," "In the Far East," "Ussuri District," "In Sikhote Alin Mountains," "Shorebird flights in South Primor," "On south Primor lakes," "Expeditions to Yakutiya," "To the summit of Aldan-Uchursk Range," "In the country of White Cranes and Ross Gulls," "Pages of expedition diaries," "South Ussuri District," "Yakutiya, Olekmo-Charsk upland," "Factoriya Stanov in tundra on Konkov River," "On biology of nesting birds," "Winter-nesting birds," "Of nests in particular," "New species in Soviet Union fauna," "Soviet Union endemics," "Some features of geographic distribution of birds," "On days of passage," "Cranes," "Some words on conservation," "In the zoological museum," "Ornithologists of elder generations: Mikhail Aleksandrovich Menzbier (1855–1935), Sergei Aleksandrovich Buturlin (1872–1938), Petr Petrovich Sushchkin (1868–1928), Nikolai Alekseevich Zarudny (1859–1959), Arkadii Yakolevich Tugarinov (1880–1948), Sergei Ivanovich Ognev (1886–1951)," "At the tomb of N. M. Przhevalskii." Vorobev's recollections review the achievements of Przhevalskii, the USSR's most esteemed Asiatic explorer which cover most of the past century. Among many outdoor deeds Przhevalskii added 5,000 bird skins to the national museum.

Numerous anecdotes and personal comments enrich the above chapters. There are 65 photographs and 6 color plates, plus incidental pen sketches to support this most outstanding ornithological autobiography.—Leon Kelso.

80. The Nesting Season. The Bird Photographs of Frederick Kent Truslow. H. G. Cruickshank. 1979. Viking Press, NY. 136 p.—From the excited blush of a Least Bittern (*Ixobrychus exilis*) to a Pileated Woodpecker's (*Dryocopus pileatus*) transport of its eggs, the pictures of Frederick Kent Truslow capture nature's magnificence. The detail, composition, clarity, and interest are superb, but most importantly the pictures are alive. They vibrate with action. I look and am drawn into the scene. I see the eagle approaching with measured wingbeats, I feel the breeze that ruffles the egret's feathers. Unfortunately the publisher has spread some pictures over two pages with the result that a gallinule has lost its tail in the binding and other birds have unsightly kinks in their physiques.

The text is well written, but is not the book's central feature. For those who read Helen Cruickshank's text there are many interesting anecdotes (e.g. an ostrich egg requires 40 min to hard boil). She raises many thought provoking questions and her breadth of coverage is outstanding. However, clutch-size is generally misunderstood to have evolved to balance mortality and evolution is viewed teleologically. Because the text is primarily factual, these theoretical problems are a minor detraction. Furthermore, the text, however, well written, must take second place to the magnificent photographs. They will provide hours of enjoyment.—Edward H. Burtt, Jr.

81. Respiratory Function in Birds, Adult and Embryonic. J. Piiper (ed.). Berlin, Springer-Verlag. 310 p. $29.00.—This book summarizes the proceedings of a satellite

symposium of the XVII International Congress of Physiological Sciences, held at the Max Planck Institute for Experimental Medicine, Göttingen, in July, 1977. The proceedings are divided into five parts, each focusing on an important area of avian respiration.

Phylogenetic similarities and differences in the respiratory and cardiovascular systems of birds and other vertebrates are outlined in the first section. Since the fossil record contains some critical gaps, theories about the evolution of avian respiratory systems are based in large part on the structure and function of such systems in other vertebrates, an approach not without distinct hazards. Duncker traced the increase in complexity of lung structure from the simple unicameral lung sac in lizards and snakes, through the slightly more complex, septated lungs of crocodiles and monitor lizards, to the highly divided and structurally complex avian and mammalian lungs. Gans analyzed ventilatory patterns in reptiles and concluded that the demands of flight and homeothermy had selected for greater stereotypy in lung function in birds compared with the diversity found in reptiles. The rigidity of the avian lung and its constant volume in all phases of ventilation are unique in vertebrate respiration. As Pattle noted, avian lungs contain both surfactant similar to that in mammalian lungs that seems to prevent collapse of the alveoli during deflation and a "trilaminar substance." Since the avian lung lacks alveoli and a deflation phase, the function of these substances is unclear. The sensory receptors in lungs of other vertebrates are sensitive to both CO_2 concentrations and to mechanical deformation, the latter being important for regulation of the degree of inflation. According to Fedde, avian receptors are sensitive only to CO_2.

Since some birds fly at elevations at which mammals are comatose, and since some bird species have adopted the diving habit, the physiological tolerances of and physiological responses to hypoxia have received much attention. Flight at high elevations appears to be associated with an increase in oxygen extraction efficiency, according to a study by Berger using hummingbirds hovering at 4,000 m. However, Torre-Bueno provided evidence showing that oxygen extraction efficiency does not change between rest and flight in starlings flying in low-elevation wind tunnels. Therefore, some mechanism for augmenting oxygen extraction efficiency might be postulated for high-elevation flight. Jones and West showed that physiological responses to forced and voluntary diving differ substantially. In forced submergence, bradycardia and increased peripheral resistance are more apparent than during a voluntary dive. These responses are maintained by reflexes that are apparently overridden in voluntary dives by supra-bulbar nervous structures.

The structural and functional relations between blood and gas flow were the subjects of the next section. Patterns of gas movement through the lung were tested by Burns and co-workers using a new, non-invasive technique. Flow of ^{133}Xenon during an inspiration was recorded by a scintillation camera. These data supported earlier studies indicating that gas enters the lungs and air sacs almost simultaneously during the inspiratory phase. The lungs therefore receive relatively fresh air on both the inspiratory and expiratory cycles. The air in the posterior air sacs contains CO_2 concentrations that are substantially above ambient, according to Piiper, probably due to a slight reinhalation of dead space gas. Piiper ruled out gas exchange in the air sacs themselves as a causative factor for high CO_2 tensions. The air passes convectively through the lungs and then diffuses through the small air capillaries where a cross-current arrangement brings the blood in close contact with the gas. Scheid and colleagues documented that the resistance posed to diffusion by the air capillaries is not a major limitation to O_2 uptake during rest but they postulated that such resistance might become limiting during exercise. Regulation of local microcirculation in the lung was evaluated by King and others who found no evidence of neural control of intra- and interparabronchial veins or terminal arterioles. Some intraparabroncial arterioles were innervated by branches of the autonomic nervous system and one muscular valve was located in the interparabronchial vein. The authors were unable, however, to rule out the possibility of local reflex control over constriction of arterioles or venules by local gas tensions.

A fourth section dealt with neural and chemical control of ventilation. Avian intrapulmonary chemoreceptors have been identified, but the causal relation between their firing and control of breathing is not established. Powell and co-workers showed that ventilatory frequency is influenced by inhaled concentrations of CO_2 and that chemore-

ceptors may mediate such responses. Central and peripheral temperature receptors appear to initiate panting responses and apparently can override chemoreceptor inputs.

The final section dealt with a new area of avian physiology, the respiration of the embryo. Respiration occurs by the process of diffusion of gases through microscopic pores in the shell. These pores constitute the primary resistance to diffusion of O_2, CO_2, and water vapor, according to Paganelli and colleagues. Ar and Rahn proposed that the functional pore area of the eggs of each species has evolved in coordination with egg mass and incubation period with the result that final gas tensions in the air cell prior to pipping and the fractional water loss during incubation are fairly similar among species. Calder and Seymour provided some interesting new data on eggs of kiwis and brush turkeys and used these examples to explore the ecological and evolutionary correlates of eggshell structure. The mechanism by which pores in shells are manufactured is still a mystery. Mongin presented some evidence concerning the formation of the shell itself and Tullett described various types of pores and possible mechanisms for their formation. Tazawa presented an elegant analysis of gas transfer in the chorioallantois.

This book does not serve well as an explanatory text of avian respiration, nor does it provide a good review of the state of the art of this field at the time of the symposium since the papers generally provide short descriptions of experiments performed in the laboratories of the speakers. Inclusion of numerous abstracts of studies which have subsequently been published elsewhere contributes to the lack of depth. However, the book provides some exciting and tantalizing new directions and ideas for research that have not yet been explored. The major function of this book will be to stimulate further research.—Cynthia Carey.

82. The Role of Insectivorous Birds in Forest Ecosystems. J. G. Dickson, R. N. Conner, R. R. Fleet, J. C. Kroll, and J. A. Jackson, editors. 1979. New York, Academic Press. 381 pp. $24.00.—This book contains the proceedings of a symposium held at Nacogdoches, Texas during 13–14 July 1978 and sponsored jointly by the U.S. Department of Agriculture's Forest Service and the Stephen F. Austin State University's School of Forestry. In addition to the introduction and conclusion, 18 papers were presented, categorized as follows: censusing birds, sampling prey populations, foraging strategies, and ecology. With the symposium sponsored by two agencies primarily concerned with production of forest resources, I found it something of a disappointment that most of the papers skirted the question of what role birds serve in controlling insects harmful to forests. However, two papers deserve special mention.

With use of exclusion experiments, J. C. Kroll and R. R. Fleet (pp. 269–281) gathered information leading them to conclude that predation on southern pine beetles (*Dendroctonus frontalis*) by woodpeckers does more to limit the population increase of these insects than any other agent. Counts of woodpeckers showed these birds as much as 33 times more numerous in areas infested with southern pine beetles than in other areas. The woodpeckers' most important contribution was their prevention of the spread of infestations by eating pupae and emerging adults of the beetles. Pileated, Hairy, and Downy (*Dryocopos pileatus, Picoides villosus,* and *P. pubescens*) Woodpeckers were the species chiefly responsible for the observed control.

I. S. Otvos (pp. 341–374) reviewed published reports on the role of birds in controlling infestations of several forest insects, including chiefly the spruce budworm (*Choristoneura fumiferana*), jackpine budworm (*C. pinus*), spruce beetle (*Dendroctonus rufipennis*), western pine beetle (*D. brevicomis*), and southern pine beetle. In addition to reduction of insect populations by predation, the birds were shown to cause indirect benefits, including flaking of bark and thus exposing insects or their eggs to desiccation and insect parasitism. Some birds may not prey on parasitized insects. Birds may also aid in dispersal of insect pathogens.

It is hoped that the symposium reported on in this book and the book itself will serve to motivate much needed research on the role of birds in control of forest insects. The bibliography of 126 titles furnished by the Otvos paper can be consulted advantageously by persons undertaking such research.—Paul A. Stewart.

83. Status and Distribution of Alaska Birds. B. Kessel and D. D. Gibson. 1978. Studies in Avian Biol. 1. 100 p. [$8.00. Order from J. G. Miller, Dept. Biology, Univ. of California, Los Angeles, CA 90024, U. S. A.]—No fewer than 381 species had been recorded in Alaska by 30 November 1977, termination date for data gathering for this annotated list of its birds. Kessel and Gibson define the area of their coverage to include more than 5 million km^2 of land and water area, which they further usefully subdivide into six biogeographic regions. This enormous area is approximately ⅔ the size of the contiguous United States; of equal importance, the region includes 27° of latitude and 62° of longitude, an extent exceeding the comparable length and breadth of land in the lower 48 states. The staggering dimensions of summarizing distribution information for the region are further compounded by the location of Alaska astride the northern terminus of the Pacific Ocean in close proximity to Asia and by the low density of observers there (although they list 375 cooperators). The authors define their task to be the compilation of new distribution information developed since Gabrielson and Lincoln's **The Birds of Alaska** (1959. Stackpole Books and Wildl. Manage. Inst.). They address their goal by limiting their discussions to those species about which knowledge has improved significantly. This report is thus a companion volume or appendix to the earlier treatise, a fact which doubtless will irritate some prospective users. Kessel and Gibson list all known Alaskan bird species in an introductory table. Their annotated list encompasses 202 of these (53%), treated in a very compact style. The authors indicate that the primary reason for inclusion of most species was an improved understanding of actual status rather than a known change in status since 1959. **Status and Distribution of Alaska Birds** is a useful compendium of documented geographical occurrence records for the state with brief qualitative annotations of abundance status. As such Kessel and Gibson have achieved their goal. A more elaborate biological objective, such as a treatment of numerical abundance patterns of birds of this huge area, must await further extensive, and intensive, fieldwork.—Paul B. Hamel.