RECENT LITERATURE

Edited by Edward H. Burtt, Jr.

BANDING AND LONGEVITY

(see also 55, 82)

1. Geographic and temporal differences in band reporting rates for American Black Ducks. M. J. Conroy and W. W. Blandin. 1984. J. Wildl. Manage. 48:23–36.—Recovery rates of banded waterfowl are used as indices to harvest rates in the setting of hunting regulations. The authors compared recovery rates of standard-banded American Black Ducks (*Anas rubripes*) to those having reward bands for which the finder was given $15. All reward bands were assumed to be reported, allowing an estimate to be made of the reporting rate of the standard bands.

The mean reporting rate for all geographic areas (Canada, Atlantic Flyway, Mississippi Flyway), both preseason (Jul.–Sep.) and postseason (Dec.–Feb.), was .43. Little evidence was found for differences in band reporting rates by proximity to banding site, geographic location, or time. Because of great differences in cultural, economic, and language factors from areas where Black Ducks were recovered, the authors felt that the $15 reward "did not provide the same motivation to report bands among all . . . hunters." Thus the assumption of complete reporting of reward bands was violated. Conroy and Blandin feel that Black Duck recovery rates are probably good indices to harvest rates because of their low geographic and temporal variability, but are probably overestimates because of the unknown proportion of reward bands that were not reported. However, hunters need to be better informed of the importance of banding data to prevent the expensive loss of data through non-reporting of bands.—Richard A. Lent.

MIGRATION, ORIENTATION, AND HOMING

(see also 50, 52, 60)

2. Prenuptial migration of three species of waders at Marais Poitevin (South Vendee). (La migration prénuptiale de trois espèces de limicoles dans le Marais Poitevin (sud Vendée).) J.-J. Blanchon, P. Dubois, and M. Métais. 1984. Alauda 52:204–220. (French, English summary.)—The authors discuss the dispersion of migrant Black-tailed Godwits (*Limosa limosa*), Whimbrels (*Numenius phaeopus*), and Ruffs (*Philomachus pugnax*) in spring 1982 (with some information for 1983, at Marais Poitevin, an inland area about 10 km from the Atlantic (Department of Vendée, France). This area consists of flooded meso-hydrophylic marshes, several communities, and some remnants of salt marsh.

Sixty to eighty thousand godwits pass through western France in spring on their way to nesting grounds in Holland and Germany. In 1982, there were two peaks at Vendée, one at the end of February (40,000 birds) and another at the end of March (16,300 birds). Between these peaks numbers fell to 8200. For comparison, the maximum number of godwits was 50,000 in 1983. Most godwits remained at Marais Poitevin for only 3–4 days. By mid-May the population had dwindled to 14 birds. Aside from Vendée and Anjou (about 140 km away), no major spring stopover areas for godwits have been found in south France.

Many stopover sites are known for Whimbrels in Ireland, Great Britain, Belgium, Holland, Hungary, and Somalia. Whimbrels that stopover in France probably belong to the nominal race which nests in northern Siberia. Peak numbers occupy Vendée in late April (10,500–13,500 in 1982; 16,400–20,000 in 1983), then drop sharply to no more than several hundred in early May. Whimbrels are widely dispersed in the marshes around the Bay of Aiguillon during the day, in foraging bands of several dozen to several hundred, often in the company of Ruffs and Black-tailed Godwits (the latter association has not been reported previously). The number counted sleeping at the Bay of Aiguillon was approximately the same as the number dispersed in Marais Poitevin during the day. In late April 1982 and 1983 the authors followed the arrival of Whimbrels at sleeping areas (I assume at the Bay of Aiguillon—the text doesn't say) in late afternoon. Few birds arrived

before 1800; maximum numbers arrived between 1830 and 1900; the number of arrivals per party was highly variable: 2–400 individuals.

Ruffs were not as numerous at Marais Poitevin as godwits and Whimbrels. They first appeared in the second half of February, but only 230 were present at the end of that month in 1982. Their spring migration shows peaks in the second half of March and at the end of April. Totals at Vendée never exceeded 2000. In March, they foraged with groups of godwits in flooded areas. In late April and early May, they associated with Whimbrels in drier pasturelands. The authors estimate that 5000 to 10,000 Ruffs pass through Vendée each year.

Peak numbers of Whimbrels and godwits occur a month apart at Marais Poitevin. Consequently, godwits make maximum use of Marais Poitevin when it is wet, whereas Whimbrels use it when it is dry. Ruffs are present and are able to change their foraging patterns so that they can forage with both of them.

Water management projects that have reduced flooding in the marshes and transformed marshes into intensively cultivated plots are systematically reducing the capacity of the area to support both migratory and nesting birds.—Michael D. Kern.

3. Premigratory behavior of young Short-toed Eagles *Circaetus gallicus*. (Comportement prémigratoire du juene Circaète *Circaetus gallicus*). Y. Boudoint. 1984. Alauda 52:221–225. (French.)—Boudoint describes the premigratory behavior of young Short-toed Eagles (*Circaetus gallicus*) observed from 1978–1983 along the Loire River, 7 km below Puy en Velay, France. For some time after they fledged, young eagles stayed in their natal valley and depended on their parents for food. Eventually, they ventured out of these natal areas and joined into groups of 3–4 birds which spent several hours in flight daily. Each returned to its natal valley in the evening. Adults did not participate in these assemblages. Young eagles ultimately departed from the nesting area in such groups. Adults, in contrast, left individually.

The author's observations suggest that there is a wave of migration of immature eagles and adults that are not attached to breeding sites at the beginning of September. Eagles that are rearing young remain until late September. Fledged immature eagles congregate into groups after 20 September. The adults migrate 2–3 d later. The young are no longer being fed and they begin to hunt alone and eventually leave the area in groups 6–10 d after the adults have gone. They are most likely to leave between 25 September and 1 October.—Michael D. Kern.

4. The migration of raptors observed from Fort l'Ecluse (Department of Ain) during autumn 1983. (La migration visible des rapaces au Fort l'Ecluse (Ain) pendant l'automne 1983). G. Mulhauser, T. Schmid, A. Schubert, and C. Vicari. 1984. Nos Oiseaux 37:311–330. (French, English summary.)—The authors watched raptors migrate through a narrow pass (where Fort l'Ecluse is located) in the Jural Mountains southwest of Geneva and the Leman Basin (Departments of Ain and Haute-Savoie, France). Daily observations began an hour after sunrise and continued until an hour before sunset, 21 August–30 October 1983. The authors attempted to correlate the movements of raptors with soil temperature, wind speed and direction, cloud cover and height, and general weather. Weather during this period was unusually good (high temperatures, much sunshine, dry air, high barometric pressure), which allowed raptors to fly at high altitudes where they were difficult to see.

The authors observed 3314 raptors, of which 3196 (96%) were identified. Most abundant were Common Buzzards (*Buteo buteo*; 1511 individuals), Honey Buzzards (*Pernis apivorus*; 695), Marsh Harriers (*Circus aeruginosus*; 219), Red Kites (*Milvus milvus*; 134), Black Kites (*M. migrans*; 166), and European Sparrow Hawks (*Accipiter nisus*; 277). Seen uncommonly were Ospreys (*Pandion haliaetus*; 31), Northern Harriers (*C. cyaneus*; 34), European Hobbies (*Falco subbuteo*; 23), and Common Kestrels (*F. tinnunculus*; 68). Seen rarely were Montagu's Harriers (*C. pygargus*; 8), Merlins (*F. columbarius*; 16), Northern Goshawks (*A. gentilus*; 12), Peregrine Falcon (*F. peregrinus*; 1), and a Red-footed Falcon (*F. vespertinus*; 1 juvenile).

Short descriptions of the migration of each species include dates, time of day when migration was most pronounced, whether birds migrated individually or in groups, flight

altitude, and dependence on weather conditions. To illustrate, (1) Honey Buzzards and Black Kites moved through the valley early in the season (August) taking advantage of summer updrafts, and yet Common Buzzards, also dependent on updrafts, migrated late (November) in spite of rain and cloud cover which clearly obstructed their movements; (2) especially large numbers of Marsh Harriers moved through the valley during late afternoon, perhaps because this species spent the previous night in the delta of the Rhine near Lake Constance, 400 km away; (3) Merlins and Montagu's harriers migrated alone, whereas Honey Buzzards, Common Buzzards, and European Sparrow Hawks passed by Fort l'Ecluse in large fronts; (4) as for Marsh and Hen harriers, males passed the fort first, females and juveniles followed later; and (5) rowing and flapping fliers were largely independent of weather when they migrated—e.g., Common Kestrels and Ospreys flew in the rain. There were distinct migration peaks in the second half of August, September, and October if all of the birds observed are lumped together and considered as a group.

Most birds (48%) were seen at altitudes between 850 and 1200 m. This was especially true of Common Buzzards and European Sparrow Hawks. The fewest (11%) flew below 850 m, although such low altitudes were characteristic of Red Kites. The number using altitudes above 1220 m was also small (17%); yet, such high elevations were common for Honey Buzzards.

This study adds little to data already available for species whose migration through the study area is concentrated in a short period of time. However, it is valuable for quantifying the movements of raptors such as Sparrow Hawks, Montagu's Harriers, Northern Goshawks, Ospreys, and Merlins, which migrate in small numbers over long periods of time.

The authors were unable to assess the impact of wind on migrants because it was minimal during August–October 1983. Nor could they determine how unstable air masses affect migration, although such instability increases the lift provided by the air, since when the air was unstable, raptors presumably passed over the fort at such high elevations that they could not be seen. Heavy cloud cover did not influence raptor movements.

There are a few apparent inconsistencies between the text and accompanying tables and figures. The text says that Red Kites were "one of the few migrant raptors observed early in the day" (p. 332), and that European Sparrow Hawks were "rarely seen in the middle of the day between 1200 and 1400 h" (p. 324). Both statements are contradicted by Figure 5 in the text.—Michael D. Kern.

5. Radar investigations of correlations between bird migrations and weather in Lithuania. (Radiolokatsionnye issledovaniya svyazi migratsii ptits s pogodoi v Litvye.) M. M. Zhalakyavichyus. 1985. Zool. Zh. 64:72–77. (Russian.)—The author summarizes 10 yrs of research and provides new interpretation and analysis of the migration of birds through the eastern Baltic states of Latvia, Estonia, and Lithuania. From 1975–1978, continuous radar observations were made simultaneously with synoptic weather measurements during spring and fall migrations. Twenty weather parameters such as stratified air temperatures, wind shear and speeds aloft, cloud cover, frontal passages, etc., were employed in a factorial analysis to discern correlative patterns between weather and migration peaks. During spring migrations, air temperature and cloud type (cirrus, cumulus, etc.) were most important in explaining the variance in migration effort. For autumn, wind direction and cloud type accounted for most of the observed variance. The correlations between migration and weather were best expressed during spring and over continental areas. This seems to follow earlier findings in that migration peaks seem to follow large-scale weather patterns rather than localized events.—Douglas Siegel-Causey.

6. On the flights and migrations of birds in the Western Taimyr. (O zaletakh i rasselenii ptits na zapadnom taimyre.) N. V. Vronskii. 1985. Zool. Zh. 64:78–86. (Russian.)—Although the topography in Siberia is moderate at best, migrating birds followed valley ridges rather than flying direct. Ridge systems act as channels directing north- and south-flying birds to regions not in line with breeding or wintering areas. The increased number of accidental species sighted in eastern Siberia is believed to be related to human expansion in the area and selection of slightly different ridge-directed migration routes.—Douglas Siegel-Causey.

POPULATION DYNAMICS

(see also 14, 16, 30, 37)

7. A census of the South Polar Skua at Cape Hallett, Antarctic. J. G. Pascoe. 1984. Notornis 31:312–319.—Speculation about factors controlling population size in Antarctic organisms centers on possible krill-whale-penguin interactions. Other less romantic explanations are often ignored. The skua population at Cape Hallett declined from 181 pairs in 1960–1961 to 98 pairs in 1971–1972. Whether this was a consequence of a decline in the Adelie Penguin colony or an increase in human activity, both of which were occurring, was the subject of debate. While the author wisely reaches no firm conclusions, it appears that human disturbance may not have been very important because in 1982–1983, a decade after humans departed, the colony contained 83–85 pairs and 79–83 nonbreeders. The influence of snow cover is a major factor in affecting how many nesting sites will be available in any year. Without such data, theories regarding changes (or shifts?) in penguin and skua populations will be difficult to resolve.—J. R. Jehl, Jr.

8. The method of estimation of birds on circular plots. (K metodike ucheta ptits na krugovykh ploshchadakh.) S. B. Simonov. 1985. Zool. Zh. 64:124–130.—The author develops methodology and statistical parameters for population estimates and species counts using circular-plot sampling. Through simulation and actual censusing, the efficacy of circular plots is compared with fixed area and transect sampling systems. Asymptotic accuracy greater than 98% is achieved at plot radii less than 50 m and at time samples greater than 15 min. Species with high vagility (*Emberiza*) present the highest variance. In general, circular-plot estimation seems more accurate at low population diversities and densities than more commonly used methods. Simonov develops a sampling statistic (M), believed to be normally distributed, but does not give estimates of variance or confidence intervals; these are needed before final acceptance is possible.—Douglas Siegel-Causey.

NESTING AND REPRODUCTION

(see also 18, 19, 20, 23, 24, 26, 28, 29, 36, 42, 62, 63)

9. Observations of the behavior of the Booted Eagle *Hieraaetus pennatus* (Gmelin, 1788). (Observations sur le comportement de l'Aigle botté *Hieraaetus pennatus* (Gmelin 1788).) J. Carlon. 1984. Alauda 52:189–203. (French, English summary.)—Carlon's 1982/1983 study of Booted Eagles in the southwestern Atlantic Pyrenees deals with 4 nest sites at 350–550 m elevation.

Booted Eagles arrived at these sites in late February, 5 weeks earlier than Black Kites (*Milvus migrans*), contrary to published reports. They were commonly paired when they arrived and occupied nest sites almost immediately. Pairs defended the aeries and surrounding 200 to 300 m area from conspecifics. However, they were not always aggressive toward neighboring pairs and the author saw group displays involving as many as 3 eagles without overt hostility among them.

Nuptial flights that occurred on the nesting territory are well described in the published literature.

A male that had been paired to a female for 11 days was supplanted by a second male. Carlon speculates that the latter male had been the female's mate from previous years since (1) Booted Eagles are strongly attached to nest sites and mates, and (2) they seem to pair for life, although they do not always return to the nesting site together during the prenuptial migration.

Copulation occurred between 15 April and 10 May during or after displays or while the female was incubating. It involved wing-clicking, sharp cries, soft gnashing of bills, and sometimes an offering of food by the male. The author's few observations of hunting activity, suggest that males use lookout perches and do not bring prey to the nest during incubation, but call the females to join them.

Vocalizations were most frequent before egg-laying, diminished during incubation, and were rare after the chicks hatched. They resumed again after mid-July when the nestlings were about 6 weeks old. At fledging, the parents made frequent calls from trees near the aerie as if to entice the young from the nest.

During incubation, the female left the nest silently and approached it warily. She was gone for periods of up to 83 min. The male was not near the nest when she was absent and apparently did not incubate. Incubation and brooding lasted 54–56 d if the nest contained 2 chicks, 59 d if only one chick was present.

By 3 weeks of age, the chicks had established a dominance hierarchy among themselves and were mostly alone at the nest. Broods of 2 matured more rapidly than single chicks. Parents stopped feeding the young 1–3 days before fledging. Hence, hunger, as well as calls and movement of the parents in trees near the nest, incited young birds to leave the nest.

Intraspecific interactions of Booted Eagles were common after fledging, especially since immature birds continued to follow their parents for about 1 month after they left the nest. Interspecific interactions were also common and included formations consisting of circling Black Kites, Honey Buzzards (*Pernis apivorus*), Common Buzzards (*Buteo buteo*), Northern Harriers (*Circus cyaneus*), and Booted Eagles. Some of these interactions were aggressive: Booted Eagles harassing European Sparrow Hawks (*Accipiter nisus*) or Common Buzzards, or being harassed by Northern Harriers.

Carlon witnessed talon presentations and one offering of food between adults after young had fledged. He noted young in September doing vertical falls, barrel rolls, and aerial figures, and speculates that such behavior is as much "play" as "practice."

Migration was imminent when Eagles began to congregate in flight and became detached from their nest sites. They left the area singly or in small groups between 12–28 September.—Michael D. Kern.

10. The Pygmy Owl (*Glaucidium passerinum* (L.)) in the southern French Alps: notes concerning the rearing of the young after fledging. (La Chouette chevêchette (*Glaucidium passerinum* (L.)) dans les Alpes françaises du sud: notes sur l'élevage des jeunes après l'envol.) C. Crocq. 1984. Alauda 52:241–247. (French, English summary.)—Crocq presents observations of a pair of Pygmy Owls (*Glaucidium passerinum*) and their 3 fledged young during late July 1983 in the subalpine zone of the southern French Alps. He estimates that the young had been out of the nest for 10–20 d. There is virtually no published information about the interactions of adults and fledglings of this age.

Adults began to call in the evening about 1.5 h before nightfall apparently while hunting. Based on their vocalizations and the alarm reactions of songbirds, Crocq estimates that they hunted within 80–200 m of the group of fledglings. They did not bring prey to the young, as they do to younger fledglings, but carried it to a snag at the edge of a clearing, to which a young bird came, and carried it off to another tree to eat. Unfed young owls nearby cried shrilly from surrounding trees until they were fed. All 3 were fed within about 1.5 h each evening.

All-night observations indicated that the owls did not vocalize at night and that the 3 juveniles slept together. They did not begin to beg for food until dawn. These observations are consistent with published reports that Pygmy Owls are diurnal and crepuscular.—Michael D. Kern.

11. The effects of ice cover over the colony site on reproductive activities of Herring Gulls. R. D. Morris and J. W. Chardine. 1985. Can. J. Zool. 63:607–611.—What happens when ice still covers a Herring Gull (*Larus argentatus*) breeding colony site at the usual date for egg laying? In this case, 3 of about 90 pairs nested on the ice. All birds lost their clutches. Most males continued to defend a patch of ice over the ground near where they had bred successfully in the previous year. The Herring Gulls neither deserted the colony nor moved to ice-free locations in the colony. Once the ice melted, the pairs quickly constructed nests and commenced laying, sometimes within 24 h of the substrate appearing from under the ice. Curiously, the 2-week delay in the onset of breeding caused by the ice did not reduce clutch size or hatching success of the gulls breeding in the peak period. In contrast, gulls breeding 2 weeks late the previous year did have reduced hatching success as did gulls breeding 2 weeks after the peak of breeding in the year with the ice cover. Strong selective pressures for nest-site tenacity within the colony and breeding during the peak of breeding for the colony exist for Herring Gulls at this Lake Erie site.—A. John Gatz, Jr.

12. Automated measurement of meal sizes and feeding frequency in albatrosses. P. P. Prince and D. W. H. Walton. 1984. J. Appl. Ecol. 21:789–794.—A remote weighing system used in food studies of nestling albatrosses on Bird Island, South Georgia Islands, consists of an artificial nest composed of a brown, molded fiberglass top affixed to a weighing assembly approximately the size of an albatross' nest (37 cm dia. × 19 cm ht.). The mechanical weighing system can be altered to change its operating range (accuracy is 1% within its present weighing range of 3 kg). A low pressure, low voltage transducer is used to transmit data to a recorder. The system is being used to monitor 8 "nests." Sources of error and ways to minimize them are mentioned. Sample data for the Grey-headed Albatross (*Diomedea chrysostoma*) are presented. The equipment could be modified for use with smaller or larger ground nesting species.—R. W. Colburn.

13. Duration of dependence of wild fledgling Mourning Doves upon parental care. R. R. Hitchcock and R. E. Mirarchi. 1984. J. Wildl. Manage. 48:99–108.—Thirty-five radio-tagged *Zenaida macroura* nestlings and 34 wing-tagged nestmates were monitored in Alabama from Mar.–Sept. 1980–1981 to determine length of time that the young doves were dependent upon parental care. Frequency of feeding by parents declined significantly 27–30 d posthatching. Fledglings were feeding independently of adults by 30 d of age. The authors suggest that fledgling doves can survive without parental care by 21 d post-hatching, although some interactions with parents occur thereafter. Habitat management could increase fledgling survival in this game species.—Richard A. Lent.

14. Influences of adult age and experience, nest location, clutch size, and laying sequence on the breeding success of the Great Skua *Catharacta skua*. R. W. Furness. 1984. J. Zool. (Lond.) 202:565–576.—Since 1900 the population of Great Skuas in Shetland has increased 7% per year. The rapid population growth is sustained by an unusually high fledgling production, 1.24 chicks/pair, that results from low chick mortality due to abundant and reliable food resources. That result is less surprising and less interesting than the reproductive dynamics of the colony. Inexperienced birds laid eggs later and had a lower reproductive success than more experienced birds. However, clutch-size was not correlated with age. Birds that laid single-egg clutches had significantly more addled eggs, significantly higher predation of chicks, and significantly more starvation of chicks. Since clutch-size is not correlated with experience, single-egg clutches appear to be the result of poor quality birds that are relatively nonaggressive and therefore poor defenders of their nest site and eggs or young. Poor defense also means small territories with conspecific neighbors, the primary predators of eggs and chicks, being unusually close. The existence of poor quality birds is further suggested by a significant tendency for pairs that laid one or two addled eggs in one year to lay one or two addled eggs in the next year. The basis for the qualitative difference among skuas remains to be explored.—Edward H. Burtt, Jr.

15. Interruptions extend incubation by Ancient Murrelets, Crested Auklets, and Least Auklets. S. G. Sealy. 1984. Murrelet 65:53–56.—The average length of incubation for clutches that hatched was 35 d for Ancient Murrelets (*Synthliboramphus antiquus*; n = 34), 36 d for Crested Auklets (*Aethia cristatella*; n = 6), and 31 d for Least Auklets (*A. pusilla*; n = 15), with extremes up to 47, 44, and 38 d, respectively. Longer incubation periods at 9 Ancient Murrelet nests were attributed to egg neglect, wherein eggs were abandoned for 1–3 d while adults presumably foraged far from the nest on patchily-distributed foods. One murrelet nest was neglected 4 times during incubation. Incubation was uninterrupted at most auklet nests, and the 4 cases of prolonged incubation were attributed to temporary abandonment by adults after disturbance at the nest from researchers or run-off water.—Jeffrey S. Marks.

16. Clutch size and breeding success of Tengmalm's Owl *Aegolius funereus* in natural cavities and nest-boxes. E. Korpimaki. 1984. Ornis Fenn. 61:80–83.—During breeding seasons from 1966–1982 in western Finland, breeding success was compared between birds using next-boxes versus those nesting in natural cavities. Significantly larger clutches (1–10 eggs) were laid in nest-boxes than in natural cavities (2–8 eggs). A comparison of laying dates for the two nesting sites was not significant and hatching success

was the same. Nesting owls use old Black Woodpecker (*Drycopus martius*) holes which have a smaller area than nest-boxes. The author suggests that the limit on clutch size in natural cavities is correlated with smaller bottom area in the cavities. The author cautions that data on clutch size and breeding success from populations of birds using nest-boxes may be artificially high.—Lise A. Hanners.

17. Changes in adult mass associated with the nesting cycle in the European Starling. R. E. Ricklefs and D. J. T. Hussell. 1984. Ornis Scand. 15:155–161.—Loss of mass in adult birds during the nesting cycle has been attributed to physiological stress from breeding. If this is true, then mass loss should be directly related to reproductive effort (i.e., number or total mass of nestlings). Ricklefs and Hussell manipulated European Starling (*Sturnus vulgaris*) broods into sizes of 3, 5, and 7, and weighed adults throughout the nesting cycle, to examine the relationship between mass loss and brood size. They also collected females to determine the organs and biochemical components involved in mass loss. Both sexes lost mass during the nesting season. However, only at the end of the nesting cycle, and then only for males, was body mass inversely related to brood mass. Females were heaviest during the laying period, and mass loss between laying and the end of incubation resulted from atrophy of the sexual organs. There was no evidence that females lost somatic mass during egg-laying or incubation. During the latter half of the brood-rearing period, adults rearing 5 young lost more mass than those rearing 3 young, but the average rate of loss was only .1 g/d. Thus, there were only weak indications that mass loss was related to reproductive effort, and there was no evidence that the physical condition of starlings deteriorated owing to breeding.—Jeffrey S. Marks.

BEHAVIOR

(see also 3, 9, 14, 57, 78)

18. A scenario for the evolution of social organization in Ruffs (*Philomachus pugnax*) and other charadriiform species. J. Van Rhijn. 1985. Ardea 73:25–37.—Van Rhijn reviews the mating systems of the Ruff (*Philomachus pugnax*) against the background of the social systems within the Calidridinae, Scolopacidae, Scolapaci, and the order Charadriiformes. Although the Buff-breasted Sandpiper (*Tryngites subruficollis*) and Great Snipe (*Gallinago media*) are members of the Scolopacidae and form leks, the Ruff has a social system unlike that of most related species in that it incorporates role differentiation between independent and satellite males and temporal and spatial segregation between copulation and fertilization. Likely candidates among the Charadriiformes, from which the Ruff-system could have evolved were found among ancestral systems in which there were male care and "double-clutch" strategies. The Ruff system may have evolved from a primitive state wherein the female laid two clutches of eggs in quick succession. Her mate for the first clutch would be a male with good caring qualities (a "baby-sitter" or satellite male), whereas for the second clutch her investment is greater and thus she should select a male with superior qualities (a "superman" or independent male). Behavioral dimorphism among males might have originated by disruptive selection in a double-clutch system followed by separation of both male types.—Clayton M. White.

19. The social behavior of the Pin-tailed Whydah (*Vidua macroura*) in northern Ghana. P. Shaw. 1984. Ibis 126:463–473.—While there is a considerable amount of information available on the physiological and behavioral adaptations of brood parasites to their hosts (see review **28**), relatively little is known of their mating systems. The few studies of mating systems that use color-banded populations of brood parasites indicate a dissolution of the monogamous pair-bond as might be expected of a species in which parental responsibilities are much reduced. The brood-parasitic subfamily Viduinae contains 12 species, of which only 3 have been previously described in detail. This paper describes the territorial behavior of male Pin-tailed Whydahs and the visiting behavior of females, during one breeding season in northern Ghana.

Each territorial male used 1 or 2 favored display sites where he displayed to females in groups of 1–8. The frequency of display flights and singing were correlated with diurnal pattern of visitation by females. Whereas each female was courted by up to 6 males, the

number of copulations observed was too few to indicate the type of mating system used (polygynous or promiscuous). An estimate of the operative sex ratio at 1 female to 6 territorial males suggests that a high proportion of males is prevented from breeding. Removal experiments support this idea; territories of removed males were rapidly re-occupied. Such removal experiments were a commendable addition to this 1-yr observational study.—J. M. Wunderle, Jr.

20. The mating system of Kentish Plovers (*Charadrius alexandrinus*). C. M. Lessells. 1984. Ibis 126:474–483.—Sandpipers and plovers are known to have a wide range of mating systems including monogamy, sequential polygamy, rapid multi-clutching and lekking. With this diversity of comparative data, a study of Kentish [=Snowy] Plovers was conducted in southern France over 3 breeding seasons. Using a color-banded population, Lessells focused attention on the frequency of mate change between seasons and within seasons between breeding attempts. Pairs generally re-nested together after loss of a clutch. Two instances of sequential polyandry were documented when 2 females who hatched clutches changed mates before re-nesting. By carefully observing adults accompanying broods, the author found that females normally desert the brood about a week after hatching. Mate change between seasons is the rule even if the partner from the previous season is alive.

The sequential polygamy of Kentish Plovers places them in an intermediate position relative to mating systems in the genus *Charadrius*. Mountain Plovers (*C. montanus*) have a rapid multi-clutch system frequently with sequential polyandry resulting from the female's desertion of her first clutch. The Ringed Plover (*C. hiaticula*) and Killdeer (*C. vociferus*) are monogamous within a breeding season and re-nest as the first brood fledges. Although simultaneous polygyny has been recorded in the Kentish Plover from other localities, it was not found in this study.—J. M. Wunderle, Jr.

21. Capture and caching of flying carpenter ants by Pygmy Nuthatches. S. G. Sealy. 1984. Murrelet 65:49–51.—Sealy observed 8 unmarked Pygmy Nuthatches (*Sitta pygmaea*) at 3 nests in British Columbia during May 1979. Two nests were attended by pairs and 1 nest by 4 birds, only 2 of which fed nestlings. The 2 nuthatches that did not feed nestlings were observed capturing flying carpenter ants (*Camponotus herculeanus*), and in 11 cases they cached the ants under tree bark. About 2 min were required to pursue, capture, and kill (by vigorous pecking) an ant. The 6 nuthatches that fed nestlings never were observed pursuing flying ants. Sealy speculates that capture and caching of flying ants by nuthatches was an opportunistic response to a temporary food source that could be exploited profitably only by individuals that were not feeding nestlings.—Jeffrey S. Marks.

22. Spring flocking of the Chaffinch *Fringilla coelebs* and the Brambling *F. montifringilla* in northern Finland. A. V. Mikkonen. 1984. Ornis Fenn. 61:33–53.—The Chaffinch and Brambling were chosen for study because they are congeners that meet (in migrating flocks) during the prenesting period before dispersing to their sympatric breeding grounds. The Brambling forms larger flocks and uses group displays on the breeding grounds; Chaffinches form smaller flocks in migration and are highly territorial while breeding. Mikkonen made observations in spring and summer from 1967–1972 to compare the species to determine selective pressures influencing their social organizations before and during nesting.

Chaffinches arrived from spring migration about 2 weeks earlier than Bramblings. Chaffinches usually occurred as single individuals or in small groups; Bramblings were rarely alone and were usually in large flocks. Flocks of both species used the same habitats for feeding, but usually at different times in the spring. Behavior during migration was similar between the species. As breeding began Chaffinches dispersed individually to territories while Bramblings dispersed in loose groups or as single individuals. Male Bramblings may sing in groups joined by females in display flocks.

Mikkonen concludes that there is a distinct separation in social ecology between Bramblings and Chaffinches and discusses competition as a possible explanation. Few data from other references are provided. As in many papers on competition (see review **32**), the author has demonstrated that the species are distinct in their habits; competition has not been demonstrated.—Lise A. Hanners.

23. Relationship between the Common Cuckoo *Cuculus canorus* and its host, the Redstart *Phoenicurus phoenicurus*. A. Jarvinen. 1984. Ornis Fenn. 61:84–88.—L. v. Haartman proposed that Redstart females may be dimorphic in their response to eggs laid by parasitic cuckoos, being either "acceptors" or "rejectors" of the eggs. This paper tested v. Haartman's hypothesis by repeating his experiments with a larger sample size over 3 yrs. Foreign eggs from Brambling (*Fringilla montifringilla*), Meadow Pipit (*Anthus pratensis*), and Redpoll (*Carduelis flammea*) nests were introduced into 35 different Redstart nests and the response of the females recorded. During the egg-laying phase all female Redstarts accepted the egg, regardless of the species of the foreign egg. During the incubation phase 35% of the females were "rejectors," again regardless of the identity of the foreign egg. These experiments were performed in NW Finnish Lapland at the edge of the breeding range of the two species. Jarvinen proposed that the accepting females were northern birds that had less selection pressure to discriminate against foreign eggs, and the rejectors were southern birds more experienced with cuckoos. Differences in annual rejection rate could therefore be explained by fluctuating annual immigration of Redstarts into Lapland from the south.—Lise A. Hanners.

24. Courtship disruption modifies mate choice in a lek-breeding bird. P. W. Trail. 1985. Science 227:778–780.—Much recent work in evolutionary biology has focused on mate selection and its role in sexual selection. A central issue has been the degree to which members of the limiting sex (usually females) are able to control with whom they mate. Males of lekking species thwart female choice by courtship disruption. This has been defined as "any interference in courtship or mating that decreases the number of complete copulations performed by a male or that increases the time and energy required to perform them." While this disruption has been documented in other lek species, no previous work has documented the adaptive significance of courtship disruption. Thus the question remains as to what benefit a male might receive by disrupting another pair's courtship.

Trail answered this question using color-banded individuals during a 4-yr study of the Cock of the Rock (Cotingidae; *Rupicola rupicola*) in Surinam. As with other lek species, mating success is highly skewed, with the most successful male *Rupicola* performing an average of 30% of all matings per year and 67% of territorial males failing to mate at all each year. Trail found that interference among territorial adult males disrupted 31% of all female courtship visits and terminated 32% of all matings at a large lek (with an average of 55 territorial males). Courtship disruption is a normal aspect of male *Rupicola* behavior since approximately half the territorial males performed courtship disruption each year, regardless of their mating success or territory location. Males that disrupted courtship had a direct effect upon the behavior of the female. For example, interrupted females subsequently visited more males than did undisturbed females and they were more likely to mate with more than one male. The tendency of females to redirect their mate choice away from males with whom they were interrupted results in a direct reduction in male mating success due to disruption. Disrupting males benefited by obtaining more matings (62%) than nondisrupters. Since reproductively successful males do not perform more disruptions, this result is not due to a restriction of disruptive behavior to the most attractive males.

Does disruption redirect mate choice to the individual disruptive male or does it merely reopen the choice process of females? The results suggest that males that performed the most intense disruptions were significantly more likely to mate with the disrupted female than were less disruptive males.

If disruption provides reproductive benefits, why isn't it even more common in the *Rupicola* mating system? Disruption carries at least two major costs. Highly disruptive males may suffer because of the decreased time and energy they spend defending and advertising on their own territories. Also, intense disruption requires considerable energetic costs and runs the risk of retaliation. These costs seem to restrict the overall incidence of courtship disruption in this lek species with the result that female mate choice is freed from direct male control. I hope this fine study will stimulate similar work on the lekking shorebirds, grouse, hummingbirds, manakins, and other cotingids.—J. M. Wunderle, Jr.

25. The testing of the ability for imprinting and finding the site of future nesting in young Chaffinches *Fringilla coelebs*. (Proverka sposobnosti molodykh zyablikov zapechatlevat' i nakhodit' territoriyu budushchego gnezdovaniya.) L. V. Sokolov, K. U. Bol'shakov, N. V. Vinogradova, T. V. Dol'nik, D. S. lyuleeva, V. A. Payevskii, M. E. Shumakov, and M. L. Yablonkevich. 1984. Zool. Zh. 63:1671–1681. (Russian.)—One hundred-eighteen Chaffinches were reared in laboratory conditions to about 25–28 d of age, then acclimated in a rearing cage outside. A control group of 48 birds was released at various ages (32–70 d old). Others (70 birds) were kept in the holding cage until 50 d of age, and then at a similar schedule of ages as the control group, transported at least 70 km away and released. The only birds retrapped around the holding cage the next year were members of the control group. The authors interpret these results to show that during a sensitive period of development (30–40 d), young Chaffinches need to move freely around the nesting site in order to imprint the area of future nesting.—Douglas Siegel-Causey.

ECOLOGY

(see also 7, 8, 11, 22, 33, 34, 39, 57, 73, 74, 75, 76, 77)

26. Aspects of habitat selection in the Sedge Warbler *Acrocephalus schoenobaenus*. D. K. Thomas. 1984. Bird Study 31:187–194.—From 1975–1979, censuses were conducted to determine the size of the breeding population of Sedge Warblers at the Oxwich National Nature Reserve in the Gower Peninsula of Wales. In each year regular censuses were made during the period of territory establishment to determine the sequence in which different habitats were occupied. Sites of mixed bramble, primarily consisting of *Rubus fruticosus*, were occupied first. All of the mixed bramble habitat was occupied in only 1 of the 5 years. Occupied mixed-bramble sites had more complex branching patterns than unoccupied sites, suggesting that complexity of vegetation was an important determinant of nest-site selection. Similarly, the time of site occupation was negatively correlated with an index of the branching pattern. Thomas concludes that vegetation structure is a more important determinant of habitat selection than plant species composition, but his data suggest only that both factors appear important in the choice of territories by Sedge Warblers.—Stephen R. Patton.

27. Estimating numbers of birds by point counts: how long should counts last? R. J. Fuller and D. R. Langslow. 1984. Bird Study 31:195–202.—Point counts of 20 min duration, but recorded separately for each consecutive 5 min were made at 2 locations in England. All birds counted were estimated to be within 50 m of the observer. The relationship between count duration and number of species recorded was curvilinear for 6 habitats. In each habitat, more than 50% of the species and number of pairs were recorded in the first 5 min and more than 70% each after 10 min. Some variation existed in the rates at which different species were recorded, but sample sizes were inadequate to test statistically. Measures of community composition based on counts of different durations were similar (Kendall's coefficient of concordance: .833–1.000). Count duration did not affect estimates of species dominance or species number. The authors concluded that counts exceeding 10 min duration wasted time that could be better spent by increasing the number of counts in an area or improving other aspects of sampling (see review **39**).—Stephen R. Patton.

28. Female spacing patterns in Brown-headed Cowbirds. K. L. Teather and R. J. Robertson. 1985. Can. J. Zool. 63:218–222.—If available host nests constitute a limiting resource, one might expect female Brown-headed Cowbirds (*Molothrus ater*) to defend territories based on host-nest locations, just as food-limited birds defend feeding territories. So neat and universal a pattern has not been seen in previous studies. Earlier results range from finding no territories, to overlapping territories, to exclusive territories. This variation is not easily interpreted, however, in the absence of detailed information on food and host-nest availability. Here, Teather and Robertson make a start toward rectifying this problem by not only examining territoriality of 7 radio-tagged female cowbirds, but also analyzing food and host-nest resources. They found that at Lake Opinicon, Ontario,

female Brown-headed Cowbirds had widely overlapping territories and showed highest aggression near the center of their ranges. Aggression was most evident when birds were not feeding; instead, it was most frequent in habitat types—woodlands and swamps—where potential host-nests would be expected to be most abundant. These results imply an important role for host-nests in determining cowbird spacing patterns. A fuller understanding will be gained once additional quantitative work is done either in several areas with different resource levels (food and host-nests) or in the same area with resource levels manipulated.—A. John Gatz, Jr.

29. Do Northern Harriers (*Circus cyaneus*) choose nest sites adaptively? R. Simmons and P. C. Smith. 1985. Can. J. Zool. 63:494–498.—From 1980–1982, Northern Harriers at Tantramar Marsh, New Brunswick, nested most frequently in wet areas surrounded by cattails, but with their nests visible from more than 10 m. How much selectivity of nest sites was involved and how adaptive these nest locations were is not well defined by the study. Availability of the various habitat types was quantified only for moisture levels and, hence, selectivity for this variable alone was assessed. Predation losses averaged only 20% of all nesting failures during the 3 years of the study, so further work on nest location relative to other selective forces such as food resources and the presence of high provisioning males needs to be integrated with the predation results to give an overview of adaptiveness of nest-site locations. Simmons and Smith recognize the significance of some of these points in their discussion and suggest a balance of selective forces that they think might be critical to the harriers. The real work of performing an integrated study of nest-site selection (i.e., use in proportion to availability) and determining the relative importance of food, mates, predation, and habitat type to nest-site selection still needs to be done.—A. John Gatz, Jr.

30. Group size and sex ratios among Finnish Black Grouse. W. Hanson and M. Soikkeli. 1984. Ornis Fenn. 61:65–68.—Sightings of over 25,000 Black Grouse (*Tetrao tetrix*) during 1945–1962 were analyzed. Group size was largest in winter (mean of 13.73 birds) and smallest in the breeding season (mean 4.34). Group size was smaller in northern Finland than southern, reflecting the lower population density of grouse in northern Finland. Brood sizes between northern and southern birds were the same. The sex ratio of the groups was uneven with the fraction of males ranging from .56 to .66. The authors indicate that these field surveys may be biased because males are physically more conspicuous and less secretive than females and will therefore be counted more frequently.—Lise A. Hanners.

31. Weight gain of Blue-footed Booby chicks: an indicator of marine resources. R. E. Ricklefs, D. Duffy, and M. Coulter. 1984. Ornis Scand. 15:162–166.—Our marine resources are under ever-increasing pressures from pollution and intensive, mechanized harvest. The impacts of these pressures are difficult to assess directly. Because growth rates of seabird chicks are sensitive to changes in food supply, Ricklefs et al. measured 5-d weight changes (adjusted by wing length) in young Blue-footed Boobies (*Sula nebouxii*) at 13 colonies in the Galápagos Islands in an effort to develop a simple, indirect measure of marine productivity.

In the Galápagos, natural variability in food supply is provided by seasonal shifts in the position of the cold Cromwell Current. Blue-footed Boobies nest at all times of the year in the archipelago, and they forage within a few km of their colonies. Thus, chick weights should reflect food conditions in the waters immediately adjacent to nesting colonies.

As expected, most booby chicks from colonies adjacent to the cold-water (i.e., high productivity) region of the archipelago exhibited large increases in weight, whereas chicks from colonies near warmer waters either lost weight (some substantially) or gained little weight compared with cold-water chicks.

These results suggest that seabird growth rates can provide a valuable and easily-obtained measure of short-term changes in marine productivity. Ricklefs et al. further suggest that by selecting the appropriate species (trophically and behaviorally), oceanographers and ecologists will be able to evaluate both nearshore and pelagic conditions, as well as focus on particular parts of the marine system.—Jeffrey S. Marks.

32. Prey weight, food overlap, and reproductive output of potentially competing Long-eared and Tawny owls. I. N. Nilsson. 1984. Ornis Scand. 15:176–182.—Long-eared Owls (*Asio otus*) and Tawny Owls (*Strix aluco*) occupy similar habitats in southern Sweden. In this study, diet and productivity of neighboring owls (interspecifics nesting or roosting ≤1 km apart) were compared with those of non-neighboring owls (≥2 km apart) to determine whether the 2 species were competing. Long-eared Owls were dietary specialists that fed primarily on voles. Tawny Owls were generalists, feeding on amphibians, voles, wood mice, and birds. Despite a large difference in mean body weight (Tawny Owl = 472 g; Long-eared Owl = 276 g), both species ate similar-sized prey. Nilsson suggests that a sit-and-wait predator like the Tawny Owl can "afford" to take smaller prey relative to its size than can an on-the-wing hunter like the Long-eared Owl. Dietary overlap was greater among non-neighbors (42–46%) than among neighbors (30–41%). Long-eared Owls that nested near Tawny Owls fledged fewer young (2.6/nest; n = 10) than those without Tawny Owl neighbors (3.5/nest; n = 8), whereas Tawny Owls that nested near Long-eared Owls fledged *more* young (3.3/nest; n = 7) than those without Long-eared Owl neighbors (2.3/nest; n = 10). Nilsson concludes that the 2 species were competing for food, and that food competition probably reduced the reproductive output of Long-eared Owls that nested near Tawny Owls.

This is an interesting piece of work. However, overlap values are difficult to interpret, especially when they are as low and as similar as in this study. In addition, the productivity differences could have been an artifact of sample size (Nilsson admits this). Nilsson's conclusions should be considered tentative until someone gathers additional productivity data and data on food delivery rates and/or fledgling weights from Long-eared Owl nests with and without Tawny Owl neighbors.—Jeffrey S. Marks.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

(see also 1, 8, 13, 27, 31)

33. Response of avian communities to herbicide-induced vegetation changes. M. L. Morrison and E. C. Meslow. 1984. J. Wildl. Manage. 48:14–22.—This 3-yr study from the Douglas-fir (*Pseudotsuga menziesii*) region of western Oregon examines effects on bird communities of spraying young clear-cuts with the herbicides 2,4-D and/or 2,4,5-T. The herbicides are used to suppress woody growth that competes with timber species. Bird populations, vegetation structure, and avian foraging behavior (location, substrate, and height of foraging) were sampled on sites sprayed 1 and 4 yr previously and compared with data from untreated controls.

Herbicide application reduced vegetation complexity on treated sites through suppression of deciduous trees. In general, avian density and species diversity were similar on treated and untreated sites. However, densities of Wilson's Warbler (*Wilsonia pusilla*) declined on sprayed sites, although this species modified its foraging behavior to include a greater proportion of shrubs versus deciduous trees. MacGillivray's Warbler (*Oporornis tolmiei*) also showed reduced densities on treated sites, but only 1 yr post-spray. This species increased its use of deciduous trees "in an apparent attempt to compensate for loss of habitat following defoliation of shrubs." The density effect had evened out by 4 yr post-spray. Spraying apparently enhanced habitat for White-crowned Sparrows (*Zonotrichia leucophrys*). The remaining 8 species showed no population changes that could be attributed to changes in habitat use or foraging behavior. The authors claim that retaining only a small amount of deciduous cover on herbicide-treated clear-cuts would result in bird communities similar to those on untreated clear-cuts.—Richard A. Lent.

34. Dabbling duck-habitat associations during spring in Delta Marsh, Manitoba. R. M. Kaminski and H. H. Prince. 1984. J. Wildl. Manage. 48:37–50.—Habitat associations of 5 duck species (Mallard, *Anas platyrhynchos*; Blue-winged Teal, *A. discors*; Northern Shoveler, *A. clypeata*; Gadwall, *A. strepera*; Northern Pintail, *A. acuta*) were examined between Apr.–Jun. 1976–1978, using stepwise multiple regression of duck densities and species richness on 8 habitat variables. Habitat data were derived from aerial photographs and mapping supplemented by ground-truthing; bird censuses were conducted by air.

Most species greatly increased in number in 1977, a drought year, probably due to

displacement of birds from drought-impacted habitats. The amount of whitetop-rivergrass (*Scolochloa festucacea*)-awned sedge (*Carex atherides*) habitat (WS) "exerted a major influence on dabbler pair densities." Mallard, teal, shoveler, and pintail densities were positively correlated with this cover type in 1976; Gadwall densities were negatively correlated with it in 1977. Forest cover was consistently negatively correlated with dabbler pair densities. Duck species richness was positively associated with WS habitat in 1976, and was frequently positively associated with an index of vegetation-water interspersion. Many habitat variables showed no association with species densities or richness in certain years.

This paper is a good example of the use of stepwise regression in describing avian habitat relationships, and of the formulation of management recommendations based on a numerical analysis. The authors downplay the probabilities associated with their regression coefficients. This is wise because stepwise regression is notorious for generating "pseudo p-values" in the process of selecting the "best" subset of predictor variables (see Sokal and Rohlf, **Biometry**, 2nd ed., W. H. Freeman and Co., 1981:663).

Although strong patterns of association among bird and habitat variables were present in certain years, overall the habitat variables did not explain a very large fraction of the variation in duck densities or species richness (R^2 ranging from .22 to .76 for 18 regressions). However, the patterns of habitat association were strong enough for the authors to advocate water level management "to improve northern prairie marshes primarily for breeding dabbling ducks." They do suggest that habitat variables alone are inadequate to reliably predict density or species richness of ducks in a general approach such as theirs.—Richard A. Lent.

35. Distribution and habitat use of waterfowl wintering in Oklahoma. M. E. Heitmeyer and P. A. Vohs, Jr. 1984. J. Wildl. Manage. 48:51–62.—Air and ground surveys of 10 waterfowl species were conducted during the winters of 1978–1979 and 1979–1980 to evaluate distribution and habitat use of waterfowl, concentrating on small scattered wetlands, large (>445 ha) reservoirs, and 5 National Wildlife Refuges (NWR's). Common Mergansers (*Mergus merganser*), Snow Geese (*Chen caerulescens*), and Canada Geese (*Branta canadensis*) were the most numerous wintering waterfowl in the larger reservoirs and NWR's. Use of smaller wetlands by dabbling ducks was significant. Details on distribution, use of specific habitats, and sex and pairing status are summarized by species. Results of a principal components analysis and multivariate analysis of variance of 36 habitat variables from wetlands used and not used by ducks are presented, but are only briefly discussed, the reader being referred to the authors' other publications for details.

Midwinter waterfowl inventories in Oklahoma and elsewhere in the Central Flyway are conducted only on large reservoirs and NWR's. Because this study has demonstrated a preference by dabbling ducks wintering in Oklahoma for small, scattered wetlands over man-made water bodies, "these counts may significantly underestimate . . . early winter dabbling duck populations." The authors suggest that dabbling duck management efforts in this region be turned more towards preserving small natural wetlands rather than managing large reservoirs or other man-made impoundments.—Richard A. Lent.

36. Declining survival of Ring-necked Pheasant chicks in Illinois agricultural ecosystems. R. E. Warner, S. L. Etter, G. B. Joselyn, and J. A. Ellis. 1984. J. Wildl. Manage. 48:82–88.—This paper evaluates changes in survival of *Phasianus colchicus* chicks from 1946 through 1981 relative to recent changes in agricultural practices. Corn and soybean farming in Illinois pheasant range substantially increased following World War II. Traditional pheasant brood habitat (hay and small grains), on the other hand, has become less abundant since the 1960's. The mean number of pheasant chicks per brood following hatching declined from 1946 to 1981, while brood size at hatching did not change significantly from a mean of 8.55 eggs/successful clutch. Brood size was significantly positively correlated with number of hectares planted to hay and small grains, and significantly negatively correlated with hectares planted to corn and soybeans. Use of chlorinated hydrocarbon insecticides was apparently not a contributing factor in the decline of mean brood size. The authors state that row-cropping systems may subject pheasant chicks to increased mortality as they are forced to forage more widely in habitats devoid of high-protein food sources.—Richard A. Lent.

37. Some population parameters of Sandhill Cranes from mid-continental North America. T. C. Tacha and P. A. Vohs. 1984. J. Wildl. Manage. 48:89–98.—The authors develop techniques for monitoring annual recruitment and examine timing and geographic characteristics of the North American Sandhill Crane (*Grus canadensis*) harvest. Presence of brown nape feathers and crown feathers were reliable aging characters for juveniles. In North Dakota and Texas, juvenile cranes made up 38–55% of the harvest, and were nearly 4 times more vulnerable to hunting than adults. Males constituted 55% of the harvest in the same states and were 1.3 times more vulnerable to hunting than females. The authors suggest that the magnitude and age structure of the crane harvest can be managed by manipulating season dates and by regulating the use of decoys.—Richard A. Lent.

38. Comparative effectiveness of Avitrol, exploders, and hawk-kites in reducing blackbird damage to corn. M. R. Conover. 1984. J. Wildl. Manage. 48:109–116.—In reducing Red-winged Blackbird (*Agelaius phoeniceus*) and Common Grackle (*Quiscalus quiscula*) damage to maturing cornfields, propane exploders were the most cost-effective and reduced damage by 77% over unprotected control fields. Hawk-kites reduced damage by 83% but required much labor and were vulnerable to damage. The chemical Avitrol FC-99, which frightens off birds by producing erratic behavior in those that consume it, was the least successful and was not cost-effective. Hawk-kites, held aloft by helium balloons, "were the most successful in reducing damage in their immediate vicinity." Conover feels that kites hold promise if a more efficient way can be found to keep them aloft.—Richard A. Lent.

39. The accuracy of the combined version of the mapping method in the reedbed habitat on the example of Reed Warbler *Acrocephalus scirpaceus*. M. Borowiec and E. Ranoszek. 1984. Ring Int. Ornithol. Bull. 118–119:209–215.—The standard spot-mapping method has been shown to underestimate bird populations in dense marsh habitats. In order to overcome this deficiency, a combined version of the mapping methods has been developed as a more effective technique for quantitatively estimating numbers of singing males in dense marsh. The authors used both methods to estimate the size of 2 color-banded populations of Reed Warblers. They found the combined mapping method to precisely estimate one of these populations and underestimate the other by 9.4%, whereas the standard spot-mapping method underestimated both populations by 15–20%. While the combined mapping method proved to be more accurate for Reed Warblers, they cautioned that its effectiveness for other marsh inhabiting birds remains to be tested.—Bruce G. Peterjohn.

40. The Scottish Mute Swan census 1983. A. W. Brown and L. M. Brown. 1985. Scott. Birds 13:140–148.—Since the 1955–1956 census, the Scottish population of Mute Swans (*Cygnus olor*) has expanded and extended its range in northern Scotland, declined in central Scotland, and remained stable in southern Scotland. Counts suggest a 3.6% decline overall. However, coverage was incomplete in some counties in 1955–1956, which suggests a low population estimate. The low estimate may have been offset by late counts of nonbreeding birds which were moving to molt sites and may have been double-counted. Thus the population trend is difficult to estimate and the 1983 census provides the quantitative baseline from which to measure future trends.—Edward H. Burtt, Jr.

CONSERVATION AND ENVIRONMENTAL QUALITY

(see also 7, 31, 40, 65)

41. The Peregrine Falcon *Falco peregrinus* in the southern part of the Central Massif between 1974 and 1983. (Le Faucon Pélerin *Falco peregrinus* dans le sud du Massif Central de 1974 à 1983.) J.-M. Cugnasse. 1984. Alauda 52:161–176. (French, English summary.)—This is a continuation (1983) of studies of Peregrine Falcons begun in 1974 in a 20,000 km² area of south Central Massif, an area that includes the Department of Hérault, in France. Nineteen nest sites were occupied by at least 1 bird in 1983, most (89.5%) were occupied by 2 birds. Immature birds (mostly females) were seen at occupied sites on 17 occasions. Under ideal conditions, the distance between nesting pairs of per-

egrines was only 2–3 km. However, it averaged 8 km in areas where there were few rocky escarpments.

Peregrines shared nesting and foraging areas with several other raptors and large corvids and a fairly well-established dominance hierarchy existed among these species. Golden Eagles (*Aquila chrysaetos*) were at the top of the hierarchy. The status of Bonelli's Eagles (*Hieraaetus fasciatus*) was uncertain. Eagle Owls (*Bubo bubo*) prey on peregrines, and yet the 2 species sometimes coexisted in the same areas. Peregrines attacked Common Buzzards (*Buteo buteo*) and Black Kites (*Milvus migrans*), and clearly dominated Ravens (*Corvus corax*). But, curiously they did not harass European Sparrow Hawks (*Accipiter nisus*) or Northern Goshawks (*Accipiter gentilis*) which were numerous in the area and food competitors. Foxes, martins, and genets also occupied the peregrines' nesting cliffs and genets preyed on their eggs.

Nest sites were generally 300–400 m in elevation, 700 m in the Mediterranean zone. Nests were usually in cavities or on steep parts of calcareous or shale cliffs. Those on calcareous cliffs were rarely used in consecutive years, but those on shale cliffs were commonly used from one year to the next.

Since 1974, 86–100% of (102) pairs have laid eggs, the peak being during mid-March. Significantly more chicks developed from eggs laid between 1 and 15 March than from eggs laid later (2.55 vs. 1.57). Clutch size averaged 3.13 eggs and ranged from 2–4 eggs. Most (69–80%) pairs that laid eggs hatched young. For pairs that fledged young, 2.45 young fledged per pair per nest. Reproductive success was 1.5–1.8 young per pair per year.

Peregrines preyed on at least 57 species of birds in the area (listed by the author with information on their frequency of use and biomass); they constituted 99.9% of the prey biomass (the remainder were insects and small mammals). Average prey mass was 123.5 g. Adult males require about 100 g of food daily; females 150 g.

The above specific information suggests that the peregrine population in the Central Massif is healthy, although its productivity is lower than the minimal productivity (1.6–2.3 young per pair per year) considered by other investigators essential to maintain stable population size. The author thinks that the latter estimate of required productivity is too high, at least for the Central Massif where the adults are long-lived. After a long period of population stability (1971–1980), there has been a recent increase in the nesting population with the formation of 9 new pairs in the last 3 yrs.—Michael D. Kern.

42. Impact of outdoor recreation upon nest-site choice and breeding success of the Kestrel. A. N. Van der Zande and T. J. Verstrael. 1985. Ardea 73:90–99.—By means of a mail questionnaire, data on 160 nest boxes of the Kestrel (*Falco tinnunculus*) were gathered for 5 yrs in the Netherlands. Nest boxes were classified according to distance from human activities, accessibility, and visibility. Based on these and other variables (nest-box characteristics, vole abundance, etc.) the authors conclude that: (1) Kestrels avoid areas of human access closer than 50 m from sources of disturbance; (2) recreation may influence breeding success in areas with free human access; (3) the effect of accessibility is strongest in years of low food supply; and (4) the effect of distance from the source of disturbance (i.e., a road) can be strong in both vole non-peak and vole peak years especially during incubation and young-rearing periods.—Clayton M. White.

43. Current impact of DDE on Black-crowned Night-herons in the intermountain west. C. J. Henny, L. J. Blus, A. J. Krynitsky, and C. M. Bunck. 1984. J. Wildl. Manage. 48:1–13.—A 3-yr study examined organochlorine contamination in 220 eggs selected at random from nests in 8 Black-crowned Night-heron (*Nycticorax nycticorax*) colonies. Colonies were in Washington, Oregon, and Nevada. DDE residues were found in all eggs. Other contaminants were detected in 35% or less of the eggs. A negative relationship was found between eggshell thickness and DDE levels, with cracked or crushed eggs found more often in clutches with higher levels of contamination. Nest success, clutch size, and number of young per successful nest all declined with DDE levels >8 ppm. A strong north–south contamination gradient was found, with southern colonies more heavily contaminated. Little evidence of pesticide contamination was found on the breeding grounds, leading the authors to suggest that these herons are being exposed to DDT on their wintering grounds.—Richard A. Lent.

44. Field-feeding ecology of waterfowl wintering on the southern high plains of Texas. G. A. Baldassarre and E. G. Bolen. 1984. J. Wildl. Manage. 48:63–71.—As the authors state in their introduction, "Field-feeding on waste grain may be of increasing importance to survival of wintering waterfowl as wetland destruction continues and natural food resources decline." They examine this phenomenon in Castro County, Texas as it relates to abundance of waste corn left on fields, timing/duration of field-feeding flights of waterfowl [interspecific groups of Northern Pintail (*Anas acuta*), Green-winged Teal (*A. crecca*), American Wigeon (*A. americana*), and Mallards (*A. platyrhynchos*)], and field-feeding preference and behavior.

Pintails and teal made up 50–75% of most flocks. Birds performed 2 feeding flights/day (morning and evening). Evening flights were longer than morning flights, and increased in length with colder weather, suggesting greater energy needs of birds in preparation for cooler night temperaures and stressful weather. Ducks preferred burned fields when available because burning made waste corn more accessible. Flocks apparently minimized foraging time by selecting fields on an abundance-availability scale. The authors state that the phenomenon of field-feeding may be a learned response of waterfowl to decreasing availability of higher-quality natural foods due to destruction of wetland habitats.—Richard A. Lent.

45. Water birds in the Italian part of Switzerland and neighboring areas, mid-January, 1984 (31st census). (Les oiseaux d'eau en Suisse romande et secteurs limitrophes, mi-janvier 1984 (31e recensement).) P. Geroudet. 1984. Nos Oiseaux 37:371–374. (French.)—In general, the 31st census of water birds in the Italian part of Switzerland (14–15 Jan. 1984) was of limited value because weather conditions were so poor (high winds, rain mixed with snow, visibility often near zero). Nonetheless, Geroudet provides a table that summarizes the census data. Here he lists the species and numbers of water birds seen at lakes Léman, Neuchâtel, Bienne, Morat, and in what he calls "diverse areas."

Point counts during calm weather and observations made prior to the census indicate that the number of diving ducks, at least on lakes Léman and Neuchâtel, had declined since 1983. There are 3 possible reasons for this: a worldwide decline in populations of diving ducks, changes in their wintering distribution, and a food shortage. Diving birds overwintered farther north than usual in 1983–1984 apparently because of the relatively mild winter weather. For example they were unusually numerous on Lake Constance. However, the most likely reason for the small populations of overwintering diving ducks was a dramatic decline in striped mussels (*Dreissena polymorpha*) upon which they feed. No direct measurements of mussel abundance were made, but indirect evidence suggests that this source of food was small. For example, flocks of European Pochards (*Aythya ferina*) and Tufted Ducks (*A. fuligula*) west of Lake Léman shrank perceptibly in size after mid-December. These ducks, as well as coots, did not congregate at banks where striped mussels occur, as they have in the past. In addition, Tufted Ducks were unusually abundant in reserves along the Rhône River between Geneva and Verbois; and the normally enormous gatherings of Pochards and Tufted Ducks on Lake Neuchâtel were virtually absent above Fanel in 1983–1984.

Other aspects of the census could not be compared with the results of previous censuses because of the unusually poor character of the data in 1984.—Michael D. Kern.

46. Birds in modern human ecology. (Ptitsy v ekologii sovre mennogo cheloveka.) V. D. Il'ichev. 1985. Priroda (Mosc) 1985:30–43. (Russian.)—This profusely illustrated article by one of the Soviet Union's most prominent ornithologists summarizes several areas of human-bird relations that have acquired particular urgency in the industrialized world or whose significance has just begun to be appreciated. These areas present ornithology with new challenges.

1. Urbanization is responsible for the destruction of habitat, and for altering local population distribution. It also has created habitat for some species, for instance gulls and starlings, that thrive in cities to the extent that they can become a nuisance and a health hazard.

2. Birds and human technology conflict when birds strike aircraft, collide with radio masts and skyscrapers, decapitate or electrocute themselves on overhead cables, or cause power outages.

3. Wild birds can have a great impact on agriculture—some species consuming quantities of insect pests, others consuming quantities of crops.

4. Commercial poultry enterprises may supply all the ecological requirements needed by domestic fowl, but they are not designed to meet ethological requirements. For instance, chicks raised mechanically develop more slowly in the shell, hatch less synchronously, feed less well, and grow more slowly than those brooded and raised by a hen. Yet duplicating natural conditions on a commercial scale would be prohibitively expensive and complicated.

5. Bird migration introduces a seasonal factor into problems like crop damage and aircraft strikes. Migrating birds are now known to be disease vectors. Local development can destroy a traditional wintering area (or sometimes create a new one), change migration routes and times, or create sedentary populations. Those migratory species that are hunted bring indirect benefit to people by providing communion with nature (as do cage birds—to the extent that they are still natural).

6. The need for conservation of rare and vanishing species is known and supported to such an extent that a majority of the attendees at the XVIII Ornithological Congress, responding to a questionnaire, listed it as the most important aspect of ornithology today.

Some ways in which Soviet ornithologists are tackling these areas of conflict-cum-benefit between man and birds include installing devices that discourage birds from perching on electric power lines or orchard trees with brightly flashing lights and recordings of distress calls. Such devices, plus planting mulberries nearby, has reduced bird depredations in some Uzbekistan vineyards 90–97%. A complex of recordings that mimic the natural acoustic background for chickens has been developed for poultry farms: the recordings herd chicks, encourage them to feed, and so on, "educating" them as a hen would.

One area overlooked by Il'ichev is the role of birds as ecological indicators, as birds of prey inadvertently became pollutant monitors.—Elizabeth C. Anderson.

47. The Levant Sparrowhawk (*Yastreb-tiuvik*). V. P. Belik. 1984. Priroda (Mosc) 1985:54–56. (Russian.)—The Levant Sparrowhawk (*Accipiter brevipes*), listed in the new, second edition of the USSR's Red Data Book, actually is a fairly common species within its nesting range in the southwestern USSR. The northern border of its range coincides with the northern limit of forest-steppe; the Levant Sparrowhawk is found here in broadleaf riverbottom forest along steppe rivers.

It may have come to be considered rare and vanishing by confusion with the [?Common] Sparrowhawk, *Accipiter nisus,* from which it can be separated in the field only with great care (although in the USSR their ranges hardly overlap). The most obvious distinguishing feature are the Levant adult's dark eyes, short toes (hence the specific name *brevipes*), adapted to catching insects, its most common prey, and the cry uttered incessantly by hungry nestlings to stimulate their father's hunting: "tiuvy-tiuvy-tiuvy-tiuvy!" (hence the Russian name *tiuvik*).

The Levant Sparrowhawk is fairly tame and tolerates human activity near its nest, so there is no concern for its immediate future, but because its range in the USSR is small and subject to intensive development, its listing in the USSR's Red Data Book is still justified and prudent. (By the way, the second edition of the USSR's Red Data Book, just published or about to be published, lists 80 species, of which 22 are classed as in danger of extinction. Ross's Gull *Rhodostethia rosea,* the Caucasian Blackcock *Tetrao mlokosiewiczi,* the Barnacle Goose *Branta leucopsis,* and Bewick's Swan *Cygnus columbianus bewickii* have been moved from the "rare and vanishing" category to "out of danger"—evidence that conservation efforts on their behalf have succeeded.)—Elizabeth C. Anderson.

48. The status of the Raven in southern Scotland and Northumbria. R. Mearns. 1983. Scott. Birds 12:211–218.—The population of Ravens (*Corvus corax*) in southern Scotland has declined in recent years, apparently a result of changes in sheep farming which have reduced the available carrion on which the Ravens feed. Intensive land management has also reduced the need for pasture, resulting in reforestation of many areas formerly occupied by Ravens. In such forests carrion is not accessible. Thus improved agricultural management has reduced the food supply and restricted the number of suitable territories. The existence of winter flocks and good production of young suggest that

neither pollutants nor direct human interference are responsible for the declining population.—Edward H. Burtt, Jr.

49. The status of the Chough in Scotland. J. W. Warnes. 1983. Scott. Birds 12: 238–246.—Choughs (*Pyrrhocorax pyrrhocorax*) feed largely on soil invertebrates that are abundant in permanent and unimproved pastures. The gradual decline of the Chough in Scotland during the 18th and 19th centuries appears to be the result of improved cultivation of pastures, land reclamation that incluced boulder removal, and the indoor wintering of cattle. Colder winters and human persecution may have exacerbated the effect of agricultural improvements. On Islay, agricultural practices have changed little in the last two centuries, the human population has decreased, and the number of Choughs has remained stable. From Islay, Choughs may be colonizing nearby islands. The population history of the Chough serves once again to emphasize how slight changes in habitat may have prolonged and widespread effects on avian populations (see review **48**).—Edward H. Burtt, Jr.

50. The IV National Crane Convention. (IV vsesoiuznoe soveshchanie po zhuravlyam.) E. M. Smirenskaya. 1985. Zool. Zh. 64:317–319. (Russian.)—Fifty ornithologists and about 10,000 Common Cranes (*Grus grus*) gathered 24–27 September 1984 at the Matsalu Nature Preserve on the Estonian shore of the Baltic for the IV National Crane Convention. The Common Crane was emphasized at this meeting which coincided with the largest fall concentration of Common Cranes in Europe. Papers at the conference touched on the following topics.

The history of the USSR's Crane Working Group (CWG) was outlined for the audience, along with a summary of its achievements and on-going projects. The CWG has produced 3 informational bulletins and 3 compendia of papers presented at previous national conventions. Such compendia are published only in the USSR and USA, but are much more useful and valuable than monographs that reach only a small, regional audience.

Several papers presented results of studies of Common Cranes in the European USSR, including radar studies of migration, anatomical studies of heavy metal traces in inner organs of cranes, and the Soviet-Finnish project "Grus" which coordinates research on the Common Crane between these nations.

The articles devoted to rare species summarized the current status of *Grus leucogeranus* (if reports of some 800 cranes in China are correct, the Soviets need to find another nesting ground for about 500, since they know of only 2, accommodating 300 birds); reported on progress at the rare crane breeding center at the Oka Nature Preserve (46 birds of 9 species; use of *Grus canadensis* instead of machinery to incubate *Grus japonensis* eggs has produced the first normally developed chicks); and appealed for student help at the Oka center—a mutually beneficial project providing the center with "serious and interested helpers" and the students with practical experience and research material. Another article reported on research and conservation of rare cranes in the Soviet Far East.

One of the sessions was devoted to discussions of methodology (trapping, banding, marking conventions, and censusing). The conference participants took part in morning and evening censuses of the cranes at the preserve.

Looking forward, the conferees resolved to continue expanding and improving research, especially multidisciplinary research on habitat, and to improve and agree on a uniform marking scheme. They called for increasing the quality of papers submitted for publication and applauded efforts to bring publications on cranes to the widest audience possible. A "who's who" in Soviet crane research was [or perhaps is in the process of being] drawn up, by species, region, and interest.

The V National Crane Convention will take place in August or September, 1986, in the Khingan Nature Preserve in the Soviet Far East.—Elizabeth C. Anderson.

PHYSIOLOGY

51. Electrical responses of homing pigeon and guinea pig Purkinje cells to pineal indoleamines applied by microelectrophoresis. P. Semm and L. Vollrath. 1984. J. Comp. Physiol. A. Sens. Neural Behav. Physiol. 154:674–681.—Melatonin, 5-methoxytryptophol

(ML), 5-hydroxytryptophol (HL), and noradrenaline (NA) were applied microelectrophoretically to Purkinje cells and other (unidentified) cells in the cerebellum of pigeons and guinea pigs. During the day Purkinje cells of the pigeon most commonly responded to melatonin and ML with excitation, to HL and NA with inhibition. Night time responses were reversed to the indoleamines, but not to noradrenaline. Pinealectomized pigeons responded more commonly to melatonin and ML with excitation, and to HL with excitation and inhibition equally often. There was no difference between birds tested during the day and those tested at night. Similarly, the guinea pig did not show any day/night difference, although its responses to melantonin and ML were mostly inhibitory. The authors postulated that the differences between intact vs. pinealectomized pigeons, and between pigeons vs. guinea pigs, are due to the role of the pineal gland in circadian rhythms of activity in birds but not mammals, where the suprachiasmatic nucleus functions as the biological clock. Results of this study suggest that pineal indoleamines may function as neural modulators in the cerebellum of birds and mammals.—Robert C. Beason.

52. Neural basis of the magnetic compass: interactions of visual, magnetic, and vestibular inputs in the pigeon's brain. P. Semm, D. Nohr, C. Demaine, and W. Wiltschko. 1984. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 155:283–288.—Semm et al. (Wallraff and Papi, eds., Avian Navigation, Springer, Berlin, pp. 329–337, 1982) have reported previously on the response of pigeon pineal cells to changes in magnetic field information. This paper reports on neural responses of additional areas of the pigeon's brain including the basal optic root nucleus (nBOR), and nuclei associated with the vestibular system. About 70% of the cells in the nBOR which responded to moving light stimuli also responded to gradual changes in the strength of the vertical or horizontal component of the magnetic field. Most of the responding cells showed an increase in the rate of firing (60%), with only 10% showing inhibition. Most (?%) of the responding cells showed a sensitivity to changes in the magnetic information only during part of the range. No information is provided regarding the number of cells sensitive to changes only in the vertical or horizontal directions, and those responding to changes in both components. At least some units appear to have responded to changes in the horizontal magnetic field, counter to the predictions based on the dip compass of Wiltschko and Wiltschko (Science 1976:62–64, 1972). None of the cells in the vestibular system which responded to tilting responded to changes in the magnetic field while the pigeon was horizontal. When the pigeon was tilted 10° to 45°, 40% of the tested cells showed a response to a gradual change in the magnetic field. Most of these responses were excitatory. In 4 instances magnetically responsive cells were retested following pinealectomy. These cells showed the same response following surgery as before, indicating that the magnetically sensitive cells of the pineal were not the source of the nervous response to the magnetic field. When the contralateral eye was removed, there was no response from the cells of the vestibular nuclei to changes in the magnetic field, but the vestibular nucleus which was on the opposite side of the intact eye continued to show a response to changes in the magnetic field. When recordings were made in total darkness, cells in both the vestibular system and the nBOR failed to show any response to magnetic changes. The authors conclude that the photoreceptors of the eye must be intact and stimulated by light for the tested cells of the nBOR and the vestibular system to respond to magnetic information. The vestibular system must be activated by tilting just prior to changing the magnetic field to obtain a response from the vestibular system. They hypothesize that magnetic detection may occur in the eye using rhodopsin as proposed by Leask (Nature 267:144–145, 1977). Because it receives input from changes in position and the magnetic field, the authors suggest that the vestibular nuclei are the location of the dip compass for orientation. Unfortunately, there are no behavioral data to indicate that the visual and vestibular systems are involved in the magnetic compass sytem any more than the pineal or magnetite, consequently, such conclusions and the title seem premature.—Robert C. Beason.

53. Electrical responses to direct and indirect photic stimulation of the pineal gland in the pigeon. P. Semm and C. Demaine. 1983. J. Neural Trans. 58:281–289.—The spontaneous electrical activity of pineal cells was modified by direct light stimulation in both sighted and blinded pigeons. In sighted pigeons most of the cells (42 of 68 tested)

responded with excitation, whereas in blinded birds inhibition was the most common response (30 of 42 responding, 68 cells tested). The response usually was sustained while the light stimulus was present. Cells that responded to the stimulus showed an immediate response in sighted pigeons, but a gradual change in firing rate in blinded birds. While the paper presents clear evidence for a response to direct photic stimulation by the pineal, no results are given (or discussed) for indirect response of pineal cells to illumination of the lateral eye, although the title and methods indicate such tests were conducted.—Robert C. Beason.

54. Sexual differences in temperature regulation and energetics in the Capercaillie *Tetrao urogallus*. H. Rintamaki, L. Karplund, H. Linden, and R. Hissa. 1984. Ornis Fenn. 61:69–74.—Temperature regulation of captive-reared male and female Capercaillies (n = 7 for both) was examined in winter and summer in northern Finland. Sex-dependent differences were found in several parameters including mean body temperature which was .5°C lower in males than females throughout the year. Mass-specific heat production (watts per kg) was higher in females at all ambient temperatures studied. In both seasons the body mass of the females was 55% lower than that of males, which may be causing some of the intersexual differences in thermoregulation. The authors suggest that some undetermined factor(s) are needed to explain the observed degree of difference.—Lise A. Hanners.

MORPHOLOGY AND ANATOMY

(see also 17, 71)

55. Sexual size dimorphism and age-related size variation in Bald Eagles. G. R. Bortolotti. 1984. J. Wildl. Manage. 48:72–81.—Using measurements of 10 morphological variables from 135 museum specimens of Bald Eagles (*Haliaeetus leucocephalus alascanus*), the author applied principal components and discriminant function analyses to the problem of sexing eagles in the field. For each of 4 plumage classes (young immature, old immature, subadult, adult), the major source of variation in the original variables was overall body size and associated changes in morphometric measurements (corresponding to the first principal component axis, which accounted for 57–77% of the original variation). A discriminant function derived from measurements of bill depth and length of hallux claw correctly classified 98% of the specimens. Data from 4 captive birds were used to validate the model; all were correctly classified. Bortolotti discusses plumage succession in eagles and previous problems with sexing of museum specimens. His classificatory equation will be useful to field workers because both morphological variables are easily measured.—Richard A. Lent.

56. Notes on the growth of Gossander, *Mergus merganser*, chicks. (Notes sur la croissance du poussin de Harle bièvre, *Mergus merganser.*) P. Cordonnier. 1984. Nos Oiseaux 37:365–369. (French.)—The author examined daily changes in the size and plumage of 3 female Gossander (*Mergus merganser*) chicks from hatching to adulthood, in order to establish criteria for aging Gossander chicks and to compare their growth rates with those of Mallards (*Anas platyrhynchos*) and European Pochards (*Aythya ferina*), although the author does not say if his comparisons were with females of the other two species.

Compared with Mallards (10 weeks) and pochards (13 weeks), Gossanders grew to adult weight slowly—over a period of 18 weeks. Growth of the bill was also slow: 120 days were required for the bill to reach adult size of 51 mm, whereas Mallards and pochards needed only 50 and 80 days, respectively. In contrast, the Gossanders' tarsi grew very rapidly: adult size (50 mm) was achieved in 63 days and exceeded the tarsus length of the other species (Mallards: 51 mm at 40 days of age; pochards: 41 mm at 70 days of age). At hatching, iris color was gray; after day 19 it had changed to blue; and after day 50 it was yellow.

The author gives the dates when the major feather tracts erupted for all 3 species. All but the rectrices and scapular feathers appeared later in Gossanders than in the other species. Rectrices were fully developed at 29 days, tertiary coverts on day 46. The white speculum on the wing was visible at 53 days. The natal down was mostly gone at 58 days.

The plumage was completely developed at 91 days (as compared to 63 days for Mallards). The female's crest measured 4 cm at 106 days. As in other Anatidae, tertiary wing feathers appeared first (day 29), followed by secondaries (day 40), and finally primaries (day 50). The remiges were fully developed at 80 days, although the birds did not begin to fly until they were 91 days of age.

Daily changes in the body weight, and in the length of the tarsus and beak for the 3 species are nicely presented in figures. There is also a figure showing silhouettes of Gossander chicks in profile at selected ages with the profile of the adult. At 4 days of age, the chicks were proportionally (compared to adults) smaller than Mallards. Thereafter, the growth rates of the two species were similar.—Michael D. Kern.

57. Morphometric variation in introduced populations of the Common Myna (*Acridotheres tristis*): an application of the jackknife to principal component analysis. A. R. Gibson, A. J. Baker, and A. Moeed. 1984. Syst. Zool. 33:408–421.—Fourteen skeletal measurements were taken from specimens from 11 introduced populations of Common Mynas from Australia, New Zealand, Fiji, and Hawaii. Sample sizes from each locality varied between 20 and 50. Principal component analyses (PCA) were performed on the data in order to investigate patterns of within locality variation and geographic variation among localities. Such studies have been performed previously on a variety of species of birds, including other introduced species. Unfortunately, the reliability of the results of such studies are in doubt because techniques such as PCA, which depend on variance partitioning, may be unstable due to outliers in the data as a result of abnormally developed and deformed individuals or simply due to measurement error.

Gibson and his colleagues investigated this important issue using a technique devised to explore the robustness of statistical estimators, the jackknife. This involved iteratively removing each specimen from the analysis and recomputing the PCA scores. If the analysis were robust, then the orientation of the principal components and their character loadings should not be greatly affected by removal of single specimens. The authors termed their results "sobering." Only the first principal component was sufficiently stable in terms of orientation and amount of variation explained to be suitable for biological interpretation, even given the relatively large sample sizes. The first component did seem related to size, but further components seemed arbitrary.

PCA is now being widely used by systematists, ecologists, and behaviorists; this paper is critical of such work, but does offer a solution to the problem of how to avoid excessive interpretation of one's data.—George F. Barrowclough.

PLUMAGES AND MOLT

(see 37, 56)

ZOOGEOGRAPHY AND DISTRIBUTION

(see also 2, 35, 41, 45, 68, 79, 80, 81)

58. Several new findings among the avifauna of Senegal as well as the Madeleine Islands. (Quelques données nouvelles sur l'avifaune du Sénégal ainsi que sur celle des Iles de la Madeleine.) A. R. Dupuy. 1984. Alauda 52:177–183. (French.)—What follows are notes on the avifauna of Senegal (see review **59**) and the Madeleine Islands gathered by Dupuy in the last 8 years, according to the text, although some of his comments date to 1971. He presents notes on 8 species of rare birds, either sighted or found dead: Merlins (*Falco columbarius,* first reported in November 1982); Lapwings (*Vanellus vanellus*); Gadwalls (*Anas strepera*); Greater Shearwaters (*Puffinus gravis*); Leach's Storm Petrels (*Oceanodroma l. leucorhoa*); Great Crested Grebes (*Podiceps cristatus*); Brown Boobies (*Sula leucogaster*); and Common Shelduck (*Tadorna tadorna*).

Newly discovered nesting species in Senegal include White-backed Night-Herons (*Gorsachius leuconotus,* 2 nests found so far), African Tiger Bitterns (*Tigriornis leucolophus*), Gray Herons (*Ardea cinerea*; overwintering individuals number in the thousands; and small numbers have nested in Senegal since 1977), Kentish Plovers (*Charadrius alexandrinus,* at Casamance, since 1979), Black-winged Stilts (*Himantopus himantopus,* a clutch discovered

in 1977, but none since), Roseate Terns (*Sterna dougallii,* a nest was found at Kalissaye in 1980; this is the first report of a nest of this species in West Africa), Little Terns (*S. albifrons*), and Southern Black-backed Gulls (*Larus dominicanus*).

Breeding species with expanding populations include Red-billed Tropic Birds (*Phaëthon aethereus mesonauta*; 30 pairs now nest on Madeleine Island year-round), Common Cormorants (*Phalacrocorax carbo lucidus*; 5 breeding areas as of January, 1982; 300 pairs total; a new site discovered in 1983), Black-crowned Night-Herons (*Nycticorax nycticorax*; several hundred pairs now nest in Senegal; a small colony was recently discovered at Kalissaye en Casamance), Common Terns (*S. hirundo,* along the coast), Gull-billed Terns (*Gelochelidon nilotica*), Bridled Terns (*S. anaethetus*), Slender-billed Gulls (*L. genei,* about 5000 pairs now), and House Sparrows (*Passer domesticus,* rapidly colonizing the entire region).

Lesser Flamingos (*Phoeniconaias minor*) have been seen regularly during the last few years in numbers between 20 and about 1000. However, there is no evidence that they are nesting and their presence is probably due to the exceedingly dry conditions throughout East Africa. About 30 pairs of Purple Herons (*A. purpurea*) have nested regularly at Djoudj since 1975. Thousands overwinter at Senegal. Cattle Egrets (*Bubulcus ibis*) are a common breeding species, but at the National Park at the Delta of Saloum, they nest in May and June, whereas at Djoudj they nest in August and September, as reported elsewhere.—Michael D. Kern.

59. The specific identity of certain gulls that nest at Senegal. (Sur l'identité spécifique de certains laridés nicheurs au Sénégal.) C. Erard, J. J. Guillou, and N. Mayaud. 1984. Alauda 52:184–188. (French, English summary.)—The authors discovered a pair of Kelp Gulls (*Larus dominicanus*) nesting on the Island of Birds, Senegal. This confirms the suggestion that breeding Kelp Gulls are established in Africa. At Senegal, however, they nest in May and June, whereas in South Africa they do so in November. The authors caution observers to pay close attention to black-backed gulls along the Atlantic coast of Africa in the future and not to assume that all of them are Lesser Black-backed Gulls (*L. f. fuscus*). They suggest further that Kelp Gulls reach West Africa by accompanying other gulls during the prenuptial migration. This idea is supported by their discovery of 3 Kelp Gulls at Lake Retba, 150 km north of Sine-Saloum, early in May 1983.

On the Island of Birds, the authors also discovered a mixed pair of gulls, incubating eggs, consisting of a Grey-headed (*L. cirrocephalus*) and a Franklin's (*L. pipixcan*) gull. This is the first report of the latter in Africa.

On the Island of Diamania, they saw what appeared to be a Laughing Gull (*L. atricilla*). If their identification is correct, the gull's size indicates that it belonged to the nominal race. They concede, however, that this bird could have been a first-year Franklin's Gull.

In summary, Kelp Gulls, apparently from South Africa, now nest on the Islands of Sine-Saloum, Senegal. The possible presence of 2 American species (Franklin's and Laughing gulls) there is exceptional and such birds are likely strays.—Michael D. Kern.

60. Cyclones and pelagic seabird movements. S. Blomqvist and M. Peterz. 1984. Mar. Ecol. Prog. Ser. 20:85–92.—Seabirds rely on moderate, but predictable winds and good weather for prolonged foraging flights, thus they should avoid severe low pressure centers as the centers move from west to east across the northern hemisphere. Because winds circulate clockwise around advancing low pressure centers, birds should also fly clockwise around the edges of the storm. Non-resident seabirds, observed from Kullen in southwestern Sweden, follow the expected flight path. Flying east and south of an advancing storm they encounter the Swedish coast of the Kattegat, turn south and west as the storm passes, and fly north along the Danish coast as the storm moves out over the Baltic Sea. Data presented here represent the best documentation of local seabird movements that depend on dynamic soaring and the influence of the clockwise wind shift associated with passing storms.—Edward H. Burtt, Jr.

61. Extension of the known range of some seabirds on the coast of southern Chile. G. S. Clark. A. J. Goodwin, and A. P. von Meyer. 1984. Notornis 31:320–324.—The beautiful and rugged coast of southern Chile has long been of interest to ornithologists, but its forbidding nature and general inaccessibility have precluded much serious study.

Some of its ornithological mysteries have been revealed by preliminary results of the Totorore Expedition, which cruised the area from May 1983–May 1984. Among the most exciting finds are colonies of Rockhopper penguins (*Eudyptes crestatus*) to 49°S, a mixed colony of 25,000 Macaroni (*E. chrysolophus*) and Rockhopper penguins on Isla Noir (54°S), along with colonies of Southern Giant Petrel (*Macronectes giganteus*) and Narrow-billed Prion (*Pachyptila belcheri*), Blue Petrels (*Halobaena caerulea*) nesting on Cape Horn, and breeding colonies of Sooty Shearwaters (*Puffinus griseus*) on Isla Guafo (200,000 birds) and Isla Guamblin (ca. 44°S).—J. R. Jehl, Jr.

62. First evidence that the Common Redpoll, *Carduelis flammea*, nests in Franche-Comte. Present status of the species in the Jural Massif. (Première preuve de reproduction de Sizerin flammé, *Carduelis flammea*, en Franche-Comté. Statut actuel de l'espèce dans le massif du Jura.) M. Duquet. 1984. Nos Oiseaux 37:331–340. (French, English summary.)—In 1877, Common Redpolls were only migrants that passed through Doubs (France). In 1966 a single one overwintered there. By 1979, redpolls were observed both in Doubs and the Jural Mountains during the nesting season. This report describes the first nests that have been found in the high valley of Doubs. They were found in 1983 at the natural reserve at Lake Remoray, in Franche-Comte, 18 km upstream of Pontarlier, at 1850 m elevation.

Three pairs of redpolls were found in a peat bog on the southwestern side of Lake Remoray in a stand of trees dominated by birches (*Betula pubescens*). The first nest was found on 20 June; it contained four 4–5-day-old chicks. A second nest was discovered later on 11 July, 50 m from the first; it contained a clutch of 4 eggs (presumably a second clutch) that was being incubated by a female. A third, old nest was found nearby. All 3 nests were in birches at the edges of the stand, 6–9.5 m above ground. Their locations (one at the end of a branch, the others against the main trunk of the tree) and heights differ from data reported elsewhere, but redpolls are highly variable in these regards and the author interprets such variation as adaptive and characteristic of a species that is in the process of expanding its range. As reported in other studies, redpolls used material from an old nest to construct a new one at Remoray.

The breeding density of redpolls (at Remoray, 4.3 pairs/10 ha) and the vegetation of their nesting habitat vary considerably in areas of Europe in which they have been studied (Lapland, Great Britain, Switzerland, Denmark, and elsewhere in France): breeding density varies from 0.2 to 7.9 pairs/10 ha; the vegetation at the nest site may be birch woods, as at Remoray, or stands of larch, pine, alders, or spruce.

Duquet traces the expansion of redpolls in the Jural Massif from 1972 to 1983. On a map of the area, he shows 12 nesting localities around Lake Léman on the French-Swiss frontier (see review **80**), together with their elevations (830–1718 m), and cites published reports about each. Alpine populations (subspecies *cabaret*) began to expand in 1968–1970: they were first reported nesting in the Valley of Joux (1005 m) in 1972; became increasingly numerous in the Jural Massif in 1978; and simultaneously invaded the Valaise Plain of the Rhône (1977). Their expansion in the Jural Mountains occurred in 2 phases: they first colonized the summits at elevations of 1600–1700 m, and them moved into peat bogs and wooded marshes at elevations below 1000 m. These bogs and marshes, as elsewhere, are "relay habitats" that they have used as stepping stones to invade lower elevations. They are always near open water. The author predicts that the entire Jural Massif will eventually be colonized by redpolls because it contains many habitats like those in which the birds are nesting at Doubs.—Michael D. Kern.

63. Nesting of the Sardinian Warbler, *Sylvia melanocephala*, in the Valley of Aoste. (Nidification de la Fauvette mélanocéphale, *Sylvia melanocephala*, en Vallée d'Aoste.) M. Bocca. 1984. Nos Oiseaux 37:357–363. (French, English summary.)—A pair of Sardinian Warblers (*Sylvia melanocephala*) was discovered nesting in the middle valley of Aoste between Sarre and St. Pierre (45°N latitude), northwestern Italy, in June–July 1984.

The male was apparently establishing a territory (.4 ha) and advertising in mid-June (sang in flight and from perches). The female was first seen in late June and was probably on the nest shortly thereafter (both birds were secretive and gave alarm cries on 26 June, and 1 and 5 July). The nest with 4 chicks was discovered on 17 July. Both adults fed the

chicks at the nest (every 3–22 min). The chicks fledged on 19–20 July. Bocca assumes that incubation and nestling period collectively are 23–26 d in duration and that egg-laying occurred between 24 and 27 June (normal dates for a second clutch).

The nest (shown in a photograph) was made of herbaceous stems, horse hair, and spider webs, and had an outer diameter of 8.5 cm, an inner diameter of 5.5 cm, and a cavity depth of 4.0 cm. It was 85 cm above ground in a juniper on a brushy terraced slope (shown in photographs) that is part of an abandoned vineyard rewooded by pines and oaks and covered with steppe vegetation, very dry (precipitation less than 600 mm annually). This nesting area is 930 m in elevation, considerably higher than the maximum elevations (700–800 m) previously reported for Sardinian Warblers in France and Italy.

Sardinian Warblers have not been seen in the valley of Aoste previously. The nearest known nesting pairs are in the valley of Suse near Turin, 75 km south of St. Pierre. This is the first observation of the species in the Alps and represents the northernmost limit of its distribution. In northern Italy, only small populations of Sardinian Warblers occur in disjunct, subalpine areas west of Turin. These areas are xeric vegetative islands that resemble the warbler's Mediterranean habitats. One cannot say with certainty that the species recently colonized the valley of Aoste, however, because so little published information is available for this area and because the birds are secretive in nature and could easily go unnoticed. Brushy xeric areas large enough to harbor nests of Sardinian Warblers are extremely rare in the valley of Aoste.—Michael D. Kern.

64. Winter wader populations on the open shores of northern Scotland. R. W. Summers and N. E. Buxton. 1983. Scott. Birds 12:206–211.—Purple Sandpipers (*Calidris maritima*) were the most abundant overwintering species along 132 km of rocky and 23 km of sandy shore surveyed during January–March 1982. However, populations of Oystercatchers (*Haematopus ostralegus*) and Curlews (*Numenius arquata*) were almost as large and may have been underestimated as birds commuted between the open shores and nearby coastal fields.—Edward H. Burtt, Jr.

65. Divers in the Moray Firth, Scotland. J. Barrett and C. F. Barrett. 1985. Scott. Birds 13:149–154.—Up to 1500 Red-throated Divers (*Gavia stellata*) overwinter in the Moray Firth which also contains important oil reserves that are now being exploited. From September to December the divers are molting with 73% in body molt in October, the month of peak numbers on the Moray Firth. Molting birds are particularly susceptible to oiling, thus a spill in the Moray Firth could have a serious impact on the population breeding in Scotland.—Edward H. Burtt, Jr.

SYSTEMATICS AND PALEONTOLOGY

(see also 57, 72)

66. Biochemical systematics of the Australian cockatoos (Psittaciformes: Cacatuinae). M. Adams, P. R. Baverstock, D. A. Saunders, R. Schodde, and G. T. Smith. 1984. Aust. J. Zool. 32:363–377.—Electrophoresis was used to investigate species limits and phylogenetic relationships within the Australian cockatoos. Several other genera of Australian parrots were included as outgroups. Specific isozyme staining was used to reveal genetic variation at 28 loci. Genetic distances among the species were small, as has been reported previously for many avian taxa (see review **72**). Samples from some putative subspecies were found to be genetically more similar to other species than to conspecific populations; thus the authors were forced to conclude that electrophoresis may have limited usefulness in delimiting closely related species.

A distance Wagner method was used to infer a phylogenetic tree for the taxa, using a matrix of Nei's genetic distances. This was incorrectly called a cladistic method; however, because it is based on a general distance measure, it could more accurately be described as a phenetic approach that is not dependent on the assumption of a constant rate of molecular evolution. The results of the analysis are of interest. They suggest that white and black cockatoos form two separate, major branches of an evolutionary tree, and that the Cockatiel (*Nymphicus hollandicus*) is an early offshoot that diverged near that major division.

Several levels of outgroups were included in the study; thus, it would have been possible to perform a true cladistic analysis of these data. This could have been done by designating alleles present in both the cockatoos and outgroups as primitive, and using only the alternative, derived ones for inferring a tree.—George F. Barrowclough.

67. Faunal turnover and development of fossil avifaunas in South America. F. Vuilleumier. 1984. Evolution 38:1384–1396.—Vuilleumier analyzed and synthesized data from the literature on fossil South American birds. Thirteen percent of the families, 26% of the genera, and 34% of the species found in the fossil avifaunas are now extinct. The author computed estimates of long-term extinction and speciation rates for that continent. The fossil history of South America was not sufficiently known, however, to allow analysis of the faunal dynamics associated with the North America/South America interchange that occurred after the Central American land bridge arose. Unfortunately, Vuilleumier was not able to evaluate the allocation and taxonomy of the fossil material itself. Original fossil identifications are not always reliable and a critical reassessment might alter some of the statistics.—George F. Barrowclough.

68. The relationships of the extinct Chatham Island eagle. S. L. Olson. 1984. Notornis 31:273–277.—A sea eagle originally described as *Ichthyophaga australis* is reassigned to *Haliaeetus* and seems most closely related to Steller's Sea Eagle. The extinct eagle represents one of a small number of species from the New Zealand region that was derived by colonization from Northern Hemisphere ancestors. Olson speculates that *Haliaeetus* was once more widespread on the Pacific islands and, perhaps, was exterminated by man.—J. R. Jehl, Jr.

69. Systematic relationships among waterfowl (Anatidae) inferred from restriction endonuclease analysis of mitochondrial DNA. L. G. Kessler and J. C. Avise. 1984. Syst. Zool. 33:370–380.—The authors used the mtDNA restriction enzyme technique described elsewhere (see review **72**) to investigate the phylogenetic relationships of 9 species of *Anas* and 4 species of *Aythya* ducks. In this case the data were not reduced to an overall distance matrix; rather the presence or absence of particular restriction fragments were used as characters for direct cladistic analysis using a standard (Wagner) computer algorithm. The results were in general agreement with previous opinion concerning the relationships of these birds. For example, the Canvasback (*Aythya valisineria*) and Redhead (*A. americana*) were found to be sister species, as were the Mallard (*Anas platyrhynchos*) and Mottled Ducks (*A. fulvigula*). The results of this study suggest that the technique may be useful for inferring phylogenies at relatively low taxonomic levels (within genera and families), but, as with most current systematic techniques, the question of the robustness of such estimates of relationship has not been well investigated.—George F. Barrowclough.

EVOLUTION AND GENETICS

(see also 18, 23, 83)

70. Inheritance patterns of enzymes and serum proteins of Mallard-Black Duck hybrids. R. P. Morgan, D. W. Meritt, S. B. Block, M.A. Cole, S. T. Sulkin, F. B. Lee, and C. J. Henny. 1984. Biochem. Syst. Ecol. 12:119–123.—Increased hybridization between Black Ducks (*Anas rubripes*) and Mallards (*Anas platyrhynchos*) has occurred along the Atlantic Flyway during the last 10 years. This increase is attributed to the eastward and southward expansion of the Mallard's range and Mallard introductions by various organizations. Black Duck populations appear to be declining and there is concern that early pair-bonding by Mallards with Black Ducks may be swamping the gene pool of the Black Duck. Analysis of hybrids along the Atlantic Flyway through the techniques of enzyme and serum electrophoresis was undertaken to determine an index of introgression between the species. A breeding program was establishd at Jamestown, N. D. and data were collected and analyzed from known hybrids. Nineteen enzyme systems were scored for 27 loci. Three systems were not consistent and were deleted from the data analysis: (1) glyceraldehyde-3-phosphate dehydrogenase, (2) xanthine dehydrogenase, and (3) alkaline phosphatase. Interspecies differences were reported for EST-1 and EST-2 (serum and liver),

PGM-1, LAP-1, and G6PDH-1 with distinct alleles at each locus. Hybrids were easily distinguished since patterns were additive between parents. Progeny for the cross of the F_1 generation with either parent produced a variety of patterns, some additive, some parental. Hence, these enzymes appear useful at the F_1 level but not beyond. Serum proteins behaved similarly. Crosses of the F_1 back to the parent could not be reliably identified. The sex of the parent appeared to play a role in the degree of detection of the hybrid when serum esterases were studied. There is a brief synopsis of the electrophoresis techniques used.—R. W. Colburn.

71. Insensitivity of brain growth to selection of four-week body mass in Japanese Quail. R. E. Ricklefs and H. L. Marks. 1984. Evolution 38:1180–1185.—The authors selected a line of quail (*Coturnix c. japonica*) for high body mass for 47 generations. During this period of time the average mass of the selected line was increased to more than twice that of the control line; however, brain size remained constant during the experiment. Thus, the relative brain size in the selected line was about half that of the controls. The authors compared these results to the observed pattern of brain-body size allometry in galliforms (slope = .5) and among breeds of domestic fowl (slope = .2), and concluded that short-term, intensive artificial selection may not be a good model for investigating long-term evolutionary diversification.

While not discussed in this paper, a companion paper by Atchley and his colleagues (Evolution 38:1165–1179, 1984) suggests that there are two components to size increase in rodents (and presumably in other vertebrates): cell multiplication early in ontogeny, and cell enlargement later. Brain size, unlike body size, is not sensitive to the cell enlargement phase of growth. Thus, if there is more genetic variation for cell enlargement than cell division, selection experiments such as this one on quail will result in the observed pattern of a lack of correlation. If, however, long-term evolution is more dependent on changes that occur earlier in development than cell enlargement, then a positive correlation is to be expected. Thus, the magnitude of correlations of size, shape, and allometry among different characters may depend on the period during development that is affected by selection.—George F. Barrowclough.

72. A comparative description of mitochondrial DNA differentiation in selected avian and other vertebrate genera. L. G. Kessler and J. C. Avise. 1985. Mol. Biol. Evol. 2:109–125.—Mitochondrial DNA (mtDNA) was extracted from several species from each of the genera *Anas, Aythya, Zonotrichia,* and *Dendroica.* In addition, samples of mtDNA were taken from some fish and tree frogs. Restriction enzyme digestion and electrophoresis of the resulting DNA fragments were used to analyze base pair differences among species.

Restriction enzymes recognize and cleave DNA only at sites where specific sequences of base pairs occur. For example, a particular enzyme might recognize and cleave DNA only at the base pair sequence AAGCTT (Adenine, Cytosine, Guanine, and Thymine are the 4 bases involved in the DNA code). If such a sequence occurs in several homologous places in the DNAs of 2 or more species, then those species will share fragments of identical molecular weight, and hence of identical electrophoretic mobility. Thus, this technique can be used to assess the similarity of DNAs of different species. MtDNA is most frequently used because it is a much smaller molecule than is nuclear DNA, and so the number of fragments on the gel is not overwhelming. The technique has proven quite useful for systematic purposes at lower taxonomic levels (within species and genera) in mammals and *Drosophila*; these authors have begun an investigation of its utility in birds.

For all 4 avian taxa, the statistics summarizing mtDNA distances suggest that, within genera, these species are more similar to each other than are congeneric species of fish, frogs, and rodents. These results are of special interest because, for the last decade, ornithologists working with protein electrophoresis have been reporting genetic distances for birds that were small in comparison with those reported for other organisms (see review **66**). It now appears that the same result is true of the mtDNA of birds. Consequently, mtDNA represents a new set of characters that confirm either a relatively recent origin of avian taxa vis-à-vis other vertebrates, or a slowdown of avian molecular evolution that extends to both nuclear and mitochondrial DNAs. Because there is no clear mechanism for the latter, the former appears more likely at the present time.—George F. Barrowclough.

73. Ecological character displacement in Darwin's Finches. D. Schulter, T. D. Price, and P. R. Grant. 1985. Science 227:1056–1059.—Theory predicts that competitive interactions between coexisting species might enhance morphological differences. Thus competing species should be more "different" morphologically when sympatric than when allopatric. This assumes that there are no other factors, such as food supply, influencing morphological differences between locations. Since this assumption is frequently false, ecological character displacement has been extremely difficult to demonstrate. One of the more familiar examples of apparent character displacement is found in the Darwin's Finches. Two species, *Geospiza fortis* and *G. fuliginosa* are sympatric on most Galápagos islands where they are very different in beak and body size. Yet their beak sizes are intermediate where they occur alone on two separate islands.

The authors reexamine this example of character displacement by using two approaches: (1) a comparison of morphology of the species in sympatry and allopatry while controlling for differences arising from variation in food supply, and (2) observations of selection pressures on one species in allopatry to demonstrate how the differential survival of phenotypes is affected by the use of foods used on other islands by the other species. It is this second approach which illustrates the connection between feeding and selection pressures associated with morphology and thus can serve as a powerful method for assessing character displacement. Their results support the original interpretation of character displacement in the Darwin's Finches. This appears to be the strongest documentation of ecological character displacement in birds.—J. M. Wunderle, Jr.

FOOD AND FEEDING

(see also 10, 21, 32, 44, 45, 81)

74. An analysis of the diet of Cattle Egrets in the Ebro Delta, Spain. X. Ruiz. 1985. Ardea 73:49–60.—For this study 118 stomachs of the Cattle Egret (*Bubulcus ibis*) were examined throughout a yearly cycle. Prey use in different parts of the year were estimated by means of Simpson's index of dominance. Inter-individual differences in food choice were estimated by comparing different values of dietary diversity to detect existence of an aggregation of certain prey. In autumn and winter, vertebrates, mainly frogs, predominated in the diet. In spring and summer, arthropods were the main food with Orthoptera in spring and Coleoptera in summer. While frogs were the main autumn food, rodents or a group of arthropods were an alternative prey; in winter, frogs were supplemented with fish and arthropods. In spring or summer, arthropods were complemented with vertebrates including fish, reptiles, and rodents. The change of food from one with a large biomass (vertebrates) to one with a small biomass (arthropods) was correlated with changes in prey dynamics within the rice fields where the egrets captured their food.—Clayton M. White.

75. Long-distance transport of prey from the intertidal zone to high-tide roosts by the Oystercatcher. M. F. Leopold, E. C. L. Marteijn, and C. Sevennes. 1985. Ardea 73:76–82.—Both adult and immature Oystercatchers (*Haematopus ostralegus*) transport single prey items (mostly mussels and cockles) in their beaks from the intertidal foraging area to high-tide roost sites at all seasons of the year. The frequency of this behavior was examined in relation to 5 factors: temperature, wind force and direction, potential feeding time, and speed of incoming tides that drive Oystercatchers from the feeding grounds. Low ambient temperatures with little or no winds and a short low tide period were the main factors causing transport of food. Using equations for energy costs, the authors concluded that energy content of the prey is about 10 times higher than transport cost, but the profit of transporting one prey item is no more than 1–3% of the total intake of the intertidal feeding period. It was estimated that at one roost the yearly transport was 350,000 prey items or about 1.3 tons of shells.—Clayton M. White.

76. Diet of the Dunlin *Calidris alpina* in the Severn Estuary. D. H. Worrall. 1984. Bird Study 31:203–212.—Pellets, droppings, and gizzard contents were studied to determine the diets of Dunlins wintering in the Severn Estuary, South Wales. Three prey species dominated the Dunlin's diet: *Nereis diversicolor, Macoma balthica,* and *Hydrobia ulvae.*

In terms of dry weight, *N. diversicolor* was the most important prey item, but by volume, *H. ulvae* was consumed more than the other two species in mid-winter. Most *H. ulvae* consumed ranged between 2–3 mm in shell height, whereas the *M. balthica* consumed ranged between 4–6 mm. Dunlins were not selecting the most common size classes of shell available to them, rather they apparently were taking the largest individuals available that they could handle. As larger worms became available to them in spring, the size of worms taken by Dunlins increased.—Stephen R. Patton.

77. Habitat utilisation and the prey taken by Kestrels in arable fenland. R. A. Pettifor. 1984. Bird Study 31:213–216.—Kestrels (*Falco tinnunculus*) preferentially foraged over grassy areas that comprised 12.6% to 16.9% of the total habitat within their territories. Small mammal remains, primarily short-tailed voles (*Microtus agrestis*) occurred in 97% of 935 pellets examined. Similarly, most observed predatory strikes by Kestrels were directed at small mammals (71%) compared with 27% directed at insects and 2% directed at birds. Most strikes at mammals occurred in grassy habitats, whereas most strikes at insects occurred over arable land. Small mammal and invertebrate remains in Kestrel pellets were negatively correlated with each other. The increases of invertebrates in the Kestrels' diets occurred during spring and fall, apparently corresponding to times of increased insect activity. Prey availability at the study site was not sampled.—Stephen R. Patton.

78. Effects of environmental parameters on the foraging behavior of three species of wintering dabbling ducks (Anatini). G. R. Hepp. Can. J. Zool. 63:289–294.—Hepp observed foraging speed (m/min) and rate of dipping (dips/min) in three species of dabbling ducks—Gadwall (*Anas strepera*), Pintail (*Anas acuta*), and Green-winged Teal (*Anas crecca carolinensis*)—during fall and winter at Bodie Island, North Carolina. Both foraging variables tended to increase from fall to winter in spite of there being no change in biomass of food available. Hence, the net effect would be a reduction of foraging time and an increase in resting time from fall to winter. Stepwise multiple regression indicated that day length was the most important environmental factor influencing these differences, although temperature, windspeed, and density of ducks also had significant effects in some cases. Still, only 15–47% of the variance in foraging behavior was explained by any combination of environmental variables. Clearly, other factors are also critical, and Hepp suggests that the species composition of the food available may be the most important of these. His data show only that the relative abundances of different prey categories changed greatly with season. Given even this minor bit of information, however, it is clear that additional work is desirable to examine the interaction between prey species composition and foraging behavior of these ducks. The existence of different optimal foraging techniques for different prey species might "explain" as much of the variance in foraging technique as the environmental variables that were studied here.—A. John Gatz, Jr.

MISCELLANEOUS

79. An index to Georgia bird records in American Birds (Volumes 25–37, 1971–1983) and its predecessor, Audubon Field Notes (Volumes 1–24, 1947–1970). R. W. Loftin. 1984. Occasional Publ. 9, Georgia Ornithol. Soc., 28 p. $4.00. (Available from Carolina H. Lane, 869 Clifton Rd., N. E. Atlanta, GA 30307.)—For those interested in the birds of Georgia this index provides time-saving access to all records of Georgia birds available in American Birds. It is organized taxonomically and includes family references (e.g. warblers) as well as species and occasional subspecies references. My checks suggest that the index is both accurate and complete.—Edward H. Burtt, Jr.

BOOKS AND MONOGRAPHS

80. Nesting birds of the high Valley of the Orbe. (Oiseaux nicheurs de la haute Vallée de l'Orbe.) D. Glayre and D. Magnenat. 1984. Nos Oiseaux. Nyon, Switzerland. 143 p. 25 Fr. s. (French.)—This is a field guide (and much more) to birds that nest in the Valley of the Orbe, on the French-Swiss frontier just north of Lake Léman and to the northwest of Lausanne. The valley is one of the highest in the Jural Mountains and is the largest closed basin in Switzerland. Two hundred of its 232 km² are in Switzerland; the

remainder in the Departments of Jura and Doubs, France. The valley floor features four lakes, of which lakes Joux and Rousses are the largest, and a single watercourse, the Orbe River. The slopes that extend upward from all sides of the valley's floor (1000–1100 m elevation) to the overlooking summits (1500–1700 m) are wooded with spruce, beech, and fir trees, or covered by pastures and wet meadows. Peat bogs run along the valley floor.

Oiseaux nicheurs de la Haute Vallée de l'Orbe is the result of a 3-yr study (1980–1982) of the valley's avifauna. It represents more than 2800 h of observations spread over 332 days. The authors divided the valley into 268, 1 km^2 (=100 ha) sectors which they surveyed repeatedly. They devote most of the book to the 95 nesting species in the valley, for each of which they present short species accounts (abundance, nesting habitat, dates of arrival, etc.). There is, however, no standardized format or content in these accounts. Distribution maps accompany 88 of them showing the sectors in which each species nests. (None is included for protected species and species so rarely seen that distribution maps would be of little value.)

Sixteen species nest in at least 75% of the sectors in the valley; 29 others in more than 50% of them; 36 in at least 33% of them; and 33 in less than 10% of them. Two hundred of the valley's 268 sectors support 25–53 nesting species. Sectors on the valley floor and those checkered with forest and pastures at higher elevations have particularly high species richness (40 or more nesting species). Red Kites (*Milvus milvus*), Peregrine Falcons (*Falco peregrinus*), Tufted Ducks (*Aythya fuligula*), Long-tailed Tits (*Aegithalos caudatus*), and Lapwings (*Vanellus vanellus*) are rare and may not nest every year.

Some of the more interesting tidbits that can be gleaned from the species accounts and the text are the following: A single pair of Peregrines nested successfully in the valley in each of the 3 years of the study. Capercaillies (*Tetrao urogallus*) are still well represented in the forests and are apparently adjusting well to the presence of humans. Wood Pigeons (*Columba palumbus*) and Carrion Crows (*Corvus corone*) are numerous, but their relatives, Stock Doves (*C. oenas*) and Ravens (*C. corax*), are not. Of the 7 species of tits that nest in the valley, Willow (*Parus montanus*), Crested (*P. cristatus*), and Coal (*P. ater*) tits are especially widespread. Redpolls (*Carduelis flammea*), which began to expand their range in Europe in 1960, were first found nesting in the Orbe Valley in 1972 and are colonizing the area in ever-increasing numbers. The authors' distribution maps show that this species nested in 18 sectors of the valley in 1980, 26 sectors in 1981, and 44 sectors in 1982. Redpolls, Siskins (*C. spinus*), and Red Crossbills (*Loxia curvirostra*) were unusually numerous in the valley during 1982, probably because of the high mast production in 1981. The most widespread and abundant breeding bird in the valley is the Chaffinch (*Fringilla coelebs*) which nests in every sector.

The authors witnessed significant annual fluctuations in the numbers of at least 36 nesting species between 1980 and 1982. Most marked were variations in the number of Water Rails (*Rallus aquaticus*), Skylarks (*Alauda arvensis*), House Martins (*Delichon urbica*), Grey Wagtails (*Motacilla cinerea*), Redstarts (*Phoenicurus phoenicurus*), Whinchats (*Saxicola rubetra*), Grasshopper Warblers (*Locustella naevia*), Green Finches (*C. chloris*), Goldfinches (*C. carduelis*), Redpolls, and Reed Buntings (*Emberiza schoeniclus*). Some variations (e.g., Great Crested Grebes (*Podiceps cristatus*), Mute Swans (*Cygnus olor*), and Common Coots (*Fulica atra*) did not nest in 1980) were due to fluctuations in the water levels of the lakes or in mast production (see above), but others (e.g., the unusual abundance of Bullfinches (*Pyrrhula pyrrhula*) in 1981) could not be readily explained.

The authors also give brief accounts of 8 additional species that probably nest in the Valley of Orbe, 11 that probably will do so in the future, 12 that nested in the valley previously or are thought to have done so, and 37 migrant species observed there incidentally between 1978 and 1983. Also included is information about weather in the valley, dates when the lakes are frozen over, effects of human activity on the valley's avifauna, and 3 censuses of selected parts of the valley. The text concludes with a bibliography of published papers dealing with birds in and around the valley, and a species index.

The book contains numerous sketches, photographs, and colored plates, along with maps showing the geography and topography of the valley and the total number of nesting

species in each of its 268 sectors. There are, however, no keys to the birds; so one must be able to identify them from the outset in order to make best use of the book.

Oiseaux nicheurs de la Haute Vallée de l'Orbe is a soft-covered, sturdily bound field guide printed on paper of good quality. More than just a guide to the birds in a remote European valley, it is a sound foundation upon which future studies of the area's avifauna can be constructed.—Michael D. Kern.

81. Guide to owl watching in North America. D. S. Heintzelman. 1984. New Century Publ., Winchester Press, Piscataway, NJ. xiii + 193 p. $8.95.—In the Preface, Heintzelman proclaims this "the first full-scale owl-watching field guide ever published." It contains life history accounts of the 19 North American owl species and sections on methods of watching owls, field equipment, pellets and food habits, migrations and invasions, adaptations for nocturnal predation, owl conservation, and an annotated list of owl-watching locations. Nomenclature follows the 6th edition of the A.O.U. Check-list, except that hyphens are omitted from barn-owl, screech-owl, hawk-owl, and pygmy-owl. The book apparently is written for the amateur birder, but contains information that might be used by professional biologists who are unfamiliar with owls. This would be a mistake, for there are many errors and undocumented statements that severely compromise the value of this book as a reference source. A list of some of the errors, undocumented statements, and omissions follows.

Common Barn-Owls (*Tyto alba*) are said to have no juvenal plumage (Heintzelman misuses "juvenal" and "juvenile" throughout the species accounts and photo captions). Reported among the food habits are such far-fetched items as "fruits, berries, and other plant material" for Eastern Screech-Owls (*Otus asio*); "fruits and seeds" for Burrowing Owls (*Athene cunicularia*); and "garbage and offal" for Spotted Owls (*Strix occidentalis*). The Elf Owl (*Micrathene whitneyi*) is credited with a 14-day incubation period, despite Ligon's (Misc. Publ. Mus. Zool. Univ. Mich. No. 136, 1968) careful documentation of a 24 d incubation period for this species. A 21 d incubation period is given for the Long-eared Owl (*Asio otus*) and Short-eared Owl (*A. flammeus*), instead of the correct period of 28 days. Heintzelman states that Common Barn-Owls do not construct nests (*contra* Martin, Bird-Banding 44:59–60, 1973) and that Flammulated Owls (*Otus flammeolus*) do not use nest boxes (*contra* Cannings and Cannings, Murrelet 63:66–68, 1982; Bloom, West. Birds 14:49–52, 1983). He also perpetuates the myth that owls are color-blind, and incorrectly implies that owls erect their ear tufts only when they perceive danger. Without documentation, we are told that 2 color morphs exist for Common Barn-Owls, both species of pygmy-owls (*Glaucidium gnoma* and *G. brasilianum*), Elf Owls, and Short-eared Owls. Likewise, there is no documentation for the statement that Snowy Owls (*Nyctea scandiaca*) occasionaly nest in old eagle nests in trees. No mention is made of the westward range extension of Barred Owls (*Strix varia*) nor of the breeding populations of Boreal Owls (*Aegolius funereus*) in Minnesota, Washington, Montana, Idaho, Wyoming, and Colorado. Heintzelman also neglects to mention the communal roosting habits of Long-eared Owls and Short-eared Owls.

An absurd feature is the "Owl Pellet Guide," which lists the size (e.g., tiny, very small, small, medium, fairly large) and characteristics (e.g., loosely formed, rarely formed, compact, smooth, dry, gray) of each species' pellets in an attempt to allow identification of a pellet without seeing the owl species that produced it. This is pure folly.

Seventy-five pages are devoted to a state-by-state list of owl-watching sites. As one would expect, these places allow public access (e.g., state parks, wildlife refuges, cemeteries), and in many cases this attribute seems to be more important than the ecological features that might explain why such places would harbor owls. Certainly this section could have been trimmed considerably and the space saved devoted to a detailed treatment of the habitat affinities of each species.

Heintzelman admirably cautions birders to avoid disturbing nesting owls, and he writes with a genuine concern for the conservation of all owl species. Given this concern, one wonders why he prepared the book with such blatant disregard for fact. I cannot recommend that anyone purchase this book.—Jeffery S. Marks.

82. Bird banding. E. McClure. 1984. The Boxwood Press, Pacific Grove, CA. 330 p. $15.00.—This book is purported to be the "how to" reference for bird banders. Unfortunately, its scope is aimed towards banding birds throughout the world so that the amount of practical information for North American banders is rather limited. For example, nearly 60 pages are required to describe the "banding idiosyncracies" of each bird family in the world. Since the author has limited experience with most of these families, these discussions are mostly limited to very general statements concerning breeding ecology and behavior with little specific information. Nearly half of the text is devoted to detailed descriptions of traps, snares, and nets, discussing virtually every method imaginable (and several that are illegal in this country) to capture birds. Descriptions of albatross snares and walk-in traps for Currawongs (*Strepera* spp.) may be interesting, but of little practical value for the typical bander.

When the author finally gets around to discussing equipment used by most North American banders, the text adequately addresses most of the essential information. His chapter on mist nets thoroughly discusses how to use them properly and the problems associated with their use. His discussion of banding techniques and equipment tends to emphasize his own personal preferences rather than the entire spectrum of options available to a bander. For example, he states there are two methods for removing birds from mist nets but then only describes the one he prefers. The descriptions of banding kits, holding cages, and related equipment are generally more appropriate for permanent banding stations processing large numbers of birds rather than the equipment required by the typical solitary bander. The chapter on record keeping is rather weak, describing the age codes at great length, but hardly mentioning proper measurement of the various anatomical features of a bird, the recording of molt patterns, and the reasons for collecting these data.

The absence of any discussion on bird identification was a serious omission. At a minimum, the author should have provided a list of the standard identification references available to banders. His chapter on banding nestling birds was woefully inadequate, hardly more than a page of text stating that there are many problems associated with banding young in the nest, but not describing these problems in detail.

While the book contains some useful information, it will probably prove to be more valuable for the experienced bander who can more accurately assess the applicability of this information to his or her particular banding operation. Beginners should still learn banding techniques under the guidance of experienced banders rather than try to glean the essential information from this book.—Bruce G. Peterjohn.

83. International registry of poultry genetic stocks. R. G. Somes. 1984. Storrs Agricultural Experiment Station Publ., Storrs, CN. iv + 96 p. $3.00.—As first published in 1972 the registry covered genetic strains of chickens (*Gallus domesticus*) found in the United States. This fifth edition includes not only 235 strains of chicken, but also lists 60 strains of Japanese Quail (*C. coturnix*) and 15 strains of turkey (*Meleagris gallopavo*). The new registry also covers twenty countries in addition to the United States.

The fifth edition is divided into 7 sections: (1) descriptions and locations of chicken, quail, and turkey strain; (2) inheritance, linkage, characterization, literature reference, and locations of chicken, quail, and turkey mutant traits; (3) a listing of genetic traits and gene symbols; (4) chromosome linkage maps; (5) description and location of breeds and varieties; (6) phenotypic description and genotyic groups of chicken plumage color patterns; (7) breeder-supplier index cross-reference to earlier lists of strains, breeds, and varieties. This is a valuable resource book.—Edward H. Burtt, Jr.