RECENT LITERATURE

Edited by Bertram G. Murray, Jr.

BANDING AND LONGEVITY

1. Longevity records. W. Rydzewski. 1973. *Ring*, **74**(1): 7-10.—Rydzewski presents another of his useful compilations of maximum longevity records obtained for wild birds and states that a regular column in *The Ring* is to be devoted to this topic. The present compilation includes maximum elapsed times between banding and recovery for birds banded under the ringing schemes of Australia and New Zealand through the 1971 ringing reports and through vol. 10, 1972, of the "Recovery Round-up" column of *The Australian Bird Bander*.—Roger B. Clapp.

MIGRATION, ORIENTATION, AND HOMING

2. Radar observations of migration and night flight of Swifts. (Radarbeobachtungen über Zug und Nachtflüge des Mauerseglers (*Apus apus*).) B. Bruderer and E. Weitnauer. 1972. *Rev. Suisse de Zool.*, **79**(4): 1189-1200. (In German, English summary.)—Automatic radar-tracking of swifts day and night brought further confirmation of evidence that they may pass the night one to three km high in the air even in bad weather. Wingbeat frequencies were six to eight Hz in periods of one to six seconds, with interspersed rests of 0.5 to five seconds. Average air speeds were 23 km/h for nonmigrants and 40 km/h while migrating.—Leon Kelso.

POPULATION DYNAMICS

(See also 8)

3. Evolution of the predator isocline. M. Rosenzweig. 1973. *Evolution*, **27**(1): 84-94.—Success or dominance among species ever invites much speculation. "Analysis of differential equations likely to be dynamical models of exploitation reveals that as a predator population improves its exploitative proficiency it endangers both its victims and its own existence. However, because of the counterevolution of the victim, the system may not become extinct. In fact, a steady-state proficiency exists because both the selective death rate due to exploitation and the beneficial mutation rate change as proficiency does. If the system is stable at this proficiency, it should persist indefinitely." Hence it is of interest to refer to *Bird-Banding* (**43:** 58, rev. no. 5, 1972) where on the relevant subject of "irruptions" it is suggested that present prevalence of a species may not guarantee a secure future, with further ideas on this phenomenon.—Leon Kelso.

4. Survival rates for visited and unvisited nests of Bicolored Antbirds. E. O. Willis. 1973. *Auk*, **90**: 263-267.—Unvisited nests were monitered by observing the activity pattern of color-banded, adult antbirds at columns of army ants upon which they regularly fed. Visited nests were looked at infrequently, never more than once a day. Both nest groups had the same overall mortality, but mortality occurred earlier in the nesting cycle of the visited nests. The author suggests that visits to the nest accelerate destruction of easily discovered nests with little or no effect on the final percentage of surviving nests. The very slight disturbance at visited nests is unfortunate because many nesting studies require more than infrequent, visual checks of the nest contents.—Edward H. Burtt, Jr.

NESTING AND REPRODUCTION

(See also 4, 15)

5. Barn Swallows use freshwater and marine algae in nest construction. K. Duffin. 1973. *Wilson Bull.*, **85**: 237-238—Barn Swallows (*Hirundo* *rustica*) nesting on Great Gull Island at the eastern end of Long Island Sound use freshwater algae (*Schizomeris*), club mosses (*Lycopodium*), and marine algae instead of mud in constructing their nests.—Edward H. Burtt, Jr.

6. **Incubation behavior and incubation patches of males in five species of genus *Sylvia*.** (Povedenie nasizhivaniya i nasednye pyatna samtsov u pyat vidov ptits roda *Sylvia*.) V. Efremov and V. Paevskii. 1973. *Z. zhurn.*, **52**(5): 721-827. (In Russian, English summary.)—At the newly-named station, "Fringillid," on the Courish Spit of the Baltic Sea, the behavior of five species of *Sylvia* at the nest was studied, using 24-hour instrumental recordings. The males of the Barred Warbler (*S. nisoria*), Garden Warbler (*S. borin*), Blackcap (*S. atricapilla*), Whitethroat (*S. communis*), and Lesser Whitethroat (*S. curruca*) shared with the female the incubation and brooding of young by day only. Except for *S. communis*, all males of this group of species developed an incubation patch covering most of the breast and abdomen. Its absence in the former species is unexplained. It is suggested that maintenance of humidity over the eggs and young is a part of its function. The argument is that maintenance of humidity is as important if not more so than temperature for embryonic development. After laying, egg water loss by evaporation begins, at a higher ratio per weight from smaller than from larger eggs. Some observers of incubation rhythms and air temperature have noted a marked contradiction: the brooding is closer and more persistent at both the highest and lowest points of temperature fluctuation during the daily and seasonal cycles. This apparent paradox is logical if brooding and the patch serve to maintain humidity at all times.

Miscellaneous additional notes included the following. With only females on the nest at night in all five species, their total time varied from five to 8.5 hours (no species differences). More information is needed on the mechanism of hormonal control of the brood patch in passerines. Its absence in ratite birds may indicate evolutionary recency. Effective incubation temperature for passerines locally was determined as about 34 °C, whereas bird body temperature varies from 38 to 43.5 °C. The generally known interruption of incubation during the cooler early days of egg-laying might give the benefit of periodic egg-warming but also reduction of water evaporation. It is suggested that alternate sharing of incubation by the parents, more prevalent among nonpasserines, shortens the total time required. Males' duties at the nest included egg-turning, 90 times per day for *S. atricapilla* and 162 for *S. curruca*.—Leon Kelso.

7. **Breeding biology and nestling food of the Common Jay.** (Beitrage zur Kenntnis der Brutbiologie und Brutnahrung der Eichelhaher, *Garrulus glandarius* L.) G. Korodi, 1972. *Trav. Mus. Hist. Nat. "Gregoire Antipa"*, **12**: 355-383. (In German, with Rumanian, Russian, and French summaries.)—Of 41 nests observed in the spring 1971, 29% were in pear orchards, at an average height of 4 m. Of 109 eggs in 19 nests, 102 hatched, averaging 5 young per nest. Of all nests, 53% were destroyed by "biotic factors." Analysis of 300 food samples taken from 75 ringed young found only insects and other invertebrates. Daily food of young was estimated as 43 g, or 41% of body weight. Of this 5 g, of 25%, were assimilated; the remainder, 38 g, or 74.8%, were excreted.—Leon Kelso.

8. **The breeding biology of the Great Blue Heron on Tobacco Island, Nova Scotia.** K. McAloney. 1973. *Can. Field-Nat.*, **87**(2): 137-140.—Egg-laying (from observation and calculated from hatching dates) in *Ardea herodias* occurred from 20 April through 4 June 1971 with peak initiation of laying (19 of 40 nests) between 2 and 8 May. Clutch-size ranged from 3 to 6 eggs ($n = 35$, $\bar{x} = 4.17$) and incubation period ranged from 25 to 30 days ($n = 11$, $\bar{x} = 27.1$). Hatching success of 155 eggs was reported as 75% (it actually calculates as 76.1%). This figure is derived by considering a 5% (actually calculates as 4.5%) loss to predators and windstorms as a hatching failure. The author then compares this figure with that in Pratt's study (*Condor*, **72**(4): 407-416, 1970) wherein 84% hatched. The two figures are not comparable, however, as Pratt's definition of hatching success included only those eggs that could have hatched. Rounded to the nearest percentage point the correct percentage for hatching success in this study, when used in such a comparison, is 80%. Mean fledging success (here considering birds that lived to 45 days as having fledged) was 2.57 young for 42 active nests, 2.84 per nesting pair, and 3.09 per successful nest. Some data are also given

on nestling mortality, renesting, and nestling growth and development.—Roger B. Clapp.

9. Extreme overlap between first and second nesting in the Rose-breasted Grosbeak. S. I. Rothstein. 1973. *Wilson Bull.*, **85:** 242-243.—The first egg of the second clutch was laid when the nestlings of the first brood were two to six days old. Both nests were tended by both adults. Rothstein suggests that such overlap may explain why this species sings on the nest: "when stages of the nesting cycle normally accompanied by singing occur during the second nesting the demands of the first nest may also require the singing bird to incubate or brood."—Edward H. Burtt, Jr.

10. Daily and annual time budget of the Yellow-billed Magpie. N. A. M. Verbeek. 1972. *Auk,* **89:** 567-582.—Verner (*Condor,* **67:** 125-139, 1965) hypothesized that those individuals whose optimum time budget is best adapted to local environmental conditions are favored in natural selection. Verbeek tested this hypothesis by observing the annual and daily time budget of the Yellow-billed Magpie (*Pica nuttalli*) at the Hastings Reservation, Monterey County, California.

The magpie reproduces when higher daytime temperatures reduce metabolic requirements and when food is most abundant. Nonetheless reproduction demands more time to satisfy the energy requirements of the adults, of the young, and to obtain the additional energy needed to find food for the young. If food were less abundant, or energy requirements higher, reproduction could not occur because of lack of time in the day.—Edward H. Burtt, Jr.

BEHAVIOR

(See also 6, 10, 39, 44, 45, 46, 47, 48)

11. The problem of play in animals. (K probleme igry u zhivotnykh.) K. Fabri. 1973. *Byull. mosk. obshch. isp. prirody, otdel. biil.*, **78**(3): 137-146. (In Russian, English summary.)—The psychology of play, particularly with respect to its function in mammals, has long occupied a variety of researchers, much of whose work is summarized here. A main thought is that play in young particularly may give rise to new behaviors, although consisting of pre-play "motor elements, i.e., modes of contacting and fixing objects." The relation of play to orientative and exploratory activity and adult play needs more study. The energy expended on avian aerial display would seem to exceed strict energy economy.—Leon Kelso.

12. Absence of "individual distance" in the Tree Swallow during adverse weather. T. C. Grubb, Jr. 1973. *Auk,* **90:** 432-433.—Tree Swallows (*Iridoprocne bicolor*), normally a "distance" species, were observed huddled together during a period of low temperature, high wind, and a scarcity of prey. Presumably this is an adaptation that reduces heat loss.—Edward H. Burtt, Jr.

13. Tool-making and tool-using in the Northern Blue Jay. T. Jones and A. Kamil. 1973. *Science,* **180**(4090): 1076-1078.—According to a formal summary, laboratory-raised *Cyanocitta cristata* tear pieces of pages of newspaper and utilize them as tools to rake in food pellets that were otherwise out of reach. The frequency of this behavior was dependent upon the motivated state of the jay and the presence of food pellets. Additional concerns suggested are the need of coverage of food storage and nest decoration, and even of "anting" in a general consideration of the matter. If the keen analysis here is appropriate, then much greater vistas lie open. What for example does pebble storage in woodpeckers and corvids signify? There is a fair bibliography but more recent penetrative notes are not included.—Leon Kelso.

14. Comparative ethology of the Ciconiidae. Part 6. The Black-necked, Saddlebill, and Jabiru Storks (genera *Xenorhynchus, Ephippiorhynchus,* and *Jabiru*). M. P. Kahl. *Condor,* **75**(1): 17-27.—On the basis of comparative ethology and morphological characters the author recommends combining *Xenorhynchus asiaticus* and *Ephippiorhynchus senegalensis* into the genus *Ephippiorhynchus* and retaining *Jabiru mycteria* in a monotypic genus. The author includes these three species and the polytypic genus *Leptoptilos* in the tribe Leptotilini.—M. Ralph Browning.

15. Some aspects of the ontogeny of cliff nesting behaviour in the Kittiwake (*Rissa tridactyla*) and the Herring Gull (*Larus argentatus*). H. M. C. McLannahan. 1973. *Behaviour,* **32:** 36-86.—This paper is an excellent exploration of Cullen's (*Ibis,* **99:** 275-302, 1957) observation that Kittiwake chicks face the rock wall and do not run when disturbed. McLannahan found that although Kittiwake chicks show a strong tendency to avoid an abyss on the first day posthatch, this tendency becomes even stronger as the chicks mature up until the time of their first flight. At all ages the Kittiwakes showed a greater tendency to avoid the abyss than Herring Gull chicks reared on cliffs and on level ground.

The small sample sizes, although unavoidable, are regrettable. One wonders if the numerous experiments did not have a cumulative effect on the few gull chicks used in all experiments. Although the author does attend somewhat to the behavior of the adults, this is a weak point. The possibility that the adults are important in preventing the chicks from moving is not adequately explored in this study nor in similar and earlier studies by Emlen (*Behav.,* **22:** 1-15, 1963) and Smith (*Ibis,* **108:** 68-83, 1966).—Edward H. Burtt, Jr.

16. Black-headed Caiques (*Pionites melanocephala*). G. Smith. 1971. *Avic. Mag.,* **77**(6): 202-218.—A detailed general account of this small South American parrot's distribution and its habits as observed in captivity affords some notes relative to plumage care and anting. They "foliage bathe," that is, rub themselves on rain-soaked branches. They have a unique habit of chewing off a piece of bark from a twig and rubbing themselves on the moist, exposed, wood surface. It is not certain whether the moist area stimulates the Caique to rain-bathe or whether they peel off the bark that they may "sap-bathe." They rub themselves on dry twigs also. One of the author's correspondents, who keeps this species, notes the apparent ecstasy of the act and suggests that sap-bathing is a form of anting.—Leon Kelso.

17. The behavior and ecology of Hermit Hummingbirds in the Kanaku Mountains, Guyana. B. K. Snow. 1973. *Wilson Bull.,* **85:** 163-177.—The Pale-tailed Barbthroat (*Threnetes leucurus*), Long-tailed Hermit. (*Phaethornis superciliosus*), and the Reddish Hermit (*P. ruber*) exhibit their most brightly or contrastingly colored region (e.g., the colorful gape displayed by *Phaethornis* species) during courtship and agonistic displays. The singing behavior of these species is described qualitatively. A discussion of flower preference by three nectar-feeding hummingbirds, *Glaucis hirsuta, P. superciliosus,* and *P. ruber,* is based on sufficient and interesting data. Other ecological aspects, particularly timing of the breeding season and nest site selection, are poorly substantiated. The descriptions of behavior patterns are lacking. Both the behavioral and ecological data are poorly quantified and sample sizes are often too small for conclusions to be drawn.—Edward H. Burtt, Jr.

ECOLOGY

(**See also 3, 4, 17**)

18. Birds under the midnight sun. (Vögel unter der Mitternachtssonne.) B. Eichorn. 1973. *Kosmos,* **69**(3): 109-112. (In German.)—At Kevo National Park, Finnish Lapland and north Norway, breeding density of birds is highest in the region. The short summers and capricious climate oblige birds to begin nesting immediately at snow-thaw. Populations of open woods, tundra, swamps, and coast of Varanger Fiord are described, the latter being perhaps the sole locale in Europe where the King (*Somateria spectabilis*) and Steller's (*S. stelleri*) eiders occur regularly in summer.—Leon Kelso.

WILDLIFE MANAGEMENT AND ECONOMIC ORNITHOLOGY

19. Grazing and predation on Blue Grouse. F. C. Zwickel. 1972. *Murrelet,* **53**(3): 52-53.—Predation on *Dendragapus obscurus* was found to be more frequent on ungrazed areas than on grazed areas in Washington. Differences are attributed to a larger population of raptors in the ungrazed area.—M. Ralph Browning.

CONSERVATION AND ENVIRONMENTAL QUALITY

20. Effect of artefact pollution on the viability of seabird colonies on Long Island, New York. M. Gochfield. 1973. *Environ. Pollut.*, **4**(1): 1-6.—Seven of 21 adult Common Terns (*Sterna hirundo*) found dead in 1971 in two colonies at Jones Beach had died due to encounters with kite strings, and two per cent of the young died as a result of encounters with miscellaneous artifacts, particularly kite strings and nylon fishing line. Young Black Skimmers (*Rynchops nigra*) were more adversely affected with 2.4% having been trapped by artifacts.—Roger B. Clapp.

21. The heat production of oiled Mallards and Scaup. E. McEwan and A. Koelink. 1973. *Can. J. Zool.*, **51**(1): 469-479.—A ratio for the thermal conductance of the plumage of normal and oiled *Anas platyrhynchos* and *Aythya marila* was determined from "regression analyses" that compared metabolic rate and ambient temperature. The heat loss of heavily oiled Mallards and Scaup was 1.7 and two times greater than their normal values, respectively. Oiling, artificially here, not only tended to increase the basal heat production but also shifted the lower critical temperature from 12° to 25°C. Attempts to rehabilitate the Scaup after oiling and cleaning were rarely successful because of plumage deterioration and loss of water repellency. Despite laborious procedures using polycomplex A-11, residues remained on the feather barbules and resulted in loss of water repellence. "Further testing of detergents is needed to solve some of the problems of cleaning the plumage of birds which spend a lot of time on the surface of the sea." True, but awareness of research elsewhere is beneficial, for example that being done at University of Newcastle-upon-Tyne, England.—Leon Kelso.

22. DDE thins Screech Owl eggshells. M. McLane and L. Hall. 1972. *Bull. Env. Contam. Toxicol.*, **8**(2): 65-68.—Fourteen pairs of *Otus asio* fed untreated food in 1970 and 1971 laid eggs of consistent thickness annually. When fed DDE dosed food in 1971, they laid eggs with shells 13% thinner than those untreated both in 1970 and 1971. The dosage was "2.8 ppm of DDE." The eggshell thinning found in the owl was less than that found in similar studies of Black Duck (*Anas rubripes*), 17.6%, and more than in those of American Kestrel (*Falco sparverius*), 10.0%.—Leon Kelso.

23. Pesticide residues in eggs of wild birds: adjustment for loss of moisture and lipid. L. Stickel, S. Wiemeyer, and L. Blus. 1973. *Bull. Env. Contam. Toxicol.*, **9**(4): 193-196.—Eggs taken in the wild for testing for pesticides or other pollutants vary from fresh to nearly dry at time of collection so that the concentration of chemicals varies. In eggs of the Osprey (*Pandion haliaetus*) for example, the variation is as much as eight times (or 800% presumably). Valid analysis, they declare, requires adjustment for such discrepancies. But here they raise the problem of the validity of their formula proposed for compensating by calculating volume of the eggs. A plan is suggested, which would extend into the future the collection of basic data (egg weights, measurements, and chemical analyses) for each bird species, based on eggs collected at or before egg-laying—Leon Kelso.

PARASITES AND DISEASES

24. The feather mite genus *Freyanella* Dubinin (Analgoidea:Pterolichidae). W. Atyeo, J. Gaud, and W. Humphreys. 1972. *Acarologia*, **13**(2): 382-409.—Dwelling well concealed between the barbs of primaries of a variety of wading birds, members of this genus of mites show a remarkable asymmetry. Many readers may recollect folklorish fables of mammals circling the sides of hills so persistently that they developed shorter limbs on the uphill than on the downhill side. In *Freyanella* the appendages on the opposite sides of the males have markedly different proportions. This asymmetry affects sometimes the right, sometimes the left, side of different individuals, the legs on the "overdeveloped" side serving, it is believed, to wedge the mite more tightly between the feather barbs, more securely against dislodgement. Using very advanced "phase and scanning electron microscopy" this illustrated study corrects former observations and elicits new details worthy of reading by parasitologists.—Leon Kelso.

PHYSIOLOGY

(See also 6, 21, 53)

25. Neuro-hormonal regulation of heat exchange in birds. (O neiro-gormonalnoi regulyatsii teploobmena u ptits.) S. Karapetyan and R. Arumyunyan. 1973. *Zh. evolyutsionnoi biokhimii i fiziologii,* **9**(2): 150-154. (In Russian.)—At 15 to 30 °C oxygen consumption, heat production, and respiration rate in male Guinea Hen (*Numida meleagris*) are twice those in domestic fowl (*Gallus bankiva*). When ambient temperature is reduced to 5° chemical thermoregulation increases 18 to 30% in *N. meleagris,* and 12 to 18% in *G. bankiva.* Thermal polypnoea sets in at 35°. It is three times more intense in the latter than in the former species. A similar but less pronounced pattern was obtained in birds whose cerebra had been removed.—Leon Kelso.

26. The pecten oculi of the pigeon, with particular regard to its function. K. Wingstrand and O. Munk. 1965. *Biol. Skr. Danske. Vid. Selsk.,* **14**(3): 1-64. (In English.)—Discovery of the pecten is credited to Borrichius in 1674. About 30 different theories on its function have been proposed. A delicate operation to block blood supply arteries to the pecten proved successful. This resulted in its progressive degeneration until revascularization started after some weeks. By contrast there was no degeneration in 31 eyes operated upon where one or more arteries were left intact. It was concluded that the pecten is a nutritive organ, necessary for the maintenance of inner retinal layers. Tests of oxygen pressure by "oxygen cathodes" found a decline from 100mm Hg (mercury pressure) near the pecten to about 5mm Hg near the retina, thus proving that oxygen does diffuse from pecten to retina in amounts large enough to be nutritionally significant. This arterial block also apparently resulted in almost complete anoxia in the corpus vitreum and inner retinal layers. "It thus indicated that the inner retinal layers are dependent on the pecten for their oxygen supply. . . .It cannot be excluded that the pecten may perform other, subsidiary functions in the bulb, but this still remains to be shown." All this is supported by 12 excellent electron photo micrographs and 17 text figures. The 165 titles in the bibliography, comprising an estimated total of about 1,100 pages, signifies considerable attention historically for so small an item.—Leon Kelso.

27. Possible roles of near UV light in the cataractous process. S. Zigman, J. Schultz, and T. Yulo. 1973. *Exp. Eye Res.,* **15**(2): 201-208.—Here is more evidence that certain commonly used fluorescent illumination in the environment may cause harmful effects on vertebrate eyes, in this case by cataract formation trends in the lenses of dogfish (*Mustelus canus*) and laboratory mice. This is in accord with previous experiments with pigeon eyes (review no. 20, *Bird-Banding,* **44**(2): 131, 1973.). The damage comes about by accumulation of insoluble proteins in the lenses of eyes placed under near-ultraviolet fluorescent light. "These results therefore show for the first time *in vivo* that near UV light enhances cataractous changes in the lens."—Leon Kelso.

MORPHOLOGY AND ANATOMY

(See also 14, 26, 32, 33, 53, 54

28. Morphology of the sublingual pouch and tongue musculature in Clark's Nutcracker. W. J. Bock, R. P. Balda, and S. B. Vander Wall. 1973. *Auk,* **90**: 491-519.—Clark's Nutcracker (*Nucifraga columbiana*) stores pine seeds in communal caching areas for use during the next breeding season. To help carry the nuts it has an expandable sublingual pouch, whose anatomy is described here in great detail. The pouch lies between the mandibular rami and is ventral to the tongue. The tongue muscles and the pouch itself are thoroughly described and are illustrated with excellent line drawings. The ventral part of the pouch penetrates M. mylohyoideus, dividing this normally single muscle into two parts. The M. cucullaris caput portion retains its usual form, but is enlarged to form a muscular sling supporting the pouch. The greatest modification in associated structures is in the M. genioglossus. This muscle arises from the mandibular symphysis, and in other passerines inserts on the tongue. In *Nucifraga*, however, the tongue insertion is lost; instead the muscle subdivides and inserts on the ventroposterior surface of the pouch. All of these changes are relatively minor. On the whole this new organ has been developed with remarkably little effect on surrounding structures; the basic tongue mechanism remains unmodified.

This is an excellent study in descriptive anatomy. The main shortcoming of the work is in the absence of more than a casual functional analysis. It is not clear how the bird fills and empties the pouch. A few suggestions are made on the basis of limited field observations, but a careful behavioral study, perhaps with captive birds, is needed to fill out this study of an unusual and interesting adaptation.—Robert J. Raikow.

29. Notched toe pads in climbing oscines. G. A. Clark, Jr. 1973. *Condor*, **75**(1): 119-120.—The distalmost pads on the ventral surface of the toes were found to be notched in many climbing oscines. The author considers that this character might function in climbing and is probably a derived rather than a primitive function.—M. Ralph Browning.

30. Tongue structure of the Plumed Whistling Duck (*Dendrocygna eytoni*). M. K. Rylander and E. C. Bolen. 1973. *Condor*, **75**: 246-247.—An anterior process of the tongue of *D. eytoni* has a fimbriated lateral margin, which does not occur in other species of *Dendrocygna* nor in other anatids. It appears to be an anterior extension of a dense row of trichia found on the ventral surface of the posterior part of the tongue. Its function cannot be determined from present knowledge of the feeding habits of the species, but presumably it does confer some fringe benefit to its possessor.—Robert J. Raikow.

PLUMAGES AND MOLTS

(See also 53)

31. North Island Brown Kiwi (*Apteryx australis mantelli*). Measurements and weights of a young chick. B. Reid. 1972. *Notornis*, **19**(3): 261-266.—In an array of valuable data, a particularly salient point is that for an adult Kiwi of 1699. 2 g weight the presumably primitive plumage weighs 115.2 g, which, at 6.8%, is above the grand average (6.0%) for birds as a whole (see Turcek, *Ekol. Polska*—ser. A, **14**(32): 617-634, 1966; rev. no. 32 in *Bird-Banding*, **38**(2): 161, 1967). For a newly hatched chick of 205.5 g, the plumage weight was 12.9 g, or 6.3%. This, according to Turcek, suggests a dynamic rather than a passive protective function for plumage.—Leon Kelso.

32. The water-holding mechanism of Sandgrouse feathers. A. Rijke. 1972. *J. Exp. Biol.*, **56**(1): 195-200.—Water applied to the ventral side of breast feathers is readily drawn up into the hair-like extensions of the barbules. When it reaches the basal coiled regions, the helices abruptly uncoil and expose their lengthy ends perpendicular to the plane of the feather. X-ray analyses of the dry and wetted Sandgrouse barbules support the proposed operative mechanism of a reversible melting-recrystallization cycle for the barbule keratin tissue.—Leon Kelso.

33. On the substructure of iridescent feathers of Birds-of-Paradise. (Zur Substrukture schillerden Federn bei Paradiesevögeln, Aves, Paradiseidae.) E. Rutschke. 1972. *Z. Wiss. Zool.*, **185**(1-2): 76-87. (In German, English summary.)—Fine structures of iridescent feathers of seven species were examined by scanning electron microscope. In iridescent colors barbules were decidedly flattened, closely compressed, and of smooth surface. The colors were reflected by alternate multilayers of melanin and keratin. Melanin lamination was parallel to lengthwise rods measuring 1.2 x 0.12 millimicrons, and in double layers. Feathers with one or two such layers showed blue or violet, with three or four, green, with five to seven, bronze or rufescent tints.—Leon Kelso.

34. A possible method of sexing Thick-billed Parrots (*Rhynchopsitta pachyrhyncha*). G. A. Smith. 1973. *Avic. Mag.*, **79**(3): 93-95.—Smith, who examined 15 birds, indicates that males have somewhat larger bills than females but makes no statistical test. He also suggests that red feathering on the underside of the wing at the distal extremity of the hand (carpometacarpal region) might indicate males as it was present in both wings in all 10 males examined but was only represented by a single red feather in one wing in 1 of the 5 females examined. I made a quick check on this feature on specimens in the USNM collection. Seven of 14 males and 6 of 12 females had red well or partially developed on both wings in this region, thus indicating that Smith's conjecture is not valid. It seems likely, as Ridgway suggested back in 1916 (*U. S. Natl. Mus. Bull.*, **50.** Pt. 7: 141), that the development of red may indicate age rather than sex.—Roger B. Clapp.

ZOOGEOGRAPHY AND DISTRIBUTION

(See also 16, 18, 43)

35. Egg-tooth Marbled Murrelet in Pierce County, Washington. J. F. Colby. 1972. *Murrelet,* **53(3)**: 49.—An immature *Brachyramphus marmoratum* having an egg tooth was collected in a small lagoon at North Rosedale, Pierce County, Washington, on 24 July 1971. The bird died 17 August 1971 and is now specimen number 1983 in the University of Puget Sound Museum of Natural History, Tacoma, Washington.—M. Ralph Browning.

36. The list of West Virginia birds. G. A. Hall. 1971. *Redstart,* **38:** 2-18. (Available from the Brooks Bird Club, 707 Warwood Avenue, Wheeling, W. Va., $0.50.)—This is the first complete listing of West Virginia's birds since 1944. The accepted list totals 295 species, and the hypothetical list, an additional nine. The list includes only brief annotations regarding status. The criteria for acceptability are fairly rigorous, resulting in the unacceptability of sight records by the state's more famous ornithologists (e.g., Brooks, Sutton, and the author).—Bertram G. Murray, Jr.

37. Notes on Okinawan birds and Ryukya Island zoogeography. L.L. Short. 1973. *Ibis,* **115**(2): 264-267.—Twenty-eight species of birds, including *Sapheopipo noguchii,* the endangered Okinawan Woodpecker, were observed between 2 and 9 February 1972. The author concludes that the avifauna of the Ryukyu Islands is too small in number of species to permit a simple zoogeographic characterization of these islands. The origin of several species is discussed.—M. Ralph Browning.

SYSTEMATICS AND PALEONTOLOGY

(See also 43)

38. Possible female hybrids between *Bucephala islandica* and *clangula.* J. Fjeldså. 1973. *Bull. Brit. Orn. Cl.,* **93**(1): 6-9.—Mensural data are presented in bill ratios of *Bucephala islandica* and *B. clangula* and are compared to two possible hybrids, a juvenile from Maine and an adult female from Iceland. Hybridization between the two species is discussed.—M. Ralph Browning.

39. Remarks on the observation of a *Sterna bengalensis* in the Camargue (Sudfrankreich). (Bemerkungen zur Beobachtung einer *Sterna bengalensis* in der Camargue (Sudfrankreich)) P. Isenmann. 1972. *Ardea,* **60** (3-4): 226-228. (In German, English summary).—*Sterna bengalensis* was observed displaying with *Sterna sandvicensis.* These two species are very closely related and along with *S. eurygnatha* and *S. elegans* are considered to belong to a cosmopolitan Artenkreis of medium to large terns (see Junge and Voous, *Ardea,* **43:** 226-247, 1955).—M. Ralph Browning.

40. On the taxonomic position of the Little Owl, *Athene noctua* (Scop.) of southeast Europe. A. Keve, I. Kohl, F. Matoušek, A. Mošansky, and R. Rucner-Kronseisl. 1960. (Translated 1972). *Larus,* **14:** 26-74.—Variation and distribution of *Athene noctua noctua, A.n. indigena,* and *A.n. daciae* are discussed. The subspecies *daciae* is considered endemic to Transylvania and somewhat intermediate between nominate *noctua* and *indigena*, but is said not to show characters of a transitional population (intergrades between nominate *noctua* and *indigena*?). The description and distribution of *daciae* are given more detail compared to the original description (see Keve and Kohl, *Bull. Brit. Orn. Cl.*, **81**(3): 51-52, 1965). Vaurie ("The Birds of the Palearctic Fauna," p. 610, 1965) considers the name *daciae* a synonym of nominate *noctua*.—M. Ralph Browning.

41. The relationships of *Picathartes*. C. G. Sibley. 1971. *Bull. Brit. Orn. Cl.*, **93**(1): 23-25.—From egg-white protein studies the author recommends that *Picathartes* be placed next to *Turdoides* of the family Timaliidae (Babblers).—M. Ralph Browning.

42. Proof of taxonomic value of particular unique characters by the correlation coefficient factor. (Dokaszitelnostvo taksonomicheskoi tsennosti redkikh priznakov s pomoshchyu svoistv koeffitsienta korrelyatsii.) P. Tamarin. 1973. *Zhurn. obschch. biol.*, **34**(2): 264-274. (In Russian, English summary.)—The point of contention between adherents of Adanson's equality of characters doctrine and Smirnov's weighted taxonomy (i.e. the more unique the occurrence of the diagnostic character among species of a genus, the better it characterizes the species) is: which is more trenchant and reliable? This paper would demonstrate by elaborate mathematical formulas that greater taxonomic value of rare characters directly follows from the generally accepted correlation coefficient formula when applied to analysis of qualitative characters. It is found that more unique characters more adequately define the natural subgroups of the taxon under consideration, and therefore are the most valuable taxonomically.—Leon Kelso.

EVOLUTION AND GENETICS

(See also 3, 51)

43. Distribution, taxonomy, and evolution of the Gardener Bowerbirds *Amblyornis* spp. in eastern New Guinea with descriptions of two new subspecies. R. Schodde and J. L. McKean. 1973. *Emu*, **73**(2): 51-60.—The evolution and distribution of *Amblyornis macgregoriae* and *A. subalaris* are interpreted in terms of isolation of one ancestor brought about by climatic oscillations of the Pleistocene. *A. macgregoriae* now occurs above 1,200 m and *A. subalaris*, below 1,500 m. Competition between these species is implied where there is local altitudinal overlap. The new subspecies *A. macgregoriae kombok* and *A.m. nubicola* are described. Holotypes are at CSIRO Division of Wildlife Research, Canberra, Australia.—M. Ralph Browning.

FOOD AND FEEDING

(See also 7, 10, 13)

44. Foraging success of Cattle Egrets, *Bubulcus ibis*. J. J. Dinsmore. 1973. *Amer. Midl. Nat.*, **89**(1): 242-246.—In this study conducted in northcentral Florida Cattle Egrets feeding with cows caught significantly more prey items and took significantly fewer steps than did egrets foraging alone. The proportion of successful captures per attempt was also significantly higher when egrets were foraging with cows. Egrets feeding behind farm machinery were also significantly more successful in capturing prey than were birds feeding alone. Dinsmore presents arguments which suggest that the relationship between these egrets and cows should be considered commensalism rather than mutualism as it has been termed by some other authors.—Roger B. Clapp.

45. Sparrow Hawk predation on Bank Swallows. V. M. Freer. 1973. *Wilson Bull.*, **85**: 231-233.—"The hawk was flying in the same direction as the swallow; it appeared to simply overtake the swallow and grab it with its talons."

Three immature Bank Swallows (*Riparia riparia*) were captured in this manner. A fourth was taken directly out of a nest burrow. Six "plucking perches" were located near the colony with the remains of at least 25 more immature Bank Swallows scattered about. The author suggests that this Sparrow Hawk's (*Falco sparverius*) specialization may be an example of a "specific searching image" (H. C. Mueller, *Nature*, **233**: 345, 1971).

I have observed similar predation by Herring Gulls (*Larus argentatus*) on immature Bank Swallows, Barn Swallows (*Hirundo rustica*), and Tree Swallows (*Iridoprocne bicolor*). As with the Sparrow Hawk, the gulls simply overtake the immature swallow but grab it with the bill.—Edward H. Burtt, Jr.

46. Common, Arctic, Roseate and Sandwich terns carrying multiple fish. H. Hays, E. Dunn, and A. Poole. 1973. *Wilson Bull.*, **85**: 233-236.—Terns of these four species were infrequently (53 of 3,011 observations) seen to carry between two and nine fish in the bill at one time. The extremely clumped distribution of these occurrences suggests that this is an opportunistic behavior that occurs when small fish (*Ammodytes marinus, Clupea sprattus, Brevoortia tyrannus* were the primary prey) school near the surface. How the terns capture more than one fish remains a mystery, although the authors suggest rapid diving or rapid dipping.

This note is well written. The conclusions are drawn from a considerable body of quantitative data and the descriptive material is clear and accompanied by an excellent photograph.—Edward H. Burtt, Jr.

47. Bill-vibrating: a prey-attracting behavior of the Snowy Egret, *Leucophoyx thula*. J. A. Kushlan. 1973. *Amer. Midl. Nat.*, **89**(2): 509-512.—In a paper based primarily on four hours of observation in Everglades National Park, Florida, Kushlan describes a feeding behavior wherein egrets rapidly close and open their partially submerged bills. It was about as successful as other feeding techniques used and apparently was used primarily as an attractant for mosquito fish (*Gambusia affinis*). Investigation of the occurrence of this technique in this and other herons in relation to a variety of environmental parameters might well prove rewarding.—Roger B. Clapp.

48. Observations on Kiwis on Stewart Island. R. Larritt. 1972. *Notornis*, **19**(2): 186-187.—All the 10 individuals observed, between 10:00 and 14:00, showed uniform behavior. "On each occasion the beak alone was used to locate food which was taken near the end of the bill and dexterously devoured or crushed for eating. The feet were not seen on any occasion to be used to secure food. In walking the bird replaces its bill at each step while feeding. When disturbed or apparently listening with its bill, the bird remains quite still. On two occasions birds were seen to apparently sample the air with the beak held at about 45° to the ground, moving it in a gentle probing fashion. . . . Indications were that eyesight was apparently not used to nearly the same extent as hearing and smell. . . . Contrary to popular opinion it would appear that the Kiwi is not solely nocturnal. Hearing and smell, rather than sight, were used to identify intruders." Calls were heard only at night.—Leon Kelso.

49. Food of wood warblers in forests of the Leningrad Region. (Pitanie penocheck v lesakh leningradskoi oblasti.) I. Prokofieva. 1973. *Biol. nauki*, **16**(4): 22-28. (In Russian.)—Food brought to young in 30 nests (number per species not stated) of Chiffchaff (*Phylloscopus collybitis*), Willow Warbler (*P. trochilus*), and Wood Warbler (*P. sibilatrix*) included 740 portions comprised of 2,762 invertebrates, mainly insects and spiders of small size, unavailable to larger passerines. Beetles were notably few in comparison with food of adults (42 stomachs) and were absent in food brought to Chiffchaff young. Vegetable food was limited to only one fruit fragment in the whole lot.—Leon Kelso.

50. Some eco-areal features of the foraging of the Long-legged Buzzard, Imperial Eagle, and Steppe Eagle in the north Aral region. (Nekotorye landshaftno-ekologischeskie osobennosti pitaniya kurgannika, mogilnika, i stepnogo orla v severnom priarale.) B. Varshavskii. 1973. *Byull. mosk. obshch. isp. prirody, otdel. biol.*, **78**(3): 30-37. (In Russian, English summary.)—In this field study covering two years observations in semidesert habitats, two raptors (*Buteo rufinus* and *Aquila heliaca*) proved more generalized in predation, i.e., polyphagous. Food items represented in about 600 pellets and nest remnants were comparatively evenly divided among mammals, birds, and reptiles with miscellaneous invertebrates. Especially prominent in the prey was the Greater Gerbil (*Rhobomys opimus*). *Aquila nipalensis* was decidedly more specialized in preying on small rodents with only a comparative trace of reptiles and passerine birds in 76 pellets. It is suggested that the Steppe Eagle here finds its chief prey item, the Little Suslik (*Citellus pygmaeus*), easier to seize at its solitary burrow entrances than the Greater Gerbil at its colonies, honeycombed by many entrances.—Leon Kelso.

SONG AND VOCALIZATIONS

51. Sonarmicroscopy and biological musicality of bird sounds. (Zvukomikroscopiya i biologicheskaya muzikalnost golosa ptitsya.) P. Soeske. 1973. *Vestnik moskovskogo univ., biol. ser.*, **8**(1): 28-36. (In Russian.)—Sound microscopy consists of magnification of notes by elongation, by slowed running, and re-recording by tape, oscillograph, or other means of tape-recorded bird calls, thus lengthening them from two to 128 times. The results have evoked special interest in Russia and middle Europe, although no particular publication on the subject has been available here previously. It is stated that retarded or low speed playing of bird song brings out much imperceptible to the human ear, including evidence of evolutionary development of the various musical patterns. Thus, single notes may be, on analysis, a complex of blends or series. Notes uttered singly and sporadically may have evolved into musical series, or into a nonmusical passage in another situation. Rhythmic series of calls during evolution were concentrated, compressed, and converted into microseries of notes. The trills of the common Canary are an example. In time, according to the theory, musical intervals became stabilized and characteristic of species. More complex forms of bird voice with repeated motif were built into several to many musical measures, the Great Tit (*Parus major*) being an example. Retarded playing of these they say, brings out passages suggesting human folk songs, intriguing to both biologists and musicologists.—Leon Kelso.

MISCELLANEOUS

52. Bird collections in the United States and Canada. R. C. Banks, M. H. Clench, and J. C. Barlow. 1973. *Auk*, **90**: 136-170.—This survey lists by state or province the locations of bird collections with research potential. The number of skins, skeletons, fluid preserved specimens, eggs, and nests in each collection is stated. Each collection's geographic and systematic strengths are mentioned. The location of holotypes and of former private collections, and the person(s) responsible for each collection are also included.

The A. O. U. Committee on Collections consisting of the authors makes important recommendations with respect to the establishment, maintenance, and growth of collections. This is an invaluable reference for anyone doing research that requires the use of specimens.—Edward H. Burtt, Jr.

BOOKS AND MONOGRAPHS

53. Avian Biology. Volume II. D. S. Farner and J. R. King, (Eds.). New York, Academic Press, 1973. 612p. $32.00—This is the second of a proposed multivolume series on avian biology. The volume represents, perhaps even more pervasively than the first, progress in the field since the Marshall volumes of a decade ago. The editors and the authors are to be commended on the quality of their work. The chapters in Volume II reflect the expansion of knowledge and understanding current in ornithology. This is noticeable especially in the availability in several areas, particularly organ physiology, and new theoretical approaches in others.

The chapters fall naturally into four areas: integument and molt; respiratory and circulatory systems; nutrition, digestion, and intermediary metabolism; and osmoregulation. Individual chapters vary from about 30 pages to over 100 in pages in length. The mean is about 50 pages, but in no case does the reader get the impression that an author was limited by space. Documentation is uniformly good in the various chapters in spite of the fact that resources in some areas are limited. Good use is made of the non-traditional ornithological literature which in itself justifies the series title. This is especially true in the chapters on metabolism and nutrition where so much work has been directed toward commercially important species.

The first three chapters, by Stettenheim, Palmer, and Payne, represent about one-quarter of the entire text. Stettenheim treats the full range of structure and composition of the integument and its derivatives. Palmer and Payne focus on the feathers, especially in regard to the description and biological aspects of molt and endogenous and exogenous aspects of control. As in other chapters, there is some difference in the degree to which controversial positions are taken and the vigor with which they are defended. This admixture of descriptive and experimental biology can only be accomplished by multi-authored volumes. Among the refreshing aspects of the chapters by Stettenheim and Payne is the inclusion of physiological mechanisms and biochemical details, although there is still an apparent reluctance in the usage of the Humphrey-Parkes terminology describing molts and plumage.

The next section, with chapters on the circulatory (Jones and Johansen) and respiratory (Lasiewski) systems, represents one area of enormous recent growth in our understanding of avian biology. Both chapters are comprehensive (over 30% of the book) and well written. They represent a compilation of material available nowhere else and, perhaps for the first time, set these subjects independent of considerations of mammalian physiology. Although some comparative data are included, the important message is that, even though both groups are homeothermic, birds arei ndeed different. The differences reflect the evolution of both the design and function of the cardiovascular and respiratory systems and are not trivial. Recent work on cardiovascular performance, air movement in the respiratory tract and adjustments of both systems to environmental stress and specialized activities are discussed in detail. Sophisticated analysis lucidly presented is used to illustrate the interdependence of the two systems. These chapters represent one of the most complete and thorough interpretative compilations of these topics available.

The chapters on nutrition, digestion, and metabolism are especially appealing and informative, especially because of the neglect with which these subjects have been treated traditionally. Ziswiler and Farner are comprehensive in description yet particularly adroit in pointing out various unsolved problems associated with avian digestion. The heroic contributions in morphology, microanatomy, and histochemistry of the past are far ahead of our current appreciation of hormonal control, basic biochemistry, and dietary adaptation of the digestive system. The comparative physiology of the crop, ceca, and bursa are still relatively unexplored. Both quantitative and qualitative seasonal changes could be explored fruitfully, providing models for adaptative strategies and dietary plasticity. Fisher's contribution on nutrition is restricted to only a few species, a point he clearly recognizes. Much of the content, however, will be of value to aviculturists and provides a stimulating background for field related work where the old "stomach analysis" can be extended to rational nutritional studies of natural populations. Hopefully, factors such as net protein value, metabolizable energy and absorbability value will come out of the chicken house into the feld. Hazelwood's treatment of intermediary metabolism is impressive also and is given proper direction by the series of questions presented in lieu of a summary. Certainly each reader could add an equal number of his own without offending the quality of the presentation. The organization of the material and its coverage accentuates functional aspects with an abundance of detail, presuming the reader's adequate background in elements such as glycolysis, Krebs cycle, etc. This, like the other chapters, can be beneficial to specialist within the profession and generalist alike.

The final chapter on osmoregulation and excretion (Shoemaker) is a valuable up-to-date assessment of the progress and status of the field. Attention is given to morphological and physiological considerations of the kidney, cloaca, and salt glands, and the coverage is broadly comparative. Emphasis is placed on function and control aspects, including the biochemistry of these interesting systems. Shoemaker develops the advances of the recent past including the role avian material has played in the development of problems such as ionic transport across membranes.

The book is of high quality overall, both physically and intellectually informative, and will become an indispensable source of reference. The editing is excellent and ample use is made of cross references, a situation not always obtained in multi-authored volumes of this sort. The editors rate high on correlation between their stated purposes in the introduction and the actual performance of the authors. The authors, in turn, have obviously been encouraged to discuss experimental results relative to currently interesting or controversial hypotheses, explore newer methods of analysis, and correlate field and laboratory work.—Bertram G. Murray, Jr.

54. Anatomy of the chicken and domestic birds. Tankred Koch. Edited and translated from the German manuscript by B. H. Skold and L. De Vries. Ames, Iowa, The Iowa State University Press. 1973. 170 p. $7.95.—One of the peculiarities of this book is that its purpose and intended audience are never mentioned. Presumably it is a textbook of avian anatomy and physiology for veterinary students, although it does not discuss pathology or other practical matters. It deals mainly with the domestic chicken, with which the duck, goose, pigeon, and Guinea fowl are compared. Most of the text is devoted to descriptive anatomy without consideration of function. The several sections on comparative physiology are rather superficial and rambling.

The description of the skeletal system is generally accurate, but in Figure 2.40 the postacetabular ilium is labeled ischium. The first vertebra whose rib reaches the sternum is generally defined as the first thoracic. Anterior to this are two whose ribs do not reach the sternum. These are commonly defined as cervical, but Koch defines them as thoracic. In the left hand column of p. 26 it is stated that the goose and duck lack a notarium. In the right hand column of the same page the os dorsale is described in these birds. In Figure 2.2 and 2.3 this structure is illustrated in the two forms, and notarium and os dorsale are given as synonyms. The tibiotarsus is called the tibia, which is inaccurate because a true tibia does not include fused tarsals as does the avian tibiotarsus. The synsacrum is called the lumbosacral bone. This fails to express the inclusion of caudal elements into the structure. The quadrate is not inserted between the upper and lower jaws as stated (p. 47), rather it is a part of the upper jaw.

The coverage of the muscular system is rather poor. There are sections on the cutaneous muscles, muscles of the head, body, and limbs. The nomenclature is based on the musculature of mammals, rather than on the names generally used by ornithologists following Hudson, Fisher, or Berger. This raises the problem of homologies between the muscles of birds and mammals. This problem is not discussed. Various muscles are said to "correspond" to certain muscles in mammals, but it is not apparent whether this implies homology or merely positional similarity. Whatever the merits of a given system, some names are simply inappropriate. For example, a muscle named "iliotibialis" passes from the ilium to the femur. There are also factual errors. M. ambiens is said to be absent in the duck, when in fact it is present. The accounts of the individual muscles are inconsistent and incomplete. Some muscles are listed by name only but are not described except for their "correspondence" with mammals. Others are described at greater length. Some muscles are not illustrated, nor is function considered. I do not think that a student would gain a very clear understanding of the muscular system from this section, nor would it be effective as a guide to dissection.

There follow chapters on splanchnology (digestive, respiratory, urinary, and sex organs), circulatory system, nervous system, sense organs, and endocrine glands. I am not sufficiently familiar with these systems to be able to detect errors or problems in these sections as noted above, but the number of shortcomings in the earlier part of the book make me skeptical about the accuracy of the latter part. The captions for Figures 5.2 and 5.3 are apparently reversed, since the dorsal view of the brain is labeled ventral and visa versa. It is not clear why the skin is included in the chapter on sense organs, but it may be the same reason that the jaw muscles are included under the locomotion system.

There are problems with the naming of birds. Many species are mentioned by names in English which do not correspond to the English common names. Apparently they were obtained by making literal translations of German common names. Since the scientific names are not given, the form is unidentifiable unless one retranslates to German. For example the "shore swallow" is apparently the Bank Swallow. It is not clear whether "Buzzard" refers to the European *Buteo* or to American cathartids. There is a reference (p. 64) to a cormorant, *Palacro corax,* obviously a jumbled *Phalacrocorax.* Sometimes, however, the German names are given untranslated, e.g., Schakühuhnern (p. 97). These names are not likely to be familiar to veterinary students. The translators, rather than the author, must bear the blame for this problem.

In reading through this book I was continually bothered by the too literal translation of the original German into English. For instance the "point of gravity" is mentioned. Presumably this is a translation of "Schwerpunkt," but would accuracy have been sacrificed if the word were translated as "center of gravity?" Also, in many places, the original German sentence structure, instead of, as would have been productive of greater clarity, into an English arrangement being converted, in the original German word sequence retained is.

There are numerous illustrations by Erwin Rossa. Most of these are halftone diagrams of good quality and accuracy, except for some errors in labeling as noted above. In general the illustrations are better than the text. Many anatomical details given in the text are not illustrated, making them difficult to visualize. This underscores the value of the drawings.

Although not entirely without merit, this book is flawed by errors, inaccuracies, and a heavy-handed translation. For these reasons, and because of the mammalian terminology employed, it cannot be recommended as a general anatomical reference for ornithologists. I cannot assess its value as a text for veterinary students, but can only hope that this is not the best book on the subject available to them.—Robert J. Raikow.