ORNITHOLOGICAL LITERATURE

STRUCTURAL ADAPTATIONS OF THE HEAD AND NECK IN THE BLACK SKIMMER *RYNCHOPS NIGRA* LINNAEUS. By Richard L. Zusi. Publications of the Nuttall Ornithological Club No. 3, 1962: 6 × 9¼ in., viii + 101 pp, 44 figs., 5 tables. Cloth, $3.00. (Order from the Museum of Comparative Zoology, Harvard University, Cambridge 38, Mass.)

Many weird feeding adaptations have appeared during the evolution of birds, but none is stranger than the skimmer's method of catching fish while flying back and forth over still bodies of water with the immersed, blade-like lower mandible serving as a narrow, but efficient "snare" for fish. Although this peculiar feeding method was long known, Dr. Zusi's study provides the first accurate, detailed investigation of the mechanism of skimming and of the associated morphological adaptations of the head and neck. Throughout, the Black Skimmer is compared with the Gull-billed Tern (nondiver), Royal Tern (diver), and Laughing Gull. An excellent account is given of the skimming method, using motion-picture film as the basis for the detailed descriptions and the figures. Zusi showed that the skimmer's head is snapped down and back when the mandible hits an underwater object or a fish; in the latter case, the jaws are closed on the fish as the head moves backward. The upper jaw is elevated greatly to increase the gape while the bird is skimming; the nasal-frontal hinge and other parts of the bony palate and upper jaw are modified to permit greater protraction than in other larides. Inclusion of the several ligaments associated with the mandible-quadrate articulation renders the entire consideration of cranial kinesis particularity meaningful; these important structures are usually omitted in studies of the skull and its kinetic upper jaw. The jaw muscles are described first in the Royal Tern which serves as the basis for comparison for those in the Black Skimmer. This method is used to emphasize the structural modifications in the Black Skimmer; however I find that this system makes the descriptions somewhat difficult to follow. Coverage of the jaw muscles is complete and accurate with special attention given to the tendons of origin and insertion. Nevertheless I am not convinced that Zusi's subdivisions of the *M. adductor mandibulae externus* and of the *M. pterygoideus* give a true picture of the actual situation, and the actions of the muscles, in spite of most being completely reasonable, should have been reported as possible functions as the deductions of these actions are based upon morphological observations, not on actual functional observations and experiments. The major conclusion reached by Zusi is that adaptation for skimming has been achieved with only moderate change in the pattern of the jaw muscles characteristic of gulls and terns. This conclusion is well supported by his evidence and appears most reasonable. Zusi shows that the important adaptational unit for skimming includes the neck as well as the head. He presents an excellent discussion of the structure and possible functions of the cervical vertebrae and muscles, showing how these structures are integrated into a functional unit adapted to counteract the strong, backward forces on the head, especially those occurring when the head is doubled under the body when an object is struck or a fish is caught. This treatment of the neck muscles is especially welcomed in view of the scarcity of papers covering this most difficult part of avian anatomy.

Zusi's paper is an excellent example of functional-adaptational analysis of structure based upon careful field observations and shows how much sound information can be gathered using this approach. Some of the functional conclusions may have to be modified after further investigation in the laboratory, but this is of minor importance. The major contribution of Zusi's study, in addition to his excellent analysis and interpretation

of the skimming mechanism, is that he demonstrates how a wealth of valuable information pertaining to functional-anatomical studies can be obtained in the field. Good descriptions of feeding methods, running, climbing, flight, and other daily activities of birds are very scarce in the literature although essential to functional morphological studies. Here is an area in which the amateur ornithologist, using a minimum of equipment, can contribute much to the scientific study of birds.—WALTER J. BOCK.

BIRD STUDY. By Andrew J. Berger. John Wiley & Sons, Inc., New York, 1961: 6 × 9½ in., xii + 389 pp., 178 figs. incl. photos., many tables. $7.50 (text edition).

The proof of the suitability of a textbook is, like that of the pudding, in how avidly it is devoured, the degree to which it is digestible, and to what extent it fulfills the needs of the consumer. The reviewer has consequently delayed his review of "Bird Study" until it could be put to the test of being used for a semester as a textbook in an elementary college course in ornithology for liberal arts students—the primary audience for whom this book was geared by its author. I have taught such a course for close to thirty years and know first-hand the need that long existed for a truly suitable text. I therefore welcomed Berger's "Bird Study" for seemingly here was a text that when used jointly with Pettingill's "Laboratory Manual" and Peterson's "Field Guide" would provide the college instructor with all that he needed. Now I am not so sure that my original enthusiasm was altogether justified. Many of the chapters in the book are eminently satisfactory, others are less so, mainly because I too frequently detect a dogmatism on the part of the author, sometimes in areas in which he himself would be the last to claim to be an expert. Perhaps, though, this notion on my part reflects a fundamental difference with the author in pedagogy. Should the pros and cons of ideas be presented to the beginning student, or should certain viewpoints be expressed dogmatically on the presumption that the pros and cons can come later? Since Berger is an expert anatomist, it is surprisingly dogmatic for him to state on page 13 that "most authors," presumably himself included, consider the three remaining fingers of birds to be digits I, II, and III, instead of II, III, and IV, as shown by the researches of Holmgren and Montagna. No less an authority than Libbie Hyman, even without benefit of the knowledge adduced by recent studies, states that the question must be regarded as open to debate. The reader of the present text is not even made aware of what alternative theories exist.

More serious, though, is a philosophy of the author as revealed by the following excerpt from his chapter on Systematics, a branch of the science on which he is certainly no expert: "The subspecies concept is a cherished one, especially by those who like to see their own name perpetuated as part of the scientific name of a bird, and by those who revel in examining bird skins and then giving free reign to their imagination. This approach has certain advantages because one deals primarily with theories and is not hampered by considering facts." Such an unwarranted degradation of systematists working at the level of subspecies certainly has no place in a textbook ostensibly designed for college use.

"Bird Study" is divided into eleven chapters and each contains a wealth of information about birds, probably more than most liberal arts students with little or no biological background can possibly absorb in a single semester. Despite the shortcomings mentioned, the book is still far superior, in the reviewer's opinion, to any previous text on the biology of birds available for use in a college course in ornithology.—GEORGE H. LOWERY, JR.

THE ROUGH-WINGED SWALLOW, *STELGIDOPTERYX RUFICOLLIS* (VIEILLOT): A Study Based on Its Breeding Biology in Michigan. By William A. Lunk. Publications of the Nuttall Ornithological Club No. 4, 1962: 6 × 9¼ in., viii + 155 pp., 19 figs., 3 pls.

Data for this comprehensive life history were gathered from 97 nests by Dr. Lunk during four breeding seasons (1949–52) in southeastern Michigan. Much of the introduction is devoted to a discussion of the family Hirundinidae and the taxonomic position of *Stelgidopteryx ruficollis serripenis*, the principal subject of the book. This is the only subspecies of the monotypic genus found in the United States, except for a small area in the extreme southwest. The structure and function of the most important generic character—the outer web of the outer primary characterized by recurved barbs without barbules—is discussed in the introduction and in a later section.

Methods and materials are mentioned in Part I. Included is an interesting description of artificial nest tubes used successfully during the study. Ninety per cent of the tubes were used by swallows at least once during the three years they were made available. The author suggests using such containers to attract Rough-winged Swallows about buildings, banks, and other structures.

The text is divided into six well-organized and concisely written parts which comprise an outstanding, although typical, life-cycle study. The Parts are: I. Preliminary Considerations (Study area, methods, general characteristics and behavior, etc.); II. Prelaying Stages (nesting sites, colonialism, territorial behavior, mating, nests, nest-building); III. Eggs and Incubation (rhythm of laying, desertion, renesting, hatching); IV. Later Stages (brooding of young, roosting, feeding and food of nestlings, growth and development of young, postnesting activities); V. General Analyses (timing of nesting season, nesting success, mortality and nest failure, gregariousness); VI. Conclusions (position and status).

The figures are well prepared and clearly supplement the text. Plates II and III lack the contrast necessary for displaying feather tracts and general development of nestlings.

Dr. Lunk is to be congratulated on this fine work.—WILLIAM E. SOUTHERN.

PRAIRIE SPRING. Volume VII of the "Sounds of Nature" Series. Recorded by William W. H. Gunn; narrated by Thom Benson. Federation of Ontario Naturalists in Association with Cornell Laboratory of Ornithology, 1962: 12-inch record, 33⅓ r.p.m. $5.95. (Order from F.O.N., Edwards Gardens, Don Mills, Ontario.)

To a person with prairie experience Dr. Gunn's new recording, "Prairie Spring," really takes you "by ear" back onto the western grasslands. And for the neophyte on the prairies it is an excellent introduction with plenty of "come on," inviting exploration of this fascinating wide-open territory. One hears many comments about the monotonous prairies with nothing to see but grass to the horizon. Perhaps this is true, for persons without the eyes to see and the ears to hear what really is there to enjoy. For these uninitiated travelers "Prairie Spring" will be a real audio-revelation. The fragmented trumpeting of a horde of Sandhill Cranes; the weird tooting of the courting Sharp-tailed Grouse and the "Prairie Bells" as Seton called the distant musical tinkling songs of the Western Meadowlark, Chestnut-collared Longspur, and Baird's Sparrow and even the whistling of ground squirrels and the coyote chorus certainly rival anything the forests can produce. I am sure you will enjoy accepting Bill Gunn's invitation to better audio-recognition of the prairie wildlife, altogether 64 bird and four mammal species.

The little leaflet of supplementary notes is a valuable aid to interpreting what one

hears on the record. In this the activities of the animals are described as they occurred while the sounds were being recorded. Otherwise certain sounds would surely overtax the inexperienced person's ability to "see" what was really going on. The slapping of the swan's wings on the water at takeoff puzzled me a bit before reading the notes. These explanations make up in part for one of the weaknesses of recorded songs and sounds which is that one is never sure about how far away the animal is when a given sound is produced. Is this a loud call audible at some distance or is it a weak call recorded with the microphone close to the caller?

The record has spoken identifications throughout and is divided into bands for ease in locating a particular call. Also, the bands serve to divide the series of calls into ecological groupings, some of which are: swans in migration, geese moving out at dawn, ducks of the sloughs and potholes, waders, a gathering of cranes, prairie bells, a dancing ground, the river valleys, sage country, and parklands and bluffs (referring to prairie groves). I felt it was unfortunate that the Long-billed and Short-billed Marsh Wrens were separated by the Black Tern series of calls. The contrast of the two wren calls would be better brought out if one had immediately followed the other. Likewise the marsh-living Yellow-headed and Red-winged Blackbirds are separated. I was a little surprised not to find in the printed comments that the very obvious thumping sounds in the Sharp-tails' dancing sequence were made by the rapid pounding of the feet on the ground. Also it might well have been pointed out that the Sora call recorded, although common, is not the best recognition call of a series of descending notes so frequently heard when the bird is disturbed.

These certainly are minor criticisms, however, and I could without reservation recommend this record as a most valuable aid to a better recognition of the wildlife sounds of the prairies.—W. J. BRECKENRIDGE.

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