ORNITHOLOGICAL LITERATURE

THE SONG OF THE WOOD PEWEE (*Myiochanes virens* Linnaeus): A STUDY OF BIRD MUSIC. By Wallace Craig. New York State Museum Bulletin No. 334. Albany, 1943: 186 pp., 1 pl., 19 figs.

In this paper, which really amounts to a book, we have fulfillment of the promise made by the author in his five-page preliminary report published in *The Auk* in April, 1933. It gives us the basis for his previous generalizations and elaborates and clarifies them in such a way as to furnish a very impressive presentation of an exceedingly interesting thesis, while to many it will come as a revelation of the possibilities of the intensive study of bird song. It contains much new matter, and it covers more than the Wood Pewee's song, for thirty of its pages are devoted to bird song in general, and especially to its musicology. As the subtitle states, this is a study of bird music, and throughout the book the Wood Pewee's song is treated as music, as esthetic art, but from the scientific point of view, for of course music is a science as well as an art.

The data for this study were furnished by 22 trained observers who supplied in all 144 records of the morning twilight song and 17 of the evening song. These records were made by taking down the phrases as the bird uttered them, using a number for each of the regular phrases of the song—*1* and *2* for the two familiar gliding phrases, and *3* for the rhythmic phrase, which occurs only in the twilight singing.

As a brief summary we can say that this species has two types of singing—the leisurely singing heard only in the daytime and used for the territorial song, and the rapid rhythmic singing heard chiefly in the morning twilight but also to some extent in the evening. In the daytime singing only the two gliding phrases are used, and there are long rests between. The twilight song is rapid as well as rhythmical and shows a tendency to a 50 per cent prevalence of phrase *3*. The phrases of this song usually appear in the form of musical "sentences," of which the commonest is *3132*, a "satisfying" musical composition resembling in pattern a stanza of "Home, Sweet Home" or, as Henry Oldys pointed out forty years ago, "Swanee River." Though the author uses the word "composition" in describing the twilight song, it is not to be understood that the individual singer is a composer in the musical sense. It is the species that does the composing, and the composition comes into being through the existence of certain underlying tendencies that are musical in character, especially "the tendency to sing more *3*'s, the rhythmical phrase, when singing fast, and the tendency to regular recurrence of the *1*'s, *2*'s, and *3*'s." Dr. Craig believes that the structure of the song "cannot be explained wholly by any theory of external utility, such as the theory of territorialism or that of sexual selection." Though stating that nothing in his paper is intended to contradict the mechanistic interpretation of animal behavior, he believes that the singing of birds is not entirely unconscious and unintelligent, that while the Wood Pewee is singing one phrase he anticipates the next, that birds give attention to sound and sometimes choose one sound in preference to another, thus making a beginning in musical taste. He believes that a study of the Wood Pewee's song helps in the study of the evolution of esthetics in general and that the esthetic is related to organic growth.

The twilight song of the Wood Pewee is so different from the ordinary daytime manner of singing that it lends itself particularly well to study, and yet it is by no means unique among birds, for not only do some of the other flycatchers, notably the Eastern Kingbird and the Crested Flycatcher, possess well differentiated twilight songs, but many other birds have developed special manners of singing which they keep for early morning (and sometimes also for evening), such as the Tree Swallow and the Chipping Sparrow, while still others, like the Hylocichlae, sing so much more steadily in twilight hours when all diurnal birds are stationary that we must regard the twilight singing as fulfilling quite a different purpose

from that of either courtship or territorial defense. This purpose Dr. Craig regards as the satisfaction of the esthetic sense of the singer, and I am inclined to agree with him. Some years ago I called attention to the rhythmic cawing of the Crow in groups of short caws—two, threes, and singles—which could not be regarded as purely mechanical but seemed to give evidence of the possession of an esthetic sense (*Auk,* 36, 1919: 112–113). If so unmusical a bird as the Crow can take pleasure in rhythm, surely birds with the gift of song can sing from pure enjoyment of the sounds they produce.

We have, then, three uses for bird song, not simply two as we have been used to suppose. In addition to its use for attracting a mate and its use for proclaiming the holding of territory, we have the non-utilitarian use of satisfying a psychological need of the singer, for many of us will believe with Craig that it is not taking an anthropomorphic view of bird psychology to grant birds a glimmering of esthetic taste. And even this use, I should think, may not be strictly non-utilitarian, since it probably keeps the singer going on an even keel by supplying a means of catharsis for the emotions involved in the strenuous business of bringing up a family. This is not to say that such singing is in itself emotional, which, as Craig says, it does not appear to be.

What I have so far said relates more to the ultimate conclusions of Craig's study than to the study itself, which is chiefly occupied with the extensive minute detail of the analysis of the records of the Wood Pewee's twilight song. There is much of great interest in this study that could not be indicated without unduly extending this review. Indeed, the reader is surprised at the number of interesting corollaries that the study has brought out. I will take up only a few points.

In considering the evolution of the Eastern Wood Pewee's song the author finds some evidence that it originally resembled that of the Western Wood Pewee (*Myiochanes richardsoni),* which uses no phrase comparable with the No. 1 of *M. virens* but does have a slurred phrase resembling No. 2. He concludes that No. 2 is the older of the two common phrases phylogenetically and considers that that may account for the curious fact that it is the phrase with which it begins its song-day in the morning and ends it in the evening. He shows that the evening twilight song as a whole is a mirror image of the morning song.

There is also a very interesting discussion of the song day of the Wood Pewee, a discussion that would apply equally well to most of our song birds. The Pewee anticipates both daylight and nightfall by beginning his day before it is really light and ending it before it is really dark, just as migrating birds, by a physiological mechanism, anticipate the seasons. The song and other activities are governed by an internal mechanism. "Every animal and every plant is a chronometer."

In the discussion of bird song in general the author brings out some points that may be new to the reader. Among these is the importance of distance between breeding pairs in the development of song. The birds that have developed song to an important extent are those that breed at such a distance from others of their kind as to make song useful—neither so near as to make it unnecessary for communication nor so far as to make communication by sound impossible.

Imitation as a factor in bird song is discussed, and the author reviews the evidence for and against the theory that it plays a principal part. He finds the preponderance in favor of the theory that songs, as well as call-notes, are inherited, not acquired. As to the Wood Pewee, the observational evidence indicates that the song is uninfluenced by the singing of other birds of that or any other species. This applies both to the melody of each phrase and to the order of utterance. On the general subject, however, it is certain that the last word has not yet been written. Mrs. Nice in Part II of her "Studies in the Life History of the Song Sparrow" (1943) questions the complete validity of the conclusions reached by one of the authors whom Craig cites. Her own observations of the Song Sparrow led her to the conclusion that the main pattern of the song of that species is innate, that the quality is probably acquired by imitation, and that the particular songs

are more or less original with each individual. It would seem, therefore, that all three elements enter into the development of song—inheritance, imitation, and originality.

But in the space of this review it would be impossible to comment on everything the author has to say on the general subject of bird song. Some of the special topics treated illuminatingly are evolution of ability in singing, intelligent esthetic choice, contrast between birds and mammals, the material of bird music, the form of bird music, ranking of songbirds, the concept of bird song. Preceding the author's summary there is a section, "Problems for Future Study," in which good advice is given to young field observers.

This reviewer is not quite certain of some of the statements he finds in the paper. One of these is that on the correlation of the singing of the Wood Pewee's twilight song with the bird's respiration. On pages 54–55 we read: "Because of the continuity of the sound in the gliding phrases it seems necessary to assume that the entire phrase is sung with one expulsion of the breath. From this, and from other facts, we conclude, tentatively, that at the height of the rhythmic song the Pewee inhales and exhales only once for each phrase; his rate of singing is his rate of respiration.." Now, the fastest singing recorded averaged 32 phrases per minute, which I should think would be a very slow respiration rate for a Wood Pewee. According to Baldwin and Kendeigh in "Physiology of the Temperature of Birds" (1932) the Wood Pewee's average temperature was found to be 108°. They obtained no respiration rate for this species, but they found that the respiration rate of the Chipping Sparrow at a body temperature of 108° was 104 per minute, and the slowest rate they record at the same temperature is the Robin's of 74 per minute. There may be evidence with which I am not familiar that the Wood Pewee's respiration rate is considerably slower than that of other small birds, but Craig cites no authority for an assumption that such is the case.

I am not aware that the relation between respiration and song has ever been studied, and I suggest this as a subject for investigation by physiologists. How, for instance, can so small a bird as the Winter Wren pour forth for a period of eight seconds (A. A. Saunders in "A Guide to Bird Song") a continuous succession of warbles and trills without any apparent pause for breath? To return to the Wood Pewee, I find it impossible to account for the rate of singing on the supposition that it represents the normal rate of breathing, but an explanation of the facts is still to seek. Perhaps the time consumed by each gliding phrase is really considerably greater than the average time of all the phrases and the intermittent rests, and perhaps the bird takes several short breaths during each rest instead of only a single respiration, and thus by occasional very rapid respiration builds up a bank of oxygen upon which to draw. Or perhaps air stored in the air-sacs could be drawn upon without respiration; a considerable amount of air could be stored there for use in song. Another, though I think less probable, explanation might be that the syrinx is capable of producing sounds in inhalation as well as exhalation, so that birds might have the power of producing continuous sounds by complete respiration—aspiration following expiration without a hitch between—a feat that is difficult, if not impossible, for the human larynx to perform, though easy enough for the whistler.

Other things upon which I should not agree with Dr. Craig are largely matters of emphasis and opinion—as, for instance, I should attach much more importance to the role of the imitative factor in bird song than he does—but this is not the place for that kind of discussion. From my own point of view one of the most important contributions of the paper is the concept of the unemotional twilight song as belonging to an entirely different category from the courtship and territorial songs and from song as an emotional outlet and as a mere habit extended beyond its period of utility.

This seems to me a very important paper and one that is destined to influence profoundly the study of this most interesting phase of bird behavior.—Francis H. Allen.

WATERFOWL IN IOWA. By Jack W. and Mary R. Musgrove. Illustrated by Maynard F. Reece. State Conservation Commission, Des Moines, Iowa, 1943: 6 x 9 in., ix + 122 pp. 12 pls. (8 col.), 11 vignettes. $1.00.

For its cost, no bird guide offers more help in identifying game waterfowl than this little book, which has been prepared not as a scientific treatise but rather as an introduction to wild waterfowl. Six chapters briefly describe 37 Iowa species (2 swans, 6 geese, and 29 ducks)—which occur also in most of the central states. Four chapters discuss molts and special plumages, lead poisoning, enemies of waterfowl, and migration. The description of fall migration is a real contribution to waterfowl natural history.

The illustrations by Maynard F. Reece compare very favorably with more expensively reproduced work of well-known bird artists. The problem of necessary crowding on the plates has been satisfactorily met by varying the action and poses. With a few exceptions such as the diving ducks (whose bodies seem too long), the birds are well drawn. Unfortunately, the text and color plates do not always agree, and a few rather serious errors have crept in. For example, the "juvenile male" Red-breasted Merganser (pl. 8) has the *adult* wing, and actually is a second year or adult drake (in earlier molt than the adult drake figured just above). The "juvenile male" Redhead (pl. 5) is more like an adult female. The "juvenile" drakes of the Wood Duck, Ring-necked Duck, and American Golden-eye are not true juveniles in the "plumage succeeding the natal down"—to quote from the authors' glossary—but are shown well along in their post-juvenal molt into the first adult (nuptial) plumage. Of two dabblers shown "in eclipse," the Wood Duck is correct, but the Mallard erroneously shows traces of green head plumage and white neck-ring, which are regularly lost in full eclipse. Unfortunately, the text and illustrations present the two unproved subspecies of the Black Duck but omit all mention of plumage differences between the sexes. Actually the plate shows a pair (drake at left) rather than two races.

No mention is made of the double molt of females; but we are not surprised at this omission, considering the errors and gaps in the literature on waterfowl plumages. Crediting the Ring-necked Duck with a "soft, purring note" is to omit the very harsh, croaking notes it often utters.

Perhaps faulty color work, rather than artist's errors, is responsible for failure to show the light blue of the bills of the Ruddy and Buffle-head drakes and the pink band on the bill of the Old Squaw drake. The juvenile Snow and Blue geese are figured with pink, instead of grayish-black, bills and legs.

Nevertheless, the book will be very helpful to a great many people, especially to those who do not own the more detailed and more expensive Kortright manual. The Iowa State Conservation Commission, the authors, and artist are to be congratulated on the publication of this useful guide.—Miles D. Pirnie.

THE RAFT BOOK. By Harold Gatty. George Grady Press, 445 West 41st St., New York, 1943: 5½ x 7⅝ in., 149 pp. 29 pls. (2 col.), 2 folding maps. $3.25.

The destructive forces of modern war have made shipwreck so common that we have now a special book published for those about to be lost at sea. Harold Gatty, famous aerial circumnavigator of the globe, has used his knowledge of the remarkable native Polynesian methods of navigation to prepare a volume which will, he believes, enable even an untrained person without navigating instruments to find his way to land after being set adrift in a life boat.

To judge by his allotment of space, Gatty considers bird study second only to astronomical methods in value to the navigator forced to find his way at sea without instruments. The authenticity of Gatty's thirty-five pages and six plates devoted to birds will be instantly recognized by every bird student when he finds that the author's adviser was Robert Cushman Murphy, and his bird artist, Francis L. Jaques.

Gatty says that "birds have played a far greater part in the opening up of the world than is generally realized . . . A study of the tracks of the migration of land birds in the Pacific, and further consideration of the evolution of bird migration routes, shows that man's path in the Pacific has followed the paths of land birds. No people, whether primitive or civilized, would set out over thousands of miles of ocean without knowing that they were going to some land. The Polynesians, who were, like all primitives, close observers of nature, saw the land birds taking off year after year in the same direction, and knowing that they were not able to rest on the ocean, must certainly have realized that another land lay in that direction. What else would lead these seafaring people from Tahiti to New Zealand but the repeatedly observed migration of the Long-tailed Cuckoo between these two places?" (p. 6).

The scope of the ornithological part of the book is best indicated by the titles of the sections: Migratory Birds as Winged Pilots, Land Sighting Birds as Navigating Instruments, Land Indications from Seabirds, Birds of the Ocean and their Distribution.

The five Jaques plates figure sixty-six birds of forty-three species chosen as representative of the principal kinds of sea birds.

The book is published in two editions—one for shore use and a water-proofed edition reserved at present for use in lifeboats and rafts.

Anyone interested in the ocean and its birds will find fascinating and profitable reading in this very attractive little book.—J. Van Tyne.

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