

## REVIEWS

**The Wren.**—Edward A. Armstrong. Macmillan, New York. viii + 312 pp., 32 tables, 8 black and white plates, 41 text-figures. Price \$6.00.—In conducting this study of “the Wren,” or Holarctic Wren (*Troglodytes troglodytes*), Edward Armstrong, in addition to examining an enormous literature, filled notebook after notebook with observations on this elfin bird from various parts of its range. The study extended over a period in excess of ten years. Although the main observation areas were near Cambridge and thus pertained to the British population of the nominate race, several races, including both continental birds (which tend to be migratory) and ones from islands or isolated mountainous areas (which tend to be sedentary) are taken into account in this book. Moreover, the author has incorporated life-history information, of which some was obtained first-hand, on other troglodytid species (all New World inhabitants) and on other kinds of birds as well as other animals. The net result of Armstrong’s endeavor is an engagingly written, well-illustrated account of the ecologic life history of the Holarctic Wren. The account is illumined with many comparisons, both interracial and interspecific. Appearing as the ninth volume in The New Naturalist series, this volume is designed “to interest the general reader in the wild life of Britain by recapturing the inquiring spirit of the old naturalists.” It ought to, and doubtless will, prove of even greater interest to bird watchers, wherever they may be located, whose study of and work with birds is of more serious, steady, or advanced nature than that of the general reader.

Early chapters outline the wren’s distribution, which embraces parts of North America, several North Atlantic islands, Britain, and much of Eurasia; and its habitat, which usually involves thick cover and excludes undiversified open country and densely built-up areas. Treatment of migration, dispersal, and homing is followed by that of general behavior and feeding habits.

Territory is dealt with under a dozen sub-headings. These are, in part, as follows: size—between two and three acres, or larger where competition is lacking; boundaries—influenced, to be sure, by neighboring wrens, and sometimes though not always by open spaces; the role of the female—who leaves territorial defiance to the male; expulsion from territory—“a wren may be dispossessed of his territory by gradual usurpation or by more or less abrupt domination and evictions”; and territory and polygamy—“I have never known a polygamous wren’s mates to lay in nests close to one another when they could choose sites further apart.”

Call-notes and especially songs are handled assiduously and at considerable length (pp. 52–96). One figure illustrates “the gradations in volume and corresponding changes in function of the wren’s song” (ranging from loud territorial song to whisper song, the latter being the softest version of “sub-song”). Several histograms show song output during whole-day observations. Other parts of the chapter on voice (to mention a few) encompass such matters as defense and intimidatory songs; the effectiveness of territorial song—there being indirect evidence that “males react with more confident aggressiveness against deficient singers,” with the added note that “apparently, imperfection either in display or song reduces a bird’s chances of mating”; a comparison of wren songs; courtship songs—which “in general are sweeter, softer and more warbling than most territorial songs”; the female’s song—usually whisper song, which may be issued when brooding, feeding the young, or otherwise associated with nestlings or fledglings. A helpful tabular summary includes nine types of general call-notes, three sexual call-notes, and two juvenal call-notes.

There follows a discussion of recognition, pair-formation, and polygamy. As to species recognition, several experiments "suggest that, so far as appearance is concerned, as distinct from posturing and utterance, the general pattern is more important than any outstanding feature" (the wren having no specific adornment). The sexes look the same and are recognized by their behavior. "Pair-formation procedure among wrens may vary from association in the roost during autumn and winter maturing into a pair-bond, to a very brief summer courtship." Polygamy, which characterizes European and British but not small-island populations, is optional in that monogamy occurs and is successive in that it differs from the harem behavior of certain game animals. Yet the sex ratio does not seem unbalanced either in European birds (studied intensively by Kluijver and his associates) or in others. "Whatever other function it may serve," concludes Armstrong, "polygamy appears to accentuate competition and give selective advantage to the most vigorous males."

Having published in 1947 a well-known work, *Bird Display and Behaviour*, the author's masterful handling of the wren study is particularly evident in his chapter on sexual display. Pursuits of females by males (sometimes female-initiated) are readily noted in spring, especially in early morning hours, and "pouncing," in which a male rushes at a female where she has alighted on or near the ground and participates in a "quick mêlée" (which may or may not involve actual contact), is likewise apparent at these times. There is evidence that thwarting interactions, such as take place when one of a pair is less ardent or unable to respond by coition, result in increased song and epigamic display. Song and display may indeed be a by-product of conflicting drives. Numerous types of display behavior are recognized. These are, in part, wing quivering; banner posture (wings raised and tail erect) and windmill display (wings flapped rapidly while the bird sings); the volplane (downward floating with wings at 45° angle); nest-invitation display (with ostentatious movements or utterances, or both, in the near vicinity of the nest-entrance; and, as may be noted especially in April, female solicitation display and coition (in which she squats with spread, quivering wings and tail, giving high-pitched squeaks or squeals; coition, if it ensues, may be accomplished in two to five seconds of contact). As the author states in his preface, "In some instances matters dealt with summarily will be found discussed in more detail in *Bird Display and Behaviour*."

Nests are various in their materials, these including leaves, fern fronds, and grasses, with feathers and other downy material for lining. They vary also in their emplacement, which may be in low trees or herbage, in rocky clefts, in hut or wall crevices, in turf banks, or in other situations. As observed near Cambridge, a male usually makes more than four nests in a season (in Holland, Kluijver found the average number to exceed six). Many particulars are given on other topics, among which are nest-building technique, effect of rainfall on building, building tempo, female building activity, and lining activity. "Just as females may show some capacity as nest-builders so males sometimes manifest feeble lining impulses."

The average clutch size ranges from about 5 in southern Spain and 5-6 in England to 6-8 in Norway. There is some evidence, based chiefly on Kluijver's findings, of longer incubation periods in April and May (about 17 days) and shorter ones in June and July (about 15 days). These data pertain, however, to the time between the laying of the last egg and the hatching of the first—instead of the last—egg; the author comments that had they referred to the hatching of the last egg, the apparent shortening of the period from spring to summer would be less striking, perhaps insignificant. Other considerations are: night-brooding and roosting, effect of cold weather, retention of viability of eggs, pseudo-incubation, and incubation

rhythm. One wren (Silverband) had sessions on and recesses from the eggs averaging, respectively, 29 and 14 minutes when the mean temperature was 70°, and 33 and 11 minutes (thus, a greater coverage) when it was 65°. Further treatment of incubation, with graphic illustrations, employs not only data from the Holarctic Wren but also data from the House Wren (*Troglodytes aedon*), whose monographers were Kendeigh and Baldwin.

In the chapter on care of the nestlings are a number of topic headings. A few of these together with certain items of interest are the following: hatching—often spread over two days, occasionally three; brooding of nestlings—the average daily reduction in brooding is about 6 or 8 per cent; number of visits with food per day—with one female, 91 visits shortly after hatching to 397 two days before the young fledged; roles of the sexes—the male feeding nestlings in about 40 per cent of nests in Holland, though apparently less, and only after the young are several days old, in England; feeding tempo and polygamy—“to say that polygamy among wrens is an adaptation correlated with a relatively abundant and readily available food supply merely summarizes a complex situation.” (This statement would seem to reflect an integral part of the author’s naturalistic philosophy, for in the reviewer’s opinion the major shortcoming of the monograph is the failure to provide adequate verbal summaries; despite the fact that much has been compressed in tables and graphs, summary sentences and passages are widely scattered, almost lost, in the body of the text.) To list a few more items: nest sanitation—a young wren, when more than a week old, tends to crowd the nest-entrance and after receiving food “it turns round, and mutes the sac to the waiting female or male”; nest probing—by the female, a means of keeping the nest tidy; food brought to nestlings—mostly insects, arachnids, and other arthropods, the insular races probably supplying somewhat larger morsels; and duration of sorties while feeding nestlings—these tending to become shorter as the chicks grow.

The appearance and early reactions of the nestlings are well described, mostly in qualitative terms. There is a brief description of growth of plumage and increase in activity. Data from the Heinroths show the hatching to weigh about one gram, the weight increasing at about one gram per day. The nestling period appears to average close to 15 days in Britain, somewhat more in more northerly regions. The author develops an interesting discussion of the relation of the nestling period to food supply, and another of “spread nesting” (meaning, usually, that “pairs may begin breeding at different dates over a prolonged period or . . . have a series of broods”). In the Holarctic Wren, spread nesting is more characteristic of races inhabiting bleak, insular regions (where it “may be adapted to a continuous, relatively stable food supply or conditions in which one of several successive minor food peaks may fail”); although insular races are mainly monogamous, in other populations (as in Europe) successive polygamy is a common practice and is associated with a more closely synchronized inception of laying (even though spread appreciably), as well as with high availability of food, accentuated territorialism, and multiple nest-building.

The young normally leave the nest in the forenoon, occasionally in the afternoon. Accounts of the behavior of adults and fledglings and travels of the family are provided. “Females may feed fledged chicks for as little as 9 days . . . and for as much as 17 to 18 days.” The male tends to guide the family in its excursions; a family under female guidance may go beyond the male’s territorial bounds. Further discussions relate to second broods, certain roosting traits (including the use of nests of other species), and fostering.

Another substantial chapter brings together information on predation (despite many known "instances of the persecution or slaughter of various wrens by other birds . . . , so far as is known, no species suffers seriously from the depredations"), victimization by the cuckoo (which "can be a menace to the European wren in some areas"), parasites and nidicoles, diversionary display (injury-simulation is unrecorded for the wren), and mortality due to misadventure and to adverse weather. A final chapter covers sundry aspects of arising and roosting. As shown in one figure, arising closely follows civil twilight (when the sun is  $6^\circ$  below the horizon) throughout the year, whereas roosting is much earlier than civil twilight (even earlier than sunset) in summer but is later than this in winter. Some of the other topics include: arising and roosting when feeding young, relationship of arising to moonlight, influence of weather on roosting times, memory of the roosting place, and factors determining social roosting.

The monograph is completed by a 15-page bibliography, including titles of papers most important for the study of wrens, plus a meticulously organized index covering subspecies of *Troglodytes troglodytes* (with geographic subdivisions), other species of wrens mentioned in the text; birds other than wrens; mammals, cold-blooded vertebrates, and invertebrates; and authorities.

This important treatise, of which no review can furnish a satisfactory summary, is based on an extraordinary amount of data gleaned mainly by Edward Armstrong, though also by other workers over a long period. The author, with a felicitous literary style and an extensive grasp of the subject of bird behavior, has so molded and amplified this mass of gathered facts as to have produced a highly readable, sympathetic, and authoritative story of *Troglodytes troglodytes*.—ROBERT A. NORRIS.

**Die Vögel Hessens.**—Ludwig Gebhardt/Werner Sunkel. Senckenberg Buch No. 34, 532 pp. 5 pl. 17 figs. Price 14 D. M. W. Kramer, Frankfurt A. M. 1954.—There are probably few places in the world with as long and active a faunistic history as the area of the middle Rhine and the adjacent parts of Hesse. In the present summary it is recorded with great detail where the various species of birds occur within the study area, what changes have taken place within the last 200 years, and what the migratory behavior and the winter quarters of the Hesse bird populations are. This summarizes the information included in the enormous number of 1885 longer or shorter publications dealing with the birds of the area. An excellent biographical section (72 pages) deals with the history of the ornithological exploration of the area. As far as "pure" faunistics is concerned, it would be difficult to improve on this volume, but authors of state lists should consider carefully whether it is the ideal to consider birds merely as components of the general geography. The emphasis on presence versus absence leads one to overlook that each landscape also affects the biology quite drastically. Habitat selection, average clutch size, the frequency of second or third broods, the beginning and end of song period (and other components of the seasonal cycle) are as legitimate components of biological faunistics as the mere recording of presence and absence. This volume on the birds of Hesse represents classical faunistics at its best and will serve as a solid basis for the biological faunistics of the future.—ERNST MAYR.

**Water—The Yearbook of Agriculture, 1955.**—U. S. Department of Agriculture. (U. S. Gov't Printing Office), xiii + 751 pp. Price, \$2.00.—This treatise on the use and conservation of our water resources contains several chapters on "Water and Our Wildlife," as well as much general information of value to those interested in conservation. It should prove a valuable reference work.—ROBERT W. STORER.