

NESTING AND LOCAL DISTRIBUTION OF THE HOUSE
WREN (*TROGLODYTES AËDON AËDON*).¹

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THE researches on the matings and returns of House Wrens which have been carried on at Hillcrest Farm in Gates Mills, Ohio, since the summer of 1915, have already led to a number of interesting discoveries. That House Wrens not infrequently change mates between first and second broods has already been pointed out,² and much confirmatory data has since accumulated. Polygamy, as a possibility, was suggested earlier³ and is now definitely known to occur, though infrequently. Many Wrens have returned year after year to nest in the same locality, thus making possible the compilation of long and intricate genealogical trees (fig. 1), yet strangely, out of the many broods of nestlings banded each season, but few have returned to breed in succeeding years. Juvenile mortality must indeed be heavy, yet assuming that the species remains numerically constant, a larger percentage of survival is to be expected than is indicated by actual returns. To what extent do the nestlings of a previous year scatter for breeding purposes in succeeding years? In the hope that some light might be thrown on such questions as this, an extension of the field of investigation was planned for the summer of 1926 and Mr. Rudyerd Boulton, then assistant in the Baldwin Bird Research Laboratories, was appointed to extend activities on a much larger scale than heretofore. Mr. Boulton's place was taken by the junior author during the succeeding season, and plans for continuation of this line of investigation during future years are contemplated.

While, for reasons whose probable explanation is given later, it is impossible at the present time to conjecture much upon the main object of these investigations, a number of side issues have arisen, the discussion of which forms the basis of this paper.

¹ Contribution No. 13, from the Baldwin Bird Research Laboratory.

² Auk, 1921, pp. 237-244.

³ Ibid, pp. 238-239.

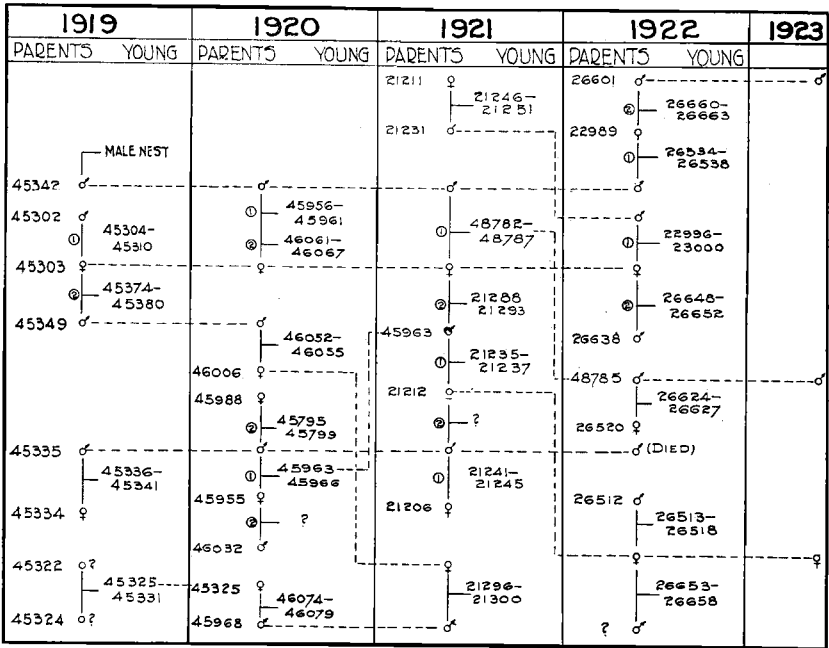


FIG. 1. GENEALOGICAL TREE OF HOUSE WRENS; NUMBERS IN CIRCLES INDICATE FIRST AND SECOND BROODS.

METHOD OF INVESTIGATION

Nesting boxes of suitable dimensions, designed in a manner enabling them to be opened readily for examination, were used. To each was fitted a trap-perch of simple design. One hundred and eight of these boxes were erected in suitable locations during the summer of 1926, and an additional 56 in 1927. The choice of location was at first largely haphazard. Barns, houses, telephone poles, trees and other likely places were selected, but later, as the Wrens arrived an attempt was made to provide a box wherever a Wren was seen or heard, and as far as possible the number of boxes was kept in excess of those occupied.

Each box, identified by a number, was visited at frequent intervals and notes were made upon nesting activities within. The interval between such visits was at first short, but, with the increase in quantity of boxes, it grew to be about a week, and as

nearly as possible thereafter each box, empty or occupied, was visited once a week during the entire nesting season. The parents were trapped and identified with Biological Survey bands. By close observation it was possible in almost every case to distinguish the sexes, for the behaviour of the two parents is somewhat different and, moreover, it was the usual practice to capture the female while incubating. At some time during the second week after hatching, by which time their legs had obtained the maximum of growth, the young were banded also.

It was found that Wrens usually sought boxes of the Baldwin Laboratory type in preference to others of less suitable dimensions, but, in order that the survey might be as complete as possible, all boxes belonging to estate owners within the territory were kept under observation. A few Wrens are wont to seek deserted Woodpeckers' holes, or crevices in rotten stumps, in which to build their nests. These sometimes occasioned difficulty, but, thanks to the untiring song of the male, the locations of such nests were usually soon discovered. To facilitate the observations on, and the capture of the parents in such "wild" nests, boxes of the type described above were erected as close to the entrance holes as possible, and, when the eggs had hatched and the young were old enough to call for food, the entire nests were transferred to the boxes. On no occasion did such seemingly drastic measures harm, or interrupt the ultimate exit of the young from the nest at the appointed time.

With such methods as these it is believed that a reasonably comprehensive and thorough survey has resulted.

A few Wren nests undoubtedly escaped observation, but their number, it is felt was too small to influence the mass of information compiled.

THE AREA SELECTED.

The western side of the Chagrin Valley, some fifteen miles east of Cleveland, Ohio, where the present study is being made, consists mainly of a number of large estates. Nestling close to the river is the village of Gates Mills with the usual assemblage of dwellings and small outlying farms. To the larger estates our attention was first directed, and, thanks to the generous support and interest of estate owners and their superintendents, free

access to all parts of the area was made possible. Later, when activities were pushed further into the heart of the village our intrusions here also met with similar cordiality and encouragement.

The Chagrin River runs almost due north to Lake Erie through an open valley some 300 feet below the level of the surrounding plain. Slightly more than half of the selected territory lies between the 1050 and the 900 foot contour lines. Then with a sudden drop, in many places precipitously, the land falls off to 800 feet above sea level, after which the decline is less and less pronounced until at slightly less than 750 feet the river's edge is reached. For the purpose of this study it is convenient to divide the territory into the following three areas:—

- (a) an upper, plain area—above the 900 foot contour line.
- (b) an intermediate, cliff area—between the 900 and 800 foot contour lines (dotted on the map, fig. 2).
- (c) a lower, valley area—below 800 feet.

These may be considered in more detail:—

(a) *The upper, plain area*—Roughly about half of this area is more or less heavily wooded (cf. figs. 2 and 3), and so is environmentally unsuited to the breeding habits of the House Wren, but a few clearings for residences are of sufficient size to attract Wrens and nesting boxes were there erected. For the remainder, the distribution of nesting boxes was confined to the more open parts of the area. Four large estates, of which the senior author's is one, are included in this area, all being situated near to the 900 foot contour. An ample supply of boxes was here erected, those on the senior author's estate having been in place for many years. The remaining portion of the open country consists of level grassy plains with a scattering of dwellings, small farms and orchards. Boxes were freely distributed in likely places, chiefly on, or near to, residences and barns.

(b) *The intermediate, cliff area*.—For the most part this consists of more or less precipitous slopes, thickly vegetated. But few boxes were erected here, and these were confined chiefly to clearings and the neighborhood of dwellings.

(c) *The lower, valley area*.—Very little of the tree-belts extend into this area, and most of the large estates, with formal gardens, orchards, and lawns scattered thinly with trees are here located.

The area, although open, is therefore considerably different from the open grassy plains above. The many dwellings afford an ample supply of suitable nesting sites for Wrens, and boxes were distributed freely. To the east this area is bounded by the river.

THE SEASON OF 1926.

For reasons unknown the summer of 1926 proved a poor year for Wrens. This is shown by a comparison of the figures given in the following summary of the Wrens that have nested at Hillcrest Farm, the senior author's estate, during the years 1921-1927 inclusive.

1921—9 pairs, of which 7 had two broods, and 2 one brood.

1922—9 pairs, of which 6 had two broods, and 3 one brood.

1923—11 pairs, of which 3 had two broods, and 8 one brood.

1924—9 pairs, of which 4 had two broods, and 5 one brood.

1925—8 pairs, of which 5 had two broods, and 3 one brood.

1926—5 pairs, of which 1 had two broods, and 3 one brood.

1927—9 pairs, of which 2 had two broods, and 7 one brood.

Early in June 1926, two female Wrens arrived on the estate. Both mated, but only one brought off a successful brood. The other was found dead near its nest box a few days after its arrival. Not until July, by which time the solitary pair were about ready to commence a second brood, was the Wren population swelled by the arrival of three more females, each of which mated and brought successfully to a climax its single brood.

In the field note book of this year it is observed that the dead female showed no signs of injury or other violent cause of death, and disease was suggested as a possible cause. Perhaps here lies the clew; some infectious disease may have swept through the entire Wren population while in its southern winter quarters. We cannot tell, but inquiries have shown that in many parts of their breeding range Wrens were unusually scarce this year.

Turning now to the extended survey with which Mr. Boulton was engaged in 1926: only 24 females were banded, six of which had two broods. Fifteen additional females, ten of which deserted their nests, escaped identification. These latter were probably many of them the same birds that were identified elsewhere. The total number of females on the whole area was probably somewhere in the neighborhood of 30.

Of the males, 21 were banded. Owing to their habit of putting sticks into two or three neighboring boxes, as well as to the fact that many are irregular, or neglectful of their parental duties, capture for identification is often impossible. It is probable however that the sexes were represented in about equal numbers.

Of the total 45 birds identified, three were returns from previous years, banded, of course, on the senior author's estate. They were:—

A—50, ♂, banded in 1924, nesting in 1926 about $\frac{1}{3}$ mile away.

31980, ♂, banded in 1925, nesting in 1926 about 2 miles away.

A—129, ♀, banded in 1924, nesting in 1926 about $\frac{1}{2}$ mile away.

A total of 157 young were raised successfully during the season.

One hundred and eight boxes were available. Thus the area was fairly well covered, but some blank spaces remained. Thirty-eight of the boxes were not even visited by birds during the entire season, and a number of others were visited only by male Wrens at sparse intervals.

A comparison of the above data with those given below for the season of 1927, illustrates sufficiently the abnormal scarcity of Wrens throughout the territory during 1926 and the consequent reason why it is unsafe, for the present, to speculate on the expected returns of either nestling or adults in the succeeding summer.

THE SEASON OF 1927.

Besides the boxes erected in 1926, of which 96 remained, a further 20 were added in early spring, making a total of 116 available at the beginning of the season. Later more were added to fill gaps here and there when indicated. Thus it is felt that with but one exception, the entire area was from the start thoroughly covered. The exception was a small area near the river at the southeastern extremity of the territory which was brought under observation too late to include first broods. Besides our own boxes there were, scattered throughout the territory, a number of Wren boxes belonging to residents and estate owners. These were kept under observation too, and 28 were occupied by Wrens during the season.

The Wren Population.—The numbers of Wrens nesting in the territory were as follows:—

Females

Newly banded	69
Returns from previous years	11
Unidentified (some possibly duplicated)	12
Total probably between 85 and 90	

Males

Newly banded	54
Returns from previous years	11
Unidentified (many probably duplicated)	57
Total probably about 90	

This is approximately three times the population of the previous season, and represents probably about the normal density, as is indicated by the summary of Wrens nesting at Hillcrest Farm during the past seven years (see page 192).

Returns from previous years.—Not one of the twenty-two returns had been banded earlier than the preceding year. This, in itself, is suggestive of a previous calamity especially when we look back for comparison to the records of earlier years (cf. fig. 1). Five of these returns were banded in the nest in 1926 and returned as follows:—

- 1 male to immediate vicinity of original nest
- 1 male and 1 female to within $\frac{1}{2}$ mile of original nest
- 2 females to within 1 mile of original nest

The remaining 17 adults of the previous season returned as follows:—

9 males and 5 females to immediate vicinity of previous year's nesting site.

- 1 female to within $\frac{3}{4}$ mile of previous year's nesting site.
- 1 female to within 1 mile of previous year's nesting site.
- 1 female to within $1\frac{1}{2}$ mile of previous year's nesting site.

The tendency of the female to stray further than the male is striking though not surprising since it is the male who selects the territory in advance of his mate.

In one instance the same pair mated together for their first broods in the same locality both years, but took new mates for second broods each time.

Number of nests and offspring.—Discounting male nests, a name given to nests in various stages of completion, built by the male as accessories to the one occupied by his mate, as well as to

those built by unmated males, there were 104 nests under observation within the territory, and from these 86 broods flew. These may be classified as follows:—

First broods—54, of which 49 were successful.

Second broods—50, of which 37 were successful.

The total number of eggs laid by all the females under observation was 581. Of these:—424, or about 73% hatched, and 390, or about 67% left the nest as normal young. The remaining 33% perished at one stage or another.

Average number of eggs per female.—Of 21 pairs of Wrens which had both broods under observation, the average number of eggs laid was:—6 eggs to the first brood, and 5.5 eggs to the second brood.

Of nineteen pairs, known to have had but one brood, the average number of eggs laid was 6.3 per female,

PERIODS OF NESTING ACTIVITIES OF HOUSE WRENS
GATES MILLS, OHIO - 1927

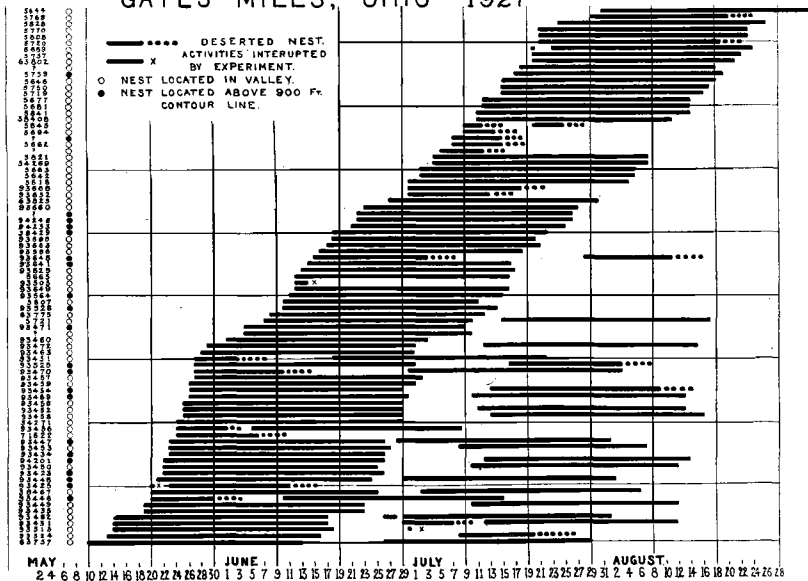


FIG. 4. LINES REPRESENT PERIOD FROM LAYING OF FIRST EGG TO DEPARTURE OF YOUNG FROM THE NEST.

Arrival and Distribution of Wrens—Wrens began to arrive during the last days of April, and by May 10, the first pair had completed nest-building and their first egg was deposited. Three days later a second nest contained its first egg, and by the following day three more had reached this stage. Nest building was actively progressing on all sides, and by May 20, ten days after the first female had laid her first egg, ten females had commenced laying.

A striking fact now came before our attention. The first seven nests to contain eggs were all located down in the valley, and the first one to reach this stage on the upper plain area was ten days behind the first in the valley. From then on, until the end of May, an average of three birds commenced laying each day, and these were in the proportion of 10 above to 13 below the 900 foot contour line. Throughout the month of June the average number of females commencing to lay dropped to about one a day, and, excepting two of the earlier ones, none of them raised a second brood. (see fig. 4.)

Not only was there a striking difference in the time of nesting between birds in the valley and those above, but also a marked discrepancy in numbers was soon apparent. The distribution of first brood nests in the three areas was as follows, (cf. map, fig. 5):

The upper, plain area	17
The intermediate, cliff area	6
The lower, valley area	25
Total	48 ¹

That this selective distribution did not merely mirror the distribution of available nest boxes is shown by the map (fig. 5), wherein it will be seen that the unoccupied boxes (represented

¹ The apparent disagreement between this figure and that given above (page 195), as well as between figs. 4 and 5, is explained by the fact that an estate to the south of the territory outlined herein was included in the survey, but owing to distance, thorough observation was not always possible. The exclusion of this estate on that account was necessary, but for the purposes of calculating percentages of successful broods the added weight of such information as this estate has yielded is taken advantage of. The diagram of "Periods of nesting activities" reproduced herein as fig. 4, was prepared early in November, 1927, for use by the junior author as a lantern slide to illustrate a paper read at the annual meeting of the A. O. U. in Washington, D. C. At the time of its preparation the limits of the territory had not definitely been fixed.

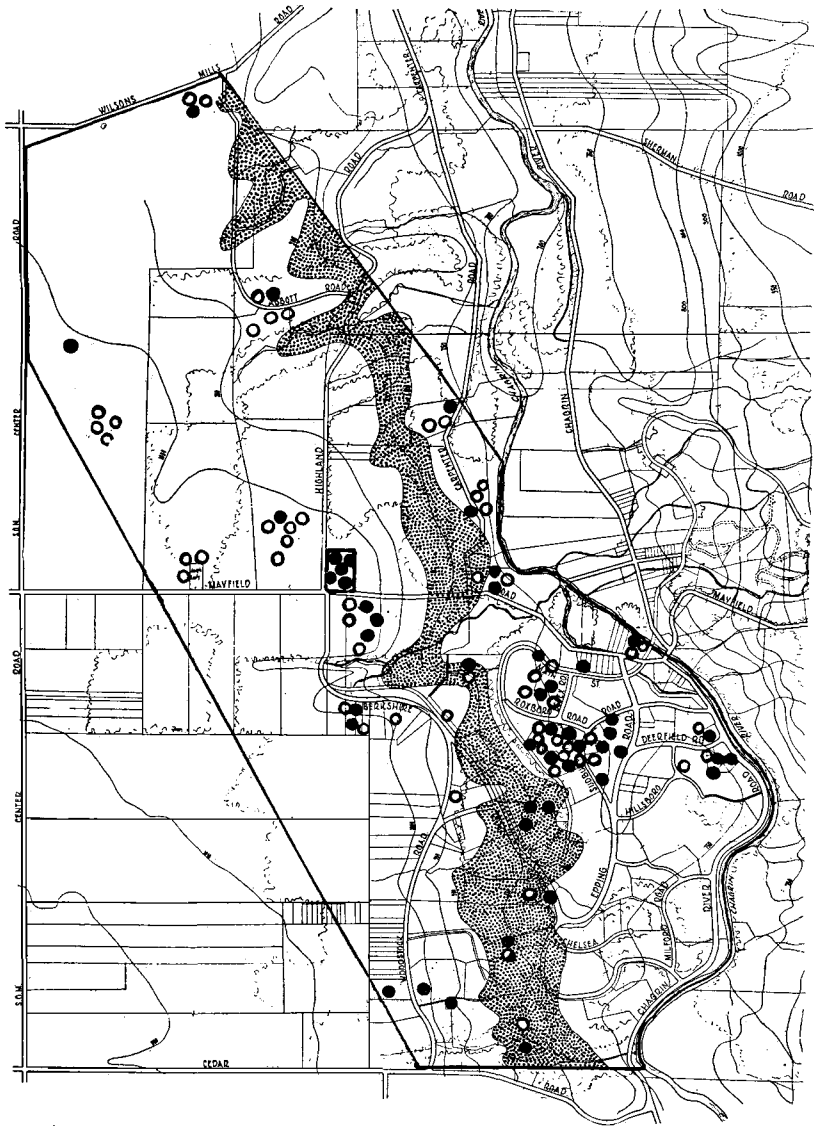


FIG. 5. DISTRIBUTION OF FIRST BROODS (SOLID DOTS) AND AVAILABLE BUT UNOCCUPIED BOXES (CIRCLES).

by circles) are throughout in excess of the occupied ones (represented by solid dots). True, there are more boxes in the valley than above but that is due to the constant demand (by the Wrens themselves) for a further supply below, and lack of such demand above.

Even more clearly was this peculiarity of distribution shown in the second brood nests, as follows:—

Upper, plain area	12
Intermediate area	4
Lower, valley area	37

A portion of the territory which for various reasons we were unable to cover during the early part of the season was, at the time of the commencement of second broods, brought fully under observation and resulted in an increase in the number of nests. As this new portion lies wholly below the 800 foot contour line the addition resulted in a raising of the percentage of nests in the valley area. At no time was the vigilance of the survey over the upper area decreased.

Speculation on the reason for such selective distribution seems hardly possible at this early date. Had a suspicion presented itself before the nesting season was under full swing, a study of the environmental conditions, particularly the flora and insect fauna, might have been attempted, but such a study with its possible correlations must remain for a future season.

Movements of Parents between broods—As a general rule it was found that the parent Wrens reared their second broods in the immediate vicinity of the nest from which the first brood had flown. There were, however, some exceptions to this rule.

A few experiments were tried in order to find whether a "sense of direction" could be attributed to the parent Wrens, and if so, to what extent.

Certain Wrens were captured at their nesting boxes and brought by automobile to the senior author's estate where they were released. Such experiments were tried only on birds that had not yet commenced laying, as it was not desired to interrupt seriously the natural course of nesting activities over the area. Fourteen such experiments were made, nine of which were with unmated males, two with mated males and three with mated

females engaged in lining their nests. The results of these experiments are hardly complete enough for analysis, but on the whole, as is seen in the following table, a tendency for the male to return from considerable distances is exhibited, while in no case was this apparent in the female.

EXPERIMENTS ON THE "HOMING" INSTINCT OF HOUSE WRENS

<i>Band No.</i>	<i>Approx. dist.</i>	<i>Returned to Same locality</i>	<i>Same box</i>	<i>Stage of Nesting Activities</i>
<i>Males</i>				
93415	2 miles	no	no	♂ nest
"	¼ "	yes	yes	"
93426	¼ "	"	no	"
93424	½ "	"	no	mated—no eggs
93455	1¼ "	"	"	♂ nest
"	1¼ "	"	"	"
71629	1½ "	"	"	"
93508	¾ "	"	yes	mated—no eggs
63764	1½ "	"	"	♂ nest
93691	3 "	"	"	"
<i>Females</i>				
93425	½ miles	no	no	mated—no eggs
93413	1½ "	"	"	" " "

1 male and 1 female were not recovered.

Movements of young after leaving the nest.—Information of this sort is not easily obtained. For the first few days they may usually be seen accompanied by their parents not far from the nest, but soon the families break up and the parents return to engage in further nest building, leaving the young to take care of themselves. A single clew which throws light on this stage of a Wrens' life came to us on Sept. 27, 1927, when a banded Wren was trapped at the Laboratory. It proved to be a nestling hatched in a nest down in the valley two months before, thus indicating that the young Wrens remain scattered over the territory until instinct, or climate, drives them south.

Gates Mills, Ohio.