

HOMING INSTINCT OF THE RED-WINGED BLACKBIRD¹

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ALTHOUGH it has been known for at least 2500 years that certain species of birds (notably the homing pigeon) possess a strongly developed homing instinct, yet there is still much to learn as to both the mechanism by which this remarkable ability operates and the degree to which it is exhibited in different species. The number of species upon which such experiments have been tried is still small, although it includes such familiar types as the Cowbird, Barn Swallow, House Martin, and Song Sparrow among the land species, and a number of species of waterbirds. Of all the work of this kind, the classic researches of Watson and Lashley on the Noddies and Sooty Terns of the Tortugas and the more recent studies of Rüppell in Germany on the Starling are the most important. The general conclusion to be drawn at present seems to be that while the homing instinct is relatively highly developed in birds, and is probably possessed to at least some degree by all species, yet different species vary greatly in the degree to which they exhibit it. The mechanism by which this ability operates must depend to a large extent on visual recognition of familiar objects when short distances are involved, but for greater distances none of the theories yet proposed offers a satisfactory explanation.

The experiments which are reported below were undertaken to test the degree to which the Red-winged Blackbird (*Agelaius phoeniceus phoeniceus*) possesses the ability to return to the locality where first caught. To do this, the birds, after being caught in a house trap or funnel trap on the University Farm, were taken in covered containers to a number of points at varying distances and directions from Syracuse. Transportation was by automobile. In a number of cases liberation was at night, and in all cases it was rather late in the day. The table below presents a summary of the work done.

The results show clearly that the Red-winged Blackbird possesses a highly developed homing instinct, although it is exhibited less strongly than by certain other common species. As the table shows, some birds returned from each of the places where they were liberated, but in most cases the proportion which returned was not high

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TABLE 1
HOMING EXPERIMENTS WITH RED-WINGED BLACKBIRDS*

<i>Place of release</i>	<i>Direction from trap</i>	<i>Distance (miles)</i>	<i>Date of release</i>	<i>Interval before recapture (days)†</i>	<i>Number of birds released</i>	<i>Number of returns</i>
Syracuse University	N	2	various	2 hours to 28 days	38	18
Fayetteville	E	9	4-17-39	4 (1)†	3	2
Tully	S	20	4-21-39	3, 12	2	2
South Bay	NE	22	5-5-39	6, 7, 9	9	3
Cazenovia	SE	25	5-2-39	4	5	1
Montezuma Swamp	W	30	5-3-39	5, 13 (2)†	10	4
Winfield	E	55	5-7-39	10, 11	7	2
Watertown	N	72	4-24-39	13	1	1
Rochester	W	89	5-28-39	(1)†	2	1
Scranton, Penna.	S	125	5-12-39	(3)†	10	3
Buffalo	W	140	5-20-39	(2)†	6	2
Aurora	SW	36	5-4-40	5, 6, 9	10	3
Alexandria Bay	N	90	5-12-40	—	16	—
Schenectady	E	114	4-27-40	12, 16, 21	7	3
Hadley, Mass.	E	210	4-19-40	17, 30	7	2
				Totals	133	47

* All the birds used in these experiments were males.

† The figures in parentheses indicate the number of birds which did not return until the following spring.

and when the date of liberation was late in the spring (after the middle of May) recapture often did not take place until the following year. It is of course true that the birds may have returned earlier without being recaptured. In general we have found that few Red-wings could be captured in our traps after June 1.

Certain other interesting points emerge from the experiments. It is clear that visual memory could have played little part at least in those cases in which the place of release was at a considerable distance from Syracuse, for the cages in which the birds were carried were always covered during transit, and liberation in many cases was at night. It may also be regarded as certain that, except perhaps in the case of points south of Syracuse, the topography of the country was quite unfamiliar to the birds. It will be observed from the table that there was no particular difference in the proportion of returns whether the distances were great or small, or the place

of release in one direction from the city or another. Such differences as appeared were not consistent, but the proportion of birds returning usually approximated one-third. It is true that no birds were recovered of those liberated at Alexandria Bay, but the experience of 1939 suggests that some of these will be recaptured next spring.

It has been observed by others that birds liberated some distance from the point of capture will often wheel about somewhat uncertainly when released, and then head back in the direction from which they came. This was also seen to occur with a number of Red-wings. Even at night, many of the birds when freed would very soon orient themselves toward Syracuse, and fly off in that direction.

In a number of cases the point of release was purposely chosen near bodies of water, or swampy areas (e. g. Montezuma Swamp, Lake Oneida, Cayuga Lake, St. Lawrence River, Connecticut River, Cazenovia Lake), since the Red-wing is fond of such places and nests near them. Home apparently was more attractive, however, for as many birds returned from such points as from any others. It was also observed that certain individuals were much more likely to return and be recaptured than others. This is a fact which has also been observed of other species. But the ability to return could have been only in part due to 'practice', for the first return in a number of cases was from a point a considerable distance from Syracuse. In a number of cases, however, those birds which subsequently came back from considerable distances had previously been released at nearer points, and it might therefore be argued that they had become more or less familiar with local landmarks.

The time which elapsed between the returning of different birds from the same place varied greatly. This might of course have been due to the fact that the birds were not always recaptured soon after they returned. Very often this was presumably the case since those birds which were recaptured after having been released on the University Campus, only about two miles from the traps, were in some instances not recaptured for a number of days. The best recorded time was made by a Red-wing (no. 39-315790) which returned from Schenectady in twelve days, thus making at least ten miles a day, if it is assumed that it was trapped immediately after it came back. In most cases, however, the interval which elapsed before recapture was relatively much greater than this, amounting to almost a year with several birds. In general the results obtained in these experiments parallel quite closely those secured by the writer with Song Sparrows several years ago, except that in the latter case the distances from which the birds returned were much shorter, not exceeding

35 miles. With other species such as the Junco, the White-crowned and the White-throated Sparrow, and the Savannah Sparrow, no returns have been secured at all, although a number of individuals have been released at various distant points as well as locally. It is believed that this may in part be accounted for by the fact that not all these species breed locally, and that they are therefore caught in passage. No doubt they simply resume their migration when released.

In summary, the experiments here reported show that the Red-wing has a strongly developed homing instinct, and that the mechanism by which this operates can hardly be accounted for by any of the theories proposed up to now. Some of the distances seem much too great to permit the retracing of the route by any sort of recollection, while recognition of landmarks along the route would be impossible. Sensitivity to magnetic variations cannot of course be ruled out, but no one has ever produced any real evidence in support of this theory. Birds which were liberated (often the same birds were used in several experiments) at distances of as much as 210 miles returned to the point of original capture in Syracuse, whether the time of liberation was before or after dark, and equally well apparently from any point of the compass. Speed of travel, as far as could be determined from the length of time between liberation and recapture, was rather slow. Certain birds exhibited the homing instinct much more strongly than others, and the proportion of birds recaptured after any given liberation did not exceed 50 per cent, and was generally not over 33 per cent. Unlike the results obtained in some other work of this kind, this proportion was not appreciably less in the case of birds released at greater distances, but such differences might have been observed had the numbers of birds been greater and the distances still further increased.

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