

ORIENTATION EXPERIMENTS WITH MALLARD

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By 1959, after twelve years plentiful food and freedom from shooting, there were far too many Mallard at Slimbridge. Various suggestions for their reduction were made, some of which, though momentarily attractive, were scarcely consonant with our functions as a Wildfowl Trust. It was decided to remove any Mallard caught and release them at a distance. Previous ringing recoveries (p. 00) had shown that Slimbridge Mallard are mostly rather sedentary and it was hoped that they would show little homing ability. The surplus stock would then be spread over the countryside, to everyone's benefit, including the wildfowlers. Further, observation of their behaviour at release promised to throw light on some problems of animal behaviour. In particular it was desired to check a report by Frank A. Bellrose that migratory Mallard he released in Illinois all turned northwards, as if towards the prairies where they had been bred.

Organised drives in the pens at the end of June 1959 resulted in the capture of 284 moulting, flightless Mallard. 150 not already carrying rings were forthwith moved to a reservoir in Somerset and to another suitable place in Hampshire. The rest, previously ringed and hence of known history, were kept in a large covered aviary, 27 by 10 yards by 7 feet high, until they had regained the power of flight. Two other large aviaries each 20 x 7 yards were later constructed. These served to store birds as they were caught until sufficient (about 30) were available to make a trip and release worthwhile, and also to provide a stock of birds long after the main catching season was over. Careful checks on the condition, weight and behaviour of these temporary captives showed that they were not to be distinguished from fresh caught birds, and that results obtained with them could be accepted with confidence.

Releases took place at sixteen different points from 24 to 158 miles away and in various directions from Slimbridge. The release sites were carefully selected. They had to be flat with a good all round view since Mallard often fly off low for the first hundred yards or so before mounting up to present a silhouette against the sky; and there had to be no large body of water nearby since the birds alight on it. Deserted airfields were ideal. The ducks were released individually, thrown up into the air, the liberator facing successively round the compass. Each bird was followed through powerful binoculars (x 16) until out of sight. Only then was the next bird released. The bearing of this vanishing point was determined, an assistant taking intermediate bearings every half minute. Only bearings of birds in full flight were used for analysis. A proportion of birds landed not because they were incapable of flight (they were often recovered later many miles away) but presumably because they had found some puddle or rivulet too great an attraction.

In all, between 30th July, 1959 and 10th June, 1960, 1042 Slimbridge Mallard were released in this way in the course of 35 separate experiments. It soon became clear that in conditions when the sun was clearly to be

¹This is a short version of a paper entitled "'Nonsense' orientation in Mallard and its relation to experiments on bird navigation" which appeared in *Ibis* 103a : 211-30 (1961).

located, more than three quarters of the birds were lost to sight between north and west of the release point. This was quite regardless of the direction of home in relation to the release point; birds released in Wales headed directly away from home. Nor did the distance of release have any effect, the N.W. orientation being shown in areas with which the birds might have been familiar, as well as those which were certainly unknown to them. Experiments spaced throughout the season showed that there was no difference in the orientation, certainly no seasonal reversal of direction as might be expected if the orientation had anything to do with migration. Nor was there any difference between birds caught at different times of the year, nor between males and females. The age of the bird had apparently negligible effect. If anything, the older birds gave a rather wider spread of vanishing points. This argues against the north-west orientation being a learned reaction to local topography, such as the lie of the river at Slimbridge relative to the Decoy. If learning were involved we would expect the orientation to become sharper with increasing experience.

The very multiplicity of release points puts out of count any suggestion that the N.W. orientation was imposed by their topography. Indeed pains were taken to select some release points where lowlands, river valleys or the coast lay to the south and east, while rising ground lay to the north and west. Again and again the Mallard headed off into the looming hills and away from the type of country that one would think they would seek on release.

A marked feature of the orientation was the extreme rapidity with which it was adopted. Bearings taken only thirty seconds after release were already clustered about north-west—even at fifteen seconds the pattern was beginning to emerge. It is clear that this is a form of astronomical orientation since if the sky is really heavily clouded the birds fly off in all directions. Overcast which is not wholly uniform still seems to give sufficient indication of the sun position for the birds to pick up, rather more crudely, their usual direction. But the exact limits of cloud density and uniformity require further experimental probing. The birds must have an appreciation of time, for the N.W. orientation is adopted swiftly at any hour between sunrise and sunset, i.e. the birds fly at different angles to the sun position.

The effect of wind on the initial orientation seems to be purely mechanical. A moderate wind sweeps the birds before it for some seconds then, if it is from the north-west, they beat back determinedly. The subsequent scatter of vanishing points is then wider because birds come back to right and left of the release point rather than heading directly away.

Although orientation continues to improve up to about two minutes from release, in the sense that the bearings close more tightly about the north-west median, thereafter orientation deteriorates the longer the bird is in sight. It may be that the north-west orientation is essentially short-lived. We certainly know that it does not continue indefinitely. The recovery points of sixty birds were scattered at random as regards the release point, the great majority being within 30 miles. A lack of homing ability is also demonstrated by a low proportion of recaptures at Slimbridge as compared with those from 279 birds released locally through the season.

We are still trying to find an explanation for this extraordinary behaviour—flying off to the north-west in all circumstances, and then apparently wandering around in all directions. It may be that to fly in one

direction and then alight on the first body of water over which it passes (this has been observed) will increase the chances of a bird rejoining its companions when a flock has been scattered. But this would still leave the question why the north-west was 'selected.' Young ducks, like other birds, show a tendency to wander northwards immediately after fledging and before commencing the normal southerly or westerly autumn migration. This may well be advantageous to the species in extending the range. So possibly the immediate reaction on escaping from duress is a reversion to juvenile behaviour. All this is pure speculation and any suggestions will be gratefully entertained. But we can eliminate any suggestion that the north-west orientation is achieved by the detection of the earth's magnetic pole—if it were, cloudy skies would have no effect.

Apart from its intrinsic interest the demonstration of "nonsense" orientation at release, unrelated to the direction of home, has important repercussions on general problems of bird navigation. It would appear that similar orientation is found in pigeons and can overlay true orientation towards home. Many of the conflicts of evidence that have arisen can be resolved now. Thus claims of pigeons showing a near-immediate orientation towards home (which would preclude any detailed observation of the sun's path) are now thought to refer to orientation northwards. These and other clarifications of thought are set out in detail in the 'Ibis' paper.

The experiments are being continued to investigate the effect of cloud in full detail, to examine night orientation and its basis, to test Mallard from other points of capture (e.g. Borough Fen) and to test other species.

