

Terminal migrants and transmigrants.—Some years ago I (Blake 1953) implied that there could be two classes of migrants of the same species in certain localities. The terms "transmigrant" and "terminal migrant" were applied to the two classes. At the time I could not draw a full satisfactory distinction between the two that would at the same time account for a postulated difference in the rates of return.

I will attempt here to suggest operational definitions which, at least, offer the possibility of experimental verification of my postulate. These definitions were brought to mind by Matthews' (1955 p. 52) distinction between pilotage and navigation.

In pilotage the bird proceeds from one recognized landmark to another or, at least, to a landmark which is seen soon after leaving the first. This is contact navigation. It is conceivable that some birds may undertake their entire migration by pilotage. In that case such migrants might return regularly to certain intermediate points on the migration route.

Navigation means setting a course whose beginning and end are, during most of the passage, out of sight. One form of navigation is to follow a "leading line." But the line is all that has significance; any point on it is equivalent to any other point. For example, if the line has a bend in it, the bird derives no information as to its location from the bend but merely follows the line around the bend. In a broad sense all passage from place to place is contact navigation. In spite of this there seems to be a psychological difference between proceeding to a goal actually in sight and proceeding in a certain direction with no actually perceived goal.

We may connect up these ideas by defining terminal migrants as those birds that are near enough to their ultimate goal to use pilotage and transmigrants as those still proceeding by navigation.

Suppose we capture a group of birds that appear to be settled, say for the winter, and displace them a certain distance. The speed of return and the proportion which return to the place of capture should enable us to tell whether the species is capable of returning by pilotage over the distance through which the birds were displaced. This distance will depend on the species and, probably, on whether breeding or wintering territory is involved and may vary from a few hundred feet to many miles. Wojtusiak (1949) concluded that the European Swallow (*Hirundo erythrogaster*) knew all territory within 120 km. of its nest-site.

Once the pilotage range is known we may test a group of newly arrived birds by displacing them a somewhat lesser distance, preferably about at right angles to the general course of migration. If my suppositions are correct, some terminal migrants should soon reappear at or near the point of capture, others, of course, proceeding to their territories. Transmigrants would simply continue the migration on a course roughly parallel to that from which they had been displaced. Such experiments can be planned so that an analysis of variance is possible. It must be noted that such experiments do not tell us the character of each individual involved. Those that do reappear at the point of capture may be quite certainly put down as terminal migrants. Those that do not are indeterminable as to status. Hence, more information will be obtained by repeating the experiment at regular intervals and dealing primarily with the proportion of determinable terminal migrants at each time.

We may further suppose that birds which appear late in one migration period and early in the following one or vice versa are terminal migrants.

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Wing length of Eastern Cardinal.—Routinely I have taken the wing length (chord) of cardinals handled at Hillsboro, N. C. The postjuvenile molt is complete and there is increase of wing length in both sexes. The small series in which the juvenal and first winter wing lengths were obtained from the same