

**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.

#### REFERENCES

- BLAKE, C. H. 1953. An overall analysis of return rates. *Bird-Banding*, **24**: 144-146.  
MATTHEWS, G. V. T. 1955. *Bird Navigation*. Cambridge Univ. Press, vii 141 pp.  
WOJTUSIAK, R. J. 1949. Polish investigations on homing birds and their orientation in space. *Proc. Linn. Soc. London* **160**: 99-108.

Charles H. Blake, Hillsboro, N. C.

**Wing length of Eastern Cardinal.**—Routinely I have taken the wing length (chord) of cardinals handled at Hillsboro, N. C. The postjuvinal 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

individuals show the differences to be significant at above the 1 percent level in each sex.

|        | No. | Same individuals |                 |                | No. | Whole series |     | Mean Adult |
|--------|-----|------------------|-----------------|----------------|-----|--------------|-----|------------|
|        |     | Mean Juv.        | Mean 1st Winter | Mean of Diffs. |     | Mean Juv.    | No. |            |
| Male   | 6   | 88.0             | 92.7            | 4.3            | 18  | 87.8         | 108 | 92.4       |
| Female | 7   | 84.3             | 88.7            | 4.4            | 26  | 85.6         | 142 | 89.9       |

There is no evidence yet as to further growth after the postjuvinal molt.—Charles H. Blake, Museum of Comparative Zoology, Cambridge, Mass.

**Migrant Kirtland's Warbler Mist-Netted.**—On May 10, 1959 a Kirtland's Warbler (*Dendroica kirtlandii*) was taken in a Japanese mist-net at Point Pelee National Park, Essex County, Ontario. On examination it proved to be a first-year male having new bluish feathers on the crown and sides of the head and worn grayish feathers on the nape and back and faint speckling on the breast. It was banded with U. S. Fish and Wildlife band number 26-88093. According to Harold Mayfield this is probably the first time a Kirtland's Warbler has ever been caught and banded during migration.

Measurements and weight are: flattened wing—68 mm; bill from feathers—12 mm; tarsus—22 mm; tail—57 mm; weight—15.6 grams and fat condition—medium (Wolfson, *Auk* 71: 413-434, 1954). The tarsus was also measured with a 'Blake gauge' (Blake, *Bird-Banding* 25: 11-16, 1954). The average greater diameter was 2.0 mm and the average lesser diameter was 0.9 mm. Recommended band size is number 0.

The bird was first seen perched near the ground in a scrub willow, in an open, sandy area bordering a cattail marsh. It was watched for several minutes by several members of the Ontario Bird Banding Association and the Federation of Ontario Naturalists. It sang briefly and occasionally flew out from its perch as if 'fly-catching'. There are two other records of the Kirtland's Warbler at Point Pelee. One, a young male was collected by W. E. Saunders October 2, 1915 and is now in the Royal Ontario Museum. The other, also a male, was seen May 10, 1953 by D. Sutton and Frank Cook (Baillie, *Aud. Field Notes* 7: 271). J. Woodford, c/o Royal Ontario Museum, Toronto 5, Ontario.

## RECENT LITERATURE

### BANDING

(See also Numbers 19, 21, 22, 23, 24, 28, 44, 62, 66.)

**1. Bird Banding in Norway, 1957, Report Number Eight.** (Ringmerkingsoversikt 1957.) Holger Holgersen. 1958. *Sterna*, 3(4): 145-177. (From the English summary.) The Norwegian banding reports are among the best summaries being published today, and several other banding schemes could profitably adopt their format. They summarize new bandings by species for the year and cumulatively, give each cooperator's totals, and present a selected list of significant recoveries with appropriate comments for each species, omitting repeats, short-term returns, and recoveries of little importance. The use of scientific names and of the internationally accepted symbols and abbreviations make the data perfectly intelligible and useful even to those who do not understand Norwegian.

In 1957 the Norwegian total bandings were 32,153, bringing their grand total to 294,007. Among the recoveries of interest are a *Rissa tridactyla* banded as a nestling in June in Norway and recovered in Newfoundland in November. A *Sturnus vulgaris* banded as an adult female in May 1954 and reported from the Barents Sea in March 1957 "apparently lost its head and course when returning from the supposed British winter-quarters."—O. L. Austin, Jr.

**2. Banding Results from the Revtangen Station for 1957.** (Ringmerkings-resultater fra Revtangen på Jaeren i 1957.) A. Bernhoft-Osa. 1958. *Sterna*, 3(4): 178-184. (From the English summary.) This is a separate report of the banding activities of the Stavanger Museum's observatory and banding station at Revtangen. The totals are included, however, in those for the previous report (No. 1). The report is outstanding for the large number of waders handled, though the fall banding "was very much handicapped by poor weather." So