

THE RELATION OF CASTRATION TO  
MIGRATION IN BIRDS.\*

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ORNITHOLOGISTS have long been interested in the basis of the physiological cycle which causes the migration of birds. On account of the close correlation between the seasons of migration and the variation in the size of the reproductive organs, it has been believed commonly that the reproductive organs control the cycle. This belief was shared by Chapman (1894), Wetmore (1920), Bergtold (1926), and Schildmacher (1933), but the theory was questioned by Schäfer as early as 1907, and by Phillips in 1913. Both Phillips and Bergtold suggested experiments in castration as a possible method of settling the question, but both thought such experiments impracticable. Rowan (1932), however, in the autumn of 1931, castrated and liberated several male crows, but treated all except three by injecting hormones, which disqualified them for the present problem. All three of the untreated crows were recovered after migrating in the usual southeasterly direction, indicating, as Rowan expressed it, that "Whatever may be the case with the northward migration, the southward is evidently not associated with the state of the reproductive organs." Putzig (1937) also reported that a Lesser Black-backed Gull (*Larus fuscus*) and two Black-headed Gulls (*Larus ridibundus*) which were castrated at Rossiten, Germany, were later recovered in southern Europe on the fall migration route.

Early in the year 1933, the writer began some experiments in the relation of castration to the migration of birds in connection with a banding station at Saginaw Forest five miles west of Ann Arbor. The results, though not as decisive as hoped for, are reported at this time, because the banding station has been discontinued, and there is little likelihood that any remaining birds will be recovered.

Three species of birds were used, Slate-colored Juncos (*Junco h. hyemalis*) (winter residents or migrants), Red-eyed Towhees (*Pipilo e. erythrophthalmus*) (summer residents or migrants), and White throated Sparrows (*Zonotrichia albicollis*) (migrants). The juncos, three in number, were operated on in April; five towhees in September and October; and the White-throated Sparrows, twenty in April and May during spring migration, and nine in October and early November during fall migration. Only males were used, as testes were less difficult to remove with certainty than ovaries. Birds were operated on under anesthesia, and were released near where they were trapped, usually on the day following the operation.

The immediate results of the operations were that most of the birds remained around the station, entering the traps more or less

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regularly until the incisions healed, then left, presumably continuing their migration. Eighteen out of twenty-nine white-throats (62%) remained from one to thirty-four days, or an average of 13.6 days. A song heard late in the spring was attributed to one of these birds, but the identity was not certain. Of white-throats not operated on, approximately fifty per cent repeated, remaining from one to nine days, averaging 2.5 days, or less than one-fifth as long as the experimental birds. All three of the juncos repeated, remaining from seven to thirty-nine days, the last one of the season being trapped on May 3. Four out of five of the towhees repeated, remaining from two to forty-nine days. The one which remained forty-nine days was released on September 1, following the operation, and repeated eleven times up to October 20. This was in 1933. This bird was retrapped in the same area on October 4, 1935, two years later, by Mr. Irvin Sturgis, who took over the operation of the banding station after the writer discontinued the work. Mr. Sturgis retrapped the bird again six days later, but released it as before, not realizing that it was an experimental bird. This bird, which was trapped originally on September 1, was an adult male, and doubtless had bred in the locality, since this was rather early for migration. Though Red-eyed Towhees may on rare occasions remain over winter in southern Michigan, the chance that this one may have remained in the locality, yet stayed away from the station, is extremely remote. It would have been very desirable for the experiment to have collected this bird upon its return and dissected it to see if any testicular tissue was present, since Hooker and Cunningham (1938) have found that testes of fowls in some cases may be regenerated, but circumstances prevented this.

In conclusion it may be said that the results of these experiments, namely the castrated birds continuing their migration in most cases as soon as they recovered sufficiently, and the return of the male towhee two years after castration, tend to verify Rowan's conclusion that the presence of reproductive organs is not necessary for the migration of birds. Apparently if the incentive to migration is under the control of the pituitary as suggested by Bissonnette (1937), it is not by way of the effect of that gland on the gonads.

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## GENERAL NOTES

**Results of Catbird Banding in Camden, New Jersey.**—The banding of 86 catbirds (*Dumetella carolinensis*) in Camden, New Jersey, between May 7, 1932, and August 18, 1934, (two years and three months) has resulted in an interesting recovery and 5 returns, two of which were mating birds. B-206175, nesting adult banded at Walt Whitman's tomb on May 28, 1932, was found dead in Camden four years later, May 15, 1936. Adult, B-236966, banded on May 6, 1933, was a return the following year on May 9, 1934, being captured in same trap with another returning bird, B-269582, which had been banded on September 12, 1933, as a juvenile. These birds were caught in the same trap the following day, May 10, 1934, and on May 11, third consecutive day, B-269582, repeated, while on May 13, B-236966 repeated. Both birds were seen in courtship, but nest in vicinity was not discovered. Last note on this mating is repeating of B-269582, on June 2, 1934. The record is interesting in that it indicates the bird banded as a juvenile returned the following year to the vicinity of its birth to mate. Two other birds, adult, B-269501 and B-269509, were returns four months after banding between June and October. Catbird, adult, B-269589 banded September 25, 1933, was a return on May 5, 1934. Sight record of banded Catbird on June 16, 1938, probably was a bird banded in the same cemetery at Camden, and since no banding continued after August 18, 1934, this bird probably was a bird at least four years old, which together with record of the recovered bird first mentioned, would indicate two birds had returned to area of banding four years later, and probably for four consecutive years. Twenty-six of the 86 banded were repeats.—WALTER R. BATEZEL, 720 Raymond Avenue, Camden, New Jersey.

**Southernmost Recovery of Banded Evening Grosbeak.**—Evening Grosbeak, (*Hesperiphona vespertina*) banded female, with male bird was sighted on February 7, 1937, at Hammonton, New Jersey. Inasmuch as no invasion of these northern birds was recorded in New Jersey that winter, the record was of interest. I trapped the bird on March 22, 1937, and report on the female, 34-208575, brought the information from Mr. Lincoln that it had been banded February 8, 1936, the previous winter, by the late James P. Melzer at Milford, New Hampshire, and that this bird according to Biological Survey records is the southernmost record for a recovered banded Grosbeak.—WALTER R. BATEZEL, 720 Raymond Avenue, Camden, New Jersey.

**Age record for Eastern Song Sparrow, (*Melospiza melodia*)** 34-105831 banded as adult at Collingswood, New Jersey, on April 24, 1934, was retrapped by me four years later at Almonesson, New Jersey, seven miles from Collingswood, on April 12, 1938. In each case the bird was trapped on creeks tributary to the Delaware River.—WALTER R. BATEZEL, 720 Raymond Avenue, Camden, New Jersey.