

old, 12.7 grams. Most of the young left the nest when 10 days old, but some not until 11 days of age.

The female broods the young for two or more days while the male feeds them almost entirely. Later both parents feed them until they have been out of the nest at least a week.

The majority of the Prothonotaries leave for the South during late July or early August, a few sometimes remaining until early September.

Ten females averaged in weight 17.41 grams (13.6 to 19.6). No males were weighed.

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Battle Creek, Michigan.

DETERMINING SEX IN BREEDING BIRDS¹

By EDWIN A. MASON

THE value and importance of being able to determine the sex of banded birds is obvious to all coöperators. When the sexes are dissimilar in plumage, no difficulty arises, but with those species in which the plumage of the two sexes are always, or at times, alike, a real difficulty presents itself.

Through handling many adult breeding birds over a long period, and actuated by the thought that there must be some differences between the sexes, however slight, the writer eventually formulated a system which has decided values in determining sex.

Feeling that perhaps this discovery was not new, although no reference to the ability of being able to determine sex in living birds except by plumage and measurements had ever come to the writer's attention, the subject has been broached on many occasions to workers in the banding field. Among those with whom the subject has been discussed, only Mr. James L. Peters, of the Harvard Museum of Comparative Zoölogy, indicated having a prior knowledge of the subject, and it is desired here to acknowledge the helpful criticisms and suggestions made by Mr. Peters during the preparation of this paper.

It is, therefore, in the hope of bringing the matter to the attention

¹ A contribution from the Wharton Bird-Banding Station, Groton, Massachusetts.

of greater numbers of bird-banders that this brief description of the external physical differences between the sexes when they are sexually active, and upon which the determinations can be based, is given.

The problem of determining sex in living birds is one that has arisen with the comparatively new technique of banding the live bird, and so probably received little or no attention from ornithologists in the past. A reference to male organs of generation made by Coues shows that these outward characteristics of the sexual parts during their period of sexual activity were known, but when working with dead specimens sexing naturally was accomplished by the more positive method of making an internal examination. The remarks made by Coues in his "Key to North American Birds," (Fourth Revised Edition p. 218), to which reference has just been made, refer to the male organs; he says: "These papillose terminations of the sperm-ducts are erectile to a degree, and answer the purpose of paired penes in those birds which are not provided with better-formed copulatory parts. *In coitu*, the cloacal chambers containing the orifices of the genital ducts are opened, and the more or less protruded papillæ come in contact or close juxtaposition."

Too much emphasis cannot be laid on the limitations of the system, however. These are two: (1) The system only has value during the period when the birds are sexually active; (2) it is not applicable with equal value to all species and all individuals, and seems to work best when applied to members of the Family *Fringillidæ*. It might be added that a limited experience indicates that Robins (*Turdus m. migratorius*) and Redstarts (*Setophaga ruticilla*), are two species outside the Finch Family that can be sexed by this system. It is hoped that other banders will attempt the application of the system to any species that comes to hand during the breeding season, in order that it may be possible ultimately to round out the knowledge of the species to which this method of determining sex can be applied. Examinations of the cloacal regions of birds of known sex would be extremely helpful to anyone seeking to build up an experience in the application of the system. A puff of breath properly directed will usually expose the parts to be examined, and is a more desirable method than exposing these delicate organs with the fingers and, by so doing, running the risk of injury to them.

It is well known, of course, that the period of reproductive activity in birds is marked by internal physical changes. In the male the gonads become greatly enlarged, and in the female the ovary increases in size as the ova ripen before actually breaking off from the mass to make their individual journeys that end with the depositing of the completed egg. Careful observation and a little experience will enable anyone to note that the ventral parts also of some birds at this season take on a changed form as they prepare for their

reproductive functions, and it is on these physical differences that sex determinations in the live bird can be based. In the simplest terms, and at the height of the reproductive cycle, they can be described as follows:

MALES: The cloacal region will be found to be in the form of a bulbous protuberance.

FEMALES: The cloacal region tapers off gradually to the vent, and the orifice itself often will be found to be dilated.

The following records taken at random are illustrative of the value of the method, particularly if breeding census work is being undertaken:

Eastern Purple Finch (*Carpodacus p. purpureus*) L32919, banded July 18, 1934, sex determined as young male, plumage fairly strong olivaceous. This bird was subsequently taken in the rosy plumage on July 2, 1935, and June 20, 1936.

Eastern Purple Finch 34-49122, banded June 22, 1935, sex determined as young male, plumage strongly olivaceous. The determination was verified on May 26, 1936, when the bird returned in the rosy plumage.

Eastern Purple Finch 36-61524, banded June 18, 1936, sexed as female, had plumage moderately olivaceous. On July 2, 1937, this bird was again trapped, and again sexed as female.

American Redstart (*Setophaga ruticilla*) 37-12856, banded June 1, 1937, and sex determined as female, repeated on July 5th, July 23d, and August 2d. On the latter date the plumage bore out the earlier sex-determination. (Dwight, *Annals N. Y. Acad. Sci.*, Vol. XIII, No. 1, pp. 1-72, July 18, 1900, referring to the Redstart, says: "Adult winter plumage acquired by a complete postnuptial moult in July.")

To repeat a previously made warning statement, the above system of determining sex has decided values, but not all individuals, even during the nesting season, can definitely be sexed by it. Such birds as clearly conform can be sexed safely, but whenever there is the least doubt, the system should not be pushed—the bird should be released as "sex undetermined."

THE EASTERN HAIRY WOODPECKER (*Dryobates v. villosus*) AS A MIGRANT

By LEWIS O. SHELLEY

IN none of the ornithological literature at my disposal have I seen any reference to the Eastern Hairy Woodpecker as a migratory species, in the sense that it migrates in a similar manner to other migratory species. The A. O. U. Check-List (Fourth Edition) does not mention any migration taking place among any race of Hairies.