

- BERGER, A. J. 1961 *Bird Study*. New York. J. Wiley & Sons, Inc. 389 pp.
- BOYD, E. M. and SHRINER, J. 1954 Nesting and food of the Barn Owl (*Tyto, alba*) in Hampshire County, Massachusetts. *Auk* 71: 199-201.
- DENNIS, J. V. 1958 Are warblers decreasing? *Aud. Mag.* 60: 32-34.
- ELIOT, S. A., JR. 1948 Blue-gray Gnatcatchers in Hampshire County, Massachusetts. *Auk* 65: 314, 315.
- 1961 Birds in March. *Bird News of Western Massachusetts*. 1: 28-30.
- FAIRBRIDGE, R. W. 1960 The changing level of the sea. *Sci. Amer.* 202: 70-79.
- FORBUSH, E. W. 1927 Birds of Massachusetts and other New England States. Vol. 2. Mass. Norwood Press xlviii + 461 pp.
- JOHNSON, G. P. 1916 Birds of Springfield, Massachusetts and vicinity. Springfield, Mass. Bassette Co., Revised by S. A. Eliot, 1960.
- MASON, E. A. 1952 Notes from our sanctuaries. Arcadia. *Mass. Aud.* 36: 394.
- and SHAUB, M. S. 1949 Report on Connecticut River Valley co-operative Evening Grosbeak survey. *Bird-Band.* 20: 169-179.
- Massachusetts Agricultural Experiment Station Meteorological Observations*
1900-1909 Meteorological Series Bull. No. 133-252
1950-1959 Meteorological Series Bull. No. 733-840
- MORRIS, R. O. 1901 The birds of Springfield and vicinity. Springfield, Mass. H. J. Johnson.
- WALLACE, G. J. 1959 The plight of the Bluebird in Michigan. *Wilson Bull.* 71: 192, 193.

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A CONVENIENT METHOD OF SEXING AND AGING THE STARLING

By G. HAPGOOD PARKS

During 1960 the Bird-Banding Office launched an 18-month project for the purpose of testing "the comparative rates of recovery of birds banded with regular Fish and Wildlife Service bands and with those bearing a post office box legend" which would reveal no connection with any governmental agency. We became aware of this project when we read the appeal, published in *EBBA News* (1) and in *Bird-Banding* (2), for interested banders to cooperate in the study.

Hartford's abundant population of Starlings (*Sturnus vulgaris*) promised adequate working material so, rather tardily, we volunteered our cooperation. On January 21, 1961 we received a supply of the special bands which carried the legend, "Write P. O. Box 66, Bowie, Md. USA," and control bands with the standard legend, "Write F & W Serv. Wash. D. C. USA."

The instruction sheet which accompanied the bands asked that all birds be sexed and aged, if possible. Although we had handled, previously, more than a thousand individuals of this species we had never made more than a cursory effort to sex and age them. We decided to take advantage of this project to test our own ability of applying certain suggested sexing and aging procedures. This paper is a brief description of our experience.

We chose to be guided by the methods described in *Bird-Banding* by

Brina Kessel (3) and by David E. Davis (4) rather than by that of Alden H. Miller (5) despite the fact that, in the latter instance, the recommended operation on the skin of the head is described as "innocuous."

To determine the bird's sex, then, we would examine the eyes and the rami of the lower mandible. If the iris was found to be uniformly deep brown and the rami bluish to black in color the bird would be accepted as a male. If, however, the dark brown iris was found to be bordered by a lighter-colored ring and the rami appeared pink or cream-colored we would record the bird as a female.

Once sexed, we would age the birds according to Davis' (4) recommendation by measuring the length of the iridescent area on the hackle feathers and applying his information that this measurement in the cases of immature and subadult females is less than 6 mm. while in adult females it is more than 7 mm. Among the males a measurement of less than 10 mm. would characterize the immatures and subadults while the adults would measure more than 12 mm.

We prepared a metric ruler according to this same author's instructions and went to work. Table scraps and stale pastries from the "reduced price" shelf at the chain store proved to be very appealing bait, but the Starlings avoided our Pull-string, Potter, and All Purpose traps so persistently as to threaten the success of our effort. When we substituted Chardonneret traps, however, the birds were captured readily enough.

With our "Bowie" bands and controls arranged in parallel numerical sequences we banded our captures, as follows: the first bird with the first "Bowie" band, the second bird with the control band carrying the identical serial number, but differing typically from the "Bowie" in its prefix and legend. The third bird received the second "Bowie" band in numerical sequence; the fourth, the corresponding control — and so on until we banded our 500th Starling just as the terminal date of the project was approaching.

Because of our absence from Hartford during the summer months this study was necessarily divided into two periods, namely: January 21 to June 9, and November 6 to December 18, 1961. As a result of our inactivity when the young were newly off the nests only three birds were taken which were too immature to have acquired the typical characteristics of eye, mandible, and hackle iridescence which we sought.

The iris ring was so definitely absent or so distinctly apparent, and agreed so positively with the coincident rami coloration, that we felt justified in sexing 487 of our 500 Starlings unquestionably as males or females, respectively. Three of the unsexed birds were locally hatched youngsters which we judged too young to be labeled as males even though none showed the iris ring (nor, of course, the bluish rami). Observations of the remaining unsexed ten were inconclusive, conflicting, or too indefinite to justify a decision as to the sex of the bird.

Once sexed, the next step was to determine the relative age of the bird. To accomplish this result we again followed the Davis (4) recommendation regarding the measurement of the iridescence on its hackle feathers. We collected a pinch of the feathers from the throat region of each bird and measured the length of the iridescent area, to the nearest 0.5 mm., on several of them. There was always more or less normal variation in these measurements, but almost without exception that variation was so slight as

3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5
		4	8	12	8														
		4	12	24	21														
		1	20	2															
FEMALES — above																			
								38	39	10	8		1			1			
MALES — below																			
							1	2	5	14	10	20	9						
							1	1	2	4	27	26	48	10					
															2	7	26	2	
																			14
TOTALS																			
																FEMALES (Immatures)	32		
																FEMALES (Subadults)	62		
																FEMALES (Age not determined)	23		
																FEMALES (Adults)	97		
																MALES (Immatures)	61		
																MALES (Subadults)	119		
																MALES (Age not determined)	37		
19	5	10	4	2				1	1										
																MALES (Adults)	56		

This table summarizes the distribution of the iridescent area measurements of the 487 Starlings which we sexed during this study.

Across the top of the table the lengths of the iridescent areas are indicated (to the nearest 0.5 mm.). Beneath each of these indicated lengths is shown the number of individual birds whose hackle iridescence corresponded to this measurement. Vertical arrangement has been planned so as to allow the sex groups to be subdivided by age.

to supply us with a composite picture which placed our bird distinctly within the measurement category indicated in the Kessel (3) description and in Davis' (4) table. The only problem which gave us any trouble proved to be a rather minor one. It involved the effect of varying conditions of illumination upon the ease with which we were able to determine the actual extent of the iridescence on the feathers.

As we handled more and more of these birds the *shape* of the hackle feathers became such a significant trait that it added itself as a sex characteristic to the two characters we had chosen to use when we began our study. Typical hackles are nicely pictured in Kessel's (3) Figure 1. Since our experience was spread over almost an entire year it is not to be expected that all of the feathers we examined could be described exactly by any single set of illustrations. We found, however, that the pictures were correctly representative. If a criticism of the diagram is permissible we would say that, in the light of our observations, part A (the adult male feather) leaves the reader with the impression of a feather that is relatively broader than was characteristic of the extremely attenuate hackle that we collected from definitely adult male birds.

The hackle measurements of the 487 sexed Starlings have been assembled in the accompanying table. The data have been arranged in such a manner as to reveal the significance of this measurement in determining the relative ages of the birds. Since the table seems capable of speaking for itself no further discussion of it will be attempted here.

SUMMARY

In spite of our lack of prior experience with the procedure we succeeded in sexing 487 of the 500 Starlings which we handled. Then we were able to determine the relative ages of 236 of the 273 males, and 191 of the 214 females. This means that 97.4 percent of our Starlings were successfully sexed and 87.7 percent of these sexed birds were successfully aged by the Kessel-Davis procedure. Individual variations in the size of the iridescent hackle areas was sufficiently great in some instances to cause their measurements to fall outside the limits associated with definite age groups. This fact accounts for that relatively small percentage of birds which we were obliged to classify as "age not determined."

CONCLUSION

We have found the Kessel-Davis method to be an adequately simple and satisfactory procedure for sexing and aging the species *Sturnus vulgaris*. Even relatively inexperienced operators who will apply this method consistently should be able to sex and age these birds with accuracy and, in so doing, they will add measurably to the value of their records, not to mention the new interest and the greater satisfaction they will experience as they handle this common, but very intriguing, bird.

REFERENCES

- (1) *EBBA News* 23(4): 78.
- (2) *Bird-Banding* 31(3): 170.
- (3) KESSEL, BRINA. 1951. Criteria for sexing and aging European Starlings (*Sturnus vulgaris*). *Bird-Banding* 22(1): 16-23.
- (4) DAVIS, DAVID E. 1960. Comments on the migration of Starlings in Eastern United States. *Bird-Banding* 31(4): 216-219.
- (5) MILLER, ALDEN H. 1946. A method of determining the age of live passerine birds. *Bird-Banding* 17(1): 33-35.
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