

## ANNUAL BILL-COLOR CYCLE OF THE STARLING

By JOHN T. NICHOLS

IT is familiar enough that the Starling (*Sturnus vulgaris*) has a yellow bill and iridescent plumage in spring, a dark bill and heavily spotted plumage in fall. On June 27, 1943, I was surprised to see an adult with all dark bill, gathering and carrying off bread presumably to feed young, at my Garden City, Long Island, N. Y., feeding station. This led me to look into Starling bill color more closely, as it doubtless has a bearing on other aspects of the annual cycle of this bird, at a given locality. The Starling is plentiful here in every month of the year, and estimated proportional counts of birds with bills in different phases as they came to the feeding station were made over the ensuing twelve months. As their bills darkened their red legs became less bright, but this is too relative a matter to keep track of.

The first evidence of the darkening of the bill noticed was a slight clouding near the base of the upper mandible; and the last parts to remain yellow or pale colored were the tip of the upper mandible or along the fissure. From July 1 to 15, 19 per cent had a yellow bill; 25 per cent a yellow bill, more or less dark on base; 40½ per cent a dark bill with more or less pale; and 15½ per cent a dark bill. From July 16 to 31, 2 per cent had a yellow bill, more or less dark on base; 14½ per cent a dark bill with more or less pale; 83½ per cent a dark bill. The last bird noted as with a yellow bill was on July 9, a yellow bill more or less dark on base, July 21, a dark bill with more or less pale, July 24.

In August all the Starlings had dark bills. The spotting of their plumage increased, spreading from the flanks over the breast and onto the back, but leaving the head black, unspotted. Young of the year, few of which came to the Station with the adults, seem to have been molting synchronously. On August 23 and again on the 30th, one with an all brown head but otherwise spotted fall plumage was noted. A first bird with sufficiently spotted head to raise slight doubt as to its age was noticed on August 27.

In September black-headed birds (adults) made 17 per cent (September 1 to 10); brown-headed birds (young) made 4 per cent (September 10 and 13); spotted headed birds (indeterminate) made 79 per cent.

After this it was mid November when a first slight change, back toward vernal conditions, was noticed. Of two birds trapped on November 14, in one the feathers on lower side of face and upper breast showed definitely iridescent, the base of its bill was slightly pale along the rictus and on the bottom of the lower mandible. In the other there was little iridescence and the bill was all dark.

Proportional counts in December gave 94 per cent still with dark bill,

4 per cent dark bill with some pale at base, 2 per cent yellow bill with dark end, but this last advanced bird was noted as early as December 5. In January 52 per cent had a dark bill; 31 per cent a dark bill with more or less pale at base; and 17 per cent a yellow bill with a dark end. One trapped January 23 had a dark upper mandible a little paler at base where there was a streak of yellow at the sides, lower mandible with a whitish base, yellow middle, dark tip. Its legs were rather strong red; head and underparts were iridescent, only lightly spotted. Incidentally the Starlings in New York City seemed a little more advanced this year, one with an essentially all yellow bill noted at the American Museum January 24.

Proportional counts in February gave dark bill 6 per cent; dark bill more or less pale on base 44 per cent; yellow bill more or less dark at end 50 per cent. In March 7 per cent had a dark bill more or less pale on base, the last on March 19, also with an exceptionally spotted plumage for the date; 30 per cent had a yellow bill with a more or less dark end; and 63 per cent a yellow bill. That the counts this month were all on and after March 12 may account in part for the considerable change since February. A bird trapped March 12 had a dull yellow bill with a dark end and whitish at base of lower mandible. Three birds trapped March 19 had, one a yellow bill, the very tip of the upper mandible faintly dark, which would not have been noticed without the bird in the hand, a yellow bill with its very tip dark, and a yellow bill with the end more broadly dark. The base of the lower mandible was whitish in all three.

In April, 6 per cent had a yellow bill with a dark end, in the last such, April 16, with only the tip of the bill dark; 94 per cent had a yellow bill. A male in breeding condition collected April 28, with a yellow bill, base of lower mandible bluish whitish, was still lightly spotted on nape, back, rump, wings (shoulders), and under tail coverts, otherwise with a plain iridescent plumage.

In May, 3 per cent had a yellow bill with dark tip or end, a belated bird with definite dark end (and very black plumage) May 28; 97 per cent had a yellow bill. In the last third of the month it was noticed that yellow bills varied in brightness. The first bird with slightly dusky clouding near the base of the bill was noted June 11, none again until June 18. The first bill was called dark with some pale June 26, and birds with all yellow bills were still present June 29. Proportional counts in June give bills essentially all yellow, 65 percent, yellow with some dusky, 28 percent, dark with some pale, 7 percent. Birds with darkening bills the end of June had no evident spotting in the plumage.

The first adult Starling noticed with a dark bill was on July 1, 1944, as compared with June 27, 1943; and about July 17 dark billed birds with a few large pale spots of the new plumage on the flanks were noticed.

To summarize, a majority in the last half of July, all the adult Starlings in August and September, all the Starlings in October and early November, a majority in late November, December and January, had a dark bill. A majority in February had bills turning from dark to yellow,—the tip is the last part to remain dark. A majority of adult Starlings in March, April, May and June had a yellow bill, but with only a short period from May 29 to June 10 when no bird with traces of dark going or coming on the bill was observed, and a majority in the first half of July a bill turning from yellow to dark,—the tip is one of the last parts to remain pale. There was negligible percentage of birds with other than a dark bill from August 1 to December 31, with other than a yellow bill from April to June 20.

Scattering notes on bill color of Starlings handled at this station 1930 to 1938, in general confirm this annual cycle of change. Those in May and June had yellow bills and red or reddish legs, with the exception of one with badly worn primaries on June 30, which had a dark gray bill with some yellowish along the fissure, and dull grayish purple legs; September 16 to November 14 (15 records) bills were dark. November 18 to December 14 (29 records) 62 per cent were dark, 38 per cent showed some change. The first indication of this was usually a pale or paler base to the lower mandible (5 cases), but in one case it was a slight light streak along the fissure. An exceptionally advanced bird on November 18 had some yellow on the bill, and such a one on December 14 a yellow bill with a dark end. Correlated with changes in bill color the legs turned from dusky reddish to brighter red. An individual with a dark bill on November 22 had the base of the lower mandible pale, its middle yellowish on December 16. Another with a dark bill on November 19 had a bright yellow bill on May 9 following. December 16 to January 11 (14 records) 21½ per cent had dark bills, 78½ per cent (11 cases) changing bills. Thus their bill change was more advanced for the date than in recent observations cited, perhaps merely a variation in samples, but there is probably an appreciable variation from year to year at a given station. Four were in the first stage, two with base of the lower mandible somewhat paler, one slightly yellowish in the middle of the lower mandible, and another with a narrow paler streak at the fissure only. Six were in an intermediate stage with lower mandible more or less pale at the base, yellowish or brownish in the middle, or in one case a dark bill slightly paler on the base of the lower mandible and along the fissure. One was in the final changing stage, the bill with a dark tip, yellow center and pale base. Four bills from March 5 to 17 were in final stages of change; yellow with pale or whitish base and dark tip; one on March 18 was bright yellow and a bird on April 21 had a full yellow bill as expected.

A Starling, trapped May 28, 1939, had a yellow bill; and I say

in my journal under that date: "Most of the adult Starlings have yellow bills but one seemingly in badly worn plumage walking with a yellow billed bird had a dark bill." A Starling, trapped August 21, 1940, had an "all dark bill and heavily spotted body, but dark head and neck with narrow iridescent feathers."

In a recent Russian Natural History (Animal Life of the U.S.S.R.: Formozov and Jitkov, ed., Moscow-Leningrad, 1940, pp. 48-49, in Russian), there is a statement that the male Starling differs from the female in spring in having a yellow bill whereas that of the female is dark at the tip. There is very likely some sex variation, and it is not improbable that the bill cycle in Russia does not correspond exactly with that on Long Island, but the evidence is reasonably conclusive that both sexes of our Starlings acquire a full yellow nuptial bill.

My earlier conclusion from other data that many of our Starlings have already established their nesting grounds as an initial step in the breeding cycle in early winter (1937, *Bird-Banding*, VIII (2), pp. 76-77) correlates with change toward the nuptial bill color getting under way in December and January. The more abrupt loss of this color in the end of June and July confirms our Starlings being essentially single brooded.

The first young of the year are usually on the wing the very end of May, and I have record of a second brood raised in a nest hole, with eggs June 13, 1933, but as likely as not by another pair of birds. Only one parent of each brood was captured,—these were different individuals.

It may be noted that some at least, perhaps the majority of birds with changing bills in June and early July, were feeding young, favoring an hypothesis that changing bills synchronize with the beginnings of the breeding cycle in winter and its close in summer. On the other hand with young already out of the nest, I have so far no record of a Starling with other than a full yellow bill in the first ten days of June.

American Museum of Natural History,  
New York, N. Y.

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## EVENING GROSBEAKS AT HARTFORD, CONNECTICUT

BY G. HAPGOOD PARKS

THE first Evening Grosbeaks (*Hesperiphona v. vespertina* (Cooper)) ever to visit my banding station at Hartford, Connecticut, were two adult females which appeared together on February 6, 1942. Two days later a false-bottom trap captured both of them and a band was affixed to each.

Not until January 14, 1944, was another bird of this species seen here.