Further observations on the regulation of the annual testicular cycle in Bobolinks (*Dolichonyx oryzivorus*).—In a recent study (Engels, *Biol. Bull.*, 123: 94–104, 1962) I reported that when male Bobolinks were transferred from the natural day-lengths of Lat 36° N to daily 14-hour photoperiods at the beginning of October, recrudescence of the testes did not occur, but it did occur when the change in the daily lighting schedule was delayed until the beginning of November. This was taken to mean that a photorefractoriness in the hypothalamic-hypophyseal gonadotropic mechanism existed in these birds, in the early autumn, and that this refractoriness was terminated during the shortening days of October (in captives retained at this latitude). A question of interpretation was raised, however, because of some heterogeneity in the material. The first series of birds had been caught during migration in September, while the later series consisted of birds caught in May, which, in captivity, did not engage in the normal activities of the reproductive season, with possible consequent, but unknown, effects on the testicular cycle. I can now add information that seems to cancel out this question. Three male Bobolinks were captured on 21 September 1962, from a small flock of migrants near Chapel Hill, North Carolina, and were held in an outdoor aviary exposed to natural day-lengths (Lat 36° N), until transfer to an indoor compartment illuminated 14 hours daily (0515–1915 hours). One each was transferred to this long photoperiod on 2 November, 12 November, and 21 November. Testicular recrudescence occurred in all three, the indicative change in beak color having been clearly evident on 4 March, 4 February, and 11 March, respectively. These birds were killed on 12 March, when the respective testicular weights were found to be 182.5, 55.8 and 80.5 mg (inactive testes weigh about 2 mg). These observations support the earlier conclusions, based on birds held captive through the summer, that the photorefractoriness exhibited by Bobolinks in the early autumn is terminated during October when birds are exposed to the day-lengths of Lat 36° N, and that these transequatorial migrants thus do not differ appreciably from temperate zone migrants *in this respect* (number of natural short days required to terminate refractoriness).

Termination of refractoriness (or its persistence) was judged solely by the eventual response (or lack of response) to 14-hour photoperiods. At present no other criterion is available. But what of the long delay in response, the three or four months that elapse before the testes produce the sex hormone that causes the change in beak pigmentation? We now have a few preliminary data on the testes for this period. Twelve male Bobolinks which had spent the summer in the outdoor aviary exposed to natural day-lengths were transferred to light-tight compartments indoors on 1 October, and exposed for four weeks to daily 12½-hour photoperiods, a regime which previously had been shown to terminate refractoriness (as defined above). On 29 October the photoperiod was increased to 14 hours. Then at irregular intervals birds were killed to determine the size of their testes. After 24 days of these 14-hour photoperiods the testes weighed 2.8 mg (average of 3 birds), after 39 days 1.7 mg (2 birds), after 51 days 2.4 mg (2 birds), after 66 days 3.1 mg (2 birds, 3.7 mg and 2.6 mg), after 101 days 5.0 mg (1 bird), after 113 days 56.5 mg (1 bird), and after 127 days 267.3 mg (1 bird). (These last two birds were not killed until the change in beak pigmentation was clearly evident.)

Although these are obviously meager data, they strongly suggest that the gonadotropic mechanism in this transequatorial migrant does not respond to this relatively long photoperiod (14 hours) for at least several weeks, in sharp contrast to Temperate Zone migrants, which show a measurable response to the same photoperiod within one week. However, quite different results are obtained with birds exposed to much

longer photoperiods, as the following preliminary experiment vividly shows. Nine male Bobolinks, captured during northward migration in early May (at Raleigh, North Carolina) were maintained during the summer in an outdoor aviary under natural day-lengths (Lat 36° N) until 2 October. On this date they were brought indoors and exposed to daily 12½-hour photoperiods for five weeks. On 6 November, the photoperiod was increased to 18 hours for five of these birds, to 14 hours for the other four. Within *sixteen* days thereafter (22 November) all of the "18-hour" birds had developed the black beak pigmentation indicative of the production of male sex hormone. All nine birds were killed on this day. Testes of the four "14-hour" birds were minute, as expected, with an average weight of 1.75 mg per bird (1.1–2.2 mg). Contrarily, the testes of the five "18-hour" birds were conspicuously enlarged, with an average weight of 54.4 mg (19.8–115.1 mg). This latter is the sort of response one would expect of a Temperate Zone migrant. To make a specific comparison we may estimate roughly the testicular growth rate constant (k: the average increment, per day, in the logarithm of the weight in mg) by assuming (1) that the increase in weight is a logarithmic function of time, linear, or nearly so, as in White-crowned Sparrows (*Zonotrichia leucophrys*), and (2) that the testicular weight in the "14-hour" birds, after only 16 days, very nearly represents the inactive (initial) weight. With these assumptions, the value of k for an 18-hour photoperiod is approximately 0.09 in this transequatorial migrant, a value of the same general order of magnitude as has been indicated for the Temperate Zone migrant *Zonotrichia leucophrys gambelii* by Farner and Wilson (*Biol. Bull.*, 13: 258, 1957). Contrarily, for 14-hour photoperiods, the k value in Bobolinks obviously approaches zero, but is at least 0.04 in *Zonotrichia*.

These preliminary data suggest that 14-hour photoperiods, although acting as long photoperiods in maintaining refractoriness in the post-breeding phase of the annual cycle in Bobolinks (as in Temperate Zone migrants), act as relatively very short photoperiods in the succeeding, photosensitive phase (in contrast to Temperate Zone migrants). This would serve admirably to retard testicular recrudescence during the long days of the Southern Hemisphere summer. The *maximum* day-lengths experienced by Bobolinks in South America (at the December solstice) range from less than 13½ hours (including civil twilight) at Lat 8° S (in Peru, west of the Andes) to less than 14¾ hours at Lat 27° S (the most southerly latitude, in Argentina, for which I have found records of occurrence for the species).—William L. Engels, *Department of Zoology, University of North Carolina, Chapel Hill, North Carolina.*

Nesting of Worm-eating Warbler and Slate-colored Junco in eastern Massachusetts.—In June, 1962, two unusual breeding records occurred at Weston, Massachusetts, Middlesex County, 15 miles (24 km) west of Boston. A pair of Worm-eating Warblers (*Helmitheros vermivorus*) and a pair of Slate-colored Juncos (*Junco hyemalis*) were found nesting within 200 yards (183 meters) of each other on Doublet Hill, the highest elevation in the town (360 feet or 109 meters).

The nest of the Worm-eating Warbler was the joint discovery of William H. Burt, III, and John J. Fitzpatrick of Weston (both aged 14). They saw the adults on 18 June and on 19 June found the nest containing five well-grown young. On 21 June two young were still in the nest, and it was empty on 24 June. The adults were seen carrying food for two days afterward. This record was confirmed by Mr. Wayne M. Petersen of Wellesley, Massachusetts, and myself. I photographed the nest and its surroundings on 26 June and took the nest which has been given to