

# DEVELOPMENT OF YOUNG HORNED LARKS

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THE development of young Horned Larks (*Eremophila alpestris praticola*) is well-suited to ground nesting. The incubation period is short, and rapid development of the feet enables young larks to leave the nest several days before they can fly, thus reducing the period of highest vulnerability to predation. Weight growth rates have been reported for *E. a. praticola* (Pickwell, 1931) and for *E. a. leucolaema* (Verbeek, 1967). This paper reports additional growth data on the young of *E. a. praticola*.

## MATERIALS AND METHODS

The data were gathered during the springs of 1969 and 1970 near Macomb, Illinois. The nests were in a hayfield and on plowed ground. Nonflying young were captured by hand, while larks capable of flight were captured with  $2.0 \times 0.6 \times 0.5$  m high "figure-8" banding traps. We measured 14 young from 5 nests, but not all data were available from all individuals. Toes of the nestlings were marked with ink for individual recognition until the birds were color-banded at 8 days. A central rectrix, the first primary, and the longest down feather in each of eight tracts were measured with a ruler held against the body. The culmen was measured along a straight line from the tip of the bill to the skin of the forehead, and the wing along the chord with the wing held half open.

## RESULTS

At hatching, young larks are covered with a cream-buff down that serves as protection against the weather and aids in concealment. The longest down of the middorsal tract varied among birds only 19 percent from the mean (Table 1), while the down in the other tracts varied to more than 100 percent from the mean. The pelvic tract was erratic: present on both sides in four individuals, present on only one side in four others, and absent in two. By day 3 or 4, pin feathers are present

TABLE 1  
DOWN LENGTHS OF 10 LARK CHICKS NEAR HATCHING

	Pelvic	Middle secondary coverts	Greater secondary coverts	Ocular	Occipital	Middorsal	Scapular	Femoral
Mean (mm)	2.0	5.2	6.9	4.7	5.7	8.0	9.8	7.4
SD	1.1	3.0	1.6	1.1	1.2	0.7	2.7	1.6
Longest	3.0	12.0	10.0	7.0	7.0	9.0	12.0	10.0
Shortest	0.0	2.5	4.5	3.0	3.0	6.5	4.5	4.0

TABLE 2  
MEANS OF BODY MEASUREMENTS OF YOUNG LARKS

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13
Number measured	9	8	6	7	11	9	9	7	5	7	4	2	1	1
Number weighed	6	4	0	5	9	7	0	3	3	0	0	0	0	0
Measurement														
Wing chord (mm)	6.9	8.6	10.5	12.9	16.9	23.1	30.1	38.0	40.0	50.3	53.3	58.5	57.0	65.0
First primary (mm)	0.0	1.0	1.1	2.3	4.3	9.1	14.5	18.4	23.0	30.3	32.0	38.5	36.0	44.0
Central rectrix (mm)	0.0	0.8	0.8	0.9	1.4	3.3	4.6	6.7	8.6	10.6	12.0	18.0	16.0	20.0
Culmen (mm)	4.2	4.5	4.7	5.4	6.4	7.0	7.3	7.3	7.4	7.2	7.6	7.3	7.0	7.0
Hallux (mm)	3.0	3.9	4.8	6.1	6.6	7.6	8.0	8.4	8.6	8.7	8.6	8.8	9.0	8.5
Hallux plus claw (mm)	4.0	4.9	6.0	7.8	8.7	10.7	11.8	12.6	13.4	13.3	13.8	14.0	14.5	14.5
Weight (g)	2.4	4.3	—	9.1	12.7	16.3	—	18.2	20.7	—	—	—	—	—

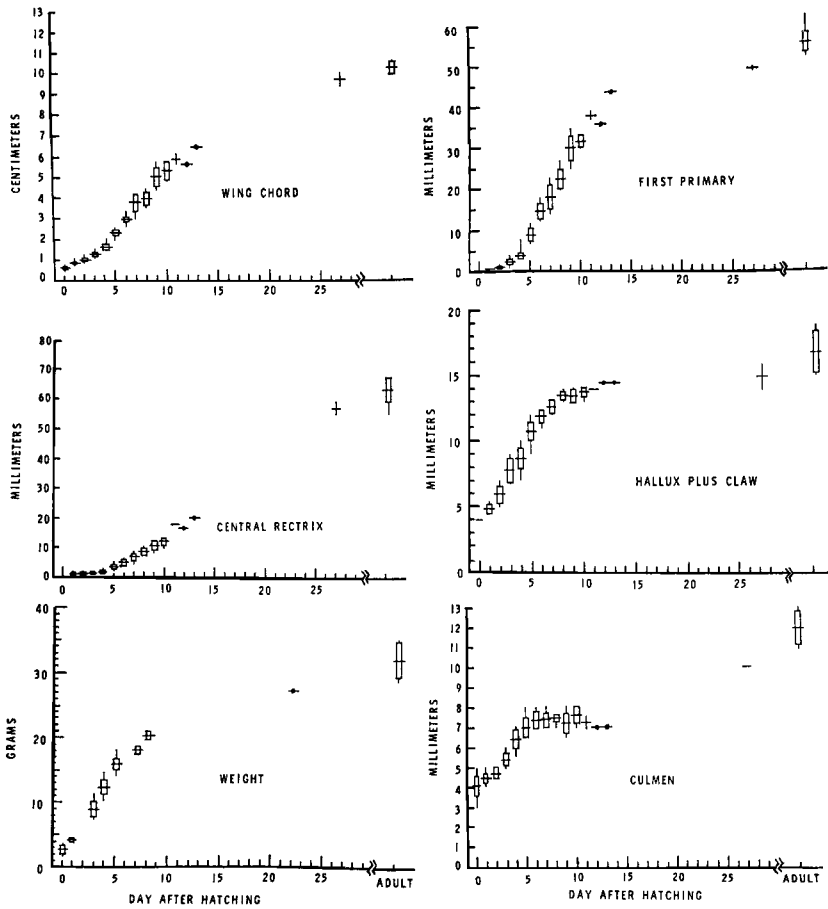


Figure 1. Daily measurements of young larks. Vertical lines indicate ranges, horizontal lines indicate means, rectangles indicate plus and minus one standard deviation, circles indicate only one datum. No standard deviations were calculated when there were less than three data.

on the breast, back, wings, abdomen, and head. By day 7 or 8, down is confined to the tips of the superciliary feathers, secondary coverts, and secondaries. All down is gone from about one-third of the birds by day 12; one of two captured on day 27 still retained down on the superciliary tracts. The body is covered with contour feathers by day 10, but flight feathers continue growing until about 30 days of age. The eyes begin to open on day 2 or 3, and are completely open by day 4, as was reported by Verbeek (1967) and Pickwell (1931).

The gape pattern is distinctive. The lining of the mouth and tongue is bright yellow-orange with five black spots: one at the tip of the upper and lower mandible, one at the tip of the tongue, and two on the back of the tongue. The pattern is still present at day 27, but only faint traces remain in the adults. Oral flanges are present at hatching, but are unresponsive to touch throughout the nestling period.

Daily measurements of young larks are shown in Table 2 and Figure 1. The growth of the wing chord is logarithmic for the first 6 days. The greatest rate of increase starts about day 4, when the primaries break through the skin. By day 27, two recaptured juveniles had wing chords near the adult size. Between days 4 and 13, there is a rapid, almost linear, growth of the first primary. It is still partially sheathed on day 13, but is unsheathed by day 27. The first primary is about equal in length to the ninth until fledging, but the ninth primary is longer on the adults. Growth of the rectrices is slow until day 5. They begin unsheathing around day 6, and are completely unsheathed by day 12. The lack of data between days 13 and 27, and the fact that individuals are within the range of adult measurements by day 27, make a complete growth curve unpredictable.

The growth of the culmen reaches a minor peak between days 6 and 10, then temporarily regresses as the skin around the posterior part of the culmen grows forward. Some time after leaving the nest the skin stops its forward growth while the culmen continues to grow. The length of the hallux increases until day 8 when it is nearly the adult length (8.75 mm). The combined length of the hallux and its claw increases until day 12 with the continued growth of the claw. The young achieve 60 percent of the adult weight in the first 8 days. Both Pickwell (1931) and Verbeek (1967) found similar weights.

On the 10th day, all the young leave a nest within a few hours of each other, but they may remain near the nest for another day or two.

#### DISCUSSION

Burns (1921) found that ground-nesting birds develop bipedal locomotion sooner than others and leave the nest sooner. The larks exhibit precocity of the feet, but not of wing development (Figure 1). In the Red-winged Blackbird (*Agelaius phoeniceus*), the feet have nearly stopped growing by the 9th day, while the wing chord continues increasing at least through the 10th day (Holcomb and Twiest, 1970). In the Common Grackle (*Quiscalus quiscula*), the foot (tarsus) and the wing chord continue to grow at about the same rate, at least until near fledging (Maxwell, 1965). Thus, the feet develop relatively faster than the wing in the lark and in the Red-winged Blackbird, but not in the grackle.

We suggest that the reason for the difference is that lark and Red-wing nestlings are within the reach of ground predators, and are therefore under selective pressure to be able to walk out of the nest before they can fly.

#### ACKNOWLEDGMENTS

This paper is condensed from a Master of Science thesis presented to Western Illinois University (Beason, 1970). We wish to thank the Department of Biological Sciences at Western Illinois University for financial assistance, and the Society of the Sigma Xi for a grant-in-aid to the senior author. Phillip Marshall kindly allowed this study to be conducted on his farm. Russell Davis furnished the "figure-8" banding traps.

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