possible, the females and their broods were leg-banded to try to gain information about dispersal of these southern nesters and their offspring.

In late winter and early spring of 1976 we located 35 broods and nests and banded 49 chicks and 11 females in various regions of Alabama. On 3 March 1976, a day-old brood of 4 chicks was banded on Wheeler National Wildlife Refuge near Decatur, Alabama.

On 1 October 1976, 1 young woodcock from this brood was killed by a hunter in Midland County, Michigan, approximately 650 air miles north of the banding site. The band recovery was verified by the U.S. Fish and Wildlife Service's Bird Banding Laboratory.

This is a very unusual recovery and raises new questions about the biology of the woodcock. Do these females and their broods move toward the more traditional breeding grounds as soon as the chicks are capable of sustained flight? Might these females also produce second broods on the northern breeding grounds? A coordinated effort by researchers in the other southern states to band chicks and females on the wintering grounds is needed to answer these questions.

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Growth and age determination of nestling Brown-headed Cowbirds.—The purpose of this study was to determine daily growth of body parts and feather tracts of nestling Brown-headed Cowbirds (*Molothrus ater*). The study was conducted in Wood and Ottawa counties in northwestern Ohio during May and June 1975. Body parts and feather tracts studied are defined by Holcomb and Twiest (Wilson Bull. 82:294–303, 1970).

Each nest containing a cowbird egg or nestling was visited daily ±1 h of the last visit. Data were recorded only from nestlings that were first discovered as eggs. The day a nestling was first discovered to have hatched was considered day 1 for that bird; however, it is possible that a cowbird hatched after the daily visit and was actually some fraction of a day older than estimated. Body weight was measured to the nearest g using a Pesola Scale. Linear measurements were recorded to the nearest mm using dividers and a 15-cm ruler.

Twenty-three cowbird eggs were located in 17 nests from 16 May 1975 to 16 June 1975. Nine eggs hatched; the earliest hatching was 20 May and the latest hatching was 18 June. Five nestlings fledged, 3 at 10 days of age and 2 at 11 days of age.

Cowbird eggs were found in the nests of Yellow Warblers (*Dendroica petechia*), Red-winged Blackbirds (*Agelaius phoeniceus*), Cardinals (*Cardinalis cardinalis*), Indigo Buntings (*Passerina cyanea*), a Field Sparrow (*Spizella pusilla*), and Song Sparrows (*Melospiza melodia*). Cowbirds fledged from Yellow Warbler, Red-winged Blackbird, and Song Sparrow nests.

Means and SD of nestling cowbird measurements are presented in Table 1. All nestlings included in Table 1 either fledged or, presumably, were removed from the nest by predators. One nestling continued to lose weight from day 6 to day 10; on day 10 it died in the host Red-winged Blackbird's nest. This nestling was not included in the calculations for Table 1.

TABLE 1

THE $\bar{x} \pm$ SD INSTANTANEOUS DAILY GROWTH OF NESTLING BROWN-HEADED COWBIRDS

	Age and weight (g)										
Age (days)	1	2	3	4	5	6	7	8	9	10	11
Sample size	8	8	7	5	5	5	5	5	5	5	2
Weight	3± 1	5 ± 2	7 ± 2	12 ± 2	16 ± 1	20 ± 1	23 ± 1	25 ± 2	26 ± 2	28 ± 1	29 ± 1
	Body part measurements (mm)										
Total body length	39 ± 2	45 ± 4	53 ± 4	60 ± 3	67 ± 4	73 ± 2	80 ± 2	85 ± 4	94 ± 2	102 ± 2	108 ± 2
Tarsus	6 ± 1	7 ± 1	10 ± 1	13 ± 2	16 ± 1	17 ± 1	20 ± 1	22 ± 1	23 ± 1	24 ± 1	24 ± 0
Wing	8 ± 1	9 ± 1	12 ± 2	18 ± 4	27 ± 4	33 ± 4	40 ± 4	48 ± 4	52 ± 2	57 ± 2	64 ± 1
	Feather tract measurements (mm) and development[1,2,3]										
Caudal	N	N	N	N	P1 ± 1	P2 ± 1	P4 ± 1	F7 ± 2	F10 ± 2	F13 ± 2	F16 ± 1
Alar	N	N	P1 ± 1	P4 ± 1	P8 ± 2	P13 ± 2	F17 ± 3	F21 ± 3	F26 ± 3	F29 ± 2	F32 ± 1
Humeral	N	N	N	P2 ± 1	P3 ± 2	P6 ± 1	F9 ± 2	F11 ± 2	F13 ± 2	F16 ± 1	F19 ± 1
Capital	N	N	N	N	N	P1 ± 1	P3 ± 1	P4 ± 1	F5 ± 1	F6 ± 0	F7 ± 1
Spinal	N	N	N	N	P2 ± 1	P5 ± 2	F7 ± 2	F10 ± 1	F12 ± 1	F15 ± 2	F18 ± 1
Ventral				P1 ± 1	P2 ± 1	P4 ± 1	F6 ± 1	F9 ± 1	F11 ± 2	F15 ± 3	F16 ± 4
Crural	N	N	N	N	P1 ± 0	P2 ± 1	F4 ± 1	F5 ± 1	F6 ± 1	F7 ± 2	F8 ± 1
Femoral	N	N	N	N	P2 ± 1	P4 ± 1	F6 ± 1	F8 ± 1	F11 ± 1	F13 ± 1	F16 ± 1

[1] N = presence of neossoptiles.
[2] P = projection of teleoptile feather sheaths through the epidermis.
[3] F = fringing of teleoptile feather barbs from feather sheaths.

The mean weight of day 1 nestling cowbirds was 3 g, and the mean fledging weight was 28 g (Table 1). Weights presented in Table 1 are supported by Nice (Auk 47:419–420, 1930) who stated that on day 8 a cowbird raised by Song Sparrows weighed 24.5 g. Weight, however, probably varies more than other characters as environmental conditions vary and/or as different host species are parasitized; therefore, it should not be emphasized during age determination.

One nestling that was weighed within 30 min of hatching weighed 2.5 g. This weight agrees with Wetherbee and Wetherbee (Bird-Banding 32:141–159, 1961) who reported that 9 newly hatched cowbirds ranged in weight from 1.85 to 2.68 g ($\bar{x} = 2.22$ g).

Nestlings partially opened their eyes on day 4. No record was kept of when eyes were completely open.

Total body length and wing length are good body parts for age determination due to their rapid growth (Table 1). Gape reached a maximum width of 15 mm on day 5 and was maintained until day 8 when gape had declined to 14 mm, a width that was maintained until fledging. Mandible tip to nostril opening reached maximum length of 7 mm at day 10. All other body parts, including toe span and mandibular tomium, grew continuously from hatching to fledging.

Some nestling cowbirds lacked neossoptiles on their ventral tracts (6 of 9) and crural tracts (4 of 9). Neossoptiles were present on all other feather tracts examined. These results agree with reports cited by Wetherbee (Bull. Amer. Mus. Nat. History 113:339–436, 1957).

Due to early projection of feather sheaths through the epidermis, early fringing of feather barbs from feather sheaths, and rapid growth, the alar tract is the best feather tract for age determination (Table 1). The alar tract was the first to project (on day 3) and the capital tract was the last (on day 6). On day 7 all tracts except the caudal and capital tracts had fringed. All tracts were fringed by day 9 supporting Neal's (Condor 75:351–352, 1973) assertion that cowbirds are entirely homeothermic by day 10.

Researchers determining age of large numbers of nestling cowbirds should find total body length the best single character for age determination. Wing length and alar tract measurements are also useful for rapid age determination; however, these measurements are of little value during days 1 and 2. Thus, total body length must be measured during days 1 and 2 to accurately determine a nestling cowbird's age.

Sources of possible error should be mentioned. Nests in Ottawa County were visited from 07:00 to 11:00 while those in Wood County were inspected from 13:00 to 17:00. Differences in the time of day when data were recorded may have influenced results since nestlings grow rapidly. For example, if 2 nestlings (1 in each county) hatched at an identical time, their measurements would probably differ if one was measured at 07:00 and the other at 17:00. In addition, the sample size was small and nestlings raised by different hosts were pooled together. With a larger sample size it would be interesting to determine if cowbirds develop differently when raised by various hosts, especially if the comparison included cowbird nestlings raised by a common vs an uncommon host.

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