

INCUBATION, CARE OF YOUNG, AND NEST SUCCESS OF THE COMMON GRACKLE (*QUISCALUS QUISCU*L*A*) IN NORTHERN OHIO

GEORGE R. MAXWELL, II, AND LOREN S. PUTNAM

THIS paper describes the breeding biology of a population of Common Grackles (*Quiscalus quiscula*) in northern Ohio. Accounts of the breeding biology and behavior of this species have been published by Petersen and Young (1950), Bent (1958), Ficken (1963), Wiens (1965), Snelling (1968), Jones (1969), and Maxwell (1970). Such studies from different parts of the range help assess the effects of environmental changes on reproductive success.

Recent population increases of blackbirds, when many other species are declining, have accentuated the need for basic knowledge of this group. As a result of their successful adaptation to a changing environment several problems need to be solved: 1. An investigation of the factors responsible for their recent population increases. 2. A study of their flocking behavior, which concentrates large flocks of several species together in small areas. 3. A determination of the rate of their population increases and the probable future effects of competition with other species of birds and man.

METHODS

Observations of egg-laying and hatching were facilitated by the use of a 4- × 6-inch mirror secured at right angles to the end of a 10-foot pole. The nest's interior was easily examined in the mirror with binoculars.

Some adult grackles were captured in a baited square-meter hardware cloth trap, and color-banded as an aid to recognition of individuals. The numbers given to pairs or nests, i.e. 5-65, are the authors' designation and the year.

The estimated times for laying and hatching of the last egg in a clutch were obtained by looking into the nest before and after the eggs were laid or hatched. All checks were made at hour intervals with care taken not to disrupt the female on the nest.

The constancy of incubation was calculated from the following equation (Skutch, 1962): $T = 100S/S + R$ where T = percentage of time on the nest (constancy of incubation), S = average length of the sessions, and R = average length of the recesses.

The data for this study were collected from March 1964 to July 1965 just outside Put-in-Bay village on a 5-acre peninsula extending northeastward from the north central part of South Bass Island, Ohio, in western Lake Erie. The total observation time in the nesting area was approximately 1,000 hours.

RESULTS AND DISCUSSION

Incubation.—Nice (1941) defines the incubation period as the elapsed time between the laying of the last egg in a clutch and the hatching of

TABLE 1
 LENGTH OF INCUBATION PERIOD FOR THE COMMON GRACKLE
 AT SOUTH BASS ISLAND, OHIO

Nest	Estimated time last egg laid	Estimated time last egg hatched	Length of incubation
8-64 ¹	07:00 20 May	08:00 2 June	13 days, 1.0 hour
10-65 ¹	06:40 19 May	14:00 1 June	13 days, 7.3 hours
26-65 ¹	07:30 18 May	16:00 30 May	12 days, 8.5 hours
20-64 ²	06:15 28 May	07:45 10 June	13 days, 1.5 hours
8-65 ²	06:00 22 May	06:00 4 June	13 days, 0.0 hours
22-65 ²	07:00 13 May	09:30 27 May	14 days, 2.5 hours
29-65 ²	06:45 17 May	06:00 30 May	12 days, 23.3 hours
		Mean	13 days, 4.0 hours

¹ All eggs in clutch hatched.

² Some eggs in clutch did not hatch.

that egg. In each clutch the hatching of all eggs except one occurred the day before the last egg hatched. This indicated that incubation began the day before the last egg was laid. Eyer (1954) estimates that incubation starts in the afternoon of the day before the last egg is laid.

The role of the sexes in the breeding cycle appeared to be quite variable, although some generalizations can be made. The female had the major responsibility for nest building (Maxwell, 1970), incubation, and brooding, and both sexes actively fed the nestlings and fledglings and shared nest maintenance duties. Burns (1915) lists the genus *Quiscalus* as one which both the male and female take regular turns at incubation. Gross in Bent (1958) and Eyer (1954) found the female to be solely responsible for incubation. In this study the female incubated the eggs throughout the incubation period without help from the male. The male role during incubation was restricted to guarding the nest site. Jones (1969) saw a male leaving the nest on two occasions during the incubation period in his Kentucky study, while Wiens (1965) attributed nest construction and incubation entirely to the female grackle.

Data from seven nests combined give a mean incubation period of 13 days and 4 hours (Table 1). According to Skutch (1962) the extended incubation period (day 14 plus), i.e. incubation not terminated by hatching, may continue an additional 50 percent to twice the normal incubation period. During this study female grackles incubated for 18 days in nest 3-64 and for 23 days in nest 6-64, or 5 and 10 days beyond the incubation period.

Data from five nests studied in detail in 1964 and 1965 were combined to show variation in the incubation constancy with respect to day of incubation. These observations totaled 392 hours, 310 of which were

TABLE 2
SUMMARY OF DATA FOR INCUBATION PATTERNS OF THE SOUTH BASS ISLAND COMMON GRACKLES

Female No.	Dates and days of incubation	Average hours, minutes watched per day	Sessions in minutes		Recesses in minutes		Average ¹ constancy \pm SE %	Average temperature	
			Range	Average	Range	Average		07:00	16:00
20-64 ²	28 May-9 June Day 1-13	7:03	10-210	49.2	5-132	19.9	71 \pm 5.0	61	64
8-65 ²	22 May-3 June Day 1-13	8:46	9-173	58.4	5-40	13.3	81 \pm 2.3	64	62
10-65 ²	19 May-31 May Day 1-13	9:10	4-109	34.6	4-120	12.3	74 \pm 3.1	62	64
3-64 ³	22 May-26 May Day 14-18	4:45	3-150	24.6	7-305	63.6	28 \pm 5.4	69	74
6-64 ³	26 May-4 June Day 14-23	6:33	7-130	47.9	6-270	27.2	64 \pm 3.0	60	61
All females	Day 1-13	8:18	4-210	47.4	4-132	15.2	76	62	63
	Day 14 plus	5:30	3-150	36.3	6-305	45.4	44	64	67

¹ SE computed for average of mean daily constancy for each female grackle.

² Normal incubation (days 1-13).

³ Extended incubation (days 14 plus).

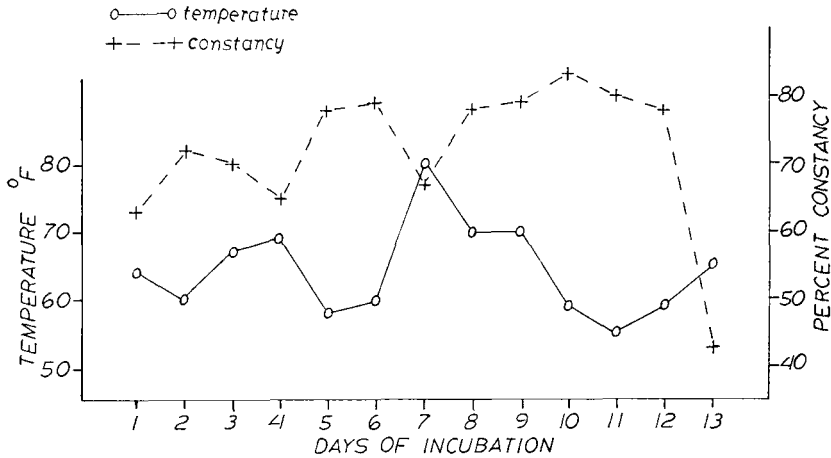


FIGURE 1. Effect of air temperature at 16:00 on the percent constancy of incubation by a female Common Grackle at nest 10-65. Data obtained during 107 hours of observation.

spent at normal nests during the incubation period from day 1 to day 13 and 82 hours at those nests that had the extended incubation periods. Incubation constancy varied considerably from day to day in all nests studied. Females 20-64, 8-65, and 10-65 (incubated day 1 through 13) spent an average of 47 minutes during an incubation session and 15 minutes during a recess. The average incubation constancy for 1964 and 1965 during the normal incubation period (days 1 through 13) was 76 percent. The nests with an extended incubation period had a lower incubation constancy of 44 percent from day 14 to nest desertion. Observations of sessions and recesses with accompanying incubation constancy percentages are presented in Table 2. A definite relationship existed between the air temperature and the female's percent of incubation constancy. Figure 1 represents 107 hours of incubation observation at nest 10-65 and shows a negative correlation between air temperature at 16:00 hours and percent incubation constancy. Low air temperature on days 2, 5, 6, 10, and 11 were accompanied by a greater percentage of female constancy at the nest. The decline in percent constancy of incubation on day 13, the last day of incubation, was typical for all nests studied.

Brooding.—Brooding of nestlings in the South Bass Island, Ohio colony was almost entirely by the females. The brooding position was established by a lateral back and forth movement of the female's body over the young, with the bill, top of her head, and tip of her tail just visible over the nest edge. Occasionally the female adjusted her position, which forced the nestlings into different positions in the nest. The brooding sessions

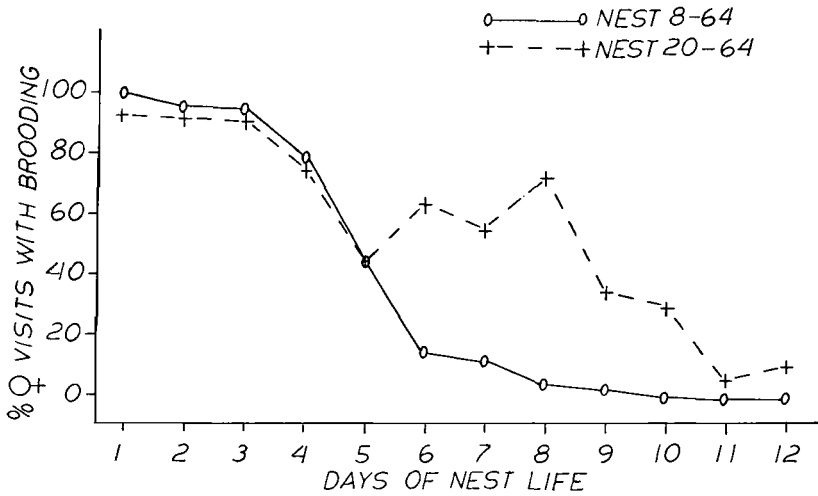


Figure 2. Comparison of percentage of female Common Grackle visits with brooding at nests 8-64 and 20-64 for each day of nest life.

were often ended by the arrival of the male with food for the nestlings. As he uttered a soft "chack" call and moved to the nest, his mate gave up her brooding position. Female grackles made brooding-only visits to the nest in addition to feeding-brooding visits for the first 5 days of nest life. After 5 days the brooding-only visits ended, brooding being accomplished by the feeding-brooding visits.

Nests showed variation in the percentage of females' time spent brooding and the number of days the female brooded the young after hatching. In nest 8-64 brooding decreased gradually until it terminated the 8th day of nest life, while brooding continued erratically throughout nest life in nest 20-64. The average percentage of females' time spent brooding during the first 5 days of nest life was similar for both nests; 8-64 (37 percent) and 20-64 (38 percent). During the last 5 days of nest life the amount of females' time spent brooding was zero percent at nest 8-64 and was 23 percent at nest 20-64 (Figure 2).

The male at nest 8-64 brooded on the 3rd, 4th and 5th days of nest life for a total of 30 minutes. Of the five brooding visits by the male, three were visits for brooding purposes only and two were feeding-brooding visits. This unusual behavior was not noticed at other nests in this colony or by Eyer (1954) in his grackle study.

Feeding the young.—Both male and female grackles participated in feeding their young. The feeding methods used by both sexes were similar. The adult grackles arrived in the nest tree with food, paused,

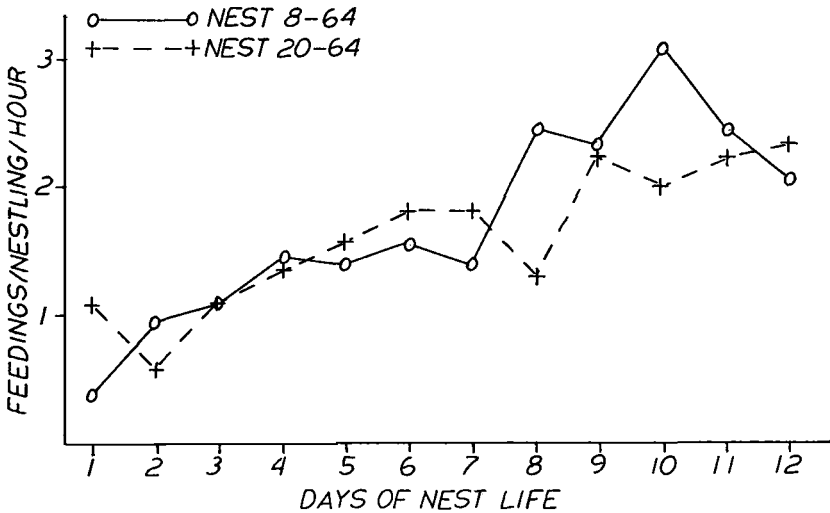


Figure 3. Comparison of the total number of feedings per nestling per hour made by both adult male and female Common Grackles at nest 8-64 and 20-64 for each day of nest life.

then approached the nest edge and forced the food into the open mouths and, in some cases, into the esophagus. Some attempt was made to distribute the food to other nestlings, but the most aggressive nestling usually took the food. The average time necessary for transfer of food from adult to nestling was 1 minute. Variation in the time needed to transfer food was caused by the type of food presented. A bill-full of mayflies took longer to give the nestling than did one caterpillar.

The number of feedings accomplished per hour by the adult male and female grackles varied between nests. An average of the feedings/nestling/hour computed for the total nest life time of 12 days shows the differences in the feeding behavior between the sexes at each nest. The male at nest 8-64 averaged 0.92 feedings/nestling/hour and the female 0.82 feedings/nestling/hour. In contrast the male from nest 20-64 had a 0.32 feedings/nestling/hour rate and the female a 1.34 feedings/nestling/hour rate. The total feeding activity at these two nests (8-64, 20-64) is compared in Figure 3 and Table 3. During the 12 days of nest life an average combined male and female feeding rate of 107 feedings/nest/day was obtained for nest 8-64 with 5 nestlings and 70 feedings/nest/day for nest 20-64 with 3 nestlings.

Nest Maintenance.—The male and female shared the fecal sac removal duties, but the female made all nest repairs. Nest repair concerned the physical remaking of the nest lining and to some extent the foundation.

TABLE 3
SUMMARY OF FEEDINGS/NEST/DAY (14 HOURS) BY FEMALE AND MALE COMMON GRACKLES AT TWO NESTS AT SOUTH BASS ISLAND

Nest	Days of nest life											
	1	2	3	4	5	6	7	8	9	10	11	12
8-64 (5 nestlings)												
Total feedings/nest/day by female	19.6	16.8	30.8	42.0	46.2	50.4	42.0	63.0	54.6	100.8	74.0	60.2
Total feedings/nest/day by male	0.0	51.8	47.6	58.8	49.0	63.0	53.2	78.4	81.2	75.6	65.8	60.2
Total feedings/nest/day	19.6	68.6	78.4	100.8	95.2	113.4	95.2	141.4	135.8	176.4	139.8	120.4
20-64 (3 nestlings)												
Total feedings/nest/day by female	47.6	26.6	44.8	54.6	43.2	56.0	54.6	50.4	82.6	57.4	56.0	93.8
Total feedings/nest/day by male	0.0	0.0	4.2	2.8	14.0	21.0	32.4	5.6	14.0	30.8	43.4	7.0
Total feedings/nest/day	47.6	26.6	49.0	57.4	57.2	77.0	87.0	56.0	96.6	88.2	99.4	100.8

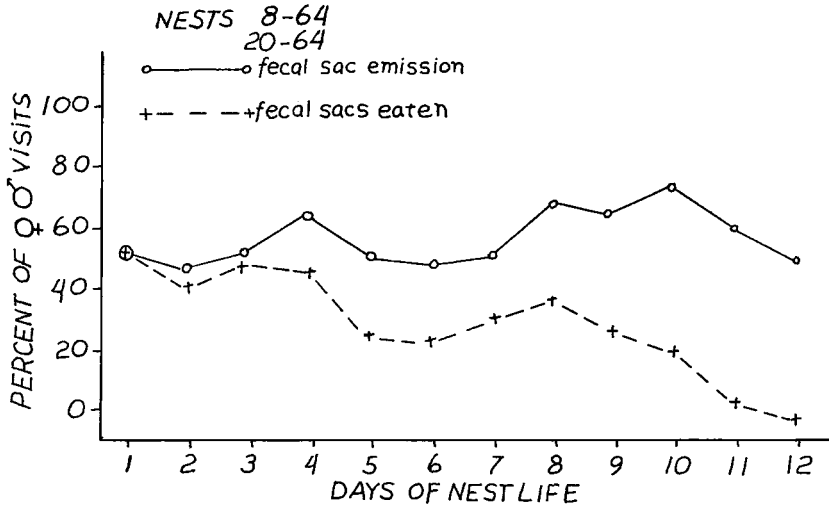


Figure 4. Nest sanitation by adult male and female Common Grackles at nests 8-64 and 20-64 for each day of nest life. The gap between the solid and dotted lines shows the percentage of adult visits after they carried the fecal sacs away instead of eating them.

Nest 8-64 needed excessive repairs of tearing caused by our removing its nestlings for measuring.

Adults removed fecal sacs during more than half the feeding visits. During the early days of nest life they ate a higher percentage than they carried away and dropped. Later in nest life the number of fecal sacs eaten decreased (Figure 4). The male and female grackles carried nearly equal proportions of sacs from nest 8-64, but the female removed more than the male at nest 20-64 (Table 4).

Nest success.—A nest was considered successful if at least one nestling fledged. Petersen and Young (1950) in their grackle study in Wisconsin give a nesting success of 55 percent over a 3-year period. Eyer (1954) found a 35 percent nesting success in his Michigan study over a 2-year period. Data from 19 nests from the South Bass Island, Ohio colony showed a nest success of 53 percent in 1964 and 1965 (Table 5).

Four factors limited nest success: human interference, weather, infertile eggs, and predators. Human interference unfortunately is greater in a colony being studied than in one left undisturbed. The birds were more prone to desert in the early stages of nesting, but became strongly bonded to the nest after the eggs hatched. Nests with eggs were deserted when branches near the nest were cut or moved to afford a better view of the nest. No nests were lost by human interference after eggs had hatched.

TABLE 4
 PERCENTAGE OF FECAL SACS EATEN OR CARRIED FROM THE
 NEST BY ADULT MALE AND FEMALE COMMON GRACKLES

Nest	Days of nest life		
	1-5	7-12	All days
8-64			
Female	49%	38%	45%
Male	51	62	55
20-64			
Female	96	75	82
Male	4	25	18

Weather was the most destructive natural cause of nest loss, doubtless because of the nests' open exposure in the junipers to the high northwest winds so common over Lake Erie.

All failures from egg infertility were in nests started at the beginning of the nesting season in early May. In both nests with infertile eggs in 1964 the first egg was laid by 8 May; in the one infertility failure in 1965, the first egg was laid on 9 May.

Only one predator, a gray squirrel (*Sciurus carolinensis*), was seen taking eggs from a grackle nest. During the incubation period one female was found dead and mutilated beneath her nest; the cause was not determined.

ACKNOWLEDGMENTS

This study was partially supported by a National Science Foundation Summer Fellowship for Graduate Teaching Assistants in 1964, an Ohio State University

TABLE 5
 NESTING SUCCESS OF COMMON GRACKLES AT SOUTH BASS ISLAND

	1964	1965	Totals and averages
Active nests ¹	12	7	19
Number of nests fledging at least one bird	7	3	10
Percent successful	59	43	53
Number of eggs	51	29	80
Number hatching	24	15	39
Percent hatching	47	52	49
Number of fledglings	18	8	26
Percent of young fledging	75	53	65
Percent of eggs producing fledglings	35	28	33

¹ Five nests abandoned because of the investigator's interference are not included.

Muellhaupt Fellowship in 1964-65, and an Ohio State University Osborn Fellowship in 1965. We wish to thank the following for their help with this project: Thomas Duff, Mildred Miskimen, Everett Seymour, Russell Smith, all from Put-in-Bay, Ohio; Eugene Good, Maurice Giltz, Milton Trautman from Columbus, Ohio; and Thomas Rambo from Dire Dawa, Ethiopia.

SUMMARY

Incubation, feeding, and brooding habits of the Common Grackle were studied on South Bass Island in Lake Erie, Ohio during 1964 and 1965. A mean incubation period of 13 days and 4 hours was determined from seven nests. The female incubated the eggs without help from the male.

The percent constancy of incubation varied inversely with daily air temperature. The average incubation constancy for all nests during the normal incubation period was 76 percent for both years. In two nests with eggs that did not hatch, females incubated for a total of 18 days and 23 days. The incubation constancy was 44 percent at these nests from day 14 to time of desertion.

Female grackles assumed the brooding responsibility in this colony. They made brooding-only visits to the nest in addition to feeding-brooding visits for the first 5 days of nest life. A male brooded for a short time on 3 separate days at one nest.

Both male and female grackles fed their young. The number of feedings accomplished per hour by the adults varied. The male at one nest was more active than the female, but at another nest the male did little feeding. A male and female feeding rate of 107 feedings/nest/day was determined at one nest and 70 feedings/nest/day at another.

Fecal sacs were carried from the nest or eaten by both male and female grackles. In the 12-day nest-life period, one female disposed of 45 percent of the fecal sacs and another female 82 percent.

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Rice Creek Biological Field Station, State University of New York College at Oswego, Oswego, New York 13126, and Franz T. Stone Laboratory, The Ohio State University, Put-in-Bay, Ohio 43456. Accepted 1 April 1971