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FURTHER STUDIES ON NESTING OF THE COMMON NIGHTHAWK

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The Common Nighthawk (*Chordeiles minor minor*) has nested on the campus of Kent State University at Kent, Ohio, since 1948, and reports have been published through the season of 1956 (Dexter, 1952; 1956). In 1957, Nighthawks returned to the campus on May 12. They had also been found five days earlier on the roof of the Akron City Hospital, where they had been studied in 1953, but the writer was unable to continue his studies in the season of 1957.

In 1958 the Nighthawks again returned to the Kent campus on May 12. A pair was located on the roof of Wills Gymnasium incubating two eggs on June 1. For the first time in seven years of nesting on the campus, the eggs were placed on the open roof at some distance from the protection of a wall. Previously, the eggs had always been deposited in a corner where the walls of the roof formed a right-angle bend. This new situation presented an opportunity to study the orientation of the incubating and brooding female in relationship to the direction of sun-rays and prevailing wind. Weller (1958) published a detailed study on the orientation of this species to sunlight. His observations are compared with the present study, and additional relations are noted here.

On June 5, 1958, the incubation behavior was observed continuously from sundown until total darkness. Just at sundown, the male came to the roof of Wills Gymnasium, flew over the roof-top several times in power dives, and then landed about one foot away from the female incubating the eggs. After several minutes, he left. At twilight he returned and again circled the roof, giving his characteristic call, and landed on the roof some distance south of the female. He called to the female several times, then flew to a position near her. After several minutes, he again left the roof. At dusk, when he was barely visible, he returned to the roof, but this time flew in silently and replaced the female at the nest. He continued incubating the eggs until it was too dark to see further. This is the first time the writer has observed the male taking part in the incubation of the eggs.

On June 6, at 10:30 P.M., the writer flushed the adult bird on the nest and listened to peeping sounds coming from one of the two eggs. The next day this egg was hatched. That evening the male joined the female on the roof at 9:15 P.M. On June 8, the female was captured in a drop trap and proved to be No. 42-232611, which has nested on our campus since 1950. The nestling was banded with No. 512-45998. The male circled overhead, while the female was being captured and the nestling was banded, but he did not land on the roof at any time the writer was in sight.

Table 1. Orientation of Nesting Nighthawks to Sunlight and Prevailing Wind

Date 1958	Time E.S.T.	Direction of Sun	Direction of Wind	Facing Direction of Nighthawk	Notes
6-1	4 P.M.	W	NW	NW	Intermittent sunlight between clouds. Bird facing strong wind after storm
6-2	7 P.M.	—	N	NW	Dusk: light rain
	7:30 A.M.	—	NE	E	Cloudy
	Noon	—	E	E	Cloudy; Facing wind
6-3	3 P.M.	—	NE	N	Cloudy
	7 A.M.	E	E	E	Facing both sun and wind
	10:30 A.M.	SE	SE	SE	Facing both sun and wind
6-4	Noon	S	S	S	Facing both sun and wind
	4 P.M.	W	SE	SE	Facing wind
	7:30 A.M.	E	W	E	Slight breeze only; facing sun, away from wind
6-5	10:30 A.M.	SE	W	SE	Slight breeze only; facing sun
	4 P.M.	W	W	E	Facing away from both sun and wind. Slight breeze only
	7 A.M.	E	W	E	Facing sun, away from wind
6-6	9:30 A.M.	SE	W	SE	Facing sun
	1 P.M.	SW	NW	SW	Facing sun
	8 A.M.	E	NE	E	Facing sun
6-7	Noon	S	NE	S	Facing sun
	4 P.M.	W	NE	W	Facing sun
	8:30 A.M.	E	—	E	Facing Sun, One egg hatched

B. Female 512-46000 with nest close to a northeast-southwest wall.

1959								
7-2	3:30 P.M.	—	—	S	Bird in shade of wall			
7-3	1 P.M.	SW	—	NE	Facing away from sun			
7-4	8 A.M.	E	—	E	Facing sun			
	11 A.M.	SE	S	W	Bird at an angle to both sun and wind			
7-5	2 P.M.	SW	W	E	Facing away from wind			
	8 A.M.	E	W	E	Facing sun, away from wind			
	Noon	S	W	W	Facing wind; at right angle to sun			
7-6	1:30 P.M.	SW	NW	NE	Facing away from sun			
7-7	11 A.M.	SE	NW	N	Facing toward wall			
	9:30 P.M.	—	—	S	Facing away from wall			
7-8	Noon	S	—	N	Facing away from sun			
	4:30 P.M.	W	W	E	In shade of wall, facing away from wind			
7-9	10:30 A.M.	SE	S	W	Bird at an angle to sun and wind			
7-12	11 A.M.	SE	N	SE	Facing sun			
7-13	10:30 A.M.	SE	N	NW	Facing away from sun			
7-14	10:30 A.M.	SE	E	NW	Facing away from sun			
7-15	10:30 A.M.	SE	SE	NW	Facing away from sun and wind			
7-16	11 A.M.	SE	E	NW	Facing away from sun			
7-17	9 P.M.	—	—	S	Facing away from wall			
	11 A.M.	SE	SE	NW	1 egg hatched. Parent facing away from both sun and wind			

Female Nighthawk 42-232611 was banded on the campus June 7, 1950, was recaptured on June 26, 1951, June 12, 1953, June 15, 1955 and, as reported in this paper, was recaptured again June 8, 1958, and June 26, 1959. Section A of Table I summarizes observations on this bird in relation to the direction of sunlight and prevailing wind.

Analysis of the table shows that this bird was found facing directly into the sun 80% of the time it was observed. This is contrary to the results of Weller (1958). However, he also observed that the female Nighthawk at times faced the sun, especially in the early morning. Sutton and Spencer (1949) likewise reported nestlings facing into the sun early in the morning. Only once did the writer find the female facing directly away from the sun. The observations of both Weller and the writer agree that the direction of sunlight seems to be of greatest importance in determining orientation, but the direction of orientation does not seem to be constant. Weller has reviewed the conflicting evidence in regard to this matter.

In the absence of direct sunlight, the bird often orients by facing the breeze, and at times of strong wind, faces the wind regardless of the direction of sunlight. During 33% of the time observed, this bird faced in the direction of the breeze, and during 28% of the time was facing in the general direction of the wind. Only three times was she found facing directly away from the wind, which was never strong at those times. In my earlier report (Dexter, 1956), I noted that a nesting female was observed to face directly into the direction of rain during a heavy rain storm.

In 1959, Nighthawks were first found nesting on the campus on May 6. On June 26, a female was discovered incubating two eggs in the southeast corner of the roof of Lowry Hall. The nest was located in the same place where Nighthawks had nested in 1954. The female was captured and again proved to be No. 42-232611, which has nested on the campus since 1950. The two eggs were accidentally destroyed during the trapping process, and the embryos were found to be only about one-fourth developed. They were uncommonly late since eggs from this same female have usually been hatched by that date. The destruction of the eggs was of no consequence, since workmen were in the process of removing the roof surface in preparation for a new one, and the eggs would not have hatched before being destroyed by the workers.

Interesting observations were made on the behavior of the parent birds. While these birds were heard frequently each day and night while on flights, they were very silent as they approached the eggs upon return to the nest. They never returned directly to the nest, but first landed some distance away on the roof, a wall of the roof, or some perch such as a television antenna, to permit careful scanning of the roof-top before returning to the eggs. A characteristic bowing of the head was usually observed to precede any movement to a position nearer to the nest.

On July 1, 1959, a male and female Nighthawk were found circling the roof of Merrill Hall. A search of the roof disclosed two eggs at the northeastern end of the building, about one foot out from the wall of the roof, and about twenty feet from the end of the building. Since the

eggs were not placed in a corner, this presented another opportunity to study orientation, although the situation was not ideal because of the northeast-southwest wall blocking winds from the opposite side. Some interesting data were collected and are presented in part B of table I.

At first it was thought that possibly this was the same pair which had nested on the roof of Lowry Hall as described above, and had moved over to the adjoining building for a second brood. However, this proved not to be the case when the female was later captured and found to be unbanded. This female was observed daily while incubating the eggs and for a short time while brooding the one nestling which hatched. Whenever she was disturbed, the male very soon appeared, presumably from a perch in some nearby tree, and took up guard by perching on a TV antenna attached to the roof. From this outlook he was able to observe my activities and repeatedly attempted to drive me away by diving at me with his characteristic "booming." Also, by landing on the roof at some distance away and hissing to attract attention, he gradually led me across the roof away from the nest as described in earlier accounts.

On July 17, one egg was found hatched, and the female continued to incubate the second egg as well as brood the nestling. When the female was flushed that day, she and two other Nighthawks, which apparently were called by her alarm, circled me repeatedly in an effort to divert me from the nest. The following day, the female was found brooding the young nestling in the northeast corner of the building and the remaining egg was abandoned. The nestling was banded with No. 512-45999. The deserted egg was dissected and found to be in an early stage of development.

Efforts to capture the female parent with a drop trap failed because she repeatedly called the nestling out from under the drop trap where I had placed it, and continued to brood the young bird out of range of the trap. While this method of trapping was underway, two males remained on guard, perched on the walls and abutments of the roof, and repeatedly attempted to drive me away. One regularly returned to his roost on the TV antenna. On July 21 Clarence Owen and the writer captured the female parent with a mist net and banded her with No. 512-46000.

Analysis of part B of table I shows that this bird, unlike the previous female which had nested on the open roof, faced directly away from the sun 50% and generally away 25% of the time when observations were made. Only three times was she found facing directly into the sun. The response to sunlight in this case agrees with the finding of Weller (1958). The difference in direction of orientation between the two years may be explained by the higher temperatures in July compared to June. In an earlier paper (Dexter, 1956), I reported finding female No. 42-232611 facing into the corner where she was nesting, away from the direct rays of the sun. More often she was found, over several years time, facing away from the corner regardless of the direction of sunlight. Sutton and Spencer, (1949), reported the same experience. At nighttime the incubating female has always been found facing out from the corner of the wall. Female No. 512-46000 faced away from the breeze 36% of the time when under observation. This female, however,

nested close to a wall which gave her protection and interfered with the breezes. Only once was she found facing directly into the wind. Because of nesting close to a wall, her responses to wind direction are not as dependable as the case given in Section A of Table I.

SUMMARY AND CONCLUSIONS

- I. A female Common Nighthawk banded (42-232611) on the campus of Kent State University, Kent, Ohio, June 7, 1950, and recaptured while nesting at the same place in 1951, 1953, and 1955, again returned for nesting in 1958 and 1959.
- II. The mate of this bird was observed to incubate the eggs at dusk for an undetermined length of time. This was the first time the writer has observed a male Nighthawk incubating the eggs.
- III. Unlike previous years this pair nested in 1958 on an open roof some distance away from any wall. Observation of the orientation of this bird to direction of sunlight and wind showed that during 80% of the observations, she was facing directly into the sunlight, and during 33% of the time observed she was facing in the direction of the breeze.
- IV. For the first time since 1948 two pairs of Nighthawks nested on the campus in 1959. The new nesting female was banded with No. 512-46000. She laid two eggs close to a wall on the roof of Merrill Hall, but the eggs were not placed in a corner as had been the practice of the female which nested on the campus from 1948-1959. This new nesting female was found to face directly away from the sun 50% of the time observed, and faced away from the direction of the breeze 36% of the time under observation. This bird, however, was sheltered by a northeast-southwest wall which formed a barrier to many breezes. Only one of her eggs hatched. The second egg was deserted shortly after the first one hatched. Dissection showed the unhatched egg to be in a very early stage of development.
- V. Observations on two incubating females showed that these birds usually orient according to the direction of sunlight. However, they do not always orient in the same manner. One female predominantly faced the sun while the other faced away from the sun over the greater part of time observed. Differences in temperature may explain the reversal of facing direction. In the absence of direct sunlight, the direction of the wind seemed to be of greatest importance in orientation. Here again, the facing direction is not constant, one bird predominantly faced the breeze directly, while the other more often faced away from the breeze. The latter bird, however, was protected by a north wall which interfered with many breezes. In cases of strong wind the incubating female always seems to face directly into it, and very strong wind is probably of more importance than direction of sunlight in determining orientation.

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MIGRATION OF THE COMMON COTURNIX IN NORTH AMERICA*

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The recent introduction to North America of some 172,000 Quail (*Coturnix coturnix*) from Japan is the most extensive attempt at introduction of an exotic game bird in recent years. This paper chronicles records of 143 banded recoveries of this species in North America taken prior to May 1, 1958 and recovered either more than 100 miles from point of release or 60 days subsequent to the release date. These birds were probably all descended from the same genetic stock of 140 breeders imported from Japan in 1953 by J. W. Steinbeck of Concord, California and propagated by various state game departments. Presumably all birds released were hatched in incubators and were artificially brooded.

Table 1. Common Coturnix releases and recoveries

<u>Release Area</u>	<u>Number Released</u>	<u>Band Returns*</u>
Arkansas	1,633	10
California	5,066	1
Georgia	3,472	7
Illinois	1,700	3
Indiana	20,819	6
Missouri	23,745	6
Nebraska	23,740	20
Nevada	64	0
New Hampshire	2,000	0
North Carolina	1,196	1
Ohio	9,978	13
Oklahoma	61,277	53
Texas	9,600	5
Virginia	7,575	18
TOTAL	171,865	143

* Note: All band returns except nine resulted from releases made during 1957. The nine returns resulting from releases made during 1956 included four from Missouri, one from Illinois, one from Ohio and three from Virginia.

Geographic analysis: Because there appears to be some tendency for Common Coturnix released in North America to migrate in a converging

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