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Experimental hypothermia in a Lesser Nighthawk.—During a study of the responses of Poor-wills (*Phalaenoptilus nuttallii*) to low temperatures (Austin and Bradley, 1969), similar observations were obtained for a Lesser Nighthawk (*Chordeiles acutipennis*). As this research is not being continued and little is known of the latter's responses to low temperatures, these preliminary observations are reported now. Previous studies on the Lesser Nighthawk were conducted by Marshall (1955). Lasiewski and Dawson (1964) reported the responses of the related Common Nighthawk (*C. minor*) to low temperatures. Austin and Bradley (1969) cite other related studies.

A male Lesser Nighthawk mist-netted at Corn Creek, Desert National Wildlife Range, Clark County, Nevada, on 4 May 1968 was brought into the laboratory for study. The bird weighed 58 g and had no visible subcutaneous fat at capture. Experimentation was initiated the following day and continued for 5 days. The bird was fed a mixture of ground beef liver, heart, and kidney on which it maintained its weight until food was withheld for 36 hours before hypothermia was induced by placing the bird in a refrigerator. Between the first and second periods of hypothermia 20 hours elapsed, and between the second and third 1.5 hours. The bird was allowed to arouse fully after the first and third periods of torpor, and it remained in apparent good health throughout the experimental period. For a more detailed description of methods used see Austin and Bradley (1969).

All temperatures are in degree Centigrade (T_a = ambient temperature, T_b = cloacal body temperature).

Marshall (1955) reported two captive Lesser Nighthawks with large fat deposits becoming hypothermic ($T_a = 18.7°$, $T_b = 18.6$ and $19.2°$). Lasiewski and Dawson (1964) reported hypothermia in the Common Nighthawk after a loss of 28 to 34 per cent of initial weight. In other caprimulgids (European Nightjar, *Caprimulgus europaeus*, and Spotted Nightjar, *Eurostopodus guttatus*) weight loss also appears to be necessary for hypothermia (Peiponen, 1965, 1966; Dawson and Fisher, 1969). Poor-wills appear to vary in their ability to enter torpor; some exhibit weight loss, others do not (Jaeger, 1949; Marshall, 1955; Bartholomew et al., 1957; Austin and Bradley, 1969).

After a loss of 22 per cent of its initial weight (58 g), the Lesser Nighthawk I studied was induced into hypothermia three times. The T_b during hypothermia fell as low as 12.8° without apparent ill effect. Euthermic T_b at room temperature (ca. 25°) was maintained between 39.5° and 40.5°. Arousal resulted from increased T_a and handling. No spontaneous arousal was observed.

After several hours at a T_a of −2° and prior to attaining hypothermia, the bird's T_b dropped to 37.2° and 36.6°. These T_b's may be within the normal euthermic range. Lasiewski and Dawson (1964) reported a T_b range of 34° to 40° in nontorpid Common Nighthawks at T_a's between 2° and 35°.

Marshall (1955) suggested that dormancy in the Lesser Nighthawk was part of its natural cycle. A cyclic response of this type seems superfluous as the majority winter in tropical and subtropical climates (A.O.U., 1957). Lasiewski and Dawson (1964) suggested that torpor was not important in the ecology of the Common Nighthawk. Only one out of four birds they studied roused spontaneously from torpor. MacMillen and Trost (1967) reported nocturnal hypothermia in the Inca Dove (*Scardafella inca*) as a possible emergency measure in response to restricted food and/or water. Birds that require a food source that is undependable, such as flying insects, may be severely affected by inclement weather. The ability to become hypothermic following severe weight loss from starvation possibly developed as an emergency mechanism for survival and energy conservation in the Lesser Nighthawk during periods of prolonged inclement weather and reduced food availability.

On the other hand Lasiewski and Lasiewski (1967) point out the impracticality of short duration torpor in larger birds. Thus it is somewhat surprising to find three large species able to attain hypothermia (Lasiewski and Dawson, 1964; Peiponen,

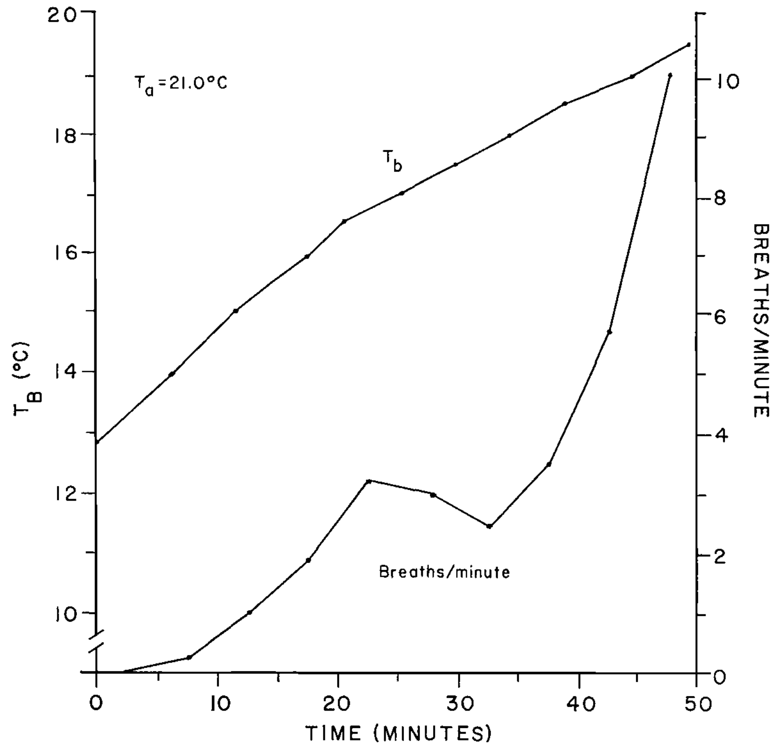

Figure 1. Respiration rate and body temperature of a Lesser Nighthawk (respiration rates given are averages of each 5-minute interval).

1965, 1966; Dawson and Fisher, 1969). Apparently the modern caprimulgids arose from a group in which heterothermy was adaptive.

Flight at low body temperatures has not been reported for the Lesser Nighthawk. Austin and Bradley (1969) reported a Poor-will flying with a T_b as low as 27.4° in the laboratory. On the basis of three flight trials, flight typical of the Lesser Nighthawk was noted at a T_b as low as 33.2° and good flight at a T_b as low as 31.0°; the bird was able to fly from the substrate at a T_b of 31.0°.

Respiratory rates during arousal from torpor are reported for the Poor-will (Marshall, 1955; Bartholomew et al., 1957; Howell and Bartholomew, 1959; Austin and Bradley, 1969) but not for the Lesser Nighthawk.

After the T_b was lowered to 12.8° on one occasion during this study, respirations were counted visually during arousal. Respiration was quite irregular, especially at the lower T_b's. At T_b's from 14.0° to 16.0° the interval between visible breaths ranged from 5 to 60 seconds. At T_b's above 16° respiration was less irregular, but six times a weak, shallow inspiration was followed immediately by a strong, deep one. Figure 1 summarizes these data up to a T_b of 20°.

In the Poor-will Austin and Bradley (1969) detected a rate of 1.4 breaths/minute at a T_b of 18.0° and no visible breathing at a T_b below 18°. My data for the Lesser Nighthawk are considerably higher than this, although not so high as those Bartholomew et al. (1957) report for a Poor-will at a T_b as low as 13.5°.

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