

*Conclusions.*—Caprimulgids respond to undue provocation at the nest by deserting the eggs or by calling the young away. Chicks are mobile within hours of hatching and readily move unaided towards a calling adult. There is no satisfactory evidence of adults deliberately transporting eggs or young, either in the mouth or between the thighs, as is claimed in the literature. Accidental transportation occasionally occurs when an egg or chick gets stuck to the soft ventral plumage of the sitting bird, and this would seem to be the explanation for most of the documented records.

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**Temperature fluctuations and nesting behavior of Rock Wrens in a high-altitude environment.**—The energetics of nesting behavior in birds has been examined by many workers (Kale, *Publ. Nuttall Ornithol. Club* 5, 1965; Verner, *Condor* 67:125–139, 1965; Walsberg, *Ecology* 59:147–153, 1978; Vleck, *Condor* 83:229–237, 1981). This paper reports observations made at a nest of Rock Wrens (*Salpinctes obsoletus*) at 3800 m above sea level. The study was conducted on 19 and 20 July 1981 at the University of California White Mountain Research Station, Inyo County, California, about 350 m above timberline. The nest was situated beneath a rock of approximately 15 cm, and opened to the southwest. Summer temperatures average from 0 to 20°C, and summer precipitation averages about one cm; winds of approximately 8 km/h were frequent. During a continuous 24-h period we recorded feeding and other behavioral patterns, and simultaneously monitored nest and ambient temperatures. The nest contained a small nestling, which we estimated to have been 2–4 days old.

*Methods.*—Nest temperatures ( $T_n$ ) were recorded with a copper-constant thermocouple taped to the roof of the rock cavity in which the nest was located (about 8 cm from the bottom of the nest depression). Ambient temperatures ( $T_a$ ) were measured with a thermometer that rested at ground level in a shaded rock crevice. Both  $T_a$  and  $T_n$  were recorded every 5 min, to obtain average hourly temperature values. Daytime parental behavior (number and duration of visits to the nest, qualitative assessment of food delivered, etc.) was observed from 12:00 to 20:45 on the first day, and from 05:00 to 12:00 on the second day. We considered the two half-days of observation as a single day. Neither parent was banded and, because the species is sexually monomorphic, we can state only that one, both, or neither of the parents was at the nest at any particular time.

*Results.*— $T_n$  averaged 21.8°C and  $T_a$  averaged 22.2°C for the active period of the day (05:00–20:00 h);  $T_n$  averaged 11.3°C during the inactive period (20:00–05:00 h). The combined number of parental visits for the entire day was 298; food was brought by the parents in 240 of these visits (15 visits/h). The rate of feeding in the morning followed an hourly pattern in which an hour of high feeding rates was followed by an hour of low ones (Fig. 1). This behavior may have been caused by response of the parents to satiation of the nestling (Kendeigh, *Illinois Biol. Monogr.* 22:1–356, 1952). The feeding rate, which declined in the afternoon, increased shortly before nightfall; this pattern is commonly observed in other species (Kluyver, *Ardea* 38:99–135, 1950; Kendeigh 1952; Morehouse and Brewer, *Auk* 85:44–54, 1958; Anderson and Anderson, *Condor* 62:351–369, 1960; Nolan, *Ornithol. Monogr.* 26, 1978).

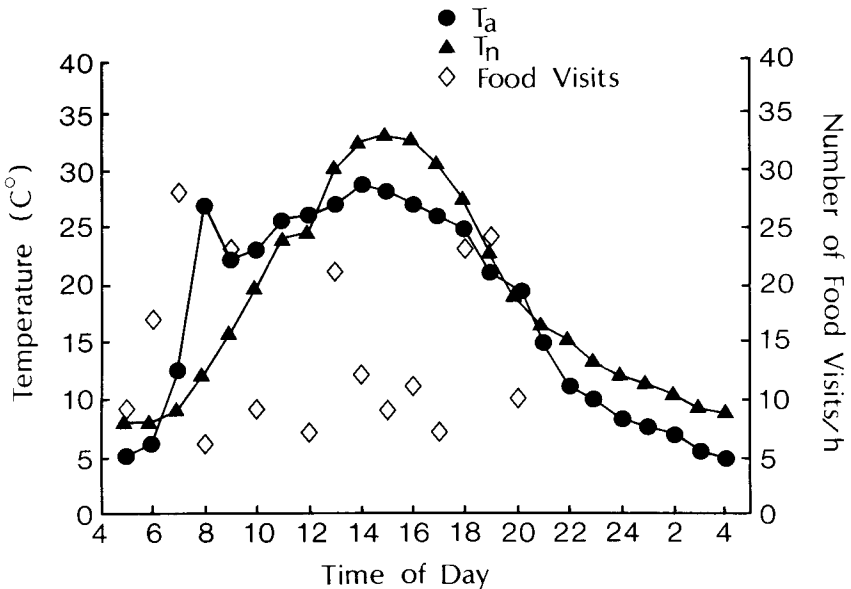


FIG. 1. Nest ( $T_n$ ) and ambient ( $T_a$ ) temperatures of a Rock Wren nest during a 24-h period, with the number of feeding visits/h by both parents. Nest temperature =  $\blacktriangle$ , ambient temperature =  $\bullet$ , parental visits =  $\diamond$ .

During the 16-h period of activity, the nestling was alone in the nest for 9 h and 15 min, or 58% of the time. The amount of time both parents spent together in the nest was usually brief (<1 min). The greatest proportion of time the nestling was alone appeared to be in the morning and early evening, presumably due to increased foraging by the parents in response to a greater demand for food at those times (Fig. 1). The nestling was alone much less during the afternoon; between 16:00 and 17:00 a parent was present for 88% of the time.

When one parent was in the nest when the second arrived, the bird already present sometimes flew out. This combined enter-exit behavior of the parents created the illusion that a single individual had entered and left the nest within a few seconds. This behavior has been reported in other species (Nolan 1978) and may function as an anti-predation mechanism.

*Discussion.*—Temperatures in the Rock Wren nest were usually above and more constant than  $T_a$ . Similar results have been obtained in studies of other cavity nesters (Kendeigh, *Wilson Bull.* 73:140–147, 1961; Mertens, *Oecologia* 28:1–29, 1977; McComb and Noble, *J. Wildl. Manage.* 45:284–289, 1981). McComb and Noble (1981) compared diurnal fluctuations in microclimates of artificial wooden nestboxes and natural tree cavities. Natural cavities (in vertical tree trunks) showed a longer temperature lag as well as decreased exposure to solar radiation relative to exposed nest boxes. Thus, by midafternoon, the temperature in the natural cavities was still below ambient temperature, whereas in nestboxes it exceeded ambient temperature. This pattern of nest temperature fluctuation is identical to that found in the Rock Wren nest in this study (Fig. 1). This suggests that the thermal inertia of typical

Rock Wren nests at White Mountain Biological Station (placed under small loose rocks) is comparable to that of exposed wooden nest boxes at lower altitudes. The combination of the horizontal orientation of the nest rock and the lack of leaf cover may have accounted for the similar temperature patterns observed in wooden nest boxes and the Rock Wren nest in this study.

The number of feeding trips to the nest (240) was higher than has been reported for most small passerines, even in larger broods (Kendeigh 1952; Anderson and Anderson 1960; Royama, *Ibis* 108:313-347, 1966; Nolan, 1978). As the nestling was probably not yet endothermic, it is doubtful that it was using large amounts of food for thermoregulation. The nutritional value of the insects may have been low or the parents may have eaten some of the food themselves. Further investigation is needed to compare the behavior of Rock Wrens at various altitudes to determine the effects of arctic-alpine habitat on the reproductive biology of these cavity nesting birds.

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**A second brood by Canada Geese.**—Canada Geese (*Branta canadensis*) normally attempt one nest each year. If the first nesting attempt fails early in the nesting cycle, renesting often occurs (Craighead and Craighead, *J. Wildl. Manage.* 13:51-64, 1949; Kossack, *Am. Midl. Nat.* 43:627-649, 1950; others summarized by Bellrose, *Ducks, Geese and Swans of North America*, 3rd ed., Stackpole, Harrisburg, Pennsylvania, 1976). At Trimble Wildlife Area, Missouri, female geese often made as many as two renesting attempts following failures, but only if the nest was destroyed before the fifth day of incubation (Brakhage, *J. Wildl. Manage.* 29:751-771, 1965). Renesting was common at Marshy Point, Manitoba, where 92% of the pairs that lost clutches during laying made a second attempt. Renesting did not occur, however, if the first nest was destroyed after the second day of incubation (Cooper, *Wildl. Monogr.* 61, 1978). Renesting occurred only up to the tenth day of incubation at Dog Lake, Manitoba (Klopman, *Wilson Bull.* 70:168-183, 1958). To my knowledge, additional nesting attempts have not been reported for Canada Geese when nests were destroyed late in incubation or at hatching, and second broods in Canada Geese have not been reported previously.

In Clinton County, northwestern Missouri, an individually marked pair (neck-collared female and leg-banded male) of resident Canada Geese (*B. c. maxima*) successfully hatched two clutches in the spring of 1983. The pair nested in an elevated man-made nesting structure in a farm pond. The female was at least 5 years old, and the male at least 3 years old. In both nests, only one egg hatched. The female began laying the first clutch of 10 eggs on 8 March 1983. One egg hatched on 22 April 1983, and the nesting pair left the pond with the gosling. The same pair returned to the nest pond without the gosling in early May. The female laid the first of 9 eggs in a new clutch on 16 May 1983. One of these eggs hatched