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Helmeted Honeyeaters Build Bulkier Nests in Cold Weather

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Birds with long breeding seasons may encounter markedly varied environmental conditions as the breeding season progresses. In the Temperate Zone, one of the most universal of these changes is an increase in temperature. At low temperatures, incubation imposes an additional energetic cost (Haftorn and Reinertsen 1985), and the insulatory capabilities of even cup nests provide demonstrable advantages (Smith et al. 1974, Walsberg and King 1978). However, at higher temperatures nest material may impede the dissipation of excess heat (Ricklefs and Hainsworth 1969). Although seasonal changes in nest orientation are well documented and have been related to prevailing temperatures and wind (Ricklefs and Hainsworth 1969, Austin 1976), structural changes are poorly documented. Nolan (1978) reported that first nests of the Prairie Warbler (*Dendroica discolor*) were 21% heavier than replacement nests.

The nest of the Helmeted Honeyeater (*Lichenostomus melanops cassidix*; Meliphagidae) is a substantial cup, usually both suspended from and supported by shrub twigs (Barrett 1933, Cooper 1967, Franklin et al. 1995). It is a tightly woven structure of bark fibers or strips, fine twigs, grass stems, and dry leaf strips. The nest is lined with diverse materials, such as pithy wood fragments, fine bark fibers, and flower buds. Construction of the nest takes about a week and is undertaken almost entirely by the female. The breeding season extends from midwinter to late summer, and a pair may make up to nine nest attempts (typically about four) in a breeding season. A new nest is built for each attempt. Wilson and Chandler (1910) noted that early nests were bulkier than later nests, and Wykes (unpubl. manuscript) suggested that this was due to a thinner lining. I examine that phenomenon.

During the 1991-1992 and 1992-1993 breeding seasons I opportunistically measured Helmeted Honeyeater nests at Yellingbo (37°50'S, 145°29'E) in southern Victoria, Australia. Measurements (to nearest millimeter) taken were: cup depth; cup diameter; external depth; and external diameter. Diameters were measured in two or three places, and the mean estimated. Wall thickness (including lining) was calculated by subtracting cup measurement from the external measurement and, in the case of the diameter, halving the result. I measured nests of 13 color-banded females. I randomly selected one nest of each of two duplicated females for inclusion in the analysis. Results were combined for both breeding seasons. Daily maximum temperatures were obtained from records maintained at Yellingbo State Nature Reserve.

Monthly means of daily maximum temperatures at Yellingbo were similar for both years, increasing as the season progressed (Fig. 1A). Mean daily maximum temperature for the 14 days prior to laying in the 13 nests was very strongly correlated with time of year ($r = 0.99$, $P < 0.001$).

Helmeted Honeyeater nests ranged from 78 to 110 mm in external diameter and 62 to 102 mm in external depth. Regression analyses indicated that neither cup diameter nor depth varied significantly with laying dates (Fig. 1B-C), but the thickness of the wall at both the rim and base declined significantly with the progression of the breeding season (Fig. 1D-E). Early nests were dense and had a deep lining, whereas late nests were thinly lined and less dense, such that the eggs could sometimes be seen from below.

The Helmeted Honeyeater built bulkier nests early in the season, when the weather was coldest. Wall thickness and density are major parameters contributing to the insulatory capabilities of nests (Smith et al. 1974, Skowron and Kern 1980). However, it is not known whether a thinner-walled nest offers thermoregulatory advantages in warmer weather. Bulky nests increase the cost of construction and may be more visible to predators, and the observed trend may be a trade-off between these factors. The trend might also result from the greater urgency of reproduction later in the season, although the long breeding season and high adult survival rate of the nonmigratory Helmeted Honeyeater (unpubl. data) should mitigate against the importance of this factor. Regardless of the costs and benefits at stake, flexibility in nest construction is likely to be particularly advantageous for multibrooded birds.

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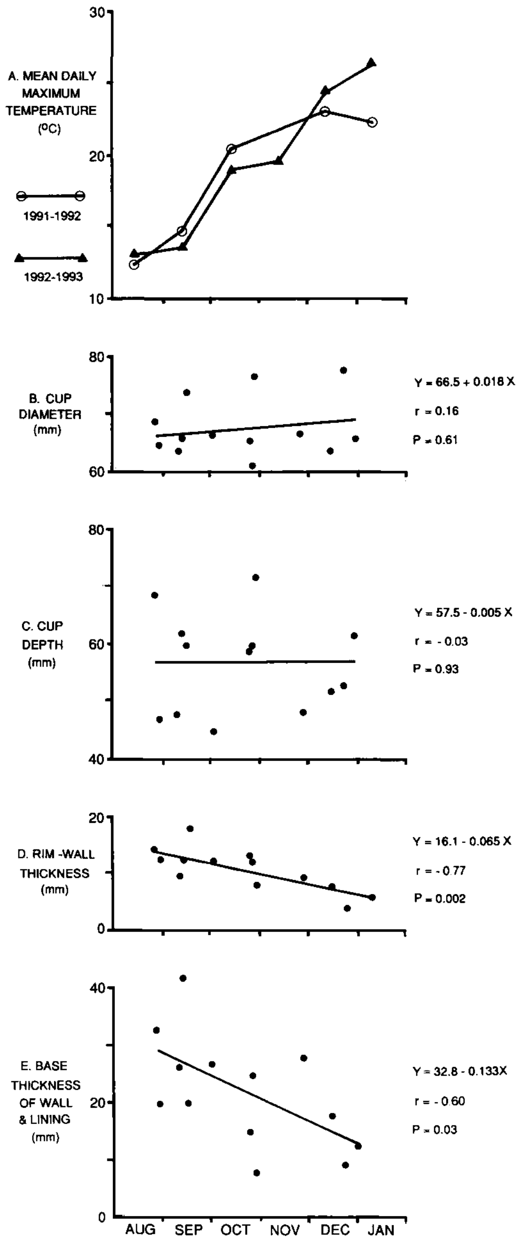

Fig. 1. Mean maximum temperatures encountered by Helmeted Honeyeaters, and dimensions of their nests. Scales differ among panels for y-axis.

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