COMMENTARY

Cavity Roosting, Philopatry, and Cooperative Breeding in the Green Woodhoopoe May Not Reflect a Physiological Trait

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Ligon et al. (1988) suggested that Green Woodhoopoes (*Phoeniculus purpureus*) roost in cavities because they are unable to cope physiologically with low nighttime air temperatures. They stated that this is the first evidence to suggest that a physiological limitation has played a major role in the evolution of philopatry and possibly cooperative breeding in an avian species.

Green Woodhoopoes suffer a high mortality rate which results largely from nocturnal predation on roosting birds (Ligon and Ligon 1988). It would appear then that woodhoopoes roost in cavities in spite of the high predation rate because there is some benefit that outweighs the potential cost.

Ligon et al. (1988) examined the possibility that woodhoopoes roost in cavities because they are unable to withstand low nocturnal ambient temperatures. Captive birds ($n = 3$) were placed individually in a metabolic chamber at 1600 and were allowed to adjust to conditions in the chamber at 30.5°C for 4 h. After steady oxygen-consumption values ($\dot{V}O_2$) were obtained, the temperature was lowered to 27°C for at least 1 h. After steady $\dot{V}O_2$ readings were obtained at this temperature, the temperature was lowered to 19°C for at least 1 h. The birds were removed from the chamber at 2400.

Woodhoopoes were inactive at air temperatures of 30.5°C and 27°C but had elevated $\dot{V}O_2$ at 19°C, coincident with frantic hopping and fluttering movements. The body temperature of each bird was measured as it was taken from the chamber. In spite of the increased activity at 19°C, the birds were becoming hypothermic. Ligon et al. (1988) concluded that these metabolic data can account for the apparent paradox that woodhoopoes roost in cavities despite the high associated risk of mortality. We suggest that this conclusion may not be correct.

The agitated state of the woodhoopoes coincided not only with the lowest experimental air temperature, but also with time of day (late evening). Thus, the agitated state of the birds observed at 19°C may have arisen, not as a response to the low ambient temperature, but as a result of their inability to enter a cavity with other birds to roost, which is what they usually do at sundown under natural conditions (an activity probably governed by their circadian rhythm). Furthermore, the birds were confined for at least 5 h while measurements were made, and there was an 8°C air temperature drop between the second and third measurements as compared with a 3.5° drop between the first and second; both conditions may have exacerbated their agitation.

$\dot{V}O_2$ in the woodhoopoes was measured at three ambient temperatures, always in the same chronological order. Thus, the effect of circadian rhythm on metabolic rate (Aschoff and Pohl 1970) was ignored. Furthermore, the low cloacal temperatures of woodhoopoes at 2400 may also have been a function of the birds' circadian rhythm. Finally, woodhoopoes in South Africa and Kenya are active in the early morning when ambient temperatures in their natural habitat may be below 20°C (pers. obs.). This also indicates that their agitated responses in the laboratory may have been due to natural circadian rhythms.

Ligon et al. (1988) concluded their paper "Thus, at present, about all that can be concluded is that contemporary Green Woodhoopoes require access to roost cavities. . . ." We concur.

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Received 31 August 1988, accepted 1 September 1988.