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GEOFFREY C. SMITH, *Australian Environmental Studies, Griffith University, Nathan, Qld 4111.*

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NOCTURNAL HYPOTHERMIA IN THE WHITE-THROATED NEEDLETAIL, *HIRUNDAPUS CAUDACUTUS*

Torpidity is a well-recognised physiological response to cold and stress in a variety of mammals and birds, which can reduce their body temperature and metabolism in certain circumstances. Members of three avian families have so far been shown to exhibit torpidity, the hummingbirds, Trochilidae, the nightjars, Caprimulgidae, and the swifts, Apodidae (see review by Dawson & Hudson 1970). Hummingbirds go into torpor whenever energy reserves fall below a minimum threshold, as part of their adaptation to the intense metabolic demands made by their tiny size and high surface area to volume ratio (Hainsworth *et al.* 1977). On the other hand, the Caprimulgid Poor-will *Phaelenoptilus nuttalli* can apparently go into torpor for a long period, having been found overwintering in rock crevices (Jaeger 1949). The question of torpor in swifts was first raised when White-throated Swifts *Aeronautes saxatalis* were observed to appear suddenly in the air around their cliff roosts on sunny days following cool periods with low insect abundance when they had not been observed for days at a time. Subsequent work in the laboratory has confirmed that White-throated Swifts can enter and recover from hypothermia (Bartholomew *et al.* 1957).

In the present report we provide observations on the White-throated Needletail *Hirundapus caudacutus*, which indicate that this migratory swift may also become torpid under certain conditions. Although our sample is restricted to one individual we feel that a record is warranted since the observation is of general interest and since it is unlikely to be repeated in the near future because of the very unusual circumstances involved.

The Needletail was found inside a hollow branch on a 20 m eucalyptus tree which had been felled by a bulldozer in the early afternoon of 25 November 1983 at 8 Mile Plain (153°E, 28°N). The bird suffered no injuries as a result of the felling, apart from a minor skin abrasion on the chin. An unseasonal, severe cold snap had occurred in the area over the previous two days, with some snow and temperatures near freezing being recorded when summery weather with a mean temperature around 25°C is normally to be expected.

When brought in the same evening the Needletail was vigorous and rapidly climbed as high as it could on any

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suitable vertical substrate (e.g. a curtain) before launching itself into space. It could run surprisingly rapidly across the floor. Both water, and food in the form of mealworms and chopped mice, were taken avidly but its body weight dropped steadily over three days in captivity when daily weights were 88 g, 85 g and 83 g respectively. On each night, the bird went into a torporose state like that already described for *Aeronautes saxatalis* (Bartholomew *et al.* 1957). The transition occurred gradually within one or two hours of lights out and we have the impression that it was delayed by extraneous sensory stimuli such as the sounds of activity in the laboratory or movements of the styrofoam box which was being used as a roost. Temperature monitoring was attempted with a cloacal thermister probe and was successful on one night when the probe was retained for ten hours. On this night, the bird's core temperature dropped gradually from 38.5°C to 28°C (3° above ambient) over a period of about two hours, beginning 20 minutes after the Needletail was put to roost and the lights turned out. Temperature returned rapidly from 28°C to 38°C over a period of a few minutes the following morning which corresponded with the arrival of the cleaning staff, with the accompanying sounds of their activities and the turning on of the lights. Attempts to obtain further information on body temperature were abandoned because the Needletail could not tolerate the cloacal thermister.

Our observations provide some direct evidence, albeit anecdotal, that the White-throated Needletail, like another species of swift, *Aeronautes saxatalis*, has the ability to go into torpor under certain conditions. The Apodidae share a number of features in common with the Caprimulgidae where the occurrence of torpidity is well-documented. Three different subfamilies within the Caprimulgiformes have been shown to exhibit variable body temperature, Caprimulginae (*Phalaenoptilus nuttali*) [Jaeger 1948, 1949; Bartholomew *et al.* 1957], Chordeilinae (*Eurostopodus guttatus* and *Chordeiles acutipennis*) [Dawson & Fisher 1969; Lasiewski & Dawson 1964] and Podargidae (*Podargus ocellatus*) [Lasiewski *et al.* 1970]. Since these are the only three Caprimulgiform groups which have been studied in this regard one may well ask whether this is a general feature of the group which might provide a further link to the swifts in which a variable temperature has been described in the Chimney Swift *Apus affinis* (Koskimies 1948) as well as the two swift species already mentioned.

It is also worthy of note that ours is the first record of *Hirundapus caudacutus* at a roost in Australia in daytime. There are reports of night-roosting Needletails in trees, but the prevailing evidence indicates that this species, along with its co-migrant *Apus pacificus* the Fork-tailed Swift, spends the whole of the daytime in Australia on the wing (Simpson 1976). We think it significant that this unprecedented finding of a swift at a day roost in Australia coincided with an equally unprecedented cold snap. We would like to suggest that, in addition to the possibility of nocturnal torpor, the swift may be adapted to handle sudden decreases in temperature and availability of food by going into torpor, and that this accounts for our subject's presence in the tree in daytime.

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J.D. PETTIGREW[1] and P. WILSON[2],

[1]*Department of Physiology and Pharmacology, University of Queensland, St Lucia 4067, Queensland, Australia.*

[2]*Taylor Bridge Veterinary Clinic, 15 Railway Avenue, Indooroopilly 4068, Queensland, Australia*

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