

UTILIZATION OF NECTAR AND OTHER NON-INSECT FOOD RESOURCES BY TREECREEPERS

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The Australian treecreepers (Climacteridae) are thought to be almost entirely insectivorous (Barker and Vestjens 1990; Higgins *et al.* 2001). However, we have observed ingestion of a number of different non-insect food items by treecreepers. Both Brown Treecreepers *Climacteris picumnus* and White-throated Treecreepers *Cormobates leucophaeus* were repeatedly observed feeding on the nectar of the Mugga Ironbark *Eucalyptus sideroxylon*. Additionally, Brown Treecreepers were observed feeding on lizards and at least two species of fungus. These appear to be the first published observations of regular nectar feeding and of ingestion of fungi or vertebrate prey.

FORAGING OBSERVATIONS

Since 1995 we have been studying both treecreepers as part of a comparative study examining social and mating behaviour, cooperative breeding, dispersal, and population genetics. Our study area consists of approximately 300 hectares located within Warraderry State Forest, near Grenfell in the central west of New South Wales. This portion of the forest is relatively intact open forest dominated by White Box *Eucalyptus albens*, Grey Box *E. moluccana*, Mugga Ironbark *E. sideroxylon* and Callitris pine *Callitris* spp. During the course of the larger study, incidental observations of unusual feeding behaviour were recorded over five breeding seasons (July–January 1995–1999).

We provide the first published observations of ingestion of vertebrate prey by treecreepers. On two occasions we observed Brown Treecreepers eating small lizards. On 25 August 1997, a breeding female and her daughter were observed removing the dried-out carcass of a skink from a crevice on the trunk of a dead tree and then feeding on it for some minutes. The carcass seemed to have been cached there, but whether by the treecreepers themselves or by another animal (whose cache they were raiding) is unknown. On 24 July 1998, a breeding female was observed feeding on an apparently freshly killed small skink. It is unknown whether either of these lizards were actually captured and killed by treecreepers. Ford (1985) reported that treecreepers occasionally eat lizards, but did not provide details. This information was based on the discovery of a piece of reptilian skin in the stomach of a single Brown Treecreeper rather than direct foraging observations (H. Ford, pers. comm.) G. Luck (pers. comm.) has observed Rufous Treecreepers *Climacteris rufa* with vertebrate prey on two occasions. Once a female was observed flying with a dead skink in her bill, and on another occasion a male was observed feeding on the

carcass of a skink. Again, however, it was unclear whether the birds actually captured and killed the lizards.

On 4 and 28 July 1998, two different Brown Treecreepers were observed feeding on white, filamentous fungus. During the same year, another Brown Treecreeper was seen to eat the entire cap of a small mushroom (Agaricaceae) in five or six bites. We found no previous reports of treecreepers feeding on fungi.

Between July 1995 and January 1999, the Mugga Ironbarks at our site experienced mass flowering events three times: July–September 1996, August 1998, and September 1999. During all three of these events, we observed both treecreeper species making regular and sometimes frequent visits to ironbark flowers. An individual would creep up to a cluster of flowers and then probe deliberately but quickly into each flower in the cluster in turn before moving on to another cluster. Successive flowers were probed without significant time intervals between them as might be required for prey handling. When treecreepers forage for insects they often distinctly peer into a crack or crevice before probing (pers. obs.), yet no treecreeper was ever observed to peer into a flower before probing it. These distinctive differences from behaviours normally associated with foraging on insects strongly suggest that treecreepers were feeding on nectar during flower probing.

There are few previous reports of treecreepers apparently feeding on nectar. McCulloch (1975) reported White-throated Treecreepers feeding on “nectar” from hanging pottery feeders and recently Gosper (1999) reported the case of a single individual appearing to feed on nectar from the flowers of a Swamp Mahogany *E. robusta*. Orenstein (1977) described how in October 1973 when paperbarks *Melaleuca minor* were flowering heavily, Brown Treecreepers, which “normally almost completely avoided” these trees, were visiting them “almost to the exclusion of other species” (p. 49). He was unwilling to conclude whether insects or nectar were being taken by individuals probing flowers, but he did note that one individual observed at close range “had the bill glistening as though wet with nectar” (p. 53). Two isolated observations of single White-throated Treecreepers feeding on *Banksia* nectar have been made by Orenstein (1977) in the Blue Mountains of New South Wales and by R. Loyn (pers. comm.) in East Gippsland, Victoria. There have also been reports of Rufous Treecreepers feeding on *Banksia* nectar in Western Australia (G. Luck, pers. comm.) and of Black-tailed Treecreepers *Climacteris melanura* feeding on nectar in the Northern Territory (Franklin 1999).

FREQUENCY OF NECTAR FEEDING

During the first of the observed flowering events in 1996, we recorded nectar feeding by Brown Treecreepers on 45 separate occasions. At least 25 of the 51 colour-banded Brown Treecreepers on our study site were observed feeding on nectar that year. We also recorded nectar feeding by five White-throated Treecreepers during the same period. These numbers are conservative, because we did not reliably record all observations of nectar feeding, especially if a particular individual had already been recorded as feeding on nectar. Bouts of continuous nectar feeding by a single individual lasted up to 20 minutes for both species. The higher number of observations of Brown Treecreepers feeding on nectar was probably due to observation effort, and our impression was that White-throated Treecreepers were feeding on nectar at least as frequently.

SIGNIFICANCE OF NECTAR FEEDING

Because all of our data on nectar feeding were recorded opportunistically, we cannot perform statistical analyses of the influence of sex, breeding status, or other demographic variables on the frequency of this behaviour. However, incubating females of both species did seem especially likely to feed on nectar. This could be due to the value of nectar as a quick energy source or perhaps more importantly to the reliability of the flowers as a food source during these flowering events (Oliver 1998). Because only females incubate in these species (Noske 1982), it is important that they forage quickly and efficiently during their short incubation breaks. For these individuals, nectar could represent a particularly important resource.

Brown Treecreepers were rarely observed foraging off their own territory, but were seen to do so relatively frequently (at least eight occasions in 1996) while feeding on nectar. In all cases, such foraging was carried out in interstitial areas between territory boundaries or, more commonly, on the territories of related individuals. Generally, individuals leaving their territories to feed on nectar had either very few ironbarks on their own territory or a relatively high density of ironbarks. In the latter case, aggressive competition from large honeyeaters, primarily Noisy Friarbirds *Philemon corniculatus*, prevented them from feeding on nectar at home. Since strong natal philopatry by male Brown Treecreepers is what creates clusters of related territory holders (E. and V. Doerr, unpubl. data), off-territory foraging, particularly on patchily distributed resources such as nectar, could represent an undescribed advantage of natal philopatry in this species.

The tongues of treecreepers are concave (i.e. forming something of a channel along the length) and fringed at the tip (Harrison 1969; McCulloch 1975; Orenstein 1977), characteristics commonly associated with tongues of nectar-feeding birds (Paton and Collins 1989). While tongue morphology does vary among the Climacteridae, the White-throated Treecreeper seems to exhibit these features particularly well, its tongue having been described as having 'fine bristles which tend to turn at the centre and curl in the sides of the tongue to form a channel' (McCulloch 1975: 2). In fact, the general similarity between the tongues of the Climacteridae and those of the

Australian honeyeaters (Meliphagidae) has been cited by some authors (e.g. Harrison 1969; Parker 1982) as evidence of close taxonomic relatedness between the two families, although this has been questioned on the basis of some DNA evidence (Sibley *et al.* 1984, but see also Christidis *et al.* 1996). However, even if these characteristics of tongue morphology are ancestral traits, they may have been retained to (or even exaggerated by) the extent to which the different species use them for nectar feeding. The morphological characteristics of the climacterid tongue, together with the frequency with which we have observed nectar feeding in our study, suggest that nectar may be an important resource for at least some treecreeper species.

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