FORAGING OF HONEYEATERS IN AN AREA OF TASMANIAN SCLEROPHYLL FOREST

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SUMMARY

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The foraging behaviour of four species of honeyeaters breeding in an area of sclerophyll forest near Hobart, Tasmania, was determined throughout the year. The Yellow-throated and Strong-billed Honeyeaters are mainly insectivorous, obtaining much of their food from bark. The Black-headed Honeyeater is mainly insectivorous, foraging mostly in the foliage. The Crescent Honeyeater is almost entirely insectivorous during the breeding season but takes much nectar during winter. A fifth species, the Eastern Spinebill, is a winter visitor to the area whose presence coincides with the flowering of the heath *Epacris impressa*. Foraging behaviour varies throughout the year and it is unjustified to extrapolate the results of short-term local determinations of foraging behaviour to whole populations.

INTRODUCTION

The foraging behaviour of four species of honeyeaters (Meliphagidae) was studied from April 1974 to March 1975 in one square kilometre of sclerophyll forest at Pottery Road, near Hobart, Tasmania. Between eleven and forty hours were spent in the area each month. The results are presented on a monthly basis. Observations were made at all times of day and in all weather. The species concerned are the Yellow-throated *Lichenostomus flavicollis*, Strong-billed *Melithreptus validirostris*, Black-headed *M. affinis* and Crescent *Phylidonyris pyrrhoptera* Honeyeaters, which breed commonly in the area, and the Eastern Spinebill *Acanthorhynchus tenuirostris*, which is a numerous winter visitor.

STUDY AREA

Pottery Road, in the foothills of Mount Wellington, is at an altitude of 250–300 metres and has a rainfall of between 750 and 1,000 millimetres evenly distributed throughout the year. The area consists of about one square kilometre of dry sclerophyll open-forest and woodland (75%) with wet sclerophyll tall open-forest in the gullies and on shaded southern-facing slopes (25%). It is typical of the dry sclerophyll forests that are the dominant habitat of the drier eastern parts of Tasmania. Being close to Hobart, the area has been burnt frequently, last by the high-intensity wildfire of 7 February 1967 (Anon. 1968) from which the vegetation is still recovering. Probably continued firing has resulted in floristic impoverishment. Thus, after the fire in 1967 no mature specimens of banksias, which are an important source of nectar, survived and regeneration has been slow.

Dry sclerophyll areas

These are dominated by Blue Gums *Eucalyptus globulus*, Black Peppermints *E. amygdalina* and White Peppermints *E. linearis*. The occurrence and proportions of these eucalypts vary according to soil, drainage and aspect. There is little understorey apart from scattered saplings of eucalyptus and acacia, generated from seed following the fire of 1967. The shrub layer is of varying height and consists mainly of xeromorphic species, members of the Compositae, Leguminosae, Myrtaceae and Epacridaceae. Grasses (Graminae) are dominant in a few scattered open areas and where there are few trees. The only flowers that attract honeyeaters in any numbers are those of the irregularly flowering *Eucalyptus globulus* and the winter-flowering heath *Epacris impressa*. During this study *Eucalyptus globulus* flowered from August to February and *Epacris impressa* from March to August.

Wet sclerophyll communities

Dominated by tall Stringybarks *Eucalyptus obliqua* with a tall understorey in the wettest areas, including some rainforest species, a well-developed tall shrub layer of acacias, *Blandfordia*, ferns and the exotic blackberry, which has spread from nearby urban areas since the fire of 1967.

METHODS

The area was visited on fifty-four days throughout the study period with two to six visits each month. Visits lastd six hours on average and the total hours of observation were 338. Time was divided between the dry and wet sclerophyll areas in about the same proportions as they occur. Because there were no obvious differences in foraging behaviour the results obtained in the wet and dry sclerophyll areas were combined.

The habitat was divided vertically into the following nine foraging zones: ground; herb and low-shrub layer; litter lying on the ground; trunks; branches; twigs; leaves; flowers; and air. Once a foraging bird had been located, the zone(s) in which the next five foraging movements were made was (were) recorded. If a bird moved out of sight or began some other activity, recording was stopped before five movements had been noted. Observations were grouped subsequently in the following categories:

Ground layer: foraging on the ground, among the litter and in the herb and low-shrub layers except when visit-

ing flowers;
Bark: foraging on trunks and branches;
Foliage: gleaning insects from leaves and twigs;
Flowers: foraging at flowers whether taking insects, pollen or nectar; and
Air: taking insects in the air (hawking).

RESULTS

Food

No attempt was made to identify the actual items eaten and few data are available in the literature. Green (1966) and Green and McGarvie (1971) have examined the stomach contents of a few individuals of four of the five species, with the following results:
Yellow-throated Honeyeater (3 birds): spiders Araneida (Arachnida), soldier beetles Telephoridae (*Telephorus* sp), leaf beetles Chrysomelidae (*Paropsis* sp), weevils Curculionidae and jewel beetles Buprestidae (Coleoptera), moths (Lepidoptera).
Strong-billed Honeyeater (5 birds): seeds (one stomach), leaf fragments; pseudoscorpions Pseudoscorpionidae and spiders Araneida (Arachnida), cockroach ootheca (Blattodea), earwigs (Dermaptera), shield-bugs Pentatomidae (Heteroptera), ground beetle larvae Carabaeidae, soldier beetles Telephoridae (*Telephorus* sp), tenebrio beetles Tenebrionidae and leaf beetles Chrysomelidae (*Paropsis* sp) (Coleoptera), ants Formicidae and lace-wing larvae (Hymenoptera).
Black-headed Honeyeater (items fed to juvenile Pallid Cuckoo *Cuculus pallidus*): bug nymphs (Homoptera), christmas beetles Scarabidae and tenebrio beetles Tenebrionidae (Coleoptera), wasps Ichneumonidae and ants Formicidae and Tirtriidae (Hymenoptera).
Crescent Honeyeater (1 bird): flies (Diptera), moths (Lepidoptera).

Although the above data are meagre they support the view that insectivorous honeyeaters are fine-grained feeders in that they take each food item as it is found (Recher and Abbott 1970). Certainly a single bird may take a wide range of invertebrates. There is also good evidence that the range of items taken by the four species overlap. Moths are eaten by Yellow-throated and Crescent Honeyeaters and by Eastern Spinebills (pers. obs.), ants by Strong-billed and Black-headed Honeyeaters, soldier beetles of the genus *Telephorus* and leaf beetles of the genus *Paropsis* by Yellow-throated and Strong-billed Honeyeaters.

Foraging behaviour

Yellow-throated Honeyeater (Fig. 1a)

Total observations 2,200; monthly range 116–303.

Keast (1970) makes the generalization that species of *Meliphaga* (which includes *Lichenostomus*) are mainly insectivorous and this is so at Pottery Road for the Yellow-throated Honeyeater, a Tasmanian endemic species. Most invertebrates (37–80%) are obtained from bark. The low value of thirty-seven per cent in January occurred during the period of post-breeding dispersal when immature birds were attracted to flowering *Eucalyptus globulus*. Immature birds were still present in early February and it was during the period of post-breeding dispersal that feeding at flowers was most recorded. At other times feeding at flowers was seen only occasionally: at *Epacris impressa* in April and May and at *Eucalyptus globulus* in September and October. Whether birds were seeking nectar, insects or even pollen is uncertain. Hawking occurred in all months with a maximum of eleven per cent.

Black-headed Honeyeater (Fig. 1b)

Total observations 1,836; monthly range 49–304.

Foliage gleaning (76–93%) is the primary foraging method. Some invertebrates were obtained from bark, mainly branches, in all months with a maximum of twenty-one per cent in June. Flowers (*E. globulus*) were visited only in December and January when post-breeding family groups had left their breeding territories. Hawking was of little importance.

Strong-billed Honeyeater (Fig. 1c)

Total observations 2,058; monthly range 51–329.

Mainly obtains insects from bark (55–100%), as has been reported by Littler (1910), Sharland (1958), Officer (1964), Ridpath and Moreau (1966), Keast (1968, 1970), Abbott (1973) and others. Strong-billed Honeyeaters breed in colonies and become nomadic once the young are fledged. From November to February small groups, containing immature birds, visited the flowers of *E. globulus* and also foraged extensively among nearby foliage. At times they foraged on or close to the ground: on 14 September thirty-two per cent of foraging actions were of a flock taking caterpillars from the ground in a grassy clearing. This illustrates how readily birds will exploit a locally abundant source of food. A few birds were seen taking nectar from *Epacris impressa* flowers in May. Hawking was of little importance. (As stated by Keast (1970) the endemic Tasmanian species of *Melithreptus* are mainly insectivorous.)

Crescent Honeyeater (Fig. 1d)

Total observations 1,116; monthly range, when birds present, 81–175.

Too few were present in the area in January and February to allow analysis. From March to June there was a marked shift in foraging, with visits to flowers (*Epacris impressa*) increasing in frequency from zero in March to fifty per cent in May and thirty per cent in June. During April a few small *Banksia marginata* were flowering and were visited. Few birds were present in July although some *E. impressa* was still flowering and being visited by Eastern Spinebills. Birds returned in August and bred at high density in areas of wet sclerophyll forest with a dense shrub layer. Foraging during the breeding season was mainly on bark (30–67%) and in the foliage (20–54%). Dependent young tend to remain near the nest in low scrub and foraging in this layer increased in December. During the breeding season

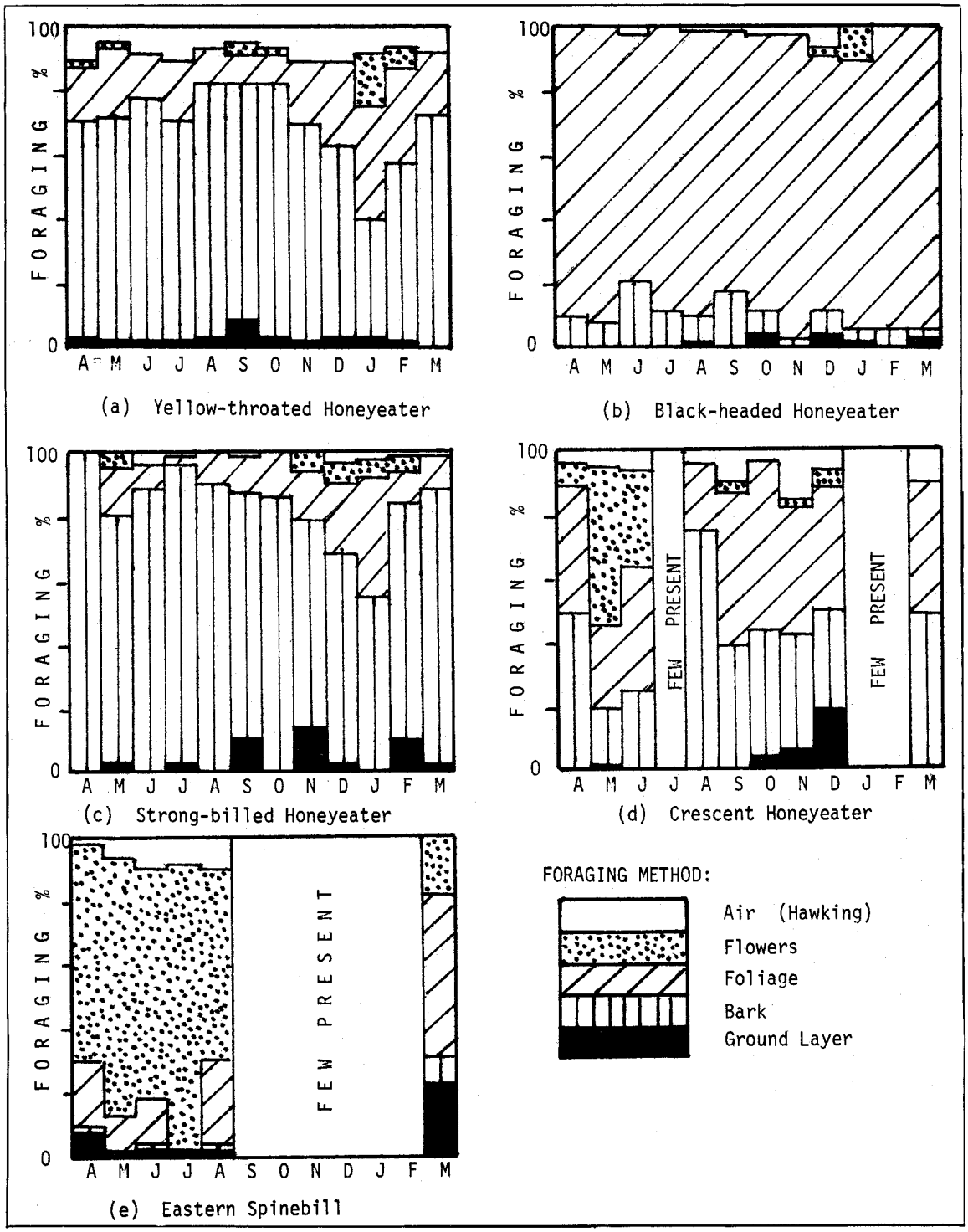

Figure 1. Foraging activities of five species of honeyeater in Tasmanian sclerophyll forest.

only occasional visits were made to blossoms of *E. globulus*. Hawking always provided a small but significant supply of insects. The Crescent Honeyeater differs from the longer-billed species of *Phylidonyris*, which are mainly nectarivorous (Keast 1970).

Eastern Spinebill (Fig. 1e)

Total observations 877; monthly range, when birds present, 91–386.

The Eastern Spinebill is a winter visitor to the area and too few were present from September to February to allow determination of foraging behaviour. The few observations made were of foliage gleaning and hawking. Birds first arrived in numbers in March when the first flowers of *Epacris impressa* appeared and had left by September when these flowers no longer occurred. They are visited extensively. Some invertebrates were taken, mainly by hawking, foliage gleaning, in the herb and low-shrub layer and occasionally by picking off bark. The results confirm that the Eastern Spinebill feeds much on nectar outside the breeding season in Tasmania, as it does in South Australia (Ford and Paton 1977).

DISCUSSION

The data presented in Figure 1 show that there is considerable variation in the foraging behaviour of the five species throughout the year at a single locality. Day-to-day variation is even more marked. This is to be expected if honeyeaters are fine-grained foragers. Tullock (1971), using the data of Gibb (1958, 1962) for the feeding of the Coal Tit *Parus ater*, concluded that just as a housewife will buy at a cheaper shop, the Coal Tit seeks food, within the range of size that it can handle, in those areas where the energy cost is lowest because it is more readily available. In other words, birds will tend to concentrate their efforts at those places where the maximum amount of food can be obtained for the expenditure of least energy.

The foraging behaviour at any time will depend on the distribution of the available resources. The optimal behaviour will vary spatially and temporally as the amount and distribution of food varies. Foraging behaviour determined in a small area over a short time ought to be regarded as only one of many possibilities and extrapolation of the results to whole populations is unsound, e.g. by Abbott (1973) who compared foraging behaviour of several species, including the Yellow-throated, Strong-billed and Black-headed Honeyeaters, on Deal, King, Flinders and Maria Islands, Tasmania and Victoria. Data were collected from plots of ten acres (4 ha) during short visits at unspecified times of year. The differences in foraging behaviour for each species on different islands are no greater than the differences found during the year for the same species at Pottery Road. Abbott failed to appreciate that he was measuring only one of many foraging behaviours at each location. This led him to the unjustified conclusion that the importance given generally to competitive processes as a reason for the impoverishment of island avifaunas (e.g. MacArthur and Wilson 1967, Lack 1971) needs re-evaluation because foraging behaviour could not be correlated consistently with lengths of bill and tarsus. My results of seasonal variation provide a warning against making too broad generalizations on the basis of observations in one season only.

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