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DIET OF THE EASTERN BRISTLEBIRD *Dasyornis brachypterus* IN NEW SOUTH WALES

LINDA GIBSON[1] and JACK BAKER[2]

[1]Australian Museum, 6 College Street, Sydney, New South Wales 2010
[2]Institute of Conservation Biology, Department of Biological Sciences, University of Wollongong, New South Wales 2522

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The diet of the Eastern Bristlebird *Dasyornis brachypterus* in New South Wales was determined from observations and an analysis of faeces, stomach and gut contents of 18 birds caught in or obtained from Booderee National Park, Jervis Bay and Barren Grounds Nature Reserve, New South Wales. The study showed these birds largely take mobile terrestrial invertebrate species, the majority of which are ants and beetles. There is some indication that plant material, especially seeds, are also part of the diet. Observations suggest that the diet is opportunistic and based on foraging behaviour of 'peck it and see'.

INTRODUCTION

The rare Eastern Bristlebird *Dasyornis brachypterus* (Passeriformes: Pardalotidae), is a small, semi-flightless, brownish bird inhabiting low, dense vegetation in coastal and near coastal south-eastern Australia. It once occurred in an almost continuous distribution from southern Queensland to western Victoria (Baker 1997). Habitat change, however, through clearing and fire has caused a significant shrinkage of its range (Garnett 1993). It is now confined to isolated pockets of its range and is listed as an endangered species under the New South Wales *Threatened Species Conservation Act 1995* and the Commonwealth *EPBC Act 1999*. Garnett and Crowley (2000) support these listings by describing the species conservation status. There is little documented information available on the diet of the Eastern Bristlebird and we wondered whether dietary specialization contributed to the rarity of the species. Previously there have been several brief mentions of the Eastern Bristlebird's diet and Higgins and Peter (2002) summarized these data. Gould (1865) proposed that the species ate 'insects of various orders' although his account did not indicate the basis of this description. North (1904) reported that an unspecified number of Eastern Bristlebird stomachs 'contained only the remains of insects'. Lea and Gray (1935) misidentified as Rufous Bristlebird *Dasyornis broadbenti*, two Eastern bristlebird from Mallacoota, Victoria (Chaffer 1954; Wakefield 1958). The guts of these birds were reported to contain fragments of cicada, cockroach and beetle; seeds of Epacridaceae, *Exocarpus* (Native cherry) and *Lycium ferocissimum* (African box-thorn); and fine grit (Lea and Gray 1935). Wakefield (1958) noted that African box-thorn was not known to occur in the Mallacoota district, which casts doubt on the accuracy of the Lea and Gray report. Barker and Vestjens (1990) reported a single Eastern Bristlebird specimen that had eaten cicadas, *Melampsalta* sp. and Chapman (1999) observed a bird feeding on the nectar of *Banksia ericifolia*. The current work investigates faecal and gut contents of Eastern Bristlebirds and reports on a number of feeding observations.

STUDY AREA AND METHODS

The specimens used in this study were obtained from two sites. Booderee National Park, (35°08'S, 150°45'E) a Commonwealth of Australia owned area that occupies most of the Bherwerre Peninsula, on the southern side of Jervis Bay, on the south coast of New South Wales and Barren Grounds Nature Reserve (34°40'S, 150°42'E) on the Illawarra plateau, west of Kiama, New South Wales. Landform on the coastal site consists of undulating sandstone with large areas, particularly on the western side, covered with sand dunes (Taws 1997). These areas support a wide variety of vegetation types including eucalypt forest and woodlands, coastal scrub, wet and dry heaths, rainforests and wetlands. Barren Grounds Nature Reserve, located on a plateau, supports vegetation types typical of a highland moist climate. These largely consist of heathland, woodland, wet sclerophyll forest and rainforest.

The material for this study consisted of faeces (1 specimen), gut flush (5 specimens), gut flush and faeces (7 specimens) and the whole guts of a bird that that died while being handled and five birds that were killed on the roads of Booderee National Park. The material was collected in Spring (13 samples), Summer (one), Autumn (four) and Winter (one) during the period 1991–1995.

Faeces from live birds were obtained by holding them in a clean cloth bag for less than 20 minutes and collecting the material that they defecated. Gut flushing involves introducing 6 milliletres of distilled water through a 3 millimetre silicon tube into the gizzard of the bird via the mouth (after Major 1990). This caused the regurgitation of the water and some contents of the stomach.

Each sample of faeces, gut flush and whole gut contents was divided into smaller sub-samples representing what appeared to be the major significant content components, e.g. gut flush containing invertebrate remains, gut flush containing plant remains. This gross sort was important where the faeces and gut flush sample were obtained from the same bird. Samples were stored in 70 per cent ethanol. These sub-samples were examined using a binocular dissecting microscope and identification was made possible using the reference collection and expertise of the Entomology section of the Australian Museum. The results (Table 1) show the number of times an identified item occurred in a sample type. Opportunistic observations of Eastern Bristlebird feeding were also recorded during the period 1992–2002.

RESULTS

Most of the samples consisted of the remains of invertebrates with a small component consisting of plant remains, especially seeds of plants (Table 1). Approximately

TABLE 1
Diet Analysis Results. Numbers represent number of times item occurred.

Item ID	Family	Sub-family	Genus/Species	Sample Type: Faeces N = 8	Gut Flush N = 5	Whole gut N = 6
Invertebrate material						
Coleoptera						
	Curculionidae			5	5	5
	Cucujoidea			2	2	2
	Scarabaeidae					
		Type 1		5	2	4
		Type 2		1	1	3
		Type 3		2		2
Unidentifiable Coleoptera				2	3	2
Hymenoptera						
	Formicidae					
		Dolichoderinae			2	1
		Myrmiciinae			1	
			Crematogastis sp.			1
			Monomorium sp.			1
			Pheidole sp.	2	1	3
			Tetramorium sp.		1	1
		Formicinae			1	
			Notoncus sp.		1	2
			Petatrechina sp.	1		
			Polyrhachis sp.			2
			Prolasius sp.	2		
			Stigmacros sp.			2
		Ponierinae			3	1
			Rhytidoponera victoriae		1	
			Rhytidoponera tasmaniensis			1
			Rhytidoponera metallica	2		3
			Rhytidoponera sp.		2	5
Unidentifiable Formicidae				3	1	1
Mantodea				1		
Diptera					1	1
Unidentified larvae				1	1	1
Arachnida				2	1	
Plant and Fungal Material						
Plants						
	Stellaria			1		
	Juncaceae		Juncus sp.	1		
Unidentifiable Plants				5	4	4
Seeds						
	Mimosaceae		Acacia sp.			1
	Cyperaceae		Carex sp.			1
	Poaceae				1	2
Unidentifiable Seeds	Type 1			1	5	4
	Type 2					1
	Type 3					1
	Type 4					1
	Type 5					1
Unidentifiable Fungal spores				2	3	

50 per cent of the samples also contained fine quartz grains, which is consistent with ground-feeding animals foraging on a sandy terrain.

The insect remains were mainly from two groups: Formicidae, the ants, and Coleoptera, the beetles. All invertebrate remains identified were from four orders of insect or from the Arachnida (spiders, mites). Where possible, ants were further identified at least to genus level, as this group obviously represented a significant proportion of the items taken by the birds. Ten ant genera from four subfamilies were identified in the samples.

Of the five ant subfamilies found in southern Australia (Andersen 1991), only the Myrmeciinae, the bull ants and jumper ants, were not detected in the diet samples, although they are common at Jervis bay and Barren Grounds (Gibson 1999). It was not only the variety of forms taken but the numbers of individual ants consumed was also high. One animal had evidence of 47 ants, another 67 individual ants.

Thirty feeding observations were recorded, 20 of birds pecking the ground, three pecking at branches and foliage in scrubs and seven birds carrying invertebrates in their bills. Pecking on the ground was thought to be for ants on five occasions and confirmed to be for ants on a further five, twice when birds were pecking ants from around the ants' nest. On one occasion a bird was observed in a heath banksia *Banksia ericifolia* that was in flower, dripping nectar down the branches. The nectar was attracting ants, on which the bird was feeding. One bird at Jervis Bay pecked at rolled oats and bread crumbs on the ground and a bird at Barren Ground pecked at a bread crust but then disregarded it. On one occasion at Barren Ground, a bird was observed taking tadpoles of the Common Froglet

Crinia signifera, from drying puddles. Birds carried an unidentified larva (n = 1), small (10–25 mm) unidentified invertebrates (n = 4) and stick insects (n = 2; 40–60 mm) Phasmatidae, one of which was bashed against a branch.

DISCUSSION

The study found that the Eastern Bristlebird took a limited range of invertebrates, consisting largely of ants and beetles. These are very common groups of insects, both where the bird occurs and in nearby similar reserve lands (Gibson 1999). Ants and beetles are also very common food for other Australian passerines with more than 75 per cent of the 323 known species including them in their diet (Barker and Vestjen 1990). In all, the birds were recorded eating four orders of insects: Coleoptera, Hymenoptera, Diptera and Mantodea, and a very low incidence of Arachnida (Spiders, etc.).

The lack of substantial evidence of other very common invertebrates, such as spiders in the diet is unusual. In a survey of terrestrial invertebrate fauna at Booderee National Park and Barren Grounds Nature Reserve in 1998–1999, Arachnida were the second most common group of invertebrates, after ants — so they were available and in an appropriate size range (Gibson 1999). Eastern Bristlebirds are diurnal (Baker 1998), so largely nocturnal fauna groups, such as most ground-dwelling spider taxa (G. Milledge, pers. comm. 1999), may not be readily sighted. Some other studies that have compared diet and food availability (e.g. Colbourne *et al.* 1990) have also reported a significant difference between what is available and what is consumed. Our result might reflect the relatively small sample size, although some studies on a similar number of faecal samples of the Noisy Scrub-bird *Atrichornis clamosus*, indicated that spiders were present in faeces in approximately similar numbers to ants and beetles. (Danks and Calver 1993; Welbon 1993). The Noisy Scrub bird is about the same size as the Eastern Bristlebird and operates in a similar ecological niche (Danks *et al.* 1996). So the results of our study are unlikely to be due to the rapid digestion of spiders; that is, digestibility (Major 1990) but rather that spiders are generally absent from the diet of Eastern Bristlebirds.

Eastern Bristlebirds also ate some plant material, especially seeds. All but one of the samples were collected during spring-autumn, the time of maximum availability of invertebrates. This, together with the variety and quantity of seeds taken, suggests that these were deliberately taken. However, the significance of seeds in the diet of the species is uncertain. The quantity and frequency of fungal spores present in the samples, together with the small size of the spores, suggests that these were ingested incidentally.

We conclude that the Eastern Bristlebird is not a dietary specialist. It is an insectivore with a 'peck and see' attitude. Eastern Bristlebirds have now been reliably recorded taking insects from six orders: Hymenoptera, Coleoptera, Diptera, Mantodea, Phasmatodea and Hemiptera (CSIRO 1991). Eastern Bristlebirds often take ants and beetles; these are common in their habitat and common in the diet of most Australian passerines. They seem to be opportunistic in taking other invertebrates, tadpoles, seeds, other vegetation and even bread crumbs and they are able to break up invertebrate prey, such as stick insects, which is too large to swallow whole. They seem to avoid Myrmeciinae and take few Arachnida, even though bull ants and spiders are common in their habitat.

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