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An observation of a nectar- / insect feeding bird attempting to feed a lizard as a novel food source

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Abstract

The hair-crested drongo (*Dicrurus hottentottus*) is a common migratory passerine bird in Asia. Although studies examining the diet of this species are rare, nectar and insects are generally considered its main food sources. Here we report a novel observation of the consumption of a vertebrate; namely an adult female drongo attempting to feed a lizard to a

nestling in Shennongjia, Hubei Province, China. This discovery provides insight into the feeding behavior of drongos and how novel protein sources may play a role in the diet of predominantly nectar feeding birds generally, which warrants further research.

Key words: *Dicrurus hottentottus*, diet, *Japalura flaviceps*, nectivore, Shennongjia

Running head: Drongo eats lizard.

The hair-crested drongo (*Dicrurus hottentottus*) is a common migratory passerine bird, which breeds in central and southern China and typically heads to tropical Indochina to overwinter (Rocamora & Yeatman-Berthelot 2009). While it is well established that drongos utilize diverse habitat, their diet is poorly understood. Previous observation has identified that, in tropical overwintering areas, the hair-crested drongo feeds primarily on nectar (Pandey 1991), whereas in subtropical and temperate breeding areas it appears to mainly eat insects (Wang & Qian 1989, Zhao 2001). Zhao (2001) claims that hair-crested drongos may eat snakes in high latitude areas, and Rocamora & Yeatman-Berthelot (2009) provide an anecdotal report that this species may eat small lizards. However, to-date, there has been no firm evidence corroborating that this nectar-insect eating bird consumes vertebrates.

Over 3 days (17, 18, 21) in June 2017, we observed a hair-crested drongo nest, built in an empress tree (*Paulownia tomentosa*), approximately 15 meters in front of a local residential house in Yangri town (478m a.s.l., 110.81°E, 31.74°N) in Shennongjia, Hubei province, China. Using a single-lens reflex camera (Canon 7D2, 100-400 mm lens), with 0.31 magnification, we observed that on June 18, at 17: 32, an adult female drongo flew back to its

nest, carrying a small lizard of the species Szechwan japalure (*Japalura flaviceps*) that it fed to one of its nestlings (Figure. 1). Although we recorded only one instance of a lizard being provisioned to a nestling among 34 feeding events on June 18, this is the first photographic evidence of this phenomenon. These insectivorous lizards, which are about 78 ± 167 millimeters long, usually live in warm, dry hillside grasslands and are common inhabitants of this mountainous study region (Zhao et al. 1999). Therefore, Szechwan japalures would be easily available to hair-crested drongos.

Our observation provides a novel insight elucidating the broader trophic diversity consumed by this nectar- / insect- eating bird in a natural context. Although likely a rare occurrence, we infer this instance was not unique, and that Szechwan japalures, and possibly other reptiles, are an occasional item taken when foraging; although potentially restricted to chick feeding. Nestlings have requirements for a high-quality diet to support rapid growth and development (Boag 1987). Hair-crested drongos also require more protein and fat to support long-distance migration (Bairlein 1987), which may exceed that provided by feeding on insects, and so adults may also consume occasional reptiles. Crucially, hair-crested drongo chicks must grow and develop sufficiently to migrate, placing quality nutrition at a premium. Given that our observation was made at an elevation of 478 m a.s.l. in a cool sub-tropical mountain region (King & Murphy 1985), it may be especially important for hair-crested drongos to exploit an even broader trophic range at this elevation in order to meet their energy requirements and those of their dependent chicks.

Corroborating this hypothesis, the hair-crested drongo's diet transitions from predominantly nectar to insects with increasing latitude, across its distributional range (Wang & Qian 1989, Pandey 1991, Zhao 2001). This relates to the decreasing availability of flowering trees, such as the red silk cotton tree (*Bombax ceiba*) and the Bengal kino tree (*Butea monosperma*) (Pandey 1991) that provide nectar (Feng 1984, Li 1995). Such dietary plasticity has been seen in the energetics of other avian nectivores (Karasov 1996), although smaller species (such as hummingbirds; Trochilidae) supplement their diet, and that of their chicks, only with insects and arthropods (Yanega & Rubega 2004); a trait also observed in some fruit-eating bat species (Courts 1998).

The phenomenon we report here is congruent with other species of drongos (*Chaetorhynchus* spp. and *Dicrurus* spp.), of which 8 occasionally consume lizards, according to our literature review (see Table 1).

Our discovery raises several questions that might spur future study: Is there evidence to support a nectar- / insect- / occasional- (opportunistic) vertebrate diet gradient across the distributional range of the hair-crested drongo? Is the bias toward protein / lipid rich vertebrates driven by climatic conditions, linked to latitude or elevation? Do other nectarivorous birds exhibit similar dietary flexibility (limited by body-size)? Is the digestive system of the hair-crested drongo specifically adapted to digest insects and lizards, versus other nectarivorous birds (Mcwhorter & López-Calleja 2000)? Resolving these questions may contribute to a broader understanding of the natural history and evolution of nectar eating birds, warranting further observation and experimentation.

84

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169 ***Table and Figures of:***

170 **An observation of a nectar- / insect feeding bird attempting to feed a lizard**

171 **as a novel food source**

172 **Table 1.** A list of vertebrates documented as food for drongos, with literature sources. This includes descriptions of vertebrate-feeding
 173 by drongos in the book *Handbook of the birds of the world* (Rocamora & Yeatman-Berthelot 2009).

Common name	Latin name	Vertebrates in diet	Reference	Food habits in the book: <i>Handbook of the birds of the world</i>
Greater racquet-tailed drongo	<i>Dicrurus paradiseus</i>	a small tree frog	Wells 2007	primarily insects; some small
		lizards and small birds	Ali and Ripley 1987	vertebrates; nectar
Hair-crested drongo	<i>D. hottentottus</i>	a completed small lizard	Mees 1982	mainly insects and nectar; small lizards
Spangled drongo	<i>D. bracteatus</i>	birds: a spotted pardalote (<i>Pardalotus punctatus</i>) and a brown gerygone (<i>Gerygone mouki</i>)	Matthew et al. 2017	Omnivorous; mainly insects; fruits; nectar; small vertebrates, include lizards, bats and, small birds
Ashy drongo	<i>D. leucophaeus</i>	lizards and small birds (warbler, iora)	Ali and Ripley 1987	principally insects; small vertebrates, include small lizards and birds; nectar
		small reptiles and birds	Mathews et al. 2007	
		reptiles and small birds	Mahabal et al. 2008	
Black drongo	<i>D. macrocercus</i>	small passerines	Craig and Taisacan 1994	predominately insects (often agricultural pests); lizards; small bats; nestlings and small birds; fish; nectar; grains
		birds: the Rota bridled white-eye (<i>Zosterops rotensis</i>); Eurasian tree sparrows (<i>Passer montanus</i>); rufous fantails (<i>Rhipidura rufifrons</i>); Guam swiftlets (<i>Aerodramus vanikorensis</i>)	Amidon 2000, Maben 1982, Perez 1968	

		lizards, small birds (<i>Prinia</i> , <i>Zosterops</i> , <i>Aegithina</i> records) and small bats (Microchiroptera)	Ali and Ripley 1987	
		birds: a Siberian stonechat (<i>Saxicola maura</i>), an Asian stubtail (<i>Urosphena squameiceps</i>)	Hong et al. 2010	
		birds: Tickell's blue flycatcher (<i>Muscicapa tickelliae</i>), <i>Prinia</i> spp., <i>Aegithina</i> spp., <i>Zosterops</i> spp. including the Indian white-eye (<i>Zosterops palpebrosa</i>), and some martins (Hirundinidae)	Osmaston 1922, Ali and Ripley 1983, Sridharan and Sivasubramanian 1987, D' Silva et al. 1990, Jayson and Ramachandran 1994	
		small rodents	Kanwal et al. 2015	
		small birds	Mahabal et al. 2008	
Fork-tailed drongo	<i>D. adsimilis</i>	lizards, small birds (<i>Prinia</i> , <i>Zosterops</i> , <i>Aegithina</i> records) and small bats (Microchiroptera)	Ali and Ripley 1987	mostly large insects; small birds; small fish ;flowers; nectar
		a bird: bronze manniken (<i>Lonchura cucullata</i>)	Pickles 2012	
Madagascar crested drongo	<i>D. forficatus</i>	fish-scaled gecko (<i>Geckolepis</i> sp.)	Gardner and Jasper 2014	invertebrates; some small vertebrates, include small chameleons (Chamaeleonidae)
Aldabra drongo	<i>D. aldabranus</i>	small reptiles	Frith 1977	mainly insects; vertebrates such as geckos (Gekkonidae) and lizards



Figure. 1. An adult female hair-crested drongo (*Dicrurus hottentottus*) carrying a Szechwan japalure (*Japalura flaviceps*) back to its nest (a) and feeding it to a nestling (b) on an empress tree (*Paulownia tomentosa*) in Shennongjia, Hubei Province, China.