

# A novel observation of food dunking in the Australian Magpie *Gymnorhina tibicen*

E. Drinkwater<sup>1, 2\*</sup>, J. Ryeland<sup>3</sup>, T. Haff<sup>4</sup> and K.D.L. Umbers<sup>4</sup>

<sup>1</sup>Department of Zoology, University of Cambridge, Downing Street, Cambridge CB2 3EJ, United Kingdom

<sup>2</sup>Department of Biology, University of York, Heslington, York YO10 5DD, United Kingdom

<sup>3</sup>Hawkesbury Institute for the Environment, Western Sydney University, Richmond NSW 2753, Australia

<sup>4</sup>School of Science and Health, Western Sydney University, Locked Bag 1797, Penrith NSW 2751, Australia

\*Corresponding author. Email: drinkwatereleanor@gmail.com

**Abstract.** We document putative food-dunking behaviour in the Australian Magpie *Gymnorhina tibicen*. While conducting an experiment on the Mountain Katydid *Acrisepeza reticulata*, we presented one to a wild adult Magpie, which appeared to conduct 'dunking behaviour' while processing the insect. The Magpie carried the katydid to a puddle of water, dunked the katydid, and then dropped it. A nearby juvenile Magpie then retrieved the katydid and performed the same dunking behaviour before eating the katydid. To our knowledge, this is the first reported instance of food dunking by Australian Magpies. We hope this observation will facilitate future investigations into behavioural adaptations to dietary choices of Magpies.

## Introduction

Food dunking, or dipping food in water (Morand-Ferron *et al.* 2004), is a behaviour that has been noted across a range of bird species (Purser 1959; Morand-Ferron *et al.* 2004; Dearborn & Gager 2009; Kasper 2012). Dunking can be an important food-processing behaviour because it might allow animals to include items in their diets that would be otherwise unpalatable or toxic (Kasper 2012). For example, dunking might remove unpalatable tastes (Menkhorst 2012) or help to moisten or soften food, which may aid in digestion (Jones 1979; Morand-Ferron *et al.* 2004). Dunking has been observed in at least 25 bird species across 16 genera (Morand-Ferron *et al.* 2004), and appears to be particularly widespread in groups that possess high cognitive abilities (Morand-Ferron *et al.* 2004), such as the Corvidae (Cnotka *et al.* 2008; Emery *et al.* 2004). The Australian Magpie *Gymnorhina tibicen* is a member of the Corvidae (Kearns *et al.* 2013; previously known as the core Corvoidea: Jönsson *et al.* 2016), and is believed to exhibit similar high cognition (Kaplan 2008), as demonstrated by behaviours such as food storing (caching: Rollinson 2002) and tool use (McCormick 2007), but until now dunking behaviour has not been noted in this species.

We observed potential dunking behaviour by two Australian Magpies within the Talbingo Caravan Park, 1.15 km from Kosciuszko National Park, New South Wales (35°35'S, 148°17'E). The caravan park comprises permanent caravans, huts, and open campgrounds backed by open non-native forest, with sparse mid-storey vegetation coverage. The observation was recorded on a Sony HDR Handycam Camcorder as part of a larger study investigating the Mountain Katydid *Acrisepeza reticulata* (Orthoptera) (Umbers *et al.* unpubl. data), a putatively toxic and distasteful local insect (Umbers & Mappes 2015). As part of the study, live katydids were presented to wild Magpies, which were individually identifiable by their distinct territories, markings and family structures. There were few Magpies in the vicinity, so individuals were easy to track. The katydids were collected within the nearby Kosciuszko National Park and, given the proximity to the Park (1.15 km) and range of the Mountain Katydid, it is

likely that the Magpies tested in this trial had encountered Mountain Katydids before. Following the presentation of one katydid to an adult male Magpie, we observed apparent food-dunking behaviour in a puddle by both the adult and a nearby juvenile Magpie. Footage is available at: <http://www.youtube.com/watch?v=9aYJwOSeeTg>.

## Observations

### *Adult male Australian Magpie*

An adult male Magpie was presented with two katydids, the second one 2 minutes after the first. When presented with the first katydid, the Magpie picked up and held the insect by the body or an appendage and carried the katydid for short distances, interspersed with repeated bouts of vigorous wiping (slow, repeated dragging of the item on the ground) or thrashing (vigorous beating of the item from side to side on the ground). After 12 minutes 28 seconds, the Magpie appeared to cache the katydid under a bush.

The Magpie processed the second katydid as follows: (1) It carried the katydid to a tree midway between the presentation point and a puddle that had formed around a leaking tap attached to one of the campsite buildings; (2) It thrashed the katydid on the ground for 14 seconds before moving a short distance and thrashing it on the ground for another 10 seconds; (3) It picked up the katydid and moved near the puddle (~1.5 m away), wiping the katydid on the ground for c. 48 seconds; (4) It dunked the katydid in the water and thrashed the katydid on the bottom of the puddle for c. 7 seconds, although the katydid was never clearly submerged as the puddle was very shallow (Figure 1a); and (5) It placed the katydid on the side of the puddle, and walked away.

### *Juvenile (fledgling) Australian Magpie*

While the male was dunking the katydid, a juvenile Magpie was <30 cm away. Two minutes 7 seconds after the male left the second katydid on the side of the puddle, the juvenile picked up the katydid, thrashed it in the puddle for 33 seconds (Figure 1b), and then thrashed it on the bank.



**Figure 1.** (a) Adult male Australian Magpie (on right) holding a katydid in its beak and dragging it across the bottom of a puddle with rapid side-to-side head movements. Juvenile (on left) on at least one occasion turned its head towards the adult as it was dunking the katydid. (b) Juvenile Magpie thrashing katydid in puddle, occasionally dropping it and picking it up again to continue the thrashing behaviour. Photos: J. Ryeland

After 7 minutes 4 seconds of thrashing it on the bank, the juvenile flew with the katydid to a rock ~1 m away, where it thrashed the katydid for c. 23 seconds before swallowing it whole.

## Discussion

To our knowledge, this is the first report of dunking behaviour by the Australian Magpie. Anecdotal reports of this type, even just two observations, are valuable in allowing future integration of separate observations (e.g. Morand-Ferron *et al.* 2004), which could provide important insights into the biological basis of this behaviour.

We tentatively suggest that dunking by Magpies could be a response to the chemical defences of the Mountain Katydid. This insect is suspected to defend itself chemically from predators (Cable & Nocke 1975; Rentz 1996; Umbers & Mappes 2015) and to produce a bitter-tasting exudate secreted under the sclerotised forewings, as well as a bitter regurgitate (Umbers & Mappes pers. obs.). The dunking behaviour could have been used to lessen the unpalatable taste of the katydid defence. Previous studies on other bird species suggest that food dunking may be used in response to unpalatable taste or toxicity, including the removal of unpalatable mucus from the Growling Grass Frog *Litoria raniformis* by the Australasian Bittern *Botaurus poiciloptilus* (Menkhorst 2012) and dunking of Texas Horned Lizards *Phrynosoma cornutum* by the Greater Roadrunner *Geococcyx californianus* (Kasper 2012). Further studies investigating the potential unpalatability of the Mountain Katydid to avian predators, as well as the efficacy of washing to improve palatability, are required to support this hypothesis. Furthermore, the demonstration of food dunking by a juvenile Australian Magpie closely following the nearby display of the same behaviour in an adult suggests social learning, although this too requires further investigation.

It is difficult to definitively determine if the dunking behaviour by Australian Magpies that we observed was a continuation of thrashing behaviour on solid ground into water, play behaviour, or a concerted washing activity.

However, it is clear that the male thrashed a katydid in a puddle, and that a nearby juvenile showed similar behaviour, then consumed the katydid. Further experimentation is needed to determine if Magpies intentionally wash food with the goal of removing distasteful substances. This might have ecological implications in allowing dietary flexibility and utilisation of unpalatable food items by this species.

## Acknowledgements

We thank Professor Gisela Kaplan, Professor Darryl Jones, Sam Jones, and the editor and reviewer for their helpful comments.

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Received 28 June 2016, accepted 2 February 2017,  
published online 7 September 2017

