



Novel observations of cleaning interactions between eastern grey kangaroos and three Australian bird species

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ABSTRACT

A variety of animals have been observed cleaning ectoparasites off of another species. In terrestrial systems, the most common interactions involve birds cleaning mammals. Despite the high density and wide distribution of kangaroos across Australia, there are almost no known records of bird-kangaroo cleaner relationships. Here I report multiple observations of bird-kangaroo interactions recorded with camera traps. This study replicates a previous report of Willie Wagtail (*Rhipidura leucophrys*) cleaning, as well as details observations of two new bird species observed perching on Eastern grey kangaroos (*Macropus giganteus*). These results indicate bird-macropod cleaning interactions may be more common than previously reported.

Cleaning associations, in which one species removes and feeds on parasites from another, are commonly found in marine and terrestrial systems (Caves, 2021). In terrestrial systems, these interactions are typically between cleaner birds and mammals, and over one hundred bird species have been observed to clean other species (Sazima, 2011). The exact nature of these interactions has been debated. Many authors have assumed that these interactions are mutualistic: cleaner birds derive food from the host mammal and the host mammal gains fitness via reduced ectoparasite load (Bezuidenhout and Stutterheim, 1980), while other studies have suggested that these interactions are solely beneficial to the cleaner (Weeks, 2000).

Despite the widespread occurrence of cleaner birds, only one species has ever been observed cleaning a marsupial mammal. The Willie wagtail (*Rhipidura leucophrys*) is a common insectivorous bird distributed throughout most of Australia, and there is one published report of this bird feeding off an Eastern grey kangaroo (*Macropus giganteus*) (Boles, 2006). In this study we provide information from additional observations of three different bird species perched on and presumably feeding from eastern grey kangaroos.

The study site is located in the Australian tropical highlands zone, which is an arid, savannah-like habitat. In order to monitor the reproduction of radio-collared chital deer (*Axis axis*), trail cameras (either Reconyx Hyperfire or Bushnell Aggressor) were placed opportunistically around the Spyglass Research Station (Lat- Lon: -19.494, 145.708), north of Charters Towers, Queensland. A total of 398 camera

deployments were set between 13 January 2018 and 18 May 2023, representing 31,004 sampling days. Cameras were set opportunistically to capture images of invasive chital deer, often near permanent water sources. Of 72,217 non-blank camera triggers, macropods (kangaroos, wallabies, and allies) were identified in 20,216 of the sequences.

In seven photo sequences, we observed birds (Magpie-lark- *Grallina cyanoleuca* $N = 5$, Pied Butcherbird- *Cracticus nigrogularis* $N = 1$, or Willie Wagtail *Rhipidura leucophrys* $N = 2$) perched on or near the shoulders of an Eastern Grey kangaroo (Figs. 1-4). Because all cameras were set to take either 3 or 10 photos consecutively, with no delay between consecutive re-triggering, I was able to estimate the time birds spent on kangaroos when in view. The birds perched on the kangaroos for between 1 and 158 s. The 1-s perch by a Willie wagtail was likely cut short due to a pair of usurping magpie-larks (Fig. 1). Based on these photos, I presume that the birds were in the process of searching for and consuming ectoparasites off the kangaroos. In two of the photo sequences, the bird can be seen poking its beak at the neck fur or ear of the kangaroo (Figs. 2-3). Given that ticks and other ectoparasites are more commonly found in areas of the body where an individual cannot groom themselves (Lydecker et al., 2019), it is likely that birds are targeting areas of the kangaroo body that have the most food items. In one photo, a white dot on the back ear of the kangaroo may be an engorged tick (Fig. 4). Unfortunately, the camera did not capture an image of the kangaroo's ear post bird visitation. (See Table 1.)

An alternate hypothesis on the nature of these interactions is that

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Fig. 1. Willie wagtail and Magpie-larks perched on an eastern grey kangaroo.

these birds could be picking fur off the kangaroos for use in nest construction (Pollock et al., 2021). This is unlikely as one of these species, the Magpie-lark, makes mud-nests (Neill and Hill, 1998). Another alternate hypothesis is that the birds are simply using the kangaroos as a perch. Meerkats (*Suricata suricatta*) have been known to climb on top of human researchers when scanning the environment for predators (M Manser, pers. comm.). While I cannot rule this out as an explanation for these observations, it seems that a kangaroo would not be a particularly ideal perching location. Unlike quadrupedal ungulates which often attract insectivorous birds (Dean and MacDonald, 1981), the hopping locomotion of kangaroos would make it difficult or impossible for the bird to remain perched when the kangaroo is traveling.

These observations also bring up the question of why are these birds picking parasites off kangaroos, but not deer at the same study site? In

our study, the number of deer photo sequences is similar to the number of macropod sequences (other macropods at the site include: Red kangaroo- *Osphranter rufus*, Common wallaroo- *Osphranter robustus*, Swamp wallaby- *Wallabia bicolor*, Agile wallaby- *Notamacropus agilis*, spectacled hare-wallaby- *Lagorchestes conspicillatus*, Rufous bettong – *Aepyprymnus rufescens*). Even though the eastern grey kangaroo is the most common macropod at the site, chital deer are the most common medium-large sized mammal. Chital deer may have fewer ticks and other ectoparasites compared to native species because they have been recently introduced to Australia (1886, Roff, 1960). On the other hand, other non-native ungulates in Australia (Banteng- *Bos javanicus*) have been observed to carry heavy ectoparasite loads and be cleaned by native Torresian crows (*Corvus orru*) (Bradshaw and White, 2006). During the course of a regional deer cull (Watter et al., 2019) and a tracking study



Fig. 2. Pied Butcherbird seemingly picking an ectoparasite off the ear of an eastern grey kangaroo.



Fig. 3. Magpie-lark appearing to pick an ectoparasite off the ear of an eastern grey kangaroo.

where more than sixty chital deer were fitted with GPS collars, observers recorded either few or no ectoparasites on deer at this study site (Michael Brennan pers. comm.). I predict that if chital deer at this site start to exhibit high ectoparasite loads, these bird species might develop deer cleaning behaviors as well.

It appears that these bird-kangaroo interactions could be an example of a facultative mutualism similar to other bird-mammal parasite cleaning interactions (Dean and MacDonald, 1981; Ruggiero and Eves, 1998; Sazima et al., 2012). In general, most mammals in these interactions are ungulates or slow-moving large rodents like capybara (*Hydrochoerus hydrochaeris*, Sazima, 2007). The interactions reported here differ because this is only the second reported example of a bird-marsupial cleaning interaction. In some cases, mammals have been observed posing in a manner which allowed the cleaner animal easier access to the parasites (McClearn, 1992; Bradshaw and White, 2006; Cove et al., 2017). In this case, kangaroos were not observed exposing

their body to the cleaner birds. Given that kangaroos do not appear to be facilitating their role as hosts to these birds, and their hopping locomotor style, I conclude that picking ticks off a kangaroo may be a more difficult task than other previously reported examples of intra-species cleaning interactions. This difficulty could be a reason why the behavior is relatively uncommon and only previously reported once.

Declaration of Competing Interest

I declare that I have no financial or personal relationship with other people or organizations that could inappropriately influence this work: “Mutualistic interaction between two Australian birds and eastern grey kangaroos”.

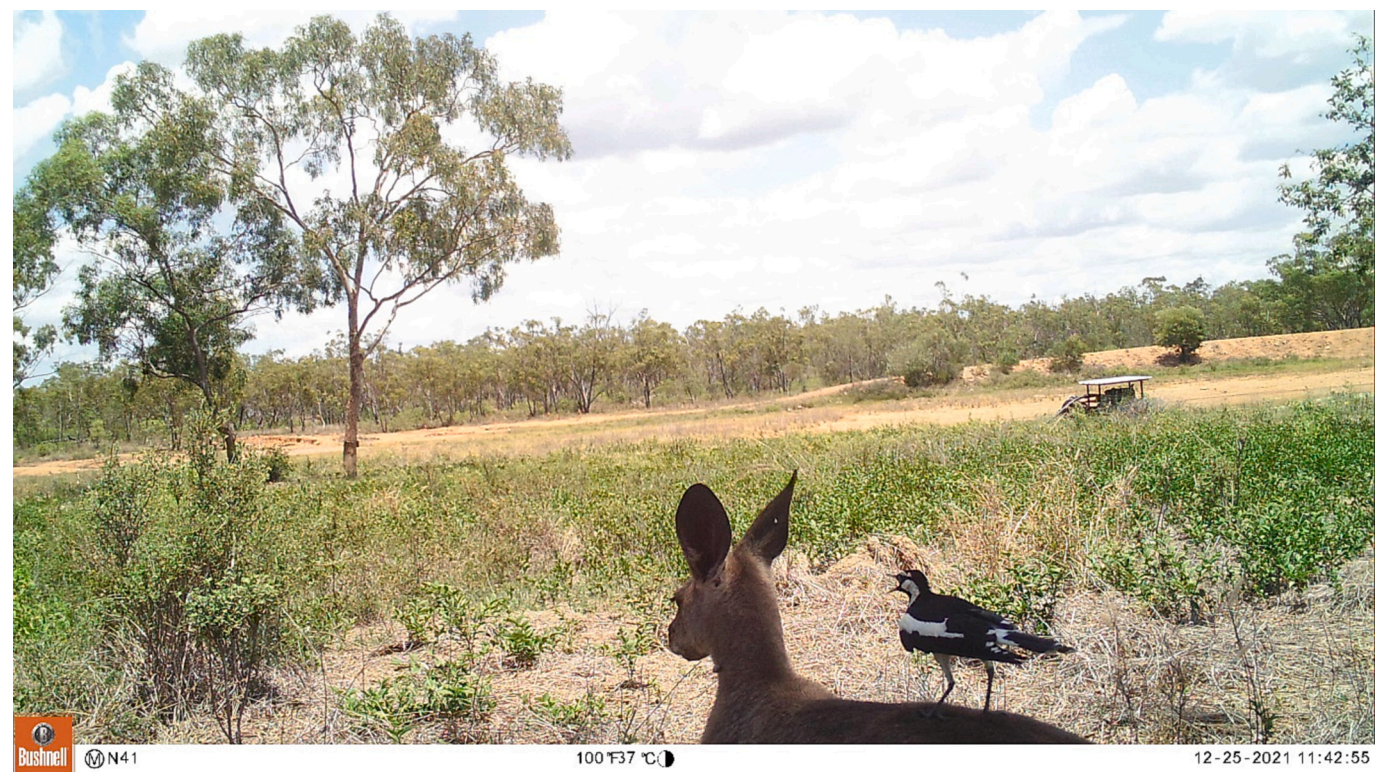


Fig. 4. Magpie-lark perched on an eastern grey kangaroo. Note the small dot, which may be a tick, on the back of the kangaroos left ear.

Table 1
Details of seven recorded bird-kangaroo interactions. Note that the 6/14/2020 observation included three individual birds in the same sequence of photos.

Date	Bird species	Visit duration (sec)
6/14/2020	Wille Wagtail	1
continued	Magpie-lark X 2	11 and 13
8/31/2020	Willie Wagtail	3
5/11/2021	Magpie-lark	1 and 158
5/23/2021	Magpie-lark	14, 15, and 3
9/26/2021	Pied Butcherbird	6
12/25/2021	Magpie-lark	3
12/22/2022	Magpie-lark	3

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References

Bezuidenhout, J.D., Stutterheim, C.J., 1980. A critical evaluation of the role played by the red-billed oxpecker *Buphagus erythrorhynchus* in the biological control of ticks. Onderstepoort J. Vet. Res. 47, 51–75.

Boles, W.E., 2006. Family Rhipiduridae (fantails), p. 200–242. In: del Hoyo, J., Elliot, A., Christie, D.A. (Eds.), Handbook of the Birds of the World. Vol. 11. Old World Flycatchers to Old World Warblers. Lynx Edicions, Barcelona.

Bradshaw, C.J.A., White, W.W., 2006. Rapid development of cleaning behaviour by Torresian crows *Corvus orru* on non-native banteng *Bos javanicus* in northern Australia. J. Avian Biol. 37, 409–411.

Caves, E.M., 2021. The behavioural ecology of marine cleaning mutualisms. Biol. Rev. 96, 2584–2601.

Cove, M.V., Maurer, A.S., O'Connell, A.F., 2017. Camera traps reveal an apparent mutualism between a common mesocarnivore and an endangered ungulate. Mamm. Biol. 87, 143–145.

Dean, W.R.J., MacDonald, I.A.W., 1981. A review of African birds feeding in association with mammals. Ostrich 52, 135–155.

Lydecker, H.W., Etheridge, B., Price, C., Banks, P.B., Hochuli, D.F., 2019. Landscapes within landscapes: a parasite utilizes different ecological niches on the host landscapes of two host species. Acta Trop. 193, 60–65.

McClearn, D., 1992. The rise and fall of a mutualism? Coatis, tapirs, and ticks on Barro Colorado Island, Panamá. Biotropica 24, 220–222.

Neill, V., Hill, A., 1998. Mate guarding in the magpie-lark. Corella 22, 80–86.

Pollock, H.S., MacDonald, S.E., Vizentin-Bugoni, J., Brawn, J.D., Sutton, Z.S., Hauber, M. E., 2021. What the pluck? The theft of mammal hair by birds is an overlooked but common behavior with fitness implications. Ecology 102, e03501.

Roff, C., 1960. Deer in Queensland. Queensl. J. Agric. Sci. 17, 43–58.

Ruggiero, R.G., Eves, H.E., 1998. Bird–mammal associations in forest openings of northern Congo (Brazzaville). Afr. J. Ecol. 36 (2), 183–193.

Sazima, I., 2007. Unexpected cleaners: black vultures (*Coragyps atratus*) remove debris, ticks, and peck at sores of capybaras (*Hydrochoerus hydrochaeris*), with an overview of tick-removing birds in Brazil. Rev. Bras. Ornitol. 15 (3), 417–426.

Sazima, C., 2011. Cleaner birds: a worldwide overview. Rev. Bras. de Ornitol. 19 (1), 32–47.

Sazima, C., Jordano, P., Guimarães Jr., P.R., Dos Reis, S.F., Sazima, I., 2012. Cleaning associations between birds and herbivorous mammals in Brazil: structure and complexity. Auk 129 (1), 36–43.

Watter, K., Baxter, G.S., Pople, T., Murray, P.J., 2019. Effects of wet season mineral nutrition on chital deer distribution in northern Queensland. Wildl. Res. 46, 499–508.

Weeks, P., 2000. Red-billed oxpeckers: vampires or tickbirds? Behav. Ecol. 11, 154–160.