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Primates

Red-tailed monkeys (*Cercopithecus ascanius*) prey upon and mob birds in the Issa Valley, western Tanzania

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1 **Title: Red-tailed monkeys (*Cercopithecus ascanius*) prey upon and mob birds in the Issa**
2 **Valley, western Tanzania**

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10

11 **Abstract**

12 Interactions between monkeys and birds are rarely observed and consequently, rarely described
13 in scientific literature. We recorded two encounters between birds (*Prionops plumatus* and *Strix*
14 *woodfordii*) and red-tailed monkeys (*Cercopithecus ascanius*) in a woodland-mosaic habitat in
15 western Tanzania. We observed a male red-tailed monkey consume a small bird in its entirety.
16 Although only a few feathers remained, we provisionally identified the bird as a white-crested
17 helmetshrike. We also observed a group of red-tailed monkeys mobbing, but not killing, an
18 African wood owl on the forest floor. This is the first reported [observation of this kind](#). These
19 encounters suggest that guenons may generalize large bodied avians as threats and small bodied
20 avians as potential prey. Hetero-specific encounters such as these provide insights into primate
21 diet and anti-predatory behavior.

22 **Key words: Anti-predator behavior, Guenon, Meat-eating, Predation, Savanna-woodland**
23 **mosaic**

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35 CL and EM collected data; CL, EM, FS, and AP wrote the manuscript.

36

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43 assistance with data collection, and David Moyer for assistance with bird species identification.

44

45

46

47 **Introduction**

48 Primates commonly exhibit anti-predation behavior in response to birds of prey, but direct
49 observations of avian predation on primates are rare (Cordeiro 1992; Shultz 2001; Paciência et
50 al. 2017). One example of primate anti-predator behavior is mobbing, defined as following,
51 approaching, or harassing an animal, either as an individual or collectively as a group (Crofoot
52 2013). Mobbing serves two primary functions. First, mobbing can allow individuals to rescue
53 group members already captured by a predator (Crofoot 2013). Second, mobbing can prevent
54 predation by deterring predators and spoiling potential ambushes (Crofoot 2013). Reporting
55 observations of anti-predation behavior, including mobbing, is important for improving our
56 understanding of which species and behaviors may be perceived as threats by primates.
57 Furthermore, these observations can highlight rarely-exhibited behaviors, such as tool use when
58 mobbing predators (e.g. white-faced capuchin monkeys, *Cebus capucinus*, using sticks to attack
59 snakes – Chapman 1986; Boinski 1988). **In cases of primates mobbing birds, underlying motives
60 are often unknown.**

61 Although relatively uncommon, primate predation on birds does occur. For example,
62 chimpanzees (*Pan troglodytes*) are known to eat birds (Toshiyuki and Shigeo 1983; Hockings et
63 al. 2012) and **vervet monkeys (*Cercopithecus aethiops*)**, white-faced capuchins (*Cebus imitator*),
64 blue monkeys (*Cercopithecus mitis*), red-tailed monkeys (*C. ascanius*), **and several other guenon
65 species** have also been observed hunting and consuming birds (Struhsaker 1967; Fedigan 1990;
66 Cordeiro 1994; Furuichi 2006; Kingdon et al. 2013). Chimpanzees have also been observed
67 capturing and killing birds for play (Carvalho et al. 2010).

68 Here, we describe two encounters between red-tailed monkeys and birds in the Issa
69 Valley, western Tanzania. The first is an observation of a red-tailed monkey capturing and

70 consuming a single individual of *Prionops plumatus*. The second observation describes red-tailed
71 monkeys mobbing an owl (*Strix woodfordii*) – the first recorded observation of this kind.

72

73 **Methods**

74 The Issa Valley is located in the Tongwe East Forest Reserve in western Tanzania. The study site
75 is characterized as a mosaic of miombo woodland, dominated by *Brachystegia* and *Julbernardia*
76 spp., and small strips of riverine forest (Piel 2018). Mean annual rainfall since 2012 is
77 ~1250mm, and daily mean temperatures in forest range from 10-33°C throughout the year
78 (McLester et al. 2019).

79 Red-tailed monkeys were first habituated at Issa in 2012 (Tapper et al. 2019; McLester et
80 al. 2018), with groups followed for 5-10 days each per month as part of long-term data
81 collection. Potential predators most frequently encountered by red-tailed monkeys at Issa include
82 birds of prey (crowned hawk-eagles, *Stephanoaetus coronatus*) and chimpanzees (*Pan*
83 *troglodytes schweinfurthii*). When Observation 1 occurred in 2016, one group (K0) comprising
84 ca. 50 individuals was being followed. When Observation 2 occurred in 2018, K0 had fissioned
85 into two daughter groups of ca. 31 individuals (K1) and ca. 16 individuals (K2).

86

87 **Observations**

88 *Observation 1*

89 On 4 January 2016 at 13.50, EM and a field assistant (PH) were following K0 as the group
90 travelled in riparian forest. The forest strip was approximately 80m wide and surrounded by
91 miombo woodland on both sides. PH observed an adult male red-tailed monkey holding a dead
92 bird after jumping into a tree. The bird was later identified as a juvenile white crested helmet

93 shrike (*Prionops plumatus*; D. Moyer personal communication). The monkey consumed the bird
94 immediately and finished eating at 13:57. No vocalizations were heard from the monkey or the
95 bird, and we did not observe any interest by conspecifics towards the interaction. The only
96 remains that we recovered were feathers and blood, which were found on the ground
97 immediately underneath the tree. The monkey left the tree immediately after finishing eating it.

98

99 *Observation 2*

100 On 18 October 2018 at 12:45, CL was following K1 in riparian forest. CL observed 8-10
101 monkeys surrounding a juvenile adult African wood owl (*Strix woodfordii*) on the ground
102 approximately 5m from a dried riverbed. The monkeys were subadults and juveniles and
103 remained between 0-3m from the owl for the entire encounter. All monkeys were either on the
104 ground or on nearby lianas, watching the owl and producing chirps and ka-trains (Marler, 1973).
105 For approximately one minute, several individuals took turns jumping on the owl (primarily
106 using their back feet) at least four times and pulling the owl's wings with their mouths and hands
107 at least two times. The owl did not vocalize or attempt to escape, even when it was not
108 restrained. At 12:54, a monkey dragged the owl by its wing into the nearby riverbed
109 (approximately a 1.5m drop) where they were obscured from view. However, at least three
110 monkeys followed down into the riverbed. By 12:55, all monkeys had ceased interacting with the
111 owl, and most individuals had begun playing on the forest floor approximately 10m away from
112 the owl. At that point, the owl was observed sitting upright with wings slightly askew but did not
113 attempt to fly. For the next two minutes, three monkeys remained on lianas overlooking the owl
114 and watched it while foraging on *Dracaena mannii*. CL twice observed a monkey look at and
115 move towards the owl while remaining on the liana. The last individual left at 13:00, at which

116 point CL photographed the owl for later species identification. When CL last observed the owl, it
117 was alive, and although it was not observed to fly away, the owl had disappeared into the foliage
118 within two minutes of the monkeys' departure. Throughout the observation, those group
119 members that did not interact with the owl (>20 individuals) foraged, rested, and by the end of
120 the observation had begun travelling further away from the mobbing location.

121

122 **Discussion**

123 Despite >4000 hours of group follows of Issa's red-tailed monkeys from 2012 – 2018, these
124 observations represent the only two observations of red-tailed monkeys mobbing and preying
125 upon birds at Issa. The rarity of these interspecies encounters is consistent with the relative
126 paucity of direct primate-avian interactions reported in the literature. Red-tailed monkeys have
127 [only once been reported](#) to hunt and consume birds (Furuichi 2006). In that interaction, two blue
128 monkeys harassed a red-tailed monkey that had captured a green pigeon (*Treron calva*). While
129 red-tailed monkeys have not been recorded to eat [vertebrate](#) prey besides the aforementioned
130 birds, a *C. mitis* x *C. ascanius* hybrid and blue monkeys were observed consuming bats
131 (*Pteropodidae* and *Molossidae*) on 13 occasions over 6.5 years in Kenya and Tanzania (Tapanes
132 [et al. 2016](#)). In addition, [several guenon species](#) have been observed to consume [vertebrates](#),
133 [including spurfowl chicks](#) (*Pternistis leucoscep* – Struhsaker 1967), galagos (*Galago* spp. –
134 Butynski 1982), flying squirrels (*Anomalurus derbianus jacksonii* – Fairgrieve 1997), and mice
135 (presumed *Muroidea* spp. - Wahome et al. 1988). The flying squirrel predation occurred during
136 the driest part of the year when food abundance was the lowest, indicating hunting may be an
137 attempt to compensate for nutrient deficiency (i.e. the “nutrient shortfall hypothesis” – Oftedal,
138 1991; Mitani & Watts, 2001). As such, direct observations of attempted and successful predation

139 of birds and mammals by monkeys can be important when contextualizing the role of vertebrate
140 tissue in primate diet against seasonal resource availability.

141 Our observation of red-tailed monkeys mobbing a wood owl is the first of its kind. Wood
142 owls are typically insectivorous, but will hunt small mammals, like shrews (Chittenden et al
143 2016). However, there is no evidence that they hunt monkeys. If monkeys are not preyed on by
144 wood owls, why would they risk injury by mobbing them? Cords (1987) proposed that monkeys
145 may generalize large bodied birds as threats. If so, our observations of monkeys playing
146 subsequent to the initial attack suggests that they (1) may not have seen it, (2) may have seen it
147 but noticed it was injured and no longer a threat, or (3) do not perceive the owl as a threat.
148 Carvalho et al. (2010) suggested that bird attacks can be initiated through chance encounters and
149 simply persist out of novelty. Therefore, our observation may have been an aggressive form of
150 play. Another possibility is that the attack was initiated out of redirected aggression. Goldberg et
151 al. (2006) described a mobbing event near Kibale National Park, Uganda, when three red colobus
152 monkeys (*Procolobus tephrosceles*) mobbed an owlet (*Glaucidium perlatum*) after a raptor
153 sighting. The authors suggested that the resulting vigilance amongst the group contributed to
154 increased arousal that eventually resulted in the (re-directed) killing of the owlet. A final
155 possibility is that the observation was an attempted predation event. For example, Rudran (1978)
156 observed a subadult male blue monkey eating a wood owl following a suspected live capture.
157 However, the underlying motivation in our observation remains unclear. More direct
158 observations of monkey-bird interactions are needed to understand the range of possible
159 responses within intra-species encounters, as well as improve our understanding of diet and
160 feeding ecology.

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