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BRIEF REPORT

Killing of a Pearl-Spotted Owlet (*Glaucidium perlatum*) by Male Red Colobus Monkeys (*Procolobus tephrosceles*) in a Forest Fragment Near Kibale National Park, Uganda

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Adult male red colobus (*Procolobus tephrosceles*) were observed capturing and killing an owl (*Glaucidium perlatum*) in the Rurama forest fragment near Kibale National Park in western Uganda. The owl was not subsequently eaten by the colobus, their conspecifics, or the other primates present during the attack. Because the incident was preceded by an agonistic encounter with a raptor, the event is best interpreted as a misdirected antipredator behavior. Although antipredator behaviors are not unknown in red colobus, this is the first such incident directed against a raptor to be documented. Am. J. Primatol. 68:1007–1011, 2006.

Key words: antipredator behavior; red colobus; Kibale; Uganda

INTRODUCTION

Primates of several species are known to engage in antipredator behaviors, including mobbing and attacks [Stanford, 2002]. Red colobus (*Procolobus* sp.) are particularly noted for directing such behaviors toward chimpanzees (*Pan troglodytes*), which commonly prey upon them [Bshary & Nöe, 1997; Busse, 1977; Ghiglieri, 1984; Skorupa, 1988; Stanford, 1995]. We are unaware, however, of any accounts of mobbing or attacks of avian predators by primates. Here we describe an incident in which male red colobus monkeys attacked and killed, but did not eat, an adult owl (*Glaucidium perlatum*). This incident has several interesting ancillary features, including the facts that 1) at the time of the incident the red colobus were in polyspecific association with two other primate species, 2) the owl was too small to have been a threat to the monkeys in the

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group, and 3) the owl's presence in the vicinity of the monkeys was immediately preceded by that of a large and potentially deadly raptor.

MATERIALS AND METHODS

Study Species and Site

Procolobus tephrosceles is one of the most endangered of the colobines, with a patchy distribution across central Africa [Colyn, 1987; Kingdon, 1989; Struhsaker, 1975]. These monkeys have a complex digestive tract that allows them to digest leaves. They live in groups of approximately 20 to more than 100 individuals, and often form mixed-species associations with other primates [Gillespie & Chapman, 2001; Struhsaker, 1975, 1981]. Kibale National Park, Uganda, has a large population of red colobus monkeys both within the park proper and in forest fragments outside of it.

Rurama, an 8.7 ha patch of remnant forest located approximately 2 km from the western boundary of Kibale National Park, is one such fragment. In Rurama, forest persists in swampy valley bottoms and on steep forested hills, and is surrounded on all sides by agricultural land [Gillespie & Chapman, in press]. Rurama is characterized by low canopy height and incomplete canopy cover compared to undisturbed sections of the national park. Elevation in the region averages 1,500 m, the mean annual rainfall is 1,741 mm (1990–2001), and the mean daily minimum and maximum temperatures are 14.9°C and 20.2°C, respectively (1990–2001) [Chapman et al., 2002]. Rainfall is bimodal, with two rainy seasons generally occurring from March to May and September to November. Before agricultural expansion occurred, mid-elevation, moist, evergreen forest dominated the region [Chapman et al., 2003]. Although the precise timing of the isolation of the Rurama forest fragment from the main forest of Kibale National Park is not known, local elders describe Rurama as an ''ancestral forest,'' and aerial photographs from 1959 confirm that it has been isolated from Kibale since at least that time [Chapman et al., 2003]. We initiated behavioral studies of the primates in the Rurama forest fragment in January 2005. The primates are not yet habituated to human observers.

RESULTS

On 25 February 2005, one of the authors (C.K.) was observing a polyspecific association of red colobus (*Procolobus tephrosceles*), black-and-white colobus (*Colobus guereza*), and red-tailed monkeys (*Cercopithecus ascanius*) in the Rurama forest fragment. The observer is a highly skilled field assistant with more than 10 years of experience recording data on primate behavior and ecology in the Kibale region.

The red colobus (group size undetermined) and red-tailed monkeys (group size of approximately 13) were feeding and resting in the same tree (a mature *Ficus capensis*), and the black-and-white colobus (group size undetermined) were feeding and resting approximately 10 m away in an adjacent *F. capensis* tree. At 1409 hr, a large raptor (unidentified species) was observed flying high above the area, circling and vocalizing. Apparently in response to the raptor, individuals of all three primate species began to make alarm calls. The red-tailed guenons immediately moved to lower branches of the tree, as did the black-and-white colobus and most of the red colobus. However, three large male red colobus moved to higher branches of the tree and were observed looking upward into the sky. The raptor flew away with no noticeable change in altitude. The three male red

colobus remained high in the tree and continued to scan the area even after the bird had passed out of sight.

Two minutes later, at 1411 hr, an owl (approximately 20 cm tall, later identified as a pearl-spotted owlet (*Glaucidium perlatum*)) flew in the direction of the tree in which the red colobus and the red-tailed guenons were located. The owl landed in the tree, approximately 6 m above the ground and 3–5 m away from one of the large red colobus males. The red colobus moved quickly in the direction of the owl, at which point a loud disturbance was heard that involved screaming by all three large males, accompanied by violent movements of branches in the vicinity.

Approximately 1 min later the observer moved to investigate and found a large male red colobus resting on a low branch of the tree, approximately 3 m from the ground. Below, on the forest floor, the owl was observed dead, with one wing disarticulated and located 4 m from the remainder of the carcass. This male red colobus remained in the vicinity despite the close presence of the observer (5 m away), and made repeated vocalizations (''chist'' vocalizations, as described in Struhsaker [1975], which may also be given in response to human observers; the proximity of the observer in this instance may have contributed to the animal's agitated state). The observer returned to the area the following morning and found the owl (carcass and disarticulated wing) in the same spot. No primates were observed in the vicinity that next morning.

DISCUSSION

This report describes the attack and killing of an owl by red colobus males in the context of a three-species polyspecific association. Because the owl was not eaten (indeed, it was found undisturbed the next day), and because to our knowledge no instances have been recorded of red colobus consuming vertebrates, this was most likely not a predation event. The fact that the behavior was performed by large males in the group during a period of heightened vigilance immediately following an encounter with a raptor suggests that this was a misdirected antipredator behavior. Red colobus are the preferred prey of chimpanzees, and are known to direct aggressive and sometimes proactive antipredator behaviors against them [Bshary & Nöe, 1997; Busse, 1977; Ghiglieri, 1984; Skorupa, 1988; Stanford, 1995, 2002]. The behavior of the three males in this instance was similar to the type of coalitional behaviors performed by male red colobus in response to attacks by chimpanzees. The observations described here indicate that such behaviors may be directed toward other types of predators as well (in this case raptors).

One interesting feature of this incident is the association of the red colobus with black-and-white colobus and red-tailed guenons at the time of the attack. It is thought that heightened vigilance against predators is one reason why primates form polyspecific associations [Noe & Bshary, 1997; Stanford, 2002; Struhsaker, 1981]. Our observations suggest that some species involved in polyspecific associations may enjoy benefits beyond enhanced vigilance, such as active defense against predation by members of other species.

These interpretations are complicated by the fact that the owl was too small to have represented an actual threat to the primates. The fact that the red colobus nevertheless attacked and killed the bird suggests some sort of redirected aggression, which has previously been documented for primates in the context of agonistic social interactions [e.g., Cheney & Seyfarth, 1989; de Waal & Yoshihara, 1983; Smuts, 1985]. The owl's untimely demise also suggests that heightened

vigilance against predators may persist in primate groups even after the initial perceived threat has passed.

It is tempting to speculate that the behavior described here was related to the environment in which the primates live. The killing of a raptor was observed in the highly disturbed Rurama forest fragment, where we have collected only approximately 250 hr of observational data on red colobus, whereas no such behavior has been observed in the relatively undisturbed forests within Kibale National Park, despite approximately 10,000 hr of behavioral observations (C. Chapman, personal communication). This suggests that behavioral differences may exist between primates in forest fragments and primates in undisturbed forests. Indeed, Skorupa [1988] argued that forest disturbance may alter predation risk for primates, and documented that attacks by Kibale red colobus against humans occurred in logged forest but not in unlogged forest during his observations. In this context, it is worth noting that one of the males involved in the incident is known to local villagers as a particularly aggressive individual that often threatens humans. The persistence of these primates in an environment characterized by incomplete canopy cover, high levels of encroachment, and frequent hostile encounters with local people could explain this individual's unusually aggressive propensities.

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