SHORT COMMUNICATION

A Brief Report on the Social Behavior of the Crested Mangabey (Cercocebus galeritus galeritus) with a Comparison to the Sooty Mangabey (C. torquatus atys)

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ABSTRACT. A group of 38 free ranging crested mangabeys in the Tana River Primate Reserve was studied over a 6-week period for a total of 209.5 hr and behavioral comparisons made to a captive group of sooty mangabeys. Although quantitative comparisons between these two mangabey species are not possible, the present data suggest that these geographically separated mangabeys share several behavioral similarities. Copulatory behavior in both species involved a pattern of female darting and female vocalizing following the mount by the male. Several similarities in agonistic behavior also existed: 1) The victim often returned or stayed within 1 m of the aggressor following an agonistic episode; 2) retaliation in which the victim first fled or avoided the aggressor, then subsequently, chased or lunged at the aggressor, typically while screaming; and 3) frequent redirection of aggression by the victim following an agonistic episode. A dominance rank reversal occurred between the two adult male crested mangabeys with no severe wounding. The rank reversal seemed to be related to two subsequent behaviors which included infant carriage by the deposed alpha in the presence of the new alpha male and female demonstrations of extreme protectiveness of their infants in the presence of the new alpha male. Both of these behaviors have been reported in the sooty mangabey group.

Key Words: Mangabeys; Aggression; Rank reversal; Reproductive behavior.

INTRODUCTION

Traditionally, mangabeys have been grouped into a single genus including five species and several subspecies (SCHWARTZ, 1928; SCHOUTEDEN, 1944; BOOTH, 1956) and this classification was followed by two more contemporary primate taxonomy texts (NAPIER & NAPIER, 1967; HILL, 1974). Recent evidence, however, suggests that the two recognized species-groups of mangabeys (torquatus and albigena) are taxonomically distinct based on immunological properties (CRONIN & SARICH, 1976), blood proteins (BARNICOT & HEWETT-EMMET, 1972; BARNICOT & WADE, 1970), and craniofacial measures (GROVES, 1978) and should be classed as separate genera. Based on these latest data, there are four species of mangabeys ranging along the equator from eastern to western Africa: Cercocebus torquatus (three subspecies including atys-sooty mangabey), C. galeritus galeritus (crested mangabey) (monotypic), C. agilis (two subspecies), and Lpotocebus albigena (four subspecies including johnstoni-grey cheeked mangabey) (GROVES, 1978). There have been few behavioral comparisons of different mangabey species, however, to contribute to assessments of species relatedness.

The crested mangabey inhabits the eastern-most portion of the mangabey range, while
the sooty mangabey inhabits the western-most portion of the range (Groves, 1978). The crested mangabey is among the most endangered primates in the world (Mittermeier, 1981). The number of mangabey groups per forest significantly declined between 1974 and 1987 (Decker & Kinnaird, 1992). These animals occupy a forested habitat within a 60 km-length of the lower Tana River (Andrews et al., 1975; Homewood, 1976) which occurs only due to ground water seepage and seasonal flooding since the surrounding region is semi-arid bushland (Andrews et al., 1975). Because the Tana River area provides the habitat for two primate species which occur only here, the Tana River crested mangabey and the Tana River red colobus monkey (Colobus badius rufoattatus), the Kenyan government gazetted the Tana River National Primate Reserve in 1976 in order to protect their remaining habitat.

The sooty mangabey (Cercocebus torquatus atys: Groves, 1978 equivalent to C. atys: Napier & Napier, 1967) is found from Liberia to Senegal in West Africa (Schwartz, 1928; Struhsaker, 1971). This species has not been studied in the wild, although a captive group has been studied extensively (e.g. Hadidian & Bernstein, 1979; Bernstein, 1976; Ehardt, 1988; Busse & Gordon, 1984; Gust et al., 1990; Gust & Gordon, 1991). The present study is based on six weeks of field observations and the purpose of this report is to describe some basic behaviors observed in the free-ranging crested mangabey and discuss them with reference to behaviors characteristic of a captive sooty mangabey group. Although rates of behavior cannot be meaningfully compared across such different environments, the expression of behavior (i.e. behavioral repertoire) is for the most part retained in large captive social groups of primates. Thus, this report presents a qualitative behavioral comparison of two geographically separate congeneric species which may contribute to the ongoing debate about evolutionary relationships in mangabeys.

METHODS

SUBJECTS

A group of 38 crested mangabeys ranging in Mcheleo and Guru forests in the Tana River Primate Reserve, Kenya served as subjects. The study group was comprised of 2 adult males, 8 adult females, 8 infants, and 20 juveniles. All members were well habituated prior to the onset of observations. Individually-identifiable animals included all adult individuals, infants, and three juveniles.

PROCEDURE

The group was followed for a total of 209.5 hr over 25 days (mean 8.4 hr/day) from January to March 1993. An "all occurrences of some behaviors" sampling technique (Altman, 1974) was used to record the frequency of screams, "whoresses" and whoop gobbles. A whoo vocalization is a low frequency rapid utterance emitted by the aggressor during an agonistic interaction (C. aterrimus: Horn, 1987; C. albigena: Chalmers, 1968; C. torquatus atys: Santee, 1992). Whoop gobble has been defined for grey checked mangabeys (Chalmers, 1968; Waser, 1975) and is associated with group spacing. For the whoop gobbles, the duration (sec) of the entire call, the number of gobbles and the number of vocalizations which followed the gobbles was also recorded. The vocalization...
which predictably followed the "gobble" portion of the call was very similar acoustically to a "staccato-bark" alarm call (Waser, 1982). An ad lib sampling technique was used to record all aggressive and post-aggressive interactions, reproductive behavior, and all social interactions involving infants in which all participants were seen. It is emphasized that the forest cover prevented the recording of all behavioral interactions, thus the present report is based on ad lib samples only. Perineal swellings were scored on a scale of 0 (flat) to 4 (maximum). Infants through subadults were aged based on size comparison with sooty mangabeys of known age. The identity and dominance ranks of the two adult males were learned from another investigator involved in an unrelated study which had been ongoing for over seven months. Agonistic episodes were used to determine dominance rank (Bernstein, 1968).

RESULTS

WHOOP GOBBLES

A total of 136 whoop gobbles was recorded during 209.5 hr of contact with the crested mangabey group. Both adult males whoop gobbled, although the caller could not consistently be identified due to the forest cover. Mean duration of whoop gobbles was 90.5 ± 10.0 sec with a mean of 5.5 ± 0.08 gobbles and 44.2 ± 4.1 barks. On three occasions, a whoop gobble was emitted by an adult male, with the exception that no whoop occurred. Figure 1 illustrates a whoop gobble of the crested mangabey compared to a whoop gobble of a sooty mangabey.

![Graph a](image)

**Fig. 1.** Sonogram of a whoop-gobble emitted by an adult male sooty mangabey (a) and an adult male crested mangabey (b). The sooty male emits a whoop and a gobble, whereas the crested male emits a whoop and a gobble followed by barks (beginning at second 7.5) which may go on for seconds or minutes. This particular crested mangabey whoop gobble is not presented in its entirety due to space limitations.
AGGRESSION

The frequency of screams and whrr vocalizations were recorded during 181.5 hr over 23 days. The mangabey group as a whole screamed an average of 1.74 times and whrr vocalized an average of 0.96 times per hour. A total of 47 agonistic episodes in which all participants were seen were recorded over 25 days. Of the agonistic behaviors displayed, 61.7% were lunges/charges; 23.4% were chases; 12.8% were grabs; 4.2% involved a bite; and 2.1% involved grappling. Victims redirected aggression to others following 14.9% of the episodes and received aid from others following 14.9% of the episodes. Predominant behaviors following aggression included victims returning to within 1 m of the aggressor within 10 sec following the aggression, 23.4% of the interactions, and retaliating against the aggressor (by lunging, charging, or chasing) while screaming, 12.8% of the interactions. Screams by the victim were associated with 63.8% of the interactions in which both the aggressor and victim were observed. Damaging contact aggression or evidence of serious wounding was not noted during the six week study.

REPRODUCTIVE BEHAVIOR

The basic pattern of copulatory behavior, based on four observed copulations involving a single female, consisted of a male mounting the female from behind by grasping her ankles with his feet and placing his hands on her hips. This was followed by intromission and thrusting. The female then vocalized softly and walked or ran away (dart) from the male (Table 1). The male remained silent during the copulation and was stationary immediately following the mount. The mounts observed were initiated by males from 2 yr of age to adult. The female did not vocalize following the mount by the 2 yr old, although she did dart away. Following the mount by the adult male, semen was seen on the female's perineum. The female, while exhibiting a swelling of two, was observed to emit a sexual vocalization when feeding alone on two occasions. The vocalizations were softer than the vocalizations typically uttered by the sooty mangabey females, however, because only one female crested mangabey was observed uttering this vocalization, the relative softness may be idiosyncratic and not typical of the species.

<table>
<thead>
<tr>
<th>Table 1. Presence of selected behaviors from the sooty mangabey repertoire as compared to the crested mangabey.</th>
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<tbody>
<tr>
<td>Behavior</td>
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<td>---------------------------------------------------------------</td>
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<tr>
<td>Female dart away from male following copulation</td>
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<td>Female copulatory vocalization during/following copulation</td>
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<td>Female copulatory vocalization disassociated from copulation</td>
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<td>Bite tail</td>
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<td>Embrace</td>
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<td>Leg kick back to other</td>
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<td>Reconciliation (return w/1 1m)</td>
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<td>Retaliation</td>
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<td>Male infant carry</td>
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<td>Infant chatter vocalization and present to adult male</td>
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<tr>
<td>Adult male head bob</td>
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<td>Adult male swagger</td>
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<td>Tongue flick</td>
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DOMINANCE REVERSAL

A rank reversal with no wounding was first noted between the beta and alpha male on February 5. The beta male was observed to aggress against the alpha male on two occasions. The original alpha did not contest the aggression on either occasion, rather, exhibited submissive behaviors (i.e. avoid, flee, present). It is not known if the challenge was ever contested since the males were not always visible during the day and since observations were limited to an average of 8.4 hr per day. It is of note that one of the adult females aided the former alpha during the second interaction observed by screaming and lunging at the former beta. Immediately thereafter, the former beta displayed on a tree by breaking branches. Six days later, the new alpha was observed to displace the new beta. No other agonistic interactions were observed between the two adult males during the following three weeks.

MALE-INFANT INTERACTIONS

Six days following the observation indicating a male dominance takeover, two adult females ran several meters to retrieve their infants from juvenile babysitters when the new alpha approached the area where the juveniles, holding the infants, were positioned. Infants over 3 months of age were often carried by juvenile females and males. Later that day, following the approach of the new alpha male toward her infant, which was being carried by a babysitter, an adult female ran while screaming toward her infant (4 months old) and retrieved it. Instances of rapid retrieval of infants by females around adult males were not noted prior to the dominance rank reversal.

Seven days following the male rank reversal, an infant (4 months old) released itself from a babysitter and approached the former alpha male, who was seated nearby, and presented while vocalizing (chattering) (see “chuckles” CHALMERS, 1968). The former alpha took the infant ventrally and when the new alpha approached grunting (see CHALMERS, 1968), the former alpha turned his back and put his arms around the infant and grunted, then moved about 4 m away to another tree branch. The male released the infant after approximately 90 sec. Seventeen days following the takeover, the former alpha male picked up the same infant and carried it ventrally while grunting. Shortly thereafter the former alpha avoided the new alpha male. The mother retrieved her infant from the former alpha male after the males separated from one another. Later the same day, the former alpha was observed holding two infants (3 months and 6 months old) while screaming at the new alpha male who was approximately 1.5 m away. The former alpha, positioned with his back toward the new alpha, clutched both infants to his ventrum while looking over his shoulder. Any preceding behaviors, for instance threats to the infants by the new alpha male, were not observed in any of the above social interactions due to lack of visibility. Infant carrying by adult males was not noted prior to the dominance rank reversal.

DISCUSSION

Several behavioral patterns seen in the crested mangabey are also present in the sooty mangabey. This is of note given that they are the most widely geographically separated mangabey species (GROVES, 1978).

Whoop gobbles were recorded 5.4 times per day; this is in the middle of the rate of 3.4
per day reported by KINNAIRD (1990a) and 7.6 per day reported by HOMWOOD (1976) for the month of February. These vocalizations are given exclusively by adult males and can be heard at least to 800 m distance (HOMWOOD, 1976). HOMWOOD (1976) found that with increased fruit availability, the total number of whoop gobblecs heard, including both the resident and any alien groups, increased. Moreover, HOMWOOD (1976) found that as the proportion of alien calls increased, the area covered during monthly and daily ranging decreased. Most of the research done on whoop gobblecs has focused on grey-cheeked mangabeyes (C. albigena) (CHALMERS, 1968; WASER, 1977a, b; WASER & WASER, 1977; WASER, 1982), although there are reports for C. galeritus agilis (QURIS, 1973, 1980), C. aterrimus (HORN, 1987), C. galeritus galeritus (WASER & HOMWOOD, 1979), and most recently for C. torquatus atys (SANTEE, 1992). It is of note that the first portion of the call, the whoop and the gobble, is very similar in the crested and sooty mangabeyes. The last part of the crested mangabey whoop gobble is absent in the sooty call and it is this part, the bark, that accounts for the variation in the total duration of the crested mangabey whoop gobble. The present report provides only the most basic description of the crested mangabey’s whoop gobble and makes only a structural comparison with the sooty mangabey. For information on the function of this call with regard to intra- and inter-group communication, the above studies should be consulted.

Although very few sexual mounts were observed due to the prevalence of lactating females, it was clear that the male pattern of mounting and the female pattern of darting and vocalizing following the mount is the same as the pattern exhibited by the sooty mangabeys (GUST & GORDON, 1991). Additionally, the female who was swelling was observed to utter a copulatory vocalization while feeding alone. The act of emitting a copulatory vocalization in the absence of copulation or even a male in proximity has been recorded in 11 out of 55 sooty mangabey females (unpubl. observ.), typically while swelling, although this behavior is not frequent and its meaning is unclear. Although not observed in the present brief study, the female crested mangabey, like the sooty, exhibits a maximum swelling approximately 50 days following conception with no further swelling through gestation (HOMWOOD, 1976; KINNAIRD, 1990b; GORDON et al., 1991).

Damaging contact aggression was not evident in the study group (at least during the brief study period) based upon the condition of individuals and upon the agonistic encounters observed. No group members exhibited wounds, scars, missing digits, or torn ears, although it is important to note that animals with scars were noted by HOMWOOD (1976). The only bites observed were to the tail with one female receiving a small wound as a result. In sooty mangabeys, bites to the tail are a common form of contact aggression although bites to the body do sometimes occur. However, body bites are controlled and almost never result in wounding (GUST & GORDON, 1991, 1993), a pattern similar to a form of controlled biting reported in stump-tailed macaques (DEMARIA & THIERRY, 1990). Severe wounding in sooty mangabeyes has been reported in the context of infant attacks by a new alpha male (BUSSE & GORDON, 1983).

Following an agonistic interaction in the crested mangabey, the victim returned or stayed within 1 m of the aggressor 23.4% of the episodes observed. The same behavior pattern occurs following sooty mangabey agonistic episodes (GUST & GORDON, 1993). The behavior just described appears to represent a submissive attempt by the victim to placate the aggressor and assess whether the aggressive bout is terminated. Another agonistic behavior pattern observed in both mangabey species is retaliation. After an individual has aggressed against another, the victim first flees or avoids the aggressor. Subsequently, the victim chases or lunges at the aggressor, typically screaming with the result that the aggressor flees or avoids the victim. This does not indicate a rank reversal, rather it appears to be a protest by the victim.
to the preceding aggression. Redirection to others following an aggressive interaction also was frequently observed and is common in the sooty mangabeys (Gust & Gordon, 1993). A dominance rank reversal occurred between the two adult male crested mangabeys with no noticeable wounding. This finding is based on identification of the alpha and beta males by another investigator studying the group for several months and the absence of any similar social interaction between the males during that time. As with all dynamic social interactions, some caution in interpretation is warranted. Although fighting was observed, it is suspected that levels of aggression diminished rapidly given that the challenge appeared not to be strongly contested. The rank reversal seemed to be related to two subsequent behaviors which included infant carriage by the deposed alpha in the presence of the new alpha male and female demonstrations of extreme protectiveness of their infants in the presence of the new alpha male. Both of these behaviors have been reported in the sooty mangabey group. Following similar circumstances, a rank reversal of the highest ranking adult males, a study was undertaken to observe male-infant interactions in the sooty group (Busse & Gordon, 1984). Fifty-two male-infant-male interactions were recorded. In 40% of 52 episodes, infant carrying occurred when the dominant male threatened an infant and the remainder occurred when the infant was in proximity to the alpha male. Results of the study indicated that the triadic male-infant interactions did not involve agonistic buffeting as reported in baboons (Ransom & Ransom, 1971; Altmann, 1980; Stoltz & Saayman, 1970; Busse, 1984), but rather protective behavior on the part of the deposed alpha. Protective behavior exhibited by females to their infants in the presence of an adult male has been observed in the sooty mangabey group as well, however the circumstances were slightly different. When infants, less than 1 yr of age, were returned to the social group following an absence (i.e. medical treatment), mothers or maternal relatives sometimes chased and screamed at adult males (unpubl. observ). During these instances, the adult males looked at and approached, but did not threaten the infants, thus it appeared that the mothers or relatives were anticipating aggression or sensed aggression directed toward their infants by the adult males, not detected by the observer. This behavior has been observed both during periods following a male dominance rank reversal and during stable conditions. It is important to note that infanticide in the captive sooty mangabey group has occurred in association with new alpha males (Busse & Gordon, 1983; unpubl. observ.) and has been speculated to occur in the crested mangabey (Kinnaird, 1990b). These behaviors are consistent with the notion that infanticide has been used to increase genetic representation in the group given that alpha status confers mating advantage in the sooty (Gust & Gordon, 1991) and the crested mangabey (Homewood, 1976; Kinnaird, 1990a).

Direct quantitative behavioral comparisons between the crested and sooty mangabeys are not possible due to the differences in observational conditions and sampling techniques. This report demonstrates that qualitative behavioral similarities are present between these two geographically separate mangabey species. The behavioral similarities lend support to the reported close taxonomic relationship between these two species based on physiological and cranial data.

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REFERENCES

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