

BRIEF REPORT

Evidence for the Consumption of Arboreal, Diurnal Primates by Bonobos (*Pan paniscus*)

MARTIN SURBECK¹, ANDREW FOWLER^{1,2}, CAROLINE DEIMEL¹, AND GOTTFRIED HOHMANN^{1*}

¹Max-Planck-Institute for Evolutionary Anthropology, Leipzig, Germany

²Department of Anthropology, University College London, Gower Street, London, United Kingdom

We present evidence for the consumption of a diurnal, arboreal, group living primate by bonobos. The digit of an immature black mangabey (*Lophocebus aterrimus*) was found in the fresh feces of a bonobo (*Pan paniscus*) at the Lui Kotale study site, Democratic Republic of Congo. In close proximity to the fecal sample containing the remains of the digit, we also found a large part of the pelt of a black mangabey. Evidence suggests that the Lui Kotale bonobos consume more meat than other bonobo populations and have greater variation in the mammalian species exploited than previously thought [Hohmann & Fruth, *Folia primatologica* 79:103–110]. The current finding supports Stanford's argument [Current Anthropology 39:399–420] that some differences in the diet and behavior between chimpanzees (*P. troglodytes*) and bonobos are an artefact of the limited number of bonobo study populations. If bonobos did obtain the monkey by active hunting, this would challenge current evolutionary models relating the intra-specific aggression and violence seen in chimpanzees and humans to hunting and meat consumption [Wrangham, Yearbook of Physical Anthropology 42:1–30]. *Am. J. Primatol.* 71:171–174, 2009. © 2008 Wiley-Liss, Inc.

Key words: *Pan paniscus*; bonobo; meat eating; faunivory; hunting; diet

INTRODUCTION

Most nonhuman primates consume a diet dominated by plants. In addition, many species complement plant foods with insects, meat of small vertebrates, and other faunal food sources. However, the consumption of larger mammals seems to be rare. In this context, great apes are no exception: Orang-utans (*Pongo pygmaeus*), gorillas (*Gorilla gorilla*), and chimpanzees feed on insects such as termites, ants, and bees, but the consumption of meat from other mammals is biased toward the two *Pan* species. Both *Pan* species prey on a variety of mammalian species. The frequency of hunting and prey species selection varies across populations and between species. Carnivory and hunting in bonobos has so far been reported from three field sites: Wamba [Ihobe, 1992; Kano, 1992], Lomako [Badrian & Malenky, 1984; Hohmann & Fruth, 1993], and Lui Kotale [Hohmann & Fruth, 2008]. Prey preference varies between bonobo populations and although duikers are present at various sites [Badrian & Badrian, 1984; Kano, 1992; Sabater Pi et al., 1993], only bonobos at Lomako and Lui Kotale have been seen to hunt them. Flying squirrels, also ubiquitous, seem to be preyed upon only at Wamba [Ihobe, 1992] and Lui Kotale (own observation). For arboreal

monkeys, present at all sites, the only record of their capture by bonobos comes from Lilungu where two monkey species—Angola pied colobus (*Colobus angolensis*) and red-tailed monkey (*Cercopithecus ascanius*)—were used as playthings instead of food [Sabater Pi et al., 1993].

Hunting and consumption of mammalian prey has been reported from all long-term chimpanzee study sites. Prey species include primates, ungulates, rodents, and birds [Hosaka et al., 2001; Mitani & Watts, 2001; Stanford, 1998b; Uehara & Ihobe, 1998], but monkeys account for the majority of meat in the chimpanzee diet [Boesch, 1994; Stanford, 1998b]. The lack of corresponding observations from bonobos has been linked to reduced levels of violence, or a lack of male coalitionary skills in hunting [Wrangham, 1999].

*Correspondence to: Gottfried Hohmann, Max Planck Institute for Evolutionary Anthropology, Department of Primatology, Deutscher Platz 6, 04103 Leipzig, Germany.
E-mail: hohmann@eva.mpg.de

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In the following report, we present evidence suggesting that bonobos at Lui Kotale consume the meat of diurnal, arboreal monkeys.

METHODS

Lui Kotale (2°45.610'S, 20°22.723'E) is a 65 km² study site in the southern sector of Salonga National Park, Democratic Republic of the Congo [Hohmann & Fruth, 2003]. The most abundant monkey species in the study site are redtail monkey (*C. ascanius*), Wolf's monkey (*C. wolfi*), Tshuapa red colobus (*Ptilocolobus tholloni*), and black mangabey (*Lophocebus aterrimus*). Black mangabeys are encountered on a daily basis, normally in groups between 5 and 22 individuals. Adult males, however, are sometimes seen to travel alone or together with other primate species.

Fieldwork at Lui Kotale started in February 2002. Ever since collection of fresh feces from bonobos has been part of the routine data collection. During the early phase of field work, when the frequency of encounters was low and habituation of bonobos to the presence of human observers was poor, the material was used to provide information on diet composition and food processing. A minimum of ten fresh fecal samples per month was used to explore variation in diet. Although habituation now allows for direct observation of individually identifiable focal subjects and bonobo parties by observers and local assistants from the time the bonobos are found until they construct night nests, the fecal sampling protocol is maintained in order to detect consumption of rare plant species, fauna, and other material. Screening of a larger set of fecal samples has already produced evidence of the consumption of a range of vertebrate species [Hohmann & Fruth, 2008].

Analyses of the contents of feces are conducted in the camp. First, intact samples are carefully disintegrated to detect larger parts of undigested matter. Later samples are washed through a wire mesh sieve to separate small items from the matrix.

The methods used to collect observational data in the field are in compliance with animal care regulations and with the requirements and guidelines of the Institut Congolaise pour la Conservation de la Nature (ICCN), and adhered to the legal requirements of the host country, the Democratic Republic of Congo.

RESULTS

One digit from a medium sized primate was found embedded in a fresh dropping of a bonobo belonging to an unhabituated neighboring community. The sample consisted of the intact nail, the distal, intermediate, and proximal phalanges, and attached tissue with hair (Fig. 1). At the same spot,

we found a large part of the pelt of a black mangabey (*L. aterrimus*). Both remains were in close proximity and were found under freshly deserted night nests within the range of the habituated community (15.5.07, S 02.78832, E 20.35363). The close proximity of the two samples suggests that both came from the same monkey. Measurements of the digit were taken and compared with the corresponding attributes of an adult female black mangabey found dead from natural causes within the study site. Measurements of the bones were as follows: tip to second joint: 1.9 cm; second joint to third joint: 0.9 cm (Fig. 1). The pelt, which was in one piece, included parts of the whitish facial hair as well as the beginning of the tail (Fig. 2) and enabled us to identify the species as well as to estimate a



Fig. 1. Lateral view of the monkey digit found embedded in a fresh bonobo fecal sample.



Fig. 2. Pelt of a black mangabey found in close proximity to the fecal sample containing the monkey digit.

head-body length excluding tail (HB) of 35 cm. Kingdon [1997] reports the HB of adult black mangabeys to range between 45 and 65 cm. Measurements of the carcass of the adult female mangabey were as follows: HB was 50 cm and the first metacarpal: tip to second joint: 2.5 cm; second joint to third joint: 2.0 cm. This suggests that the consumed monkey was not an adult.

DISCUSSION

The Lui Kotale field site provides the evidence of monkey consumption by bonobos. The species eaten was a black mangabey. The ability to catch monkeys has already been documented by Sabater Pi et al. [1993]. However, before this, the consumption of monkeys by bonobos has neither been observed nor confirmed indirectly through fecal analyses. In the absence of observations, it is not clear if the prey was obtained by active hunting or if bonobos had scavenged a dead monkey. Independent of the mode of prey acquisition, this suggests that bonobos *do* perceive monkeys as prey species. The mangabey pelt was found in close proximity to the fecal dropping containing the remains of a monkey's digit which belonged to an immature individual. Immature mangabey's are unlikely to have been encountered alone. It has been argued that the hunting of group living primates by apes in tall primary rain forest requires cooperation [Boesch & Boesch-Achermann, 2000]. Findings of noncooperative hunting in a structurally similar environment at Ngogo has been argued to be an effect of the unusually high number of adult males in this community [Mitani & Watts, 1999]. By inference, bonobos might be able to catch arboreal prey successfully without cooperation among hunters. Evidence suggests that coalitionary skills do exist in bonobos [Hare et al., 2007] and have not been lost due to female bonding [Wrangham & Peterson, 1996]. Information from chimpanzees at Ngogo [Mitani & Watts, 1999], Budongo [Reynolds, 2005], and other sites demonstrate that male coalitionary skills are not a prerequisite for monkey-hunting in apes. Moreover, the hunting of monkeys by bonobos may not be a primarily male activity and might involve a different repertoire of coalitionary bonds. Possibly female-female or male-female cooperation may be involved. Pruettz and Bertolani [2007] suggest that female chimpanzees at Fongoli in Senegal hunt prosimian prey more frequently than adult males, although cooperation is not involved.

The case reported here could have resulted through meat-stealing from other predators (e.g. crowned eagle (*Stephanoaetus coronatus*), golden cat (*Felis aurata*), or leopard (*Panthera pardus*)), as practised by the local human population, or from the perpetrator of an infanticide, as reported for chimpanzees [Reynolds, 2005]. However, evidence suggests that primates avoid scavenging even if the

carrion is fresh [Ragir et al., 2000] and such an incidence would add a new record to the short list of reports on scavenging by nonhuman primates [Stanford, 1998b].

The perceived absence of monkey-hunting and consumption by bonobos, in contrast to chimpanzees, has given rise to various speculations concerning its origin. It has been argued that cognitive architecture, uniting predation and "social demonism," evolved in a common ancestor of *Pan* and humans but was lost again with the split between chimpanzees and bonobos [Wrangham & Peterson, 1996]. The absence of hunting of highly mobile prey such as other primates has been associated with the lack of social violence in bonobos compared with chimpanzees [Wrangham, 1999]. It even has been speculated that bonobos are more "sympathetic to a victim" [Wrangham & Peterson, 1996]. However, this view is not unchallenged. In an elaborate revision of field data from both *Pan* species, Stanford [1998a] proposed that some differences in the diet and behavior between chimpanzees and bonobos may be an artifact of the small number of bonobo study populations so far under long-term study. The current finding supports the notion that part of the dichotomy in the behavioral ecology of chimpanzees and bonobos is based on the absence of detailed data from bonobos.

At Lui Kotale, the forest structure is heterogeneous, forest productivity is relatively low, and climatic changes seem to be more pronounced than at other sites [Hohmann et al., 2006]. Bonobos forage in open swamp forests and savannah patches to feed on resources such as herbs that are available year round. The use of open habitats may indicate the need for supplementary food sources. Given the ecological conditions at Lui Kotale, data from bonobos at this site have the potential to fill gaps in our understanding of the behavioral ecology of bonobos and by doing so, refine existing models of hominoid and hominin evolution.

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