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Instructions for Authors:

Pan Africa News publishes articles, notes, reviews, forums, news, essays, book reviews, letters to editor, and classified ads (restricted to non-profit organizations) on any aspect of conservation and research regarding chimpanzees (*Pan troglodytes*) and bilias (*Pan paniscus*). Contributors are requested to write in English and the papers except forums, reviews and essays should usually be 1,500 words or less. Articles and notes will be peer-reviewed by at least one appropriate expert on request of the *PAN* editorial staff.

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Contents

<NEWS>

Celebrating 50 Years of Chimpanzee Research at Gombe National Park, Tanzania

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2010 marks the 50th year of Jane Goodall's study of wild chimpanzees at Gombe National Park, Tanzania. As the first long-term study site for wild chimpanzees, Gombe provided many key insights into the behavior and ecology of chimpanzees, and continues to play a major role in primate studies today. To celebrate the scientific achievements of the Gombe study, and to discuss how Gombe and other long-term studies have helped promote conservation, researchers held two symposia on September 13th, 2010, the first day of the XXIIIrd Congress of the International Primatological Society in Kyoto, Japan.

The first symposium, titled "Reason for Hope: The Quest for Coexistence Among African Hominoids," was organized by Tetsuro Matsuzawa and Juichi Yamagiwa. Alluding to Jane Goodall's book, *Reason for Hope*, this symposium broadly addressed the relationship between long-term research and conservation efforts, and also provided valuable historical perspectives. Tetsuro Matsuzawa began the symposium with a talk on efforts to care for and conserve chimpanzees, describing the accomplishments of SAGA (Support for African/Asian Great Apes), including efforts to synthesize field and laboratory studies of chimpanzees, and conservation efforts including the "Green Corridor" reforestation program at Bossou, Guinea[1]. Next, Juichi Yamagiwa spoke on the unique scope and methodology of Japanese primatology, whose development has been influenced by the long coexistence of people and nonhuman primates in Japan[2]. Yamagiwa noted that Kinji Imanishi, who began studying Japanese macaques in 1948, also pioneered efforts to study African apes, starting in 1958, surveying mountain gorilla habitat together with Junichiro Itani. Despite the various differences between Eastern and Western primatological perspectives, it is interesting to note that at Gombe, Goodall employed some methods that had been used in Japan by Imanishi and his students, including a focus on named individuals and the use of provisioning to speed habituation. In the next talk, Gen'ichi Idani gave an overview of studies of two populations that, compared to chimpanzees in forested areas such as Gombe and Mahale, remain less well understood: bonobos and woodland chimpanzees[3]. Richard Wrangham then spoke on how long-term research has proven to be critically important, both in the protection of specific populations, and in gaining the information, developing the tools, and building the local and international constituencies needed to promote conservation[4]. Wrangham argued that simply maintaining a long-term research site provides important benefits, as keeping staff on the ground helps monitor and deter threats such as poaching and illegal logging, and employing local people helps create a local constituency for protecting the site. Moreover, many field scientists have now taken an active role in promoting conservation outreach, ecotourism, and actively use the research findings and images from their studies to help create international constituencies for conservation.

Jane Goodall, who has for many years worked to create such international constituencies for Gombe, for all chimpanzees, and for wildlife in general, gave the concluding talk of the first symposium, describing her own reasons for hope[5]. When Goodall first arrived at Gombe on 14 July 1960, her mentor, Louis Leakey, had secured funding for a four-month study, which would be nearly twice as long as any previous effort to study chimpanzees in the wild. Goodall quickly realized, however, that even four months would not be sufficient to fully understand the complex lives of chimpanzees. Goodall described how as she worked to make Gombe a long-term study, the small operation begun with a single researcher living in a tent developed into Gombe Stream Research Centre, with a staff of researchers studying three chimpanzee communities plus several baboon troops. After years of struggling to keep the study going, Goodall founded the Jane Goodall Institute (JGI), which not only supports Gombe research but also has become a conservation and education organization operating on a global scale. Goodall described how after five decades of study, with our understanding of chimpanzees enriched by long-term studies such as Mahale, Bossou, Taï, Kibale, and Budongo, as well as a growing number of other sites across Africa, we continue to learn new and surprising things about our chimpanzee cousins. During this time, a rapidly expanding human population has increasingly threatened the continued existence, not just of chimpanzees, but also of many thousands of other species and their habitats around the world. When Goodall began her study, forest and woodland covered most of the steep slopes on the village land surrounding Gombe. During the following five decades, people living in rapidly growing villages cleared much of the former tree cover for farmland, resulting in Gombe becoming increasingly isolated from other chimpanzee populations—and also in the erosion of soil on steep slopes and the degradation of other resources that people need, including clean water and firewood. Gombe thus emphatically demonstrates the challenges facing conservation, as well as the importance of conservation for human welfare. Goodall reported reasons that, despite these many challenges, she remains hopeful. The former Game Reserve, now Gombe National Park, benefits from efforts by JGI to promote reforestation in the Greater Gombe Ecosystem. On a global scale, Goodall described the eagerness to help the environment that she regularly encounters when talking to young people.

The second symposium, "Fifty years of primate research at Gombe National Park, Tanzania," organized by Anne Pusey and myself, highlighted recent scientific findings. I began the symposium with a talk on the causes of intergroup aggression[6], presenting results from 35 years of data on how ecological factors, especially the abundance of key species of ripe fruit, affect the probability of intergroup interactions. Lilian Pintea followed with a talk examining how grouping patterns in border areas change as power relations among chimpanzee communities change[7]. This study used both behavioral data and remote sensing data, to test whether habitat quality affected party composition. Ian Gilby presented findings from a study of whether dominance style affects reproductive success of alpha males[8], a study which followed in the tradition of Goodall's emphasis of the importance of each individual. This study also made use of new data on paternities obtained by the next speaker, Emily Wroblewski, who has conducted extensive lab work on genetics in addition to behavioral observations in the field. Wroblewski gave a talk on how fathers interact with their offspring[9]. Because Anne Pusey was unable to attend the conference, Ian Gilby presented Pusey's talk on factors affecting sexual cycles in chimpanzees[10]. Two talks from Gombe researchers based at Lincoln Park Zoo, Chicago, examined different aspects of chimpanzee health and wellbeing. Carson Murray presented results from her study of maternal behavior and stress, as measured from fecal hormones[11], and Elizabeth Lonsdorf provided an overview of the impact of disease on the population[12]. In addition to chimpanzees, Gombe is also the site of one of the longest running studies of baboons, which were represented in this symposium by Akiko Matsumata-Oda's talk on oestrus asynchrony in baboons[13]. Finally, drawing connections between this symposium and the previous one, Shadrack Kamenya presented a talk on conservation in the Greater Gombe Ecosystem[14].

Soiree at Yoshida-Izumidono

Together, these talks showcased the value of long-term behavioral and ecological data. Because chimpanzees live long lives, reproduce slowly, and live in complex environments that change greatly from year to year depending on fluctuations in rainfall and the fruiting patterns of key food species, long-term data are essential for understanding chimpanzee behavior and ecology. Such large datasets, however, present an imposing obstacle for analysis, unless the data are computerized. Most of the findings reported in the symposium relied on the relational database that Anne Pusey and colleagues have developed from the long-term records. Additionally, many of the talks combined analyses of these long-term data with information available from new technologies on a range of scales, from the molecular (genetics, endocrinology, virology) and microscopic (parasitology) to landscapes (GIS and remote sensing). The findings presented in this symposium demonstrated how long-term datasets, focused on the behavior of individuals, yet also probing for data on scales large and small, provide powerful tools for answering key scientific questions.

Following the two symposia, Tetsuro Matsuzawa hosted a soiree for Jane Goodall, current and former Gombe researchers, and other friends of Gombe at Yoshida-Izumidono.

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The following are all talks given at the XXIII Congress of the International Primatological Society, Kyoto, Japan, 12–18 September, 2010. Abstracts of these talks are available at http://wwwsoc.nii.ac.jp/psj2/ips/:

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2. Yamagiwa J 2010. Japanese primatology: Its unique scope and methodology.
3. Idani G 2010. From the bonobos' forest to the chimpanzees' woodland.
4. Wrangham RW, Ross E, Lloyd J, Pokempner AA 2010. Impacts of long-term research on conservation.
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6. Wilson ML, Mjungu DC, Pusey AE 2010. Causes of intergroup aggression among chimpanzees at Gombe.
7. Pintea L, Wilson ML, Gilby IC, Pusey AE 2010. Power relations among neighboring communities affect party size and composition in Gombe chimpanzees: A remote sensing and GIS analysis.
8. Gilby IC 2010. Alpha male chimpanzees at Gombe: Consequences of dominance style.
9. Wroblewski EE, Johnson L, Murray CM, Henderson J, Stanley A, Pusey AE 2010. Father-offspring relations among the Gombe chimpanzees (*Pan troglodytes schweinfurthii*).
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13. Matsumoto-Oda A, Ihara Y, Oda R, Collins DA 2010. Female baboons adopt a mate strategy of oestrus asynchrony in Gombe.
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<NOTE>

Poke-type Social Scratching Persists at Mahale

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INTRODUCTION

Social scratch is a grooming pattern observed consistently in Mahale, whereby one individual scratches the body of another individual[1]. A different type of social scratch is customarily observed at Ngogo[2]. Mahale chimpanzees employ stroke-type scratching, whereas Ngogo chimpanzees employ poke-type scratching[2] (Figure 1). Although Shimada[3] reported that three Gombe chimpanzees performed social scratch, there are no reports of this behavior from other study sites.

Although the dominant type of social scratching at

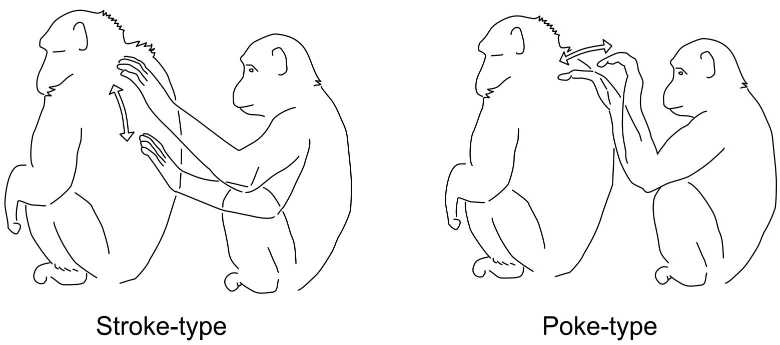

Figure 1. Two types of social scratch: stroke-type and poke-type.

Mahale is the stroke-type, one adult female *Ako* showed the poke-type scratch[2,4]: According to Nishida *et al.*[4], *Ako* was first seen to show this pattern in 1999, used both types equally (8 pokes vs 7 strokes) between 2002 and 2003, and ceased to show the poke-type in 2004. Nishida *et al.*[4] also stated that there was no evidence of social transmission in the different types of social scratch, because *Ako*'s daughter *Acadia* never showed the poke-type.

However, I observed several cases of poke-type social scratching by *Ako* and *Acadia* after 2004, as reported here.

OBSERVATIONS

Between November 2005 and July 2010, I made 9 short visits to Mahale (each visit consists of about one to two months), during which I saw 22 cases of social scratch by *Ako* (Figure 2). Twelve of them were the poke-type and 10 were the stroke-type (Table 1). Although the data-set is small, it seems *Ako* has not changed her social scratching types over the years. On September 24, 2008, she showed 4 cases of poke-type and 4 cases of stroke-type intermittently within 10 min, directed to the same adult female *Abi*. Thus, *Ako* mixed both types even in the same grooming session.

I saw her show the poke-type during my last visit, in 2010.

In the same study period from 2005, I observed 9 cases of social scratch by *Ako*'s daughter *Acadia*. *Acadia* was the first offspring born to *Ako* in 1998; thus, she was in transition from juvenility to adolescence during my study period. She showed the poke-type twice and the stroke-type 7 times (Table 1). Although *Acadia*'s poke-type was first seen only in 2006 (in the same day), it is difficult to say whether or not she changed her type because she showed the stroke-type before and after 2006. *Acadia* was last seen by observers in September 2009, and because she had started to show adolescent estrous swelling and was in good health, it was assumed that she emigrated to another group.

Ako also has a son, *Agano*, born in 2004, but he was not seen to perform social scratching during the study period.

Table 1. Two types of social scratch by *Ako* and *Acadia* at Mahale.

Year	*Ako*		*Acadia*		Source
	poke	stroke	poke	stroke	
2002–2003	8	7	–	–	Ref 4
2004	0	10	–	–	Ref 4
2005	1	0	0	2	This study
2006	1	0	2	1	This study
2007	0	0	0	0	This study
2008	8	9	0	4	This study
2009	1	1	–	–	This study
2010	1	0	–	–	This study
Subtotal of 2005–2010	12	10	2	7	

Opportunities for observing *Ako* and *Acadia* differ year-by-year (e.g., they were seldom seen in 2007 during my visit), so it makes no sense to compare the frequencies across years. *Acadia* emigrated to a different group by the 2009 study period.

Figure 2. *Ako* (left) just after performing the poke-type scratch. *Ako*'s son, *Agano*, sits in front.

DISCUSSION

Contrary to the report by Nishida *et al.*[4], *Ako* did not cease the poke-type social scratch in 2004 but instead she continues to use both types equally. It is puzzling why she did not show any poke-type scratching in 2004, but it might be an observational bias, as she has kept showing this pattern every year, except for 2007. So, the poke-type scratch still survived in Mahale's M group.

It is notable that *Ako*'s daughter *Acadia* showed, although only twice, the same poke-type scratch. As so few individuals showed the poke-type scratch at Mahale[4], I suspect that *Acadia* somehow copied this pattern from her mother, the most frequent performer of the pattern, rather than surmise that *Acadia* invented this pattern by herself. Unfortunately, we cannot do a follow-up study of whether or not *Acadia* continues to use the poke-type, as she has emigrated.

As of 2010, I have not observed *Agano*, *Ako*'s son, performing social scratching. This is partly due to his young age and partly due to short observation periods, so he is not yet observed to groom others often. He should start soon to groom others, and perhaps he will show more social scratching when he enters adolescence. It will be interesting to see whether or not he will employ the poke-type in the near future, as he had many chances to watch his mother doing the pattern and he also sometimes received the poke-type scratch from *Ako*.

ACKNOWLEDGMENTS

I thank COSTECH, TAWIRI, TANAPA for permission to conduct research at Mahale, Dr. W. C. McGrew for his comments on the manuscript, and Japanese MEXT for financial support (#21770262 to MN, #19107007 to J. Yamagiwa and #19255008 to T. Nishida).

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<NOTE>

Two Observations of Galago Predation by the Kasakela Chimpanzees of Gombe Stream National Park, Tanzania.

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INTRODUCTION

Chimpanzees (*Pan troglodytes*) are known to prey on a variety of vertebrate prey across Africa[1]. By a wide margin, the most common prey for the Kasakela chimpanzees of Gombe Stream National Park, Tanzania are red colobus monkeys (*Colobus badius*), followed by bushpig piglets (*Potamochoerus larvatus**), bushbuck fawns (*Tragelaphus scriptus*) and young baboons (*Papio anubis*). Members of this community have occasionally been observed to capture and consume blue monkeys (*Cercopithecus mitis*) and red-tailed monkeys (*Cercopithecus ascanius*) as well as smaller mammals and birds[2].

In five decades of observation there have been no published reports of Gombe chimpanzees consuming galagos, though at least three species (*Otolemur crassicaudatus monteiri*, *Galago matschiei*, and *Galago senegalensis*[3]) are believed to be endemic to the park (Collins personal communication). Predation on galagos by chimpanzees has been observed (rarely) in the chimpanzees of the Mahale Mountains in Tanzania[4,5]. Galago remains were identified from chimpanzees fecal samples at Mt. Assirik, Senegal[6] and galago predation is regularly observed by chimpanzees at Fongoli[7], also in Senegal. Chimpanzees in the latter population usually (though not always) use long sticks to assist in capturing galagos from their nests in hollow trees or other cavities. Blue monkeys (*Cercopithecus mitis*) have been observed to prey on galagos in the Kibale Forest of Uganda[8], though chimpanzees there have not been reported to do so.

In this report I document two recent observations of predation on galagos by chimpanzees of Gombe Stream National Park, Tanzania.

OBSERVATION #1:

February 21, 2008, 13:15.

While following a mixed party of chimpanzees, I observed a 15-year old male (Zeus) visually investigating an upright dead tree trunk. After a few seconds he began systematically breaking off bark and wood around the tree bole with both hands, occasionally reaching down into the hollow log. After approximately 2 min of this activity, he successfully retrieved an adult galago (not conclusively identified, but probably *Galago senegalensis* based on body size) from the trunk. Zeus immediately killed it with a bite to the face, then quickly and quietly moved to a nearby tree and began consuming it.

Zeus' activities were closely observed by several juveniles in the party (including his 9-year old sister, Zella), some of whom investigated the hole after he had moved away. One juvenile (ID unknown) retrieved what seemed to be a large piece of loose fur or bedding material from the hole after Zeus had moved away, but discarded it after smelling it. None of the adults present showed any interest in Zeus' activities.

The majority of the group were resting and grooming while Zeus captured the galago. Zeus consumed the entire carcass without interference or apparent interest by other adults in the party over the next 90 min. The juveniles in the party watched Zeus closely but none approached closer than 3 m or attempted to beg for meat.

OBSERVATION #2

October 21, 2009, 15:25.

While following a large mixed party from a feeding session in a mango stand, Zella (now 10 years old) appeared with the freshly-killed body of a galago (*Galago senegalensis*). The actual predation event was not observed, though several pairs of human observers were present. Zella carried the galago in her mouth, occasionally stopping and tearing at the skin with her teeth (Figure 1). The flesh had already been stripped from the galago's tail and its gastrointestinal tract was hanging free. I observed her successfully bite off the left hind leg and begin to consume it. She was briefly approached by Fundi (9-year old male) who watched from <1 m away but did not attempt to beg for meat or steal the carcass, and who soon moved off.

Less than 3 minutes after appearing with the galago, Zella abandoned the carcass on a trail (Figure 2), directly in the path of two approaching adults and continued on with the group. Both Frodo (33-year old adult male) and Gremlin (39-year old adult female) stepped directly over the carcass with no hesitation or interest whatsoever. Following behind his mother Gremlin, Gimli (5-year old male) immediately seized the carcass and flung it over his shoulder as he continued after her. The group traveled

Figure 1: A 10-year old female (Zella) chews off the hindlimb of a captured galago.

for several minutes before resting along a stream. Several other immature chimpanzees, including Zella, approached to observe Gimli with the carcass. None attempted to take it from him, nor did any adults in the group show any interest in the galago. Gimli interacted with the galago's body for at least an hour. This included tossing it in the air, flailing it about with one hand, chewing on it, and grooming it. He made no real progress in removing skin from the carcass and did not seem to be able to extract very much flesh. By 17:30 Gimli no longer carried the carcass, nor were any other group members seen carrying it.

DISCUSSION

These are the first published observations of predation on galagos by the chimpanzees of Gombe Stream National Park, though observation of the Kasakela community has been underway for five decades. Predation on galagos appears to be a rare behavior in this community, with only two events observed over ~10 months of observation (1608.5 contact hours). In contrast, red colobus hunts were observed up to several times a week during this same period (O'Malley unpublished data).

No tool use was seen during either observation. Pruetz and Bertolani[7] reported that enlargement of the cavity opening in a manner similar to Zeus' technique in Observation #1 was a component of tool-assisted predation on galagos by Fongoli chimpanzees. I made no on-site estimate of the initial depth or width of the cavity during Observation #1, though a *post-hoc* estimate of at least 120 cm deep and 10 cm wide is likely given that Zeus was initially able to insert his entire arm into the cavity but was unable to retrieve the galago. At Gombe, predation on galagos does not require the use of tools.

The lack of interest in Zeus' hunting behavior in Observation #1 could simply mean that the other adults did not notice his activity. However, the complete lack of interest in a freshly killed galago in Observation #2 by the adult chimpanzees (including the community's most avid and proficient hunter, Frodo) suggests that galagos are not considered high-value prey by mature Kasakela chimpanzees. I have seen a similar lack of adult interest in 'unusual' prey when immature chimpanzees at Gombe have captured other small animals such as birds or frogs (O'Malley personal observation). At Mahale, Nishida[4] reported a similar lack of interest by other party members to a galago apparently killed and then partially eaten by an adolescent male. Though Gombe chimpanzees will take freshly killed prey from baboons[9], in general chimpanzees scavenge very rarely[10]. A dead animal of unknown provenance may simply not appeal to chimpanzees even if freshly killed.

Zeus showed no apparent hesitation in acquiring, dispatching, and consuming the galago in Observation #1. Based on his confidence and proficiency, I think it is unlikely that this was the first time he had ever captured one. The actual predation event in Observation #2 was not observed. In contrast to Zeus, both Zella and Gimli appeared keenly interested in the galago but somewhat hesitant and uncertain in what to do with it. Zella's abandonment of the carcass after only consuming part of the tail and one limb might mean that galago flesh is less palatable than that of red colobus, or at least that it has an unappealing smell and/or taste. Consistent with this hypothesis, Pruetz (personal communication) has observed a male Fongoli chimpanzee that had successfully captured and begun consuming a galago discard it after sniffing the galago's genital region. The carcass was then claimed and consumed by a juvenile.

It is notable that the known and suspected galago predators (Zeus and Zella, respectively) are brother and sister. Zella was present during Zeus' successful capture in 2008. Interestingly, their mother Trezia (an immigrant from the Mitumba community to the north) appears to have introduced tool-assisted predation on *Camponotus* ants to Kasakela in the 1990's[11]. This insectivorous behavior had been completely absent during the early decades of research on the Kasakela community[2] but is now seen in a majority of the current community. At Gombe, predation

Figure 2: The galago after being partially consumed and then abandoned by Zella. It was claimed by Gimli (a 5-year old male) a few seconds after this photo was taken.

on galagos has (thus far) been observed only in a single immigrant matriline of the Kasakela community.

Red colobus, the prey of choice for many chimpanzee populations in East Africa, are not present at either Assirik or Fongoli where predation on galagos appears to be more common than elsewhere. McGrew[6] hypothesized that chimpanzees at Mt. Assirik may face steep competition from other predators for most potential vertebrate prey (both primate and otherwise) within their range and so seek out arboreal, nocturnal prosimians as an alternative. The absence of red colobus at Fongoli may explain why galagos and other unusual prey such as mongoose[12], vervet monkeys[13] and patas monkeys[14] are consumed by chimpanzees there. The small size and nocturnal activity cycle of galagos may explain why they are consumed only rarely by chimpanzees of Kasakela and in the Mahale Mountains, given the availability of large, non-cryptic, diurnal prey such as red colobus.

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* EDITORIAL NOTE:
PAN editors adopted the new trend in classification of the genus *Potamochoerus*, where there are two wild pig species: *P. porcus* (red river hog) and *P. larvatus* (bushpig), though the majority of researchers studying Eastern chimpanzees have followed a classic way of classifying bushpigs as *P. porcus*. Bushpigs (*P. larvatus*) are distributed mainly in East Africa, while red river hogs are distributed through the West and Central African rainforest belt (Wilson & Reeder 2005).

Wilson DE, Reeder DM (eds) 2005. *Mammal Species of the World: A Taxonomic and Geographic Reference (3rd ed).* Johns Hopkins University Press, Baltimore.

<NOTE>

Chimpanzees at Semliki Ignore Oil Palms

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INTRODUCTION
Chimpanzee (*Pan troglodytes*) predation on oil palms (*Elaeis guineensis*) varies from essential to non-existent[1,2]. At Gombe, in Tanzania, chimpanzees eat the pericarp of the fruit but discard the seed ('nut') containing the kernel; this foodstuff is the most frequently eaten item in their diet. At Mahale, also on the eastern shore of Lake Tanganyika, in Tanzania, the chimpanzees ignore all parts of the oil palm. However at Bossou, in Guinea, the apes consume the pericarp and pith, and use stone as hammer and anvil to crack open the dried fruit-shell, in order to consume the kernel. Bossou chimpanzees also show 'pestle-pounding', in which the detached petiole of a palm leaf is used to pulverize the apical meristem of an oil palm, before consumption.

The aim of this study was to see where on the spectrum of exploitation is the Semliki semi-habituated population of East African chimpanzees, as compared with Central[3] and West African populations[4–7]. By regular monitoring and field experiment, we sought to test three hypotheses: 1) Oil palms are absent or unproductive at Semliki; 2) Raw materials for nut-cracking are absent or unsuitable at Semliki; 3) Oil palms and raw materials are present and suitable, but the chimpanzees lack the cultural knowledge to make use of them.

METHODS

We studied the chimpanzees of Toro-Semliki Wildlife Reserve, Uganda[8], recording both ecological and ethological data. We searched opportunistically and non-randomly for oil palms within the home range of the chimpanzees; searching was biased toward the vicinity of major trails used by both apes and researchers. Oil palms were not randomly dispersed, but instead occurred in groves (patches) of unknown origin; in this study we found such four groves. When we found an oil palm, it was described in terms of girth, height and morphology. Its location was noted by GPS and it was marked with plastic tape bearing basic information for identification. We cleared undergrowth and raked clean debris from an area of 5 m radius from the trunk, sufficient to be able to record fallen fruit and signs of predators visiting the tree, e.g. foot or knuckle prints.

Whenever we passed by, on an occasional, non-systematic basis, we monitored each palm's status, no more than once daily. We noted its phenological status, e.g. fruiting, and any signs of predation, e.g. chewed fruits, stripped fronds, etc. Once data were taken, the area around the tree was swept clear again.

At each of the four groves, we assessed availability of potential hammers and anvils by running four10-m × 1-m strip-transects from a central point in the grove in each of the cardinal directions (N, E, S, W). We recorded portable stones or wooden branches/sticks ('clubs') on the surface as potential hammers, and embedded stones, exposed tree roots, or fallen logs as potential anvils. For each stone, we recorded weight (to nearest 10 g), and length, width, and height (to nearest 1 cm). Stones weighing less than 200 g were ignored, as were small, unsuitable sticks or logs. We noted type of stone, when known, and stones were crudely classified as one of three shapes: sphere, pyramid, rectangular solid.

After a month of monitoring the palms, we devised an intervention in which we placed stones suitable to act as hammer and anvil at the base of the largest palm in each grove. Stones were chosen to match features reported from sites where chimpanzees crack nuts, such as Bossou. Nearby, we placed both fresh and dry nuts, and thereafter checked to see if the tools had been moved or the nuts cracked. Later, we placed nuts directly on the 'anvil' stone with hammer close by; that is, we tried to 'scaffold' the situation to encourage processing of the nuts.

RESULTS

Over the course of a 165-day field season, from 28 May to 8 Nov. 2008, we found 16 oil palm trees along the trail system in the Mugiri River valley. These ranged from a solitary tree to a grove of seven trees, making four groves in all (with the other three groves numbering three and four trees). To monitor the palms' status, we checked on them periodically, so that on average, each tree was visited 42 times (range: 12–69 visits), thus on average each tree was visited every 4 days (range: 2–14 days).

All palms had dried and de-husked nuts underneath their canopies. We did not try to count the total number of nuts, but most of them were empty shells, having been preyed upon by beetles (probably Bruchidae). When we collected and cracked intact nuts, they proved to be edible and indistinguishable from nuts tasted elsewhere.

Four of the palms bore fresh fruit during the study, in two of the four groves. They were the only palms of more than 10 m height (median: 13.5, range: 10–14 m) and girths of more than 100 cm (median: 117, range: 111–142). Their bright orange and yellow colouring made the fresh nuts conspicuous, and we counted each batch found on the ground, at each visit. One grove of four palms yielded fresh nuts in a season that lasted at least from 23 June to 16 July (on 15 visits); another grove of seven palms yielded nuts from 9 July to 18 Sept. (on nine visits). In the former case, the mean number of fresh nuts per visit was 17 (range: 1–61 fruits); the latter case the mean was 4 (range: 1–6 fruits). Found nuts were in one of three states: intact, chewed, or cracked/split open. So, who were the consumers? Several times we encountered monkeys and palm nut vultures (*Gypohierax angoloensis*) in the palm canopy. We found no indirect signs of chimpanzees, but did find footprints of suids, probably bushpig (*Potamochoerus larvatus*).

None of the palms suffered feeding damage to any other part of the tree, including the fronds (leaves). This contrasts markedly with another palm species, *Phoenix reclinata*, the pith of which the Semliki chimpanzees ate daily, leaving tell-tale zigzag-shaped wadges strewn on the ground.

Potential raw materials were scarce on transects, compared with Lópe, Gabon[3]. Only 16 potential hammers and 7 potential anvils were found in the total of 160 m^2

($4 \times 4 \times 10m^2$) of transected area, yielding an overall density of 0.1 hammers and 0.04 anvils per metre squared. Moreover, all 16 hammer stones were found in one 5-m stretch of eroding stream-bed. No other hammers or stones bigger than gravel, and no rocky outcrops were found anywhere else in the river valley, except in eroded gullies. The seven wooden anvils were either tree roots (5) or fallen logs (2). However, each grove had several hammer and anvil stones within 25–50 m of the palms, eroding out of gully sides and bottoms.

The 16 potential hammer stones found on transects averaged 317 g (range: 200–530) in weight, and had a mean length of 8 cm (range: 6–11), width of 6 cm (range: 4–7), and height of 4 cm (range: 3–6). A selection of eight stones found nearby in streambeds was bigger: mean weight: 822 g, length: 11 cm, width: 8.5 cm, height: 6 cm. Too few anvils were measured to yield findings on dimensions. Most stones in both sets were quartz, with which we easily cracked nuts. The most common shape of stone was rectangular solid.

DISCUSSION

We found no evidence that the chimpanzees of Semliki eat oil palms, in any form. So, why do they apparently ignore this valuable, potential food source? The presence of edible, productive and accessible oil palms, growing conveniently close to well-travelled chimpanzee trails provides strong evidence against hypothesis 1. Moreover, the Semliki chimpanzees *do* eat the fruits of *Phoenix reclinata* throughout their range, showing that they are not averse to Palmae fruits.

Although potential hammers and anvils were patchy in distribution, all groves had nearby sources of stones, at least, so that raw material scarcity cannot account for the absence of nut-cracking, at least by lithic elementary technology. Carriage of stones over distances of tens of metres, in order to crack oil palm nuts, is well known in West Africa[9] and would have sufficed at Semliki. Thus, hypothesis 2 cannot account for the absence of nut-cracking.

Absence of oil palm exploitation seems unlikely to be environmentally precluded, thus leaving by exclusion support for hypothesis 3, that absence reflects cultural ignorance on the part of the apes[2,10]. However, conclusions based on absence of evidence are always problematic, so more intensive and extensive study is needed.

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<NOTE>
A Case Report of Meat and Fruit Sharing in a Pair of Wild Bonobos

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INTRODUCTION

A number of observations of hunting and meat sharing in chimpanzees across different populations in Africa have been reported[1,2]. In contrast, hunting is generally rare in bonobos (bilias). In Wamba, the Democratic Republic of the Congo, bonobos have been studied since 1973; however, only five cases of successful hunting have been reported, all of which involved a scaly-tailed squirrel as prey[3,4,5]. Among these, two involved meat sharing. On the other hand, fruit sharing is fairly common among Wamba bonobos, and Kuroda argued that the sharing of highly preferred fruits among bonobos appears to resemble the meat sharing among chimpanzees[6].

Fruit and meat sharing have also been documented in bonobos in Lomako[7] (see refs. 8, 9, 10 for meat eating in other populations). When a case of sharing two species of fruit and a case of sharing a duiker were compared, the success rate of food transfer relative to the frequency of begging behavior was significantly lower in meat sharing.

This suggests that meat and fruit sharing have different characteristics in bonobos.

It is difficult, however, to draw conclusions about the similarities and differences between fruit and meat sharing in bonobos. Because hunting is rare in bonobos, it is difficult to obtain sufficient data for analysis, as we must take into account the differences in individual tendencies and social relationships of individuals involved. Yet, one possible way to obtain insight is to compare fruit and meat sharing that occurred between two individuals within a short time period.

Here we report two cases of food sharing within a pair of unrelated adult female bonobos in Wamba. One case involved sharing a highly preferred large fruit, and the other case involved sharing the meat of a scaly-tailed squirrel.

OBSERVATIONS

We made *ad libitum* observations of the bonobos of the E1 group in Wamba in the northern sector of the Luo Scientific Reserve. Whenever possible, their behaviors were videotaped. Data presented here are based on video recordings of two cases of food sharing between two unrelated adult females Yuki and Hoshi. In both cases, the possessor of the food was Yuki.

Case 1: sharing a junglesop fruit

The video recording started when Yuki was holding a junglesop fruit (*Anonidium mannii*) on July 23, 2010. This fruit is typically approximately 40 to 50 cm long and 4 to 6 kg in weight and can be classified as a rare and highly preferred food for bonobos[6]. The size of the agglomerate of the fruit Yuki was holding was estimated to be 25 × 20 × 15 cm and 1 to 2 kg at the beginning of our observation. Hoshi then approached to within a short distance of Yuki and stayed within reach for 2 min 19 s. Hoshi then moved away from Yuki, while Yuki was still holding and eating the agglomerate of the fruit, estimated at this time to be 10 × 10 × 5 cm.

While Hoshi stayed within reach of Yuki, Hoshi showed begging behaviors 14 times. All of these resulted in the transfer of a part of the junglesop from Yuki.

Fig. 1. Yuki (lower right) holding a scaly-tailed squirrel and Hoshi (upper left). Both of them had dependent offspring.

Among these episodes, detailed interaction during the fruit transfer was documented in 12 episodes, which could be divided into two categories. The first category involved three episodes in which Hoshi extended her hand to the agglomerate of the fruit Yuki was holding in her hand. In all three episodes, Yuki showed mild rejection by moving the fruit away from Hoshi. Despite this, Hoshi grasped the fruit and tore off a tiny portion (approximately 5 × 3 × 2 cm or less) of the fruit and then ate it. The second category involved nine episodes in which Hoshi extended her hand toward Yuki's mouth while Yuki was chewing the fruit. Yuki never showed overt rejection to this type of begging behavior; instead, she removed a seed with a small amount of flesh attached from her mouth. Hoshi received it in her hand, chewed it, and after a while, discarded the seed.

Case 2: sharing a scaly-tailed squirrel

The video recording started immediately after a local assistant noticed that Yuki had captured a scaly-tailed squirrel (*Anomalurus* sp.), which also appears to be a preferred food for bonobos[3], on August 23, 2010. The squirrel was estimated to be approximately 30 cm long from head to rump and about 1 kg in weight. Yuki spent 45 min eating it. During this period, Hoshi intermittently approached to within a short distance of Yuki (Figure 1). The following description is based on 39 min 4 s of video recordings in which their behaviors were clearly identified.

While Yuki was holding and eating the prey, Hoshi stayed within reach of Yuki for nine separate bouts, for a total of 17 min 48 s. During this period, Hoshi showed begging behaviors 20 times. Of these, four resulted in the transfer of a part of the prey from Yuki. With the exception of one bony portion, the transferred part could not be identified. The 20 episodes were divided into four categories based on the begging behavior of Hoshi. The first category involved six episodes in which Hoshi extended her hand to the squirrel in Yuki's hand. None of these episodes resulted in transfer of meat. Of these episodes, Yuki showed mild rejection by moving the prey away from Hoshi in three episodes so that Hoshi could not touch the prey. In another episode, Yuki herself moved away, and Hoshi could not touch the prey. In the remaining two episodes, Yuki did not show overt rejection, but Hoshi could not touch the prey and ceased begging. The second category involved eight episodes in which Hoshi extended her hand to Yuki's mouth as Yuki was chewing a part of prey. Yuki never showed overt rejection in these episodes. In one episode, Yuki removed a tiny portion of the prey (less than 3 × 1 × 1 cm) from her mouth, and Hoshi received it. In the remaining seven episodes of this category, Hoshi ceased begging without receiving anything. The third category involved four episodes in which Hoshi brought her own mouth within 10 cm of Yuki's mouth. In one of these episodes, Yuki removed a tiny portion of the prey (longest aspect less than 1 cm) from her mouth, and Hoshi received it. The remaining three episodes did not result in food transfer, although Yuki did not show overt rejection. The last category involved two episodes in which Hoshi grabbed Yuki's hand, which was holding a tiny portion, but not the main part, of the prey, and pulled it toward her. Yuki did not show overt rejection in either episode, and Hoshi took a tiny portion. In one episode, the portion could be identified as a bone approximately 3 cm long.

DISCUSSION

The success rate of food transfer relative to the frequency of begging behavior was 14/14 in *Case 1* and 4/20 in *Case 2*. Lower transfer rate of meat is consistent with the observations at Lomako[7]. However, some features were common to both meat and fruit sharing. First, the possessor showed rejecting behavior when being begged for the main part of the food. Second, it appeared that the transferred parts were less valuable for the possessor. Therefore, the possessor was reluctant to share the most valuable parts of the food, but tolerated the transfer of non-valuable parts.

Several hypotheses have been postulated to explain food sharing in nonhuman primates, including the sharing-under-pressure hypothesis and the reciprocal exchange hypothesis[11]. The former proposes that an individual shares to avoid conflict with the beggar. The latter proposes that a possessor shares food in exchange for a past or future benefit (e.g., receiving the same food or items of a different currency, such as grooming, alliances, or copulations). Neither of these appears to fully explain our observations. The former hypothesis cannot explain the differential rate of food transfer if we assume that the degree of pressure given by the same type of behavior by the same individual toward the same target individual remains more or less constant. The latter cannot explain why the possessor only tolerated the transfer of non-valuable parts because it would be more reasonable to assume that the possessor would share the valuable part if he/she expected a future return benefit.

In a study of mother–infant chimpanzee pairs in captivity, a sharing pattern similar to our observations was documented[12]. The mothers were reluctant to share edible parts of their food with their infants, but tolerated the transfer of non-edible parts. Therefore, bonobos and chimpanzees might have a similar psychological propensity underlying food sharing, although our anecdotal observations do not allow for a systematic conclusion. Such psychological propensity should be taken into account when we attempt to understand the functional aspect of food sharing.

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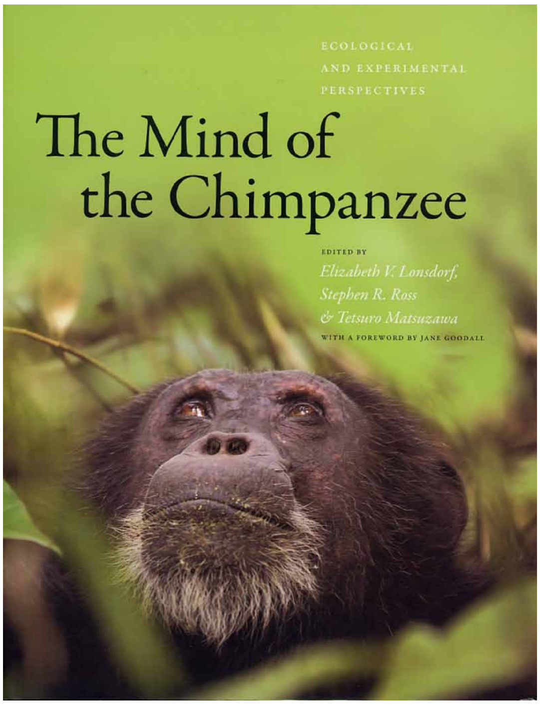
<BOOK INFO>

Edited by Elizabeth V. Lonsdorf, Stephen R. Ross, and Tetsuro Matsuzawa
With a Foreword by Jane Goodall

The Mind of the Chimpanzee: Ecological and Experimental Perspectives

Understanding the chimpanzee mind is akin to opening a window onto human consciousness. Many of our complex cognitive processes have origins that can be seen in the way that chimpanzees think, learn, and behave. The Mind of the Chimpanzee brings together scores of prominent scientists from around the world to share the most recent research into what goes on inside the mind of our closest living relative.

Intertwining a range of topics—including imitation, tool use, face recognition, culture, cooperation, and reconciliation—with critical commentaries on conservation and welfare, the collection aims to understand how chimpanzees learn, think, and feel, so that researchers can not only gain insight into the origins of human cognition, but also crystallize collective efforts to protect wild chimpanzee populations and ensure appropriate care in captive settings. With a breadth of material on cognition and culture from the lab and the field, *The Mind of the Chimpanzee* is a first-rate synthesis of contemporary studies of these fascinating mammals that will appeal to all those interested in animal minds and what we can learn from them.



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