Pan Africa News

The Newsletter of the Committee for the Care and Conservation of Chimpanzees, and the Mahale Wildlife Conservation Society

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Instructions to Authors:

Pan Africa News publishes articles, notes, reviews, forums, news, book reviews, letters to editor, and classified ads (restricted to non-profit organizations) on any aspect of conservation and research regarding chimpanzees and bilias. Contributors are requested to write in English and papers except forum and reviews should usually be 1,000 words or less. Manuscripts should be submitted by e-mail to:
PAN@jinrui.zool.kyoto-u.ac.jp

Photos and figures, however, should be sent by air mail to: T. Nishida, Dept. of Zoology, Graduate School of Science, Kyoto University, Kitashirakawa- Oiwakecho, Sakyo, Kyoto, Japan.

Publication of the next issue will be December 2003. Deadline for manuscripts is the end of November.

Contents

Gombe Health Guidelines Proposed.

Researchers as well as tourists and park staff might unwillingly transmit infectious diseases to wild chimpanzees. Everybody who approaches habituated chimpanzees closely should take every care not to hurt chimpanzees. Gombe researchers are proposing the following guidelines as the materials for further discussion. We welcome your comments (ed.):

<FORUM>

Health Guidelines for Visiting Researchers in Gombe National Park to Minimize Risk of Disease Transmission among Primates (Updated 8/01/03)

Anthony Collins
Jane Goodall Institute

A) Before coming to Gombe, researchers are requested to:

1. Obtain current immunization against:
   yellow fever (10 years protection)
   polio (lifetime protection)
   tetanus (booster every 5 years questionable time)
   hepatitis A (lifetime protection -questionable time)
   measles (lifetime protection)
   meningitis (3 years protection)
2. Ensure clear TB status (negative skin test) or vaccine for TB (10 years protection).
3. Researchers from temperate-zone countries are please to obtain (same year) immunization against influenza in winter (October through March in the Northern hemisphere, April through September in the Southern hemisphere).
4. Ensure clear internal parasite status.

B) Upon arrival at Gombe, researchers are requested to:

1. Provide proof of vaccinations.
2. Remain quarantined for 5-7 days before entering the forest and following chimpanzees and baboons.
3. Pass physical exam with GSRC staff nurse. People with illnesses are forbidden to enter the forest or follow chimps and baboons on the beach.
4. Attend a sensitization session upon arrival and sign the health and safety regulation guidelines.
5. Adhere to regular health checks during research visit.

C) Before entering forest, visiting researchers are advised to:

1. Use the latrine before entering the forest.
2. Wash hands before entering the forest and upon return.
3. Disinfect soles of field shoes in antiseptic bath of 2% chlorine solution.

D) During chimp follows, visiting researchers are advised to:

1. Ensure you are not sick: do not enter the forest and follow chimpanzees and baboons if sick.
2. Maintain the mandatory minimum following and observation distance of 7.5 meters (25 feet).
   If quarantine measures were not followed, maintain a distance of at least 10m (33 ft) and a maximum observation limit of one hour per habituated chimpanzee or group per day.
3. Be aware that the number of observers with any habituated chimp or chimp group should not exceed six people. If there is a conflict of interest when chimp parties join-up, let non-essential assistants be prepared to withdraw till the chimps separate again. Also, when a party of tourists arrive, be prepared to give them priority for their one hour.
4. Control sneezing and coughing while following and observing chimpanzees. No spitting or nose-blowing on the ground.
5. If you need a latrine and one is not nearby, dig a foot deep hole for burying feces
6. Never smoke or eat in the forest. While preparing and eating food at home, do not leave remnants outside for wild animals to consume, and never feed them. Baboons can become aggressive when trying to steal food .. it is better if they do not see it.
7. Carry equipment, backpacks and other items at all times, don't put them down. Both chimpanzees and baboons will steal anything left unattended. Such items, as well as tissues and bandannas, are possible carriers of infectious pathogens.
8. Never litter. Throwing food, candy wrappers, cigarette butts or any other waste onto the ground is forbidden. Waste items may be infectious.
9. Do not attempt flash photography or use of reflective devices. Never try to attract an animal's attention in order to take a better photograph or video.
10. Speak quietly. Do not use arm gestures while talking or move suddenly. Never look baboons directly in the eye as it is likely to be interpreted as a threat.
11. Never spread out or form a full or partial circle around animals being observed.
12. At home, do not leave clothing or other personal items unattended outside

You are responsible for the behaviour of people who work for you, cooks and guides: please educate them in ways to reduce the risk of disease transmission.

These guidelines are subject to improvement and we will welcome your suggestions.

<REVIEW>
Field Research at Ngogo, Kibale National Park, Uganda

John Mitani, University of Michigan
David Watts, Yale University

David Watts initiated fieldwork on the community of chimpanzees at Ngogo, Kibale National Park, Uganda, during two months in the summer of 1993. This followed pioneering observations carried out by Michael Ghiglieri (1) in 1976 – 1977 and subsequent study by Bettina Grieser-Johns (2) in 1992 – 1993. John Mitani returned with Watts to Ngogo in June 1995. Since that time we have been assisted by our students and Jeremiah Lwanga, Martin Muller, and a team of 4 – 5 Ugandan research assistants in our effort to maintain continuous observations of the Ngogo chimpanzees.

The unusual demographic size and structure of the Ngogo chimpanzee community furnish part of the impetus for our studies. With over 70 adult males and females and approximately 150 individuals, this community is the largest that has been reported thus far in the wild. As the result of the extremely large number of males, the Ngogo chimpanzees hunt often and with an unusual degree of success (3). Male chimpanzees at Ngogo also frequently patrol the boundary of their territory (4). This behavior has led to several documented cases of lethal intergroup aggression (5-6 and Watts & Mbabazi unpublished data). Our observations have also revealed that male chimpanzees at Ngogo sometimes adopt novel coalitionary mating tactics (7) and have shown that males who belong to the same age cohort and who are close in dominance rank affiliate and cooperate non-randomly (8). Other work has contributed to our understanding of why chimpanzees hunt and share meat (9) and has furnished insights into the intriguing evolutionary processes of reciprocity and interchange (10).

Along with our students, we continue to build on our prior work at Ngogo by conducting investigations on several topics. In previous research, we have shown that kinship may not play an important role in structuring aspects of male social relationships (8, 11). These studies have thus far been limited to information on mitochondrial DNA. In work conducted in collaboration with Linda Vigilant and University of Michigan graduate student Kevin Langergraber, we are using samples collected non-invasively in the field to obtain better estimates of genetic relatedness between males. Data derived from nuclear genetic markers will permit us to examine in greater detail the effect of kinship on various aspects of male chimpanzee social behavior. After a brief hiatus in research (12), we are returning to the study of chimpanzee vocal behavior with an investigation focused on uncovering the factors that affect acoustic variation between and within individuals. This research will be conducted by Michigan graduate student, Anne Fowler. In a study completed with Michigan graduate student, Sylvia Amsler, we have demonstrated that male chimpanzees at Ngogo form social bonds above the level of dyadic pairs (13). Two subgroups of males can be defined at Ngogo based on their tendency to associate in temporary parties. Members of both subgroups, however, range together over the entire territory, and nothing suggests that the community will fission. Amsler will carry out additional research on how the Ngogo chimpanzees use their territory.

To date, most of our research has focused on adult male chimpanzee behavior. Yale University graduate students, Hogan Sherrow and Monica Wakefield, are currently in the field conducting observations of adolescent male and adult female chimpanzees, respectively. Their work promises to fill several gaps in knowledge and enrich our understanding of the Ngogo community of chimpanzees. The Ngogo chimpanzees are very well-known for their hunting behavior (14).

Long-term data suggest that the red colobus population at Ngogo has suffered a decline in numbers since 1976 (15). Whether this decline can be attributed to chimpanzee predation is unknown. Yale University graduate student Simone Teelen has completed fieldwork to address this and related questions by studying the effects of chimpanzee predation on the behavior of red colobus monkeys at Ngogo.

As we enter our ninth continuous year of field research, much remains to be done. In future work, we plan to address some open questions regarding meat sharing and male mating behavior and social strategies. Along with our Ugandan postdoctoral associate Jeremiah Lwanga and Yale graduate student Kevin Potts, we will continue work on feeding ecology and behavior. Potts plans to examine the foraging strategies employed by the Ngogo chimpanzees. Lwanga's ongoing studies of forest ecology will be combined with data on chimpanzee feeding behavior and habitat use to address why the Ngogo community is so large. During the past year, we have witnessed four more cases of lethal aggression at Ngogo. In contrast to prior observations, one of these took place within the Ngogo community. We will describe details of these attacks in future reports.

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<REVIEWS>
Acquisition of Skilled Gathering Techniques in Mahale Chimpanzees

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Chimpanzees show a remarkable ability to organize actions into complex programs, shown most famously in their ability to employ tools in many different ways for subsistence. Chimpanzee tool use has been much studied, with an emphasis on the tool rather than the process of use. We planned instead to examine chimpanzee skills in the broader context of plant-processing techniques, with an emphasis on the process. In particular, we focused on the development of infants in parallel with describing the skills of their mothers. Data were collected from M group chimpanzees in the Mahale Mountains National Park during February–December 1998 and then again June 1999–January 2000. Focal sampling procedures were used to collect data on 14 mother-infant pairs, with 10x40 binoculars to help see the fine details and action sequences recorded on Dictaphone for later transcription.

Central to our work is the measurement of 'complexity' and the degree to which the hands of non-human great apes constrain their cognitive capacities. Several possible measures of complexity, even ones which might have been expected to 'trade off' against each other (e.g. size of action repertoire, and the mean number of such actions used for any given task), do in fact provide converging evidence of complexity (1). Many food plants used by Mahale chimpanzees were relatively simple for them to consume without elaborate techniques. However, complex plant gathering was shown in two circumstances: (1) embedded foods, e.g. pulp from tough-shelled, large fruits; and (2) physically defended leaves, where defences had to be circumvented in order to feed painlessly. In both cases, the techniques employed showed considerable manual dexterity (2), and hierarchical organization (1, 3).

Since leaf-processing varies from simple mouthing to a quite complex task, we were able to make a direct test of the hypothesis—often-assumed—that complex cognition is primarily valuable for *difficult* manual tasks. We compared processing of 8 leaf foods which differed in this way, and strongly confirmed this hypothesis: complex food processing may therefore have selected for cognitive advance in the shared chimpanzee/human line of ancestry (4).

Of cardinal interest was to examine acquisition of skill. The clearest developmental sequence we obtained was for the processing of an embedded food, *Saba florida*. Many of the developmental changes were explicable in terms of chimpanzee maturation: increasing power, reach and manual dexterity with age of infant (5). However, some aspects hinted that social learning mechanisms might also be involved: for instance, we observed some cases where the infant intently watched the mother or another older individual as they fed, frequent synchronized feeding with the mother, and numerous cases of both food solicitation and food sharing. All these circumstances might aid acquisition of complex skills—but did they? We suggest a more conservative evaluation.

Young infants typically depended on their mothers for access to the edible parts of *Saba*. This means that synchronized feeding, intense observation, and food solicitation may reflect no more than an infant's strong motivation to gain food. Social learning cannot therefore be concluded to be necessary from observation of these behaviours, although it often has been in the past. Food sharing, similarly, does not mean that the mother is deliberately sharing *knowledge* with the infant. We found that solicitation peaks very early in the infant's life, at a time when lactation is still essential, and mothers share little food at that time. Later in development, when the infant would be able to gain significant nutrition from solid food, mothers share food virtually on demand. This is most parsimoniously explained as a consequence of a mother optimizing her energy budget. When sharing solid food can aid in reducing lactational demands on the mother, she shares; but not before then, when the infant is most in need of knowledge. Thus, we do not consider that chimpanzee food sharing evolved with a primary function of passive tutoring. But, as a consequence of these factors—the infant's desire for food, and the mother's optimization of energy transfer to the infant—the learning process for the infant may nevertheless be "scaffolded" (6, 7). If relevant information is indeed gained through the infant's (hunger-motivated) observations, and the mother's (energy optimization) food-sharing, this is most likely to involve mechanisms which do not imply any intent on behalf of the mother or infant, such as affordance learning (8) or imitation without intentionality (9, 10). We found no evidence to support the idea that teaching (11) or imitation in the sense of gestural copying (12, 13) were involved in the acquisition of this rather complex natural task.

An unexpected finding was that, when processing *Saba* and *Citrus* fruits, chimpanzees show strong manual laterality which varies in direction between the sexes (14). It is generally accepted that laterality is elicited by a need for skilled manipulation (15-17), so our finding of strong individual hand preferences provides orthogonal evidence that chimpanzees see these tasks as cognitively challenging. However, the sex-linked pattern of manual laterality among the chimpanzee population is unique, as far as we know. Moreover, it may shed light on the origins of the sex difference found in modern day humans, where males are on average slightly more left-handed or ambidextrous than women.

When they handle *Saba* or *Citrus* fruits bimanually, Mahale chimpanzees first grip the whole fruit by laying one hand over another in an extra-strong grip; the choice of hand to apply first is highly lateralized and correlates positively with their later choice of hand for delicate manipulations: it is the "dominant hand", in human terms. We found a significant sex difference in dominant hand (Figure 1), with males tending to left- and females to right-hand dominance. Humans, of course, show population right-handedness in both sexes, normally explained by a species-specific "right-shift" gene (18, 19). Comparing between the sexes, the human pattern—women more strongly lateralized than men—is exactly what would be expected if the right-shift had been superimposed on a pre-human pattern of female right- and male left-handedness. We suggest that the ancestral pattern has been retained in modern chimpanzees, but is only brought out by challenging bimanual manipulations such as *Saba* eating, because as arboreal animals chimpanzees are more generally rewarded for ambidextrality (14).

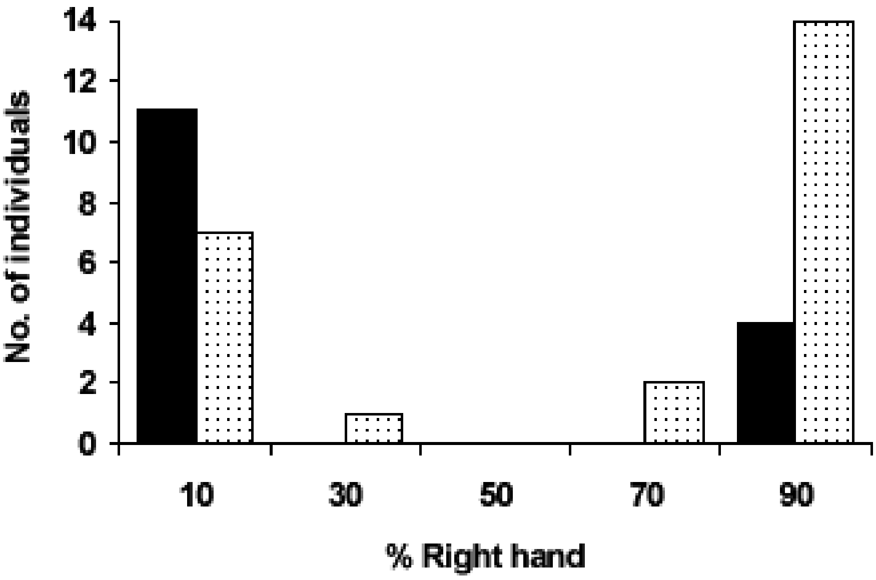

Figure 1. Sex differences in hand preference. Distribution of Mahale chimpanzees, according to the preferred hand for manipulative actions when processing Saba and Citrus fruits. The X-axis shows an individual's degree of right-hand prefernce; thus, 0 = completely left-handed, 50 = ambidextrous, 100 = completely right handed. Males (15 individuals) are shown in black, females (24) in stipple.

Plant food processing by great apes therefore proves to be a useful site for meaningful comparison of cognitive skill in the great apes. Past comparisons have been blighted by the species-specific nature of the most compelling evidence: chimpanzee social behaviour and tool-use, gorilla plant-processing, orangutan locomotion and (in one population) tools. Comparing on the 'level playing field' of plant processing, we find that when chimpanzees deal with complex manual problems they employ elaborate, hierarchically-organized programs, as is already known in gorillas. Like gorillas, they show co-ordination both between the two hands and among individual digits in different executive roles, an obvious parallel with humans (20, 21). The parallel is even tighter when their sex-differentiated handedness in a bimanual task is considered, with Mahale chimpanzees presenting a possible model of the original pattern of laterality of the last common ancestor and explaining the sex differences in degree of handedness seen in humans today. However, it is intriguing that in development of these considerable manual skills, we find that most ontogenetic changes can be explained by maturation and energy-optimization strategies of the mother, rather than advanced social learning mechanisms. Within this more mundane picture there is certainly scope for extensive incidental social learning; but it is most likely that simple processes, such as affordance learning and "unintentional" imitation by behaviour-parsing, may underwrite much of the organized complexity and impressive skills of great apes.

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<NOTE>
A Case of Infant Carrying by an Adult Male Chimpanzee in the Budongo Forest

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Introduction

Observations of chimpanzee males kidnapping and killing conspecific infants are commonplace. In many cases, infanticide is succeeded by cannibalism (1).

While not all kidnappings result in infanticide and cannibalism, observations of chimpanzee males subsequently “caring” for stolen infants are rare, although they have been reported in other primate species (2). Despite the coercive manner in which infants might be attained, such instances in which there is a shift in primary caregiver from the mother to another older individual have been loosely described as “adoptions” (3), or “transient adoptions” when the shift is temporary (4). Depending on the age of the infant being held by the male, the end product of a kidnapping and adoption may essentially equate to infanticide; i.e., unweaned infants that are not returned to their mothers within a short period of time are likely to die from starvation or dehydration. The proximate causes of transient adoptions of infants by adult males are unclear, although it has been proposed for some species that infant carrying by males may function as a "buffer" from aggression by other males (5).

The following observation concerns the temporary carrying and "care" of a newborn infant by an adult male from the Sonso community of the Budongo Forest, Uganda.

Observations

Observations of this incident were made in December 1999. On December 13 at 09:10, Jambo (JM), a high-ranking adult male, was spotted resting on the ground while holding a newborn male infant. The infant's eyes were closed, its body very small, and body hair sparse. Several other chimpanzees were present and were behaving in an excited manner, but no particular female chimpanzee appeared distressed or anxious in a way that would indicate she was the victim of an infant kidnapping. The infant was producing high-pitched squeals and whimpering, and JM responded by "cuddling" the infant closer to his chest with his arms, although the infant was able to grasp JM's chest hair.

Throughout the day, JM carried the infant on his chest, and occasionally supported it with his arm by walking tripedally. During resting periods, the infant tried to suckle JM. When JM was moving, the infant screamed intermittently, suggesting it was experiencing pain or distress. At 18:46, JM bedded down with the infant.

On December 14, JM left his bed at 06:25, with the infant who was now clinging very weakly with one arm, but still screaming forcefully when moved. JM held the infant with one arm near his crotch when he walked, and carried it with his foot when climbing. No individuals were showing any interest in JM or the infant. JM paid little attention to the infant other than to carry it, and to occasionally prod or lightly groom it when it lay on his chest. By mid-afternoon the infant was totally listless and needed to be fully supported by JM's arm. This appeared to hamper him considerably and he was unable to keep up with other individuals in his party. Despite the infant's listlessness, it still squealed forcefully, though less often, when moved. JM again bedded that night with the infant still alive.

On December 15, JM was not found until late morning. The infant appeared to be dead, although JM still carried it. No indications of physical injury were apparent on the infant. JM poked at the infant periodically as it lay on his chest, but otherwise ignored it. JM was not found by observers in the afternoon, and was not seen until the next day when he was no longer carrying the infant. No fecal samples were collected to determine if JM had consumed the dead infant.

Discussion

This report concerns the carrying and limited "care" of a newborn infant by a male chimpanzee for at least two days, until just after the infant's death. JM was found with the infant well within the community home range, and the behaviour of the surrounding group members on the morning of December 13th suggests the acquisition of the infant had occurred shortly before our discovery of the group. Alternatively, other chimpanzees may have just become aware of JM's infant and were responding accordingly. We therefore have no way of knowing whether the infant was born to a female from within the Sonso community.

The proximate motives for JM's snatching and subsequent carrying of the infant are also unclear. It is possible that JM was initially motivated by infanticide but then aborted his goal when he became fixated on the infant, perhaps even enjoying the "attention" he received initially from others as a result. Reports of captive apes, including males, becoming fixated on "playthings" or "pets" are not uncommon (6, 7), and it is possible that JM's interest in the infant was initiated by novelty but then waned once the infant became listless and died. In any event, this observation suggests that current proximate explanations for kidnapping should include the possibility that males are motivated by interest in the infant as a "possession" or object of interest, and not solely as a source of meat or means to create a reproductive opportunity.

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<NOTE>

Eleven-Year Old Male Chimpanzee Outranks Ex-Alpha Adult Male at Bossou

Michio Nakamura (Japan Monkey Centre) and Gaku Ohashi (Kyoto University)

Introduction

Dominance among chimpanzees (*Pan troglodytes*) is usually measured by the pant-grunting vocalization directed from the subordinate to the dominant (1, 2). Although a linear dominance hierarchy exists among most adult males, some dyadic relationships are ambiguous (1, 3). In contrast, there is a distinctive social gap between adult males and adolescent males, *i.e.* all adolescents pant-grunt to all adults (4). Adolescence in male chimpanzees is thus a period between sexual maturity and social maturity which is achieved at about 15 years of age (5, 6, 7 but see 8). We report here the case of *YL*, a young male at Bossou, who outranked an old ex-alpha adult male *TA* and became the beta male at the age of 11 years, and who also showed insubordination to the alpha male *FF*.

Methods

Wild chimpanzees have been continuously studied at Bossou, Guinea since 1976. In more than two decades, there has been little change in the group size (8), which is currently 19 including two adult males. Ohashi followed FF for 1210 hours from Jul. 2002 to Mar. 2003, and Nakamura followed 9 individuals including all four of the sexually mature males (Table 1) for 241 hours from Jan. to Mar. 2003. Observations were made during focal follows that included non-focal individuals around the target subjects.

Observations

YL (Figure 1) pant-grunted to *TA* until at least Jan. 2003, but no pant-grunts were heard after that. *YL* was completely subordinate to *FF* until early Feb. 2003, showing exaggerated pant-grunts characteristics of adolescent males.

On 8th Feb. 2003, *TA* showed sexual possessiveness to an estrous female *Fn* in the party that included *YL*, *PO* and some others. *PO* copulated stealthily with *Fn*, which caused great uproar in the party, and *YL* and *TA* displayed at each other. Neither pant-grunted, but finally *TA* grimaced, screamed, and sought assurance from *YL*. After that, *TA* groomed first with *YL*'s mother *Yo* who had rushed to the uproar, and then with *YL* for about 30 minutes.

In the next evening, while *TA* and *YL* ate *Rhaphiostylis beninensis* fruits with six other chimpanzees, *TA* began to make opportunistic displays around *Fn*. When *Fn* screamed, *YL* also began to display and when *YL* approached *TA*, he pant-grunted to *YL*.

Table 1 Four Mature Males at Bossou.

Name (Abbr.)	Year of Birth	Age in 2003 Mar.	Mother
Tua (*TA*)	unknown (adult in 1976)	old	unknown
Foaf (*FF*)	1980 late	23	Fana (alive)
Yolo (*YL*)	1991 middle	11	Yo (alive)
Poni (*PO*)	1993 Feb.	10	Pama (alive)

On 18th Feb. 2003, *TA* and *PO* ranged away from others. When they reunited with *YL* that evening, *TA* pant-grunted without *YL* displaying or showing aggression.

As *FF* was ranging far to the north in consortship with a female from 8th to 21st Feb, it is possible that *TA*'s submissive behavior to *YL* was temporary, because of the absence of support from *FF*. However, on 2nd Mar., *TA* pant-grunted to *YL* when *FF* was in the nearby tree, so it was obvious that *YL* dominated *TA* and was now the beta male.

After *FF*'s return, *YL* never pant-grunted to *FF* except for once on 22nd Feb. *YL* tended to walk away from *FF*, but when he met *FF* he sometimes displayed from a distance of 10-20m standing bipedal and swaying his arms with hair erection. For a while, *FF* made no aggression against *YL*'s insubordination except for displaying back, but on 12th Mar., *FF* beat *YL* out of the tree of *Ficus umbellata*. Unfortunately, this was the last day of our research at Bossou, so we could not follow further developments.

Discussion

Eleven years old is a very young age to outrank any adult males and to show insubordination to the alpha male. We propose four mutually non-exclusive explanations for this.

(1) Demography: With only a few mature males, it may be difficult for older males to maintain status higher than their actual physical strength by using coalitions or alliances, with other males.

(2) Mother's proximity: *YL*'s mother, *Yo*, had no children younger than *YL*, and she often followed and stayed near *YL*. She sometimes engaged in fights with males, so her proximity may have indirectly helped *YL* to raise rank.

(3) Early physical growth: It is possible that nutrition is better in Bossou than other places, because of the cultigens in their diet.

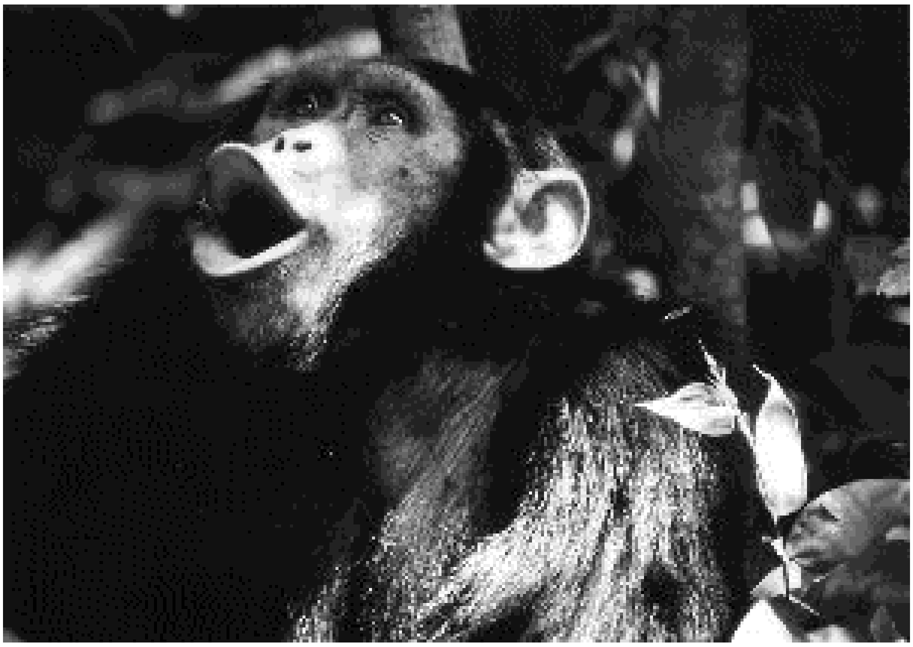

Figure 1. Eleven-year old male Yolo (*YL*)

YL looked much bigger than typical 11 year-old males and almost equaled adults at Mahale. Sugiyama (8) treated 12 years as adult at Bossou instead of the usual 16 years. Also, females at Bossou have their first birth more than three years younger than females in other wild populations (9). These also imply that physical growth is generally earlier in Bossou. This is not the difference between subspecies, because Taï chimpanzees (same subspecies as Bossou) do not seem to have this earlier growth (7).

(4) *TA*'s old age: *TA* was prime adult in 1976 (8), which made him at least 45 years old in 2003. It is possible that he was forced by aging to give way to the young.

This report implies that chimpanzee males have the potential to rise in rank earlier than usual, under some conditions such as early physical growth and few social constraints. However, large body size is not enough to attain higher rank, as one male in Mahale, *Bembe*, had been low-ranking although he was large-bodied. If there are many adult males in the group, older males may skillfully exploit the histories of relationships with other adults to maintain higher social status than the physically developed but young males.

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<NOTE>

A Note on the Southern Neighboring Groups of M group in the Mahale Mountains National Park

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Introduction

The M group is a well-habituated group of chimpanzees in Mahale that has become the main target of research and eco-tourism. In addition, the M group has several neighboring groups (1).

Two of these neighboring groups to the south of the M group's range are called the N and L groups (1, 2). The range of the N group has been estimated to extend from lakeside to Mt. Mkulume and Mt. Mhela, and that of the L group extends over the Lubugwe, Msuma and Ntala Valleys. Because there has been no more information on those groups since the 1980s, it is difficult to estimate where and in which pattern they are ranging today.

It is important to immediately investigate the ranging areas and patterns of these neighboring groups. This would serve not only to understand the between-group relationships but also to

Table 1. Direct Encounter with Chimpanzees

date	place	estimated unit group	obs. time	membership (*)	party size	group activity	what they are feeding	obs. from
3/21	Msoffwe V.	N	10:03-10:44	AM*2, YF(estrous)*1	3	feed/bark/attack	*Dioscorea odoratissima* (seeds)	ground
3/25	Syankuhe V.	L	16:09-16:41	AM*2, A?*1	3	feed	*Pterocarpus tinctorius* (leaves)	boat/ground
3/25	Syankuhe V.	L	17:03-17:08	AF*1, YM*1	2	rest		boat
3/25	Syankuhe V.	L	17:16-17:22	AF*1, YF*1	2	feed/rest	*Pterocarpus tinctorius* (leaves)	boat
3/26	Nkwasi V.	L	10:07-10:50	AF*3, YF*1, Y?*4	8	feed/travel / play/rest	*Pterocarpus tinctorius* (leaves), *Diplorhynchus condylocarpon* (seeds)	boat
3/26	Syankuhe V.	L	11:30-11:33	AF*1, Y?*1	2	rest/groom		boat

* Each symbol represents as follows, A: adult, Y: young, juvenile, infant, M: male, F: female

Table 2. New Evidences of Chimpanzees

date	place	estimated unit group	type of evidence	species of remnants
3/21	Msoffwe V.	N	trodden path	
3/23	Ilanga V.	N	bed*3	
3/23	Ilanga V.	N	trodden path	
3/23	Ilanga V.	N	remenant of bark fragments	*Brachystegia bussei*
3/25	Lubugwe V.	L	remnant of leaves	*Ficus exasperata*
3/26	Lufungu V.	L	bed*3	
3/26	Mufuga V.	L	bed*2	
3/26	between Syankuhe and Lufungu	L	bed*4	
3/26	between Syankuhe and Lufungu	L	remnants of seed pods	*Diplorhynchus condylocarpon*

provide basic information to use in habituating these chimpanzees for tourism and conservation in the future.

Surveying Area and Methods

A survey was conducted by three assistants and myself in the rainy season from March 20 to 27, 2002. The survey area extended from the Ilanga Valley at the north end to the Siyeswe Valley at the south end. We drove a small boat slowly about 50 m away from the shore along the coast at least once and counted all of the beds in sight. The length of this area from north to south is about 15 km.

We also trekked inland less than 2.5 km from the lakeside at Mt. Mkulume, Msoffwe Valley, Lubugwe River and the slope between Syankuhe and Lufungu Valleys. The area is mostly a steep slope covered with the Miombo woodland, which starts directly from the lake except for the riverine forest in some restricted areas along the valleys (2).

Whenever we encountered chimpanzees, we recorded them with a digital video camera. We also recorded information on their beds, trodden paths, and eaten food items. New evidence (0–1day old) was used to estimate the movement of chimpanzee parties and old evidence (more than 2 days old) to estimate the range of each unit group.

Data on the M group during the survey was kept by the rest of the research staff.

Distribution of N and L groups

We found 131 chimpanzee beds mostly along the lakeside area. However, we found no beds

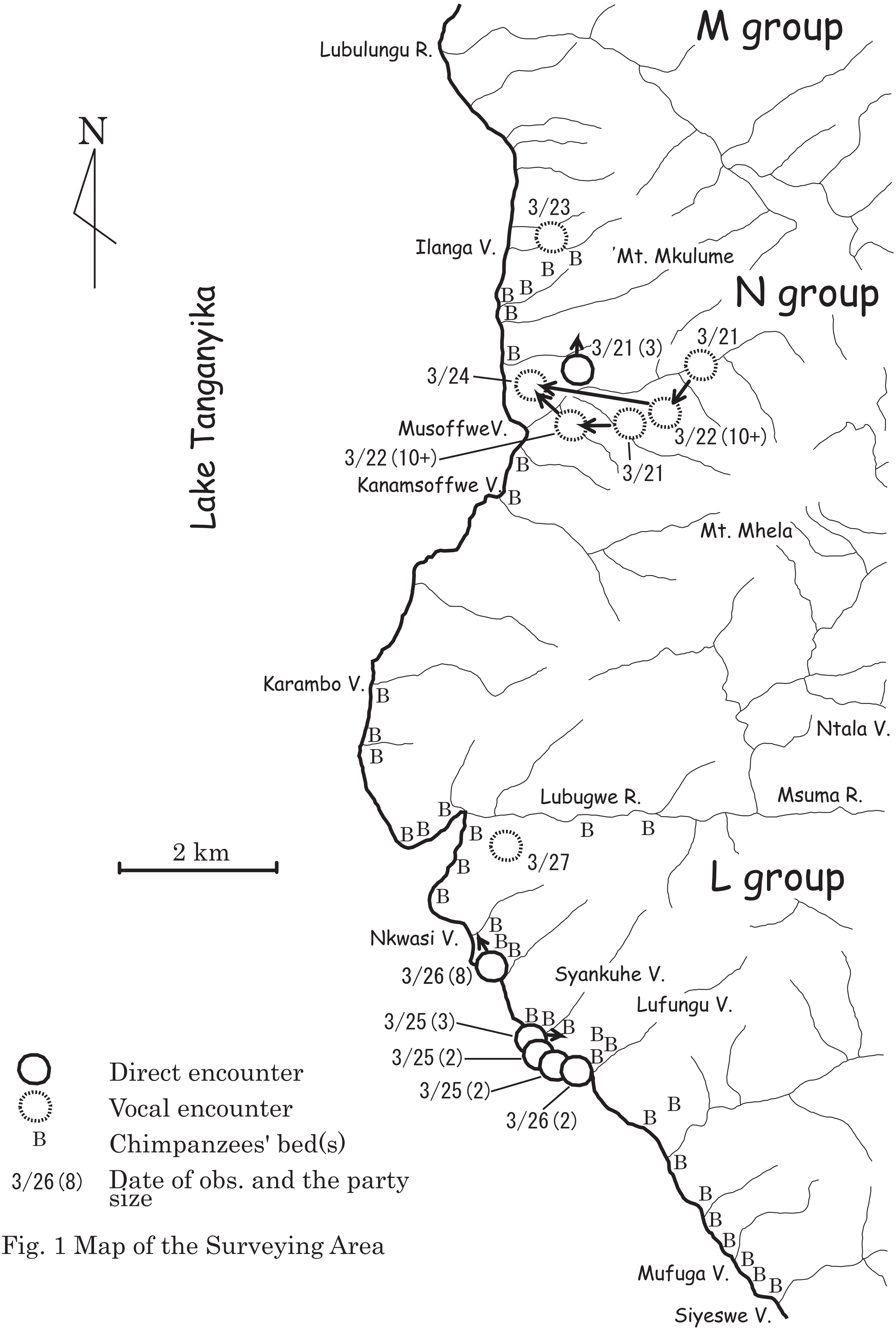

Fig. 1 Map of the Surveying Area

between Kanamsoffwe and Karambo Valleys (width=3 km), though the distribution of beds in the other area was continuous (Fig. 1). The vegetation and topography in this area are not discontinuous. Thus, this does not contradict the 1980s' estimation of the ranging areas of the N and L groups (1).

Ranging patterns and other features

Through the survey period, many types of small parties of both N and L groups were ranging separately from each other (Table 1).

Direct and vocal encounter with the N group from March 21 to 24 (Fig. 1) shows a good example of their fission-fusion society in the late rainy season: Two parties, each including about 10 individuals (or more), and a party including two adult males and an estrous female separated on March 21, and then the two bigger parties chorused to each other on March 22. Although we did not observe them on March 23, the two parties seemed to join together and move to the north of the Msoffwe Valley on March 24. In addition, at least one other party existed in the north region of the Ilanga Valley on March 23, and they may have ranged independently. The estimated movements of the N group parties are shown in Fig. 1.

As for the M group's ranging during the survey, a staff member directly observed a mother chimpanzee and her son only once on March 23 in the southern part of the M group's range.

The observed food items of the L group were mainly leaves of *Pterocarpus tinctorius* and seeds of *Diplorhynchus condylocarpon* (Tables 1, 2). These are common varieties of woodland vegetation (2). Since such food is also used by the M group chimpanzees in the rainy season (Shimada, personal observation), it is likely that the L group chimpanzees normally use the lakeside area covered with the woodland in the same part of the year.

These data suggest that it is a common phenomenon for all three unit groups to spread out widely in many small parties during the rainy season.

Reaction to humans

When we approached a party in the range of the N group on March 21, one of the males escaped silently as soon as he discovered us, and the others continued barking "Wraa" to us. On the other hand, as long as we observed from the boat, no chimpanzee of the L group seemed to be especially nervous about human observers. When I tried to land and approach three adults on March 25, one of the males hesitated to leave the feeding tree and looked at me for a few minutes. These observations gave us the impression that the L group chimpanzees were more habituated than the N group chimpanzees. The high frequency L group chimpanzees use a lakeside area in the late rainy season while humans pass by this area in boats. Consequently, we can assume that this situation facilitates more frequent encounters between chimpanzees and humans and, as a result, has already advanced the habituation process to some extent.

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<NOTE>
Evidence for Leaf Swallowing Behavior by Savanna Chimpanzees in Senegal- a New Site Record

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Evidence of leaf swallowing, a proposed form of medicinal plant use by savanna chimpanzees was recently recorded at the Fongoli study site in southeastern Senegal. Since April 2001, the Fongoli community of chimpanzees has been studied in an effort to better understand the ecology of chimpanzees in an arid environment. The habitat can be described as a mosaic of woodland and savanna containing areas of bamboo forest and grassland and interspersed with isolated areas of gallery forest (<1% of study area) and larger areas of laterite plateau. Chimpanzees at this site have been estimated to occur at a density of 0.09 individuals per km^2 (1). The site lies approximately 40 km E of the Parc National du Niokolo Koba and 10 km NW of the town of Kedougou, in southeastern Senegal.

Field assistants monitor chimpanzee ranging, diet, and habitat use within an approximately 50km^2 study area. Data are collected on chimpanzee beds as well as observations of chimpanzees. Habituation of this chimpanzee community is in progress, and diet data are based on analyses from fresh fecal samples. Currently 5 individual chimpanzees have been identified, but opportunities for behavioral observations are limited. However, research assistants have been able to remain with chimpanzee parties for up to 9 hours when they are attracted to dry season water sources. The rainy season begins in June-July, while the extensive dry season begins in November-December.

Chimpanzees share their range with baboons (*Papio hamadryas papio*), green monkeys (*Cercopithecus sabeus*), and patas monkeys (*Erythrocebus patas*). People of the Malinke, Bassari, Bedik, and Diahanke groups also share this area with the chimpanzees and do not hunt them. Much of the large mammalian fauna has been eliminated from the area, but ungulates such as warthog and bushbuck remain at low densities.

Since April 2001, over 400 fecal samples have been analyzed to determine the dietary habits of Fongoli chimpanzees. In addition to recording the number of seeds and their plant species within feces, data are also collected on the percent fiber contained per fecal sample and other characteristics, such as the presence of insect and vertebrate parts and leafy vegetation. Eighteen samples have been identified as indicative of leaf swallowing behavior.

Fecal samples thought to be indicative of leaf swallowing were observed to contain a large amount of undigested and unchewed leaves with some leaf fragments also included. Five samples were collected during the late rainy season that contained these unchewed leaves:

27 September 2002 10 whole leaves
3 October 2002 >10 whole leaves
22 October 2002 >50 whole leaves + 2 large grass leaves
22 October 2002 >10 whole leaves + 1 large grass leaf
22 October 2002 4 whole leaves.

The plant these leaves originated from was found after two weeks of searching and comparing in the field. Samples were then compared under a microscope and they are believed to be identical. This herbaceous plant is from the legume family (Fabaceae). The leaves are between 3-6 cm long and 4-5 mm wide with a slightly rounded base and an apex that is mucronate or tipped with a sharp, abrupt point. The pubescence of the upper and lower surfaces of the leaves is strigose, which means bearing straight, stiff, sharp, appressed hairs.

Several fecal samples also indicated that Fongoli chimpanzees swallow whole large amounts of grass leaves belonging to the species *Andropogon chevalieri* Reznik. During the beginning of the rainy season, on July 22, 2002, a fecal sample was collected that was made up almost entirely of wadded grass leaves. Over two months later, near the end of the rainy season, on Sept. 27, Oct. 25, and on Nov. 14, more samples were found that also contained large amounts of unchewed grass leaves. The grass leaf sections were up to 25 cm long and around 1 cm wide. The leaf surfaces are scabrous (rough) and the leaf margins are fringed with short hairs. Three other samples were collected that contained small amounts of unchewed grass leaves (between 1 and 2 leaves present per sample). Similarly, on June 18 and 19, 2003 two fecal samples were observed to contain >5 entire grass leaves measuring over 10 cm in length and 4 mm in width that may also belong to the same species.

On 31 December 2002, during the early part of the dry season, 18 entire or mostly entire leaf fragments were found contained in one fecal sample collected within a small strip of gallery forest. Leaves and leaf fragments averaged 56.9 mm in length (range: 40-102 mm) and 19.8 mm in width (range: 13-27 mm) (N=18). A number of smaller leaf fragments were also found in the dung sample. Leaves were folded/wadded when sieved from the fecal sample, but no evidence of chewing or any digestion was evident on the leaves. Leaves were identified as *Ficus asperifolia* after comparison with a series of plants in the study area. Less than 30 m from where the fecal sample was collected, a recent ground bed made from two *F. asperifolia* saplings was recorded. This particular plant is characterized by very coarse leaf surfaces. Six other instances of whole leaf swallowing were observed at Fongoli (between 1 and 2 leaves per sample). These leaves were different than the *F. asperifolia*, legume, and grass leaves. Similarly, the surfaces of some of the leaves were rough.

A study of parasite loads of Fongoli chimpanzees as well as future studies of feeding behavior here will provide a test of the hypothesis that Fongoli chimpanzees use plants medicinally. We hypothesize that Fongoli chimpanzees swallow whole leaves in a manner conducive to their medicinal use as reported for plants such as *Aspilia* and *F. exasperata* in the Kibale Forest, Uganda and at other sites (2). Chimpanzees fold and ingest physically irritating leaves whole, and analyses suggest such behavior helps to eliminate gut parasites (3). Chimpanzee fecal samples had not yet been collected for analyses of parasite load, save for the June 2003 samples. Adult parasites have been observed in at least 3 different fecal samples.

Given the aridity of the study site and the significant differences between the vegetation here and that characterizing other sites where chimpanzees have been assumed to use plants medicinally, this report of possible medicinal plant use has important implications for the universality of this aspect of chimpanzee behavior and ecology and, perhaps, cultural implications as well.

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