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## Case Study of an Unusual Human–Chimpanzee Conflict at Bulindi, Uganda

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### INTRODUCTION

Across equatorial Africa expanding human populations and forest clearance for agriculture has meant that increasingly humans and great apes occupy the same habitat. Interactions between apes and people in shared environments are often characterized by competition and conflict<sup>1–6</sup>. In this report I describe an unusual human–ape conflict involving a newly-studied community of  $\geq 25$  chimpanzees (*Pan troglodytes schweinfurthii*) in heavily disturbed forest–farm habitat at

Bulindi, Western Uganda.

### Study Site

Bulindi is situated between 1°27'–1°30'N and 31°26'–31°30'E, 25 km south of Budongo Forest. The chimpanzees' territory comprises a network of small ( $\leq 50$  ha) riverine forests within the vicinity of 11 permanent villages. These unprotected forests are being logged for timber and cleared for cultivation<sup>3</sup>. The chimpanzees regularly consume agricultural foods. They are not

hunted but experience high levels of harassment from villagers. Although familiar with people, the apes are unhabituated<sup>6</sup>.

### CONFLICT CASE STUDY

#### Background

Of five main riverine forests at Bulindi, Kaawango forest in the northeast was least utilized by chimpanzees during this study (Oct 2006–Jan 2008). No evidence

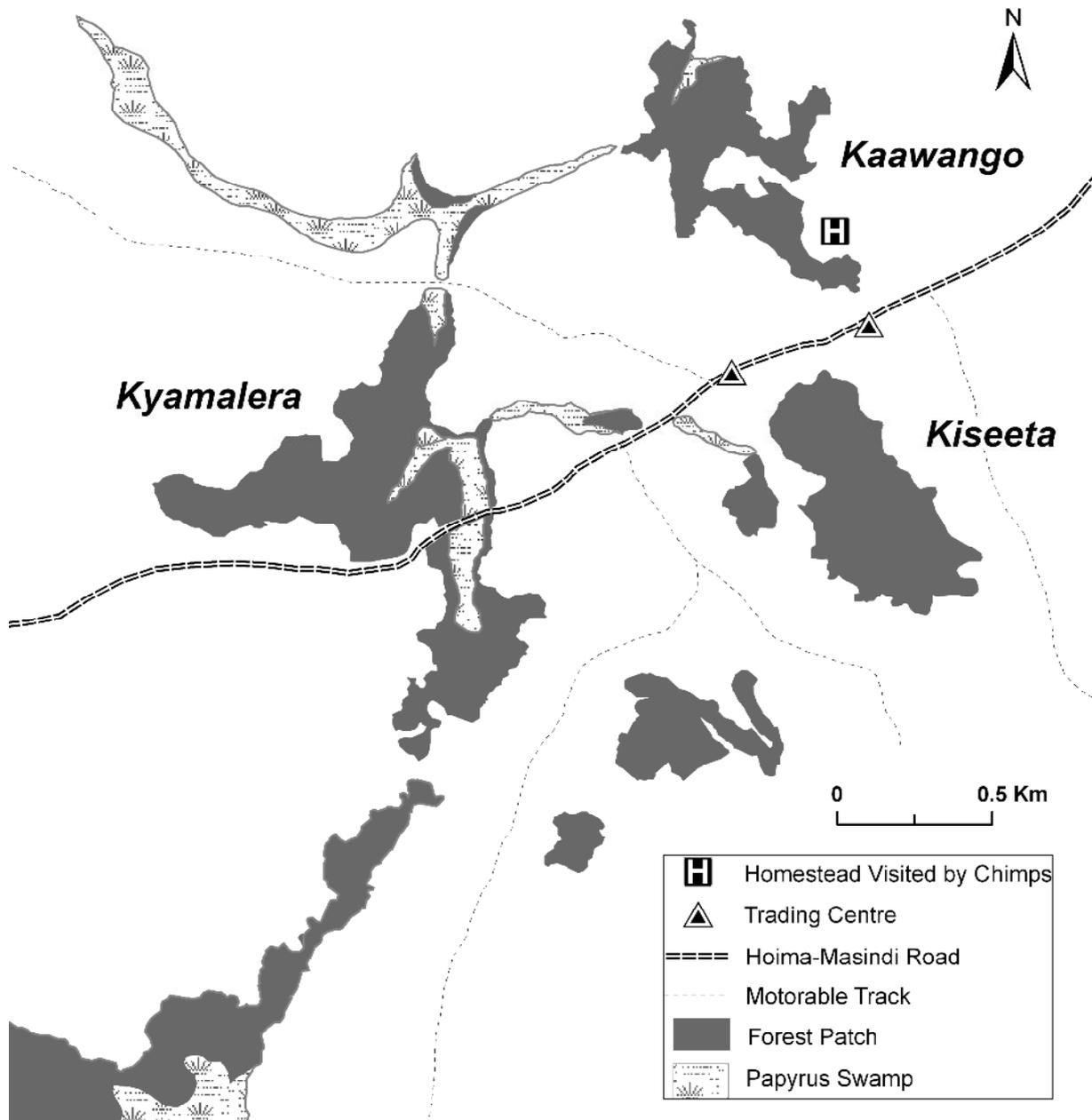


Fig. 1. Map showing riverine forest fragments at Bulindi; the surrounding matrix is dominated by farmland. Italicized names indicate forests mentioned in the text. The location of the homestead visited by chimpanzees is indicated, bordering Kaawango forest. The chimpanzees' core range extends to the southwest.

indicated chimpanzees visited Kaawango between October 2006 and April 2007. However, on 15<sup>th</sup> May, chimpanzees raided mangos at a home bordering the forest (Fig. 1). They returned to this homestead for mangos  $\geq 5$  times in May–June, after which the fruits were gone. On each occasion they travelled to Kaawango from Kiseeta or Kyamalera forests, in the core of their range (Fig. 1), apparently specifically for these mangos, which had fruited earlier than other mango trees in their territory. They spent little time within Kaawango forest.

Unlike most village homes, this house had concrete walls and glass windows. Ornamental shrubs and trees were planted around a grass lawn. The owner, a senior government official, resided in the capital Kampala but occasionally visited Bulindi. Metal doors on one side of the house had glass window panes in which chimpanzees could see their reflections, and this ‘mirror’ provoked considerable interest and excitement in the apes. Two field assistants (FA) to M.M. lived near this homestead, and much of the following account of chimpanzee behavior at the homestead is based on their observations.

**15<sup>th</sup> May.** Chimpanzees crossed to Kaawango from Kiseeta and raided mangos. In mid-afternoon, two FAs arrived at the homestead to find three adult male chimpanzees by the door. One was swaggering bipedally in front of the glass. Local residents wanted to chase them away with dogs but the FAs prevented them from doing so. When M.M. arrived, the chimpanzees were in nearby trees. Feces were found around the homestead.

**17<sup>th</sup> May.** Four adult males raided mangos late in the afternoon. Two FAs found them displaying vigorously on the lawn. They had broken several branches from small trees; one male brandished a branch while swaggering in front of the glass. Another male slowly ate a mango whilst staring intently at the glass. They paid little attention to FAs, who watched from a distance.

**23<sup>rd</sup> May.** At 0630, a FA found an adult male, an estrous female and a juvenile at the homestead. The male was displaying at the glass door. The apes left upon detecting the FA.

**28<sup>th</sup> May.** Four adult males raided mangos at 1915 and nested in trees immediately behind the house. At 0645 the next morning, a FA found them on the lawn in front of the door. They had again broken branches from ornamental trees and were examining the window. Before 0700, the males had left for Kiseeta, crossing the main road at the trading centre.

**8<sup>th</sup> June.** Three adult males raided the last of the mangos at dusk, nested nearby, and returned to the homestead at first light. Again, they displayed on the lawn, but left when a FA approached.

**18<sup>th</sup> July.** At around noon, school children saw chimpanzees ‘dancing’ at the homestead. When we arrived at 1600, five adult males were resting in trees behind the house. They crossed to Kiseeta shortly afterwards. Feces and broken branches were strewn

across the lawn.

**12<sup>th</sup> August.** Before 1130, five adult males had arrived at the homestead. It was Sunday and local residents and school children joined FAs to watch them from a distance. The males displayed all around the compound, breaking branches from trees and dragging them. Although people’s presence may have exacerbated their excitement, the apes did not threaten them directly. They appeared to want to get inside the door. One male flailed a branch against it, breaking an upper pane of glass. Another was seen trying to push a stick between the doors in an apparent attempt to prise them apart (woody particles were subsequently visible in the narrow gap separating the door’s two sides). In between bouts of displaying, the males groomed or rested, eventually leaving for Kiseeta before 1530. In addition to the broken pane, the metal panelling beneath the glass was heavily scratched by the apes’ fingernails.

The latter two visits were made after mango season was over. Both times, the chimpanzees spent several hours around the homestead, apparently without feeding, before returning to other forests in their core range.

#### ***Confrontation between Chimpanzees and the House Owner***

Shortly after 1300 on 17<sup>th</sup> August, a FA telephoned M.M in Kampala, informing him of a “big fight” between chimpanzees and the homestead’s owner, who had arrived the previous day. The owner was apparently shooting at the apes, which were in a frenzied state in trees behind the house. The owner was also highly agitated and could not be approached. It was a prolonged confrontation; shots were still being fired approximately 30 minutes later. According to FAs, chimpanzees remained at the site calling and drumming until late afternoon (i.e. several hours). The following morning, FAs searched the forest but found no dead apes and no blood.

On 22<sup>nd</sup> August M.M. visited the owner who gave the following account of the incident: at around 1300 or earlier, he was inside his house and heard loud banging against the door. Two chimpanzees were outside, immediately in front of the glass. He opened gates at the side of the house, which open to a small courtyard, and went to chase them away. The animals charged towards him, vocalizing loudly; one was carrying a branch. Shocked, he ran back into the courtyard, shutting the gates. He was convinced the apes wanted to physically attack him and began shooting with his rifle in the air to frighten them away. The chimpanzees ran 50m to *Eucalyptus* trees and, still vocalizing, broke branches to threaten him. (According to the FA, other apes were in dense undergrowth nearby, vocalizing and drumming). The owner continued firing in the air. After the initial confrontation, chimpanzees twice returned to the

homestead; each time, the owner fired shots to repel them. He said he did not shoot them because he knew chimpanzees are legally protected. The six identified adult males at Bulindi were all subsequently seen by the research team in good health.

On the afternoon of this meeting, a mixed party of  $\geq 9$  chimpanzees travelled to Kaawango. FAs found five adult males on the lawn by the glass door. At their approach, one male displayed towards them dragging a branch. However, after several minutes, the owner arrived, having heard chimpanzees were at his house, and drove his car at the apes causing them to flee. He subsequently agreed to cover the lower glass panes of the door with cloth as a temporary solution. During the remaining five months of research, chimpanzees travelled to Kaawango  $\geq 8$  times and raided papaya, sugarcane, cocoa and oranges in villages surrounding the forest. They visited the homestead  $\geq 5$  times. On three occasions, adult males were discovered seated calmly by the door, now covered with cloth; each time, they returned to the forest at our approach. In October, chimpanzees were twice chased away by the owner, apparently without incident.

## DISCUSSION

Captive chimpanzees are famously capable of self-recognition in mirrors<sup>7</sup>. However, the capacity for self-recognition is most pronounced in subadult animals (8–15 yrs), and the proportion of subjects showing self-recognition declines sharply among adults<sup>8</sup>. In this anecdotal report, wild adult male chimpanzees at Bulindi were evidently fascinated by their reflections in the glass door of a house, returning to the home once mangos – the initial attractant – had finished fruiting. The chimpanzees' range includes many streams as well as papyrus swamps, and after heavy rains stretches of riverine forest become flooded. Consequently, the apes have ample opportunity to see their reflections in water. Young chimpanzees at Mahale were observed examining their reflections in pools and streams<sup>9</sup>, but it is not yet known if similar behavior occurs at Bulindi. Although the males at times intently examined the door, their high state of arousal implies that they most likely saw 'other' chimpanzees behind the glass. The house is situated outside of their core area in the northeast corner of the chimpanzees' known range. Visiting parties usually comprised adult males only. This raises the possibility that the males had identified the homestead as a location for territorial encounters with extra-group strangers. A motivation to engage in territorial confrontation at the homestead is perhaps reflected in their willingness to remain at the conflict scene to monitor and threaten the owner, despite the noisy gunshots. After the windows were covered, chimpanzees made occasional visits to the house, but their behavior was no longer excitable and aggressive.

With increasing human penetration into great ape habitats and growing interest in the conservation

implications of human–great ape interactions in human-dominated landscapes<sup>4–6</sup>, further reports of novel human–ape conflicts are anticipated.

## ACKNOWLEDGEMENTS

Research permission was granted by the President's Office, the Uganda National Council for Science and Technology, and the Uganda Wildlife Authority. I thank Dan Balemesa, Gerald Sunday Mayanda, Tom Sabiiti, and Moses Ssemehunge for assistance in the field. The research was funded by an ESRC/NERC interdisciplinary studentship to M.M., and a Leverhulme Trust award to Catherine Hill, who provided helpful comments on the manuscript.

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**<NOTE>**

## New Way to Dip for Honey is the First Observation of Tool-use in Wild Chimpanzees of Nyungwe National Park, Rwanda

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Honey dipping is well documented in wild chimpanzee populations across their range<sup>1,2</sup>. Nyungwe National Park in the south-western region of Rwanda has an estimated chimpanzee (*Pan troglodytes schweinfurthii*) population of 340 individuals<sup>3</sup>, and this record is the first documented report of tool use from this site. There are unconfirmed reports from park field staff of chimpanzees dipping for honey with sticks and there have been several unconfirmed observations of discarded tools left protruding from tree hollows. These observations suggest honey-dipping is one type of tool-use practiced by this chimpanzee population. However I made a new observation of a novel way of manipulating a honey-probe tool by a wild chimpanzee, which expands the breadth of tool use of wild populations as a whole. I made a serendipitous observation of a tool-use episode in which an adult male chimpanzee probed for honey by manipulating the tool firstly with his hand and then by clamping the honey-probe stick between his teeth using his jaw muscles and manipulating it with his mouth. In October 2009, the individual ascended a tree with a long stick of approximately 80cm in length and then stripped the branch of bark and leaves with his teeth. Using his right hand, he forced the stick into a beehive (Possibly *Apis mellifera*), in a hollow in the trunk of the tree. However, he was unable to gain sufficient force to break into the hive, and so repositioned himself upside down and took the stick in his mouth. He gripped the stick with his molar and incisor teeth. It was positioned in such a way that it passed on the inside of his upper and lower right canines, and then extended backwards out of the side of his mouth past his right cheek and forwards from between his incisors (see Fig. 1). With the stick firmly gripped between his teeth, he used his arms, body weight and neck muscles to push his head towards the tree and at the same moment force the tool, gripped in his mouth, into the bee hive in order to break into it. After re-positioning himself and attempting for a further five attempts, he successfully broke into the hive. Once the probe had penetrated the hive, he released the stick from his mouth and manipulated it with his hand. He then removed the probe from the hole using his hand



Fig. 1. Chimpanzee probing for honey using a new technique, the jaw-clamp.

and wiped the visible honey from the tip with his lips. He repeated probing for *circa.* 35 minutes in this way by forcing probes into the hollow both by using the tool in his hand and also clamping the tool with his teeth when he required more leverage. When the first honey probe snapped, he replaced with another, using a total of four honey-probes during this single tool-using episode. All subsequent honey-probes were made by breaking off small branches of the tree in the vicinity of the bee hive before stripping them of bark and leaves with his teeth. All honey-probes were manipulated both by hand and by his mouth. This observation provides the first description of such a “jaw-clamp” manipulation in the handling of tools in free-ranging chimpanzees.

This observation expands the diversity in which tools are manipulated by chimpanzees and may provide an alternative method to pounding beehives using honey hammers / clubs which has been documented in other sites in Central Africa to access beehives, but has not yet been documented in Nyungwe<sup>4-6</sup>. There are records of wild orangutans using their mouths to manipulate tools, in which they clenched probes in their teeth to extract food from holes<sup>7</sup> and placed leaves next to their mouth in order to amplify sounds that they make<sup>8</sup>.

This opportunistic observation provides both the first documentation of any tool-use in this chimpanzee population and also expands the diverse set of tool-use abilities in free-living chimpanzees. Preservation of distinct tool-using behaviours is an important consideration for conservation strategies and this

observation highlights the need for further research of the chimpanzee population living in Nyungwe National Park, Rwanda.

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## <NOTE>

# Bird in the Hand: Bossou Chimpanzees (*Pan troglodytes*) Capture West African Wood-owls (*Ciccaba woodfordi*) but Not to Eat

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Fig. 1. Adolescent male PL after capture of the owl, carrying it in right hand.

## INTRODUCTION

Chimpanzees rarely capture an animal without eating it, but this puzzling pattern occurs in both nature and captivity, mostly by youngsters<sup>1-6</sup>. At Bossou in Guinea, chimpanzees rarely hunt for meat; their home range presents few suitable prey<sup>7</sup>. From 1976 to 2008, only one bird (West African wood-owl, *Ciccaba woodfordi*) capture was recorded, and it was consumed<sup>7</sup>. In 2009, we saw two captures of this species, which were not followed by consumption. Instead, both raptors were used as toys, as previously observed at Bossou with tree hyrax, *Dendrohyrax dorsalis*<sup>3</sup>. Here we describe the captures and discuss the implications of this behavior from an evolutionary perspective.

## METHODS

### Site and Subjects

Bossou is a long-term chimpanzee (*Pan troglodytes verus*) study-site in Africa<sup>8</sup>. Its chimpanzees range over 15 km<sup>2</sup>, dominated by primary and secondary forest and surrounded by cultivated fields, abandoned fields and

shrub forest. The chimpanzees are fully habituated to human observers. The bird captures occurred between November 2008 and November 2009, during (mostly) nest-to-nest follows totaling 690 hours. These combined focal and scan sampling, and we videotaped and photographed events to supplement direct observations. Rare or unusual events were recorded *ad libitum*. Both episodes were at nearly the same location, on the eastern slope of Guein Hill (N 7.38.698; W 8.30.102).

## RESULTS

*Case 1:* On 21 February 2009, S.C., G.Y. and two field assistants (J.D., G.Z.) followed a party of seven individuals (JR, JY, PL, JJ, TA, FF, YL), eating fruits. At 0941hr, we heard the alarm call of a bird nearby, about 20m away. Upon approaching the site, we saw an adult owl swooping over the head of an 11-year-old adolescent male chimpanzee (PL), apparently trying to “mob” him. PL descended a short distance, carrying in his mouth a motionless owl, apparently dead, and then placed the chick in a groin pocket. He had feathers in his mouth. From 0945hr to 1021hr: PL made a tree nest, then moved to another tree nearby and made two large tree nests, lay

down in each, and rested supinely with the bird on his belly. At 1027hr PL tapped his feet on the nest and feathers fell to the ground. Two minutes later, he left the third nest, but then returned to enlarge it and began to play with the carcass, balancing it on his feet while lying supine. At 1034hr, he again left the nest, carrying the owl in hand (Fig. 1). From 1037hr to 1102hr: PL moved to another tree and carrying the owl in his groin pocket, while eating fruits. He built a fourth nest at 1044hr, where he again played with the owl, balancing the carcass on his arm (Fig. 2) and grooming it. He left the nest and descended carrying the bird (now featherless) (Fig. 3). From 1102hr to 1229hr: On the ground PL carried the carcass dorsally, on his shoulder, while eating leaves. He inspected the dead bird, touched it with index finger and put the finger into his mouth, then moved away to eat fruits. He then rested on



Fig. 2. Playing in large day nest, balancing dead bird with one hand, while lying supine.



Fig. 3. Balancing the owl, after plucking its feathers.



Fig. 4. End of event 1: "toy" broken in pieces and PL is resting after 4hr of play.

the ground, with the owl lying on his belly; in this position, he touched alternately his genitals and the owl with his hand. Next, PL made a ground nest and balanced the carcass with both hands while lying supine. From 1229hr to 1346hr: PL pulled off the bird's wings. He enlarged his ground nest and rested, whisking away flies circling the carcass (Fig. 4). At 1346hr PL emerged from his ground nest, leaving the carcass behind. No other chimpanzees showed interest in PL's activities throughout the events.

*Case 2:* On 22 October 2009, Y.Y. and a field assistant (J.D.) followed PL in the Guein area. At 0855hr, they suspended observations for about an hour, then at 1003hr, resumed focal sampling on him. He sat on the ground next to the alpha male, holding a dead owl in his hand. From 1008hr to 1011hr: PL travelled and fed carrying the bird in his hand. An infant male (FL) approached him and peered closely, as PL groomed the carcass. After the infant departed, PL continued examining the bird for

about 10 seconds, then abandoned it. The researcher immediately collected the carcass and verified that feathers had been plucked and part of the viscera had been extracted.

## DISCUSSION

These are the first observed bird captures at Bossou not followed by prey consumption. Nishida *et al.*<sup>9</sup> noted at Mahale, Tanzania, that parts of the carcass sometimes were abandoned without consumption. As at Bossou, these events involved young solitary individuals who opportunistically encountered prey by chance. Bonobos (*Pan paniscus*) showed similar exploration and grooming after capturing infant monkeys, which were handled like dolls<sup>10</sup>.

Our observations echo previous reports from Bossou: Prey was found by chance, without active pursuit, and adults showed little or no interest in the prey<sup>7</sup>. Bossou's chimpanzees eat few vertebrate prey<sup>11</sup>, including only one species of bird, this one. Owls may be relatively easy to catch, as they roost during the day in the canopy. A recent report from Mahale<sup>12</sup>, on some of the very few bird predations by chimpanzees, differs somewhat from the Bossou events, for example, birds at Mahale are captured and consumed. However, several behavioral similarities emerge: catching of birds is solitary and opportunistic, does not require group hunting, the targeted birds are nestlings, and idiosyncrasies may explain why some chimpanzees tend to repeat this behavior.

Availability (or lack) of resources and distribution and abundance of prey may explain the lack of emergence of pursuit-hunting at Bossou. Or, some of the behavioral patterns seen rarely at Bossou, or seen only in the early years of research, may not have spread or persisted, due to the migration or disappearance of key members of this small group, or to too few potential extra innovators arriving through immigration. If prey-capture is sporadic and unpredictable, opportunities to watch a *hunter* are rare, and so observational learning and cultural transmission is hindered. Further research is needed to assess systematically the abundance and availability of prey and of learning opportunities.

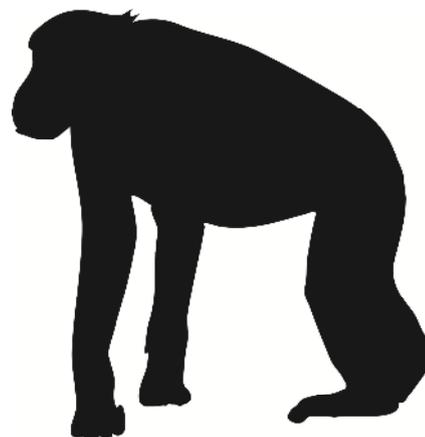
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## &lt;NEWS&gt;

## Puffy Inherits a Habit from Her Father?

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In August 2009, I visited Mahale after a two-year absence and stayed for two weeks. My field season was so short that I made every effort to observe as many chimpanzees as possible to catch a glimpse of behavioral changes among M group chimpanzees.

A nine-year-old female, Puffy, was one of the chimpanzees I wanted to observe most because she had lost her mother, Pinky, during the outbreak of respiratory disease in 2006<sup>1</sup>.

Gwekulo, a sterile female, was interested in caring for infants of other females or orphaned infants. Thus, she adopted a 4-year-old female orphan Pipi in 1994 after Pipi's mother died of another respiratory outbreak in 1993<sup>2</sup>, although she was also interested in a two-year-old male infant of Wakampompo. By September 1995, Gwekulo had begun to carry Primus, Puffy's elder brother, 4 years old at that time. Since then, Gwekulo had become Pinky's great partner. Pinky gave birth to Puffy in 2000 long after Primus was weaned, and Gwekulo became Puffy's earnest babysitter. Gwekulo and Pinky not only became close

friends but also formed a formidable coalition. Any group member in conflict with either of them had to fight both of them, and Pinky seemed to be one of the most dominant females of the M group.

After Pinky's death, Gwekulo continued to care for orphaned Puffy. However, after Puffy became an adolescent, Gwekulo's keen "maternal" drive was diverted from Puffy and directed more to younger infants although she continued to groom Puffy. In August 2009, Gwekulo was most interested in Xtina's one-year-old infant and cared for it whenever opportunity allowed. This baby had at least three babysitters: Puffy and the baby's elder sister, nine-year-old Xantippe in addition to Gwekulo. They transported and groomed the baby one after another. Xtina seemed to enjoy traveling without carrying a charge during many of the daytime hours.

On August 25, I was surprised to watch Puffy's behavior. When she pant-grunted to a young adult male, Orion, she touched her right nipple with her left fingers. This was the first time I observed her do so. Puffy massaged her left nipple with her right thumb and then pant-hooted for 5 seconds. She again continued this self-massage for 30 seconds (Fig. 1).

I was shocked because the way she fumbled the nipple was so much like that shown by an adult male, Alofu. He has been seen to massage his nipple since he was an adolescent male<sup>3,4</sup>. He was notorious for this habit<sup>5</sup> because he seemed to show this "nipple press" or "fumble nipple"<sup>6</sup> whenever he appeared to be uneasy, e.g., when he pant-grunted to the alpha male or when he anticipated the approach of aggressive males. Alofu's nipple press is different from that displayed by other chimpanzees in that he showed this behavior



Fig. 1. Puffy, massaging her left nipple with her right thumb.

frequently every day, and his pattern was meticulous. Puffy's nipple press was as meticulous as Alofu's.

It is true that other chimpanzees also occasionally show nipple press: among adult females, Abi, Fatuma and Wakusi; among adolescent males, Pim and Xmas; among adolescent females, Qanat and Carmen (and Rubicon, according to Takahisa Matsusaka); and among adult males, Fanana. However, Puffy's action was so impressive that I hit upon the idea that Alofu might have been Puffy's father. By the way, Puffy's original closest associates, Pinky, Primus and Gwekulo, never showed nipple press.

When I returned to Japan, I asked Eiji Inoue who Puffy's father was. Eiji had collected fecal samples from as many individuals as possible and was able to clarify 11 pairs of father-offspring relationships via DNA analysis<sup>7</sup>. Fortunately, Puffy was one of the few youngsters whose father was clarified, and Eiji's answer confirmed my suspicion: he was Alofu! Puffy had no close association with Alofu, and the possibility of social learning from Alofu was small. Consequently, the puzzle of the similarity between Puffy's and Alofu's patterns was solved.

There were mother-offspring pairs who shared nipple press habit, for example, Pim is Fatuma's son, and Puffy's father, Alofu, is Wakusi's son. Although social learning was considered a possibility<sup>5</sup> explaining the behavioral similarity, it may be that genetic influences should also be considered in these cases. Thus, the nipple press behavior seems to be at least partly genetically influenced.

On the other hand, Pim showed nipple press when he was an adolescent but ceased doing this after he became alpha male. Fanana did not show the behavior when he was alpha male, but began to show it by 2009, many years after he was dethroned in 2003. Moreover, I have never seen any infants or juveniles showing this behavior. Therefore, 9 dominance rank or self-confidence and sexual maturity also seemed to influence the emergence of the nipple press.

There is another question: did other chimpanzees' nipple press patterns spontaneously occur, without being influenced by Alofu's frequent performances, or were they influenced at least partially by Alofu? Nipple press is a simple behavior that anyone can engage in without practice, so this is a difficult question to address. When some behavior patterns seemed to be in fashion in a group, we have too often attributed it to social learning<sup>5</sup>. However, in the case of patterns giving physiological pleasure, we should think twice whether or not it would be more reasonable to take genetic factors into primary

consideration.

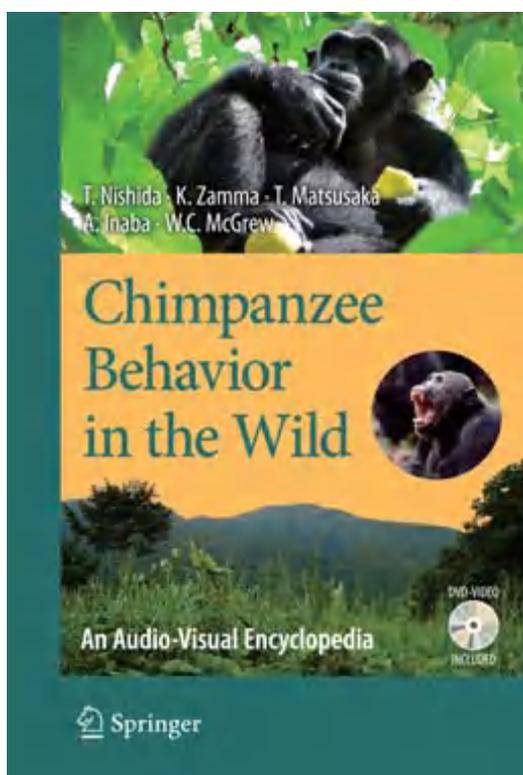
We should accumulate observational data of nipple press behavior along with the association rates of individuals as well as kinship analyses. Although an indisputable answer may not be found, we could gain a better understanding of the influences of genetic inheritance and social learning on behavioral patterns.

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