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Contents

<NEWS>
International symposium to celebrate 40 years of research on the Taï chimpanzee
Michio Nakamura 2

<NOTE>
A five-year-old chimpanzee ranged alone: Reconsidering independence in ranging
Michio Nakamura & Hitonaru Nishie 4

<NOTE>
Snare-related disability led to the near-fatal accident of a bonobo at Wamba, Democratic Republic of the Congo
Nahoko Tokuyama 7

<NOTE>
A case of maternal response towards dead offspring in wild bonobos: staring, grooming but not carrying
Shintaro Ishizuka 10

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International symposium to celebrate 40 years of research on the Taï chimpanzee

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An international symposium to celebrate 40 years of the wild chimpanzee study project at Taï Forest in Côte d'Ivoire (see Wittig 2018) was held on May 29–31, 2019 at the Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany (Figure 1). The symposium also commemorated the retirement of Dr. Christophe Boesch, who initiated the research project at Taï, and has served as Director of the Department of Primatology at the Max Planck Institute (see Boesch 2009: 2012; Boesch & Boesch-Achermann 2000 for some of Dr. Boesch's achievements). Approximately 40 speakers from Germany, Switzerland, USA, UK, and Japan, and guests from Côte d'Ivoire were invited to the symposium. Many students from the Max Planck Institute and other institutions, who are studying wild chimpanzees, were also in attendance.

On May 29, the symposium began with the session "Field Site Comparison," chaired by Dr. Roman Wittig. Dr. Wittig, together with Drs. Cat Hobaiter, Anne Pusey, Dave Morgan, Alexander Piel, Takeshi Furuichi, and Martin Muller, introduced their study sites in Taï, Budongo (Uganda), Gombe (Tanzania), Goalougo (Congo), Issa (Tanzania), Kalinzu (Uganda), and Kanyawara (Uganda). At the conclusion of the first day, Dr. Boesch gave a commemorative lecture to reflect on 40 years of research at the Taï Chimpanzee Project (Figure 2).

On the morning of the second day, the "Field Site Comparison" session continued. Drs. Simone Pika, Michio Nakamura, and David Watts spoke about their field sites at Loango (Gabon), Mahale (Tanzania), and Ngogo (Uganda). At the end of the session, Dr. Hjalmar Kühl introduced the Pan African Project, which analyzes dozens of wild chimpanzee study sites for direct behavioral comparisons.

The subsequent session on second day, entitled "Communication," was chaired by Dr. Klaus Zuberbühler. In this session, Drs. Catherine Crockford and Katie Slocombe presented vocalization studies conducted at Taï and Budongo. Dr. Julia Fischer presented her work concerning vocalization studies in green monkeys. The "Cognition" session followed, which was chaired by Dr. Robert Seyfarth. In this session, Drs. Cedric Girard-Buttoz and Erica van de Waal presented their field experimental studies of cognition in chimpanzees and vervet monkeys, respectively, while Dr. Daniel Haun presented his studies of human cognition. The last session on the second day, "Cooperation," was chaired by Dr. John Mitani. In this session, Drs. Liran Samuni, Kevin

Figure 1. The Max Planck Institute for Evolutionary Anthropology, Leipzig

Figure 2. Dr. Christophe Boesch giving a commemorative lecture on May 29

Langergraber and Redouan Bshary discussed collaborative behavior in Taï chimpanzees, Ngogo chimpanzees, and vervet monkeys, respectively.

On May 31, Dr. Richard Wrangham chaired the session "Competition." Drs. Roman Wittig and Michael Wilson discussed within- and inter-group competition among Taï and Gombe/Kanyawara chimpanzees, respectively. Dr. Julia Lehmann presented her work concerning the role of friendship when competition becomes severe among Barbary macaques. Finally, Richard McElreath presented his work concerning competition among humans in different cultures. Dr. Christophe Boesch chaired "Culture," the second session on the third day. Drs. Lydia Luncz, Crickette Sanz, and Caroline Schüppli presented their studies of material culture in Taï and Goualougo chimpanzees, and in orangutans, respectively. Dr. Ignacio de la Torre presented work concerning early human stone technology relative to current stone tool use by nonhuman primates. The final session concerned great ape physiology, genetics, and health, and was chaired by Dr. Jacinta Beehner. In this session, Drs. Tobias Deschner and Melissa Emery Thompson discussed the physiology of Taï and Kanyawara chimpanzees, respectively. Dr. Linda Vigilant presented her genetic research in the Taï chimpanzees, and Dr. Fabian Leendertz presented work concerning great ape health and disease. After these sessions concluded, Dr. Carel van Schaik summarized the symposium by introducing the outcomes of the questionnaires participants completed during the symposium.

Overall, the symposium was well-organized, and was an excellent learning and networking experience with prominent primate researchers across the globe. Amazingly, most of these eminent scientists are studying the common topic of chimpanzees in the wild. Notably, "big data" of behavioral and genomic studies on chimpanzees is now available from several long-term study sites. Such big data, if re-interrogated with new ideas, will provide new insights into our cousin species in the African forests.

Finally, I should note that, as proposed by Drs. Boesch and Wittig, the participants signed an appeal for the conservation of wild chimpanzees, and a press release was made during the meeting.

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A five-year-old chimpanzee ranged alone: Reconsidering independence in ranging

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INTRODUCTION

Chimpanzees (*Pan troglodytes*) have a long period of dependency when they are immature. Dependence on the mother may have various aspects. Infants are dependent for almost every aspect: nutrition, transportation, hygiene, and thermoregulation. Nutritional independence seems to be achieved at around their third year but infants continue to suckle the nipple to around fourth to fifth year of age (Matsumoto 2017). After weaning, offspring is considered to enter juvenility. He/she is no more carried by the mother and eats by himself/herself. Still, juveniles are thought to be dependent in ranging as they are almost always together with their mothers (Pusey 1983; Hayaki 1988). Thus, in many studies about chimpanzee ranging behavior or party size, infants and juveniles are "not counted as independent animals" (Doran 1997).

Even if not the mother, a juvenile still needs somebody to be near. When a juvenile is away from its mother, he/she follows other adults or stays in a larger party (Pusey 1983). In a rare case when a five-year-old juvenile male was left behind by his mother who emigrated to a neighboring group for ten months, he was almost always observed to be together with a particular adult male (Hiraiwa-Hasegawa & Hasegawa 1988). Thus, even when juveniles are away from mothers, they are still with somebody else and are "virtually never alone" (Pusey 1990).

Orphans are of special interest in terms of dependency on adults (Nakamura *et al.* 2014). At Mahale, three-year-old orphans may survive (Nakamura & Hosaka 2015). Such infant orphans are often "adopted" by some non-mothers (Boesch *et al.* 2010; Nakamura & Hosaka 2015). Orphans are also dependent on their "adoptive mothers" to be carried, groomed, or shared the beds with. Although juvenile orphans are not "adopted" in such a way, they usually need to follow someone. Hayaki (1988) noted that "young orphans seem to need an attachment to a particular individual." Although such particular partners were sometimes less obvious (Nakamura & Hosaka 2015), juvenile orphans had been always observed in a ranging party containing at least one adult.

Here we report two cases of a five-year-old orphan female at Mahale who seemed to have ranged completely alone. These cases may provide us information to reconsider what independence in chimpanzees' ranging is.

METHODS

The study was conducted on the M group chimpanzees at the Mahale Mountains National Park, Tanzania in August and September 2018. The orphaned juvenile in question, Quinoko (Figure 1), was born in January 2013, thus 5 years and 7–8 months old (onset of juvenility) at the time of the observations. Her mother had died in January 2018 (7–8 months earlier). Her elder sister (born in 2006) also used to take care of Quinoko in her infancy but had disappeared (probably emigrated) one month prior to the mother's death. Thus, Quinoko no more had maternal kin in the M group.

Figure 1. Close-up of Quinoko, a five-year-old orphan female in 2018

OBSERVATIONS

Case 1

On August 20, 2018, HN and a research assistant were searching for chimpanzees in the flatter area within the M group's home range since morning. They could not hear any vocalizations. At 9:47 h they split into two parties to look for chimpanzees in different locations. Soon, the assistant found Quinoko on a tree. He followed her for a while as she moved eastward on trees. The assistant gave up following Quinoko when she went off the trail to the east.

At 10:29 h, HN and the assistant reunited and searched for other chimpanzees. They could only find two adult females at 14:39 h at a different place about 1.5 km from where Quinoko had been witnessed. Judging from circumstantial evidence, it seemed that the majority of chimpanzees were high up in the mountain.

Case 2

On September 13, 2018, the majority of M-group

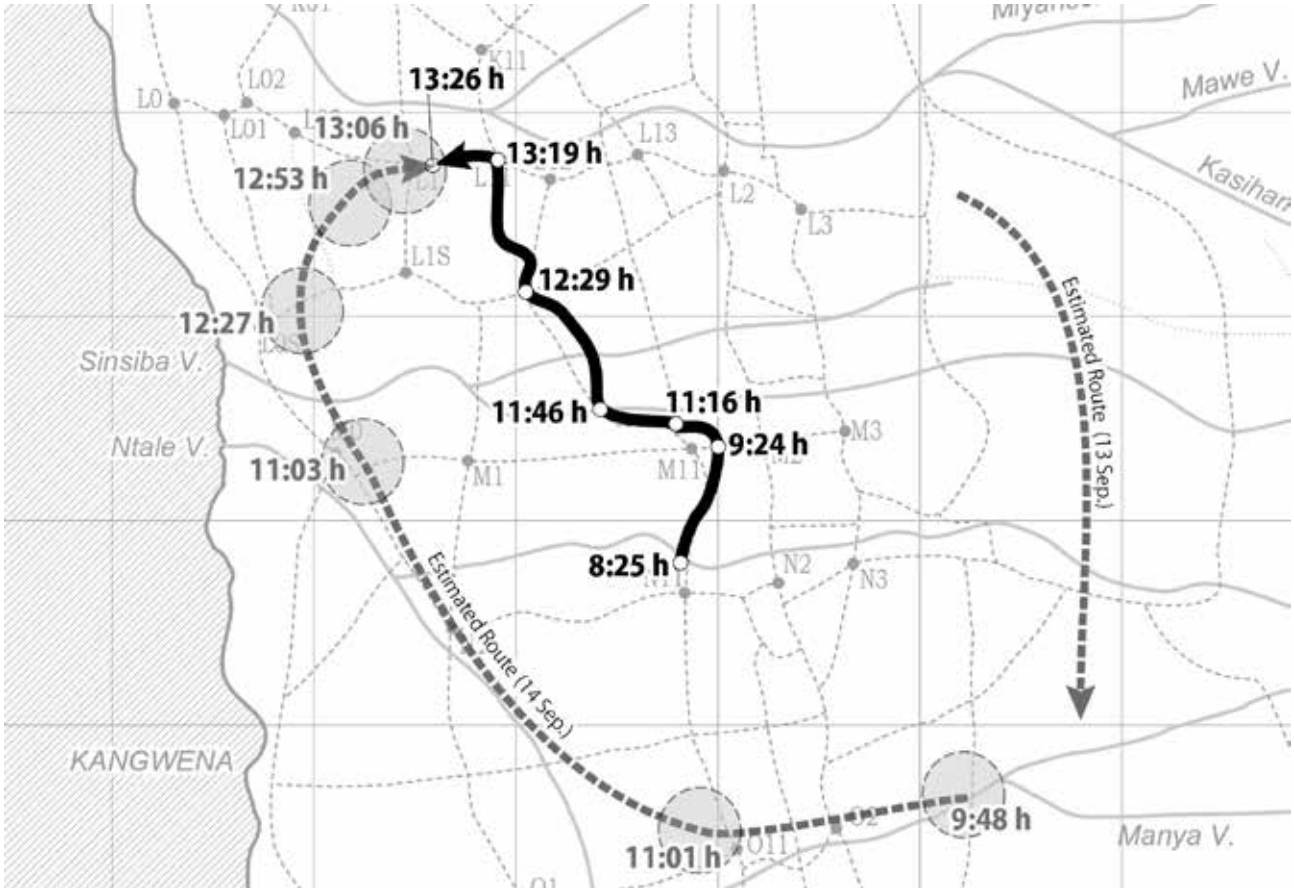

Figure 2. Ranging of Quinoko on September 14, 2018 relative to other chimpanzees' movement
Quinoko's travel route is shown in thick black arrow. White circles indicate the locations where she crossed observation trails. Other chimpanzees' estimated routes (on 13th and 14th) are shown in dotted grey arrows. Grey dotted circles indicate estimated locations of vocalizations heard while following Quinoko on 14th. One grid corresponds to 0.5 km by 0.5 km.

chimpanzees went up to the east in the morning. Judging from the vocalizations, they continued to move southward in the high mountain on the day (Figure 2, a dotted line to the right).

On September 14th, MN was heading to where he can hear vocalizations assuming large party was still on the mountain. Along the way, at 8:25 h, he found Quinoko alone on a tree eating *Saba comorensis* fruits (Figure 2). As MN followed her, Quinoko moved northward through trees, sometimes eating *Saba* and *Pycnanthus angolensis* fruits. At 9:37 h she made a humble bed on a high *Cordia* tree and lay down on it (Figure 3). At 9:48 h, chimpanzee vocalizations were heard from far southeast (still high in the mountain). Quinoko did not show any response. At 10:00 h she started to move again and ate *Saba*. She again rested at 10:39 h. At 11:01 h, chimpanzee calls were heard again, this time from far south but it seems they climbed down to flatter area. Soon afterward at 11:03 h, vocalizations came from west-northwest (someone may have preceded the main party). Still, Quinoko did not respond. At 11:13 h, she started to move and ate *Saba* and *Pycnanthus* on the way.

At 12:27 h, many vocalizations came from the west. This time they were much closer. Quinoko finally vocalized at 12:29 h: a whimper-like "*hu hu*" then a pant-hoot without a climax. The other chimpanzees' calls were intermittently heard, mostly from west. It seems the large nomadic party was spreading widely and approaching. Quinoko still moving through trees, headed north to the northwest while she replied four times to the vocalizations. At 12:56 h, she was high up in a tree looking at the direction of the voices. By 13:19 h she was completely within the range of widespread chimpanzees but still did not physically meet any.

At 13:26 h, she finally descended to the ground, ran on the trail, and pant-grunted to an adult male Carter who came from the west. After this reunion, Quinoko continued to move in this nomadic party until the evening.

DISCUSSION

It is unusual for a five-year-old juvenile to range alone, even considering that Quinoko was an orphan. In Case 1, although the observation time was short, it is likely that Quinoko had long been alone because we did not see other chimpanzees nearby despite a deliberate search. In Case 2, Quinoko was alone at least for five hours. Because most chimpanzees had been in the higher area since the day before, and we found her in the morning, we believe that she had stayed alone since the day before.

Pusey (1983) noted that one of the reasons why juveniles follow mothers is a need to learn how to find and process numerous seasonal and widely dispersed foods.

Figure 3. Quinoko resting on a high tree

This means juveniles are still dependent because they lack sufficient knowledge for foraging. However, as we observed in Case 2, Quinoko ate fruits several times and did not seem to have difficulty in finding and eating fruits. At this time, *Saba* and *Pycnanthus*, both Mahale chimpanzees' major foods, were beginning to fruit in many places. Thus in such a season, the demerit of being alone on foraging may not be so obvious.

Still, Quinoko's ranging behavior was not completely same as usual. Notably, she never descended on the ground while she was alone. In Case 2, she moved around 2 km only through trees. This is unlikely when we follow an adult chimpanzee ranging alone. Because at Mahale, tree canopies are often sparse, there seems to be a certain cost to move a long distance without descending on the ground. Quinoko actually seemed to incur extra costs to detour to the place where a branch is close to branch of the next tree or to jump from a tree to the next. It is possible that presence of the human observers may be the reason that she did not descend on ground. However, Quinoko is not usually so shy and did not show any nervous attitude toward us or try to flee. Thus, she might rather have had some unspecified anxiety.

Despite such possible anxiety, Quinoko never whimpered or made distress calls when she was far from others. This is contrasting to the situation when a similar-aged non-orphan gets lost. He/she would loudly whimper and scream and deliberately search for the mother (Hayaki 1988; Matsusaka 2003). An orphan also whimpers when he/she temporarily loses sight of the chimpanzee whom he/she is following. This may mean that juvenile chimpanzees do call only when there is somebody close enough to hear them. It is understandable that a chimpanzee does not call when he/she is completely alone not to attract predators.

Although juvenile chimpanzees almost always range with others, our observations suggest that they can be independent in some situations. It is unknown whether Quinoko chose to be alone (because she was harassed by others, for example) or was accidentally alone (i.e., got lost) for some reason. She ranged for a long time and did not seem to have difficulty in finding food. Still, as she never descended on the ground and kept moving on trees, it is suggested that ranging alone may cause some anxiety. This may be a proximate reason that juveniles are virtually never alone.

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Snare-related disability led to the near-fatal accident of a bonobo at Wamba, Democratic Republic of the Congo

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INTRODUCTION

In places where their home-ranges overlap with humans, chimpanzees and bonobos are frequently caught in snares made from metallic wire (Kano 1984; Quiatt *et al.* 2002). Although the victims are generally able to free themselves by breaking the sapling to which the wire is connected, they often fail to remove the wire itself. It is often weeks to months before the wire drops off on its own or the limb of the victim rots where the wire tightens. Snare injuries may cause serious infections, which are sometimes fatal (Hashimoto 1999; Boesch & Boesch-Achermann 2000). Moreover, the victims often suffer from limb loss or deformation (Waller & Reynolds 2001). Here, I report a near-fatal (had he not been rescued by human observers) accident encountered by a male bonobo with snare-related limb disabilities.

METHODS

Bonobos have been studied at Wamba in the Luo Scientific Reserve of the Democratic Republic of Congo since 1973 (Kano 1992). Although the use of snares made from vines or nylon strings is allowed for subsistence hunting by local people, the use of snares made from a metallic wire is prohibited. However, metallic wire is easily available at the local market and some people use metallic snares because they trap animals more efficiently than traditional snares. Bonobos in PE group have been studied intensively since September 2010, though they had been sporadically studied earlier. On November 12, 2017, when this event was observed, PE group consisted of 27 individuals, including five adult males, nine adult females, and one adolescent female. The event was observed by trained local field assistants. Teams of two assistants followed the bonobos by working two shifts (morning and afternoon). I interviewed all four assistants in the evening that day.

Gai was first identified as an adult male in PE group in 2007. His upper limbs were greatly deformed and exhibited typical effects of snare injuries (right: claw-hand and hooked-wrist, left: second to fourth digits missing from the second joint, Figure 1, Waller & Reynolds 2001). His left upper limb had been deformed before we first identified him in 2007. His right hand was trapped in a metallic wire in September 2009 and the wire did not drop off until November 2010 (T Sakamaki personal com-

Figure 1. Upper limb deformations of Gai Area inside the white box shows his left hand from a different angle.

munication). The thumb and remaining parts of the four digits of his left hand were capable of a certain amount of movement, though clumsily. His right hand and wrist were stiff and unmovable. Although slower than other individuals, he could climb trees by holding the trunk using both of his arms.

OBSERVATIONS

November 11, 2017

Two field assistants and I followed a large party of bonobos from 05:55 h. We observed all PE individuals, but lost them at 09:47 h due to heavy rain.

November 12, 2017

The morning team of field assistants started searching for bonobos at 06:00 h and located them at 06:34 h. The bonobos had gathered at one place and were vocalizing loudly. The assistants soon noticed that Gai was stuck in a tree at a height of about 3 m. His left wrist was caught in a narrow gap where the tree trunk branched into two (Figure 2). The tree trunk and the two branches were about 20, 15, and 8 cm in diameter, respectively. Because his right hand was not capable of gripping, he could not lift his body high enough to free himself from the gap. There were multiple teeth marks on the branches (Figure 2) and the vines around him were bitten through. Judging from the fruits of *Landolphia* sp. scattered on the ground, the bonobos had fed there on the afternoon of November 11. No new night beds were found nearby.

Gai seemed to be exhausted. The other bonobos were in the trees around Gai and making loud calls intermittently. At 06:34 h, when the assistants found the bonobos, an adult male (Snare) and three adult females (Bokuta, Maluta, and Nara) were sitting close to Gai and peering at him. At 06:47 h, an adult male (Malusu) approached Gai and threatened him by shaking branches and contest hooting. The other bonobos vocalized and Malusu stopped threatening Gai. At 07:00 h, an adult male (Turkey), two adult females (Saku and Marie), and a juvenile male (Hideo) approached Gai and peered at him.

At 07:20 h, the field assistants judged that Gai could not get out from the gap by himself and they started cutting down the tree to rescue him. Two adult males (Turkey and Snare) approached and threatened the assistants by shaking branches and barking, and the field assistants scared the males off by shouting loudly. The entire party of bonobos moved several dozen meters away. At 07:24 h, the tree was cut down to the ground and Gai freed himself from the gap and ran away.

At 07:34 h, the party of bonobos came back to where Gai had been caught. After one or two minutes, the bonobos moved about 50 m away and started resting and grooming on trees. All of the PE group individuals were observed there except for Gai. At 09:41 h, two adult males (Turkey and Ikura) and a juvenile male (Kale) moved to where Gai had been caught. At 09:43 h, an adult female (Marie) and a subadult female (Lucie) joined the males. At 09:44 h, all of the bonobos climbed down from the trees and started traveling. The field assistants followed the bonobos but lost them at 11:10 h because of their quick pace.

At 14:15 h, the afternoon team of field assistants observed Gai walking alone on the ground. He fled from the assistants and was not observed again until December 2, 2017 (19 days).

December 2, 2017

Gai was observed in a party of PE group at 11:23 h.

Figure 2. Tree in which Gai was trapped.
Field assistant, Iyokango Bahanande, demonstrates how Gai was trapped in the gap between the branches. Although the assistant is putting his right arm in the gap, Gai was trapped by his left arm. Teeth marks on the branches can be seen.

Figure 3. Injuries on the inside and outside of Gai's left wrist
Photos were taken on December 12, 30 days after the accident.

All individuals except Gai had been observed daily between November 12 and December 2, suggesting that Gai was ranging alone during this period. He had severe abraded wounds on the inside and outside of his left wrist (Figure 3) but showed no apparent signs of debility.

DISCUSSION

Based on indirect evidence, Gai might have been trapped in the gap of the branches when he was climbing down after eating *Landolphia* sp. on the afternoon of November 11. The branches could have been more slippery than usual because of heavy rain in the morning of that day. The teeth marks on the branches and chewed vines around him indicated that he had been struggling to free himself. He seemed to be already exhausted when the field assistants found him early in the morning on November 12. Without their rescue, Gai might have eventually died. After surviving the initial infection, snare injuries had been considered to give minimal effect on an individuals' survival (Kano 1984; Stokes 1999). However, the current case shows that snare injuries can cause serious accidents even years after the original injury. It is important for researchers and governments to perceive the ongoing risk of snare injuries and make further effort to raise awareness in local communities.

During the incident, the other group members gathered around Gai and were vocalizing loudly. Although they did not show any apparent behavior that would help Gai to free himself from the gap in the branches, some bonobos approached and peered at him. A male behaved aggressively toward Gai, but he stopped when other bonobos vocalized toward them. There were no night beds around Gai, which indicates that Gai spent the night of November 11 by himself. After Gai had become trapped, other bonobos might have left Gai in the afternoon of November 11 and then come back early in the morning of November 12. I have observed a very similar case in the same group in 2011 (Tokuyama *et al.* 2012). An adult male was caught in a snare. The other members of the party left him in the evening, but the next morning, they travelled back to where he had been trapped.

Two possibilities are considered to be the motivation for bonobos re-visiting these injured individuals. First, bonobos might care about the injured or immobilized individuals. Although the bonobos leave the injured individuals to feed or to find appropriate bed sites, they might come back at a later time to check on the condition of the injured individuals. The other possibility is that bonobos just tend to be drawn to irregular events. Bonobos sometimes gather around trapped animals, dugout canoes that local people make in the forest, and so on. In such cases, bonobos often approach, peer, touch, and shake branches toward the objects (Hayashi *et al.* 2012; N Tokuyama personal observation). Bonobos also sometimes re-visit the place of an unusual event after a few hours or days (N Tokuyama personal observations). Although it is difficult to understand the motivation for bonobos re-visiting and gathering around Gai, this case may contribute to our insight into the behavioral characteristics and emotions of wild bonobos.

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A case of maternal response towards dead offspring in wild bonobos: Staring, grooming but not carrying

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INTRODUCTION

Comparative thanatology is a research branch that scientifically studies death from various perspectives, such as ethologically, physiologically, or psychologically. Research on animal behaviors has been particularly focused on how animals respond to dead conspecifics (reviewed in Goncalves & Biro 2018). In two species of the genus *Pan*, one of the most well-known responses towards dead conspecifics is the carrying of dead offspring by their mothers. It has been reported that mother chimpanzees (*Pan troglodytes*) have carried their dead infants in Mahale, Bossou, Tai, and Gombe (Nishida 1973; Hosaka *et al.* 2000; Kooriyama 2009; Matsuzawa 1997; Biro *et al.* 2010; Boesch & Boesch-Achermann 2000; Goodall 1968). However, in bonobos (*Pan paniscus*), there are only a few available reports that mothers also carry their dead offspring (Kano 1992; Sakamaki personal communication). Another type of response by mother bonobos is the eating of the corpses of their dead infants after they carried the corpses (Fowler & Hohmann 2010; Tokuyama *et al.* 2017). These reports suggest that there is variation in the responses of mothers towards their dead offspring in bonobos, whereas our understanding of such responses is still scarce due to the limited number of observational cases. That is why more observational reports are required for a better understanding of the responses towards dead conspecifics in the genus *Pan*. Here we report a new case of maternal response towards dead offspring in wild bonobos.

METHODS

The study subjects were a group of wild bonobos (called the PW group) at Wamba, the Democratic Republic of the Congo (Kano 1992). In 2010, two groups of wild bonobos were recognized around the area previously used by the P group. One of the two groups was named the "PW group". All individuals of this group have been identified since 2012. In 2014, this group consisted of 14 individuals, including five adult/adolescent males and four females, which were estimated as immigrant and parous during the observation period. Field research concerning the PW group has been carried out sporadically since 2011 (almost once per month). Two local assistants and I followed a mother bonobo, Rebekka (Rb), and her daughter, Rida (Rd), on January 13 and 14, 2016. At the time of observation, Rb was estimated to be 13 years old. Rd was born in 2015 and estimated to be first offspring of Rb.

OBSERVATIONS

January 13, 2016

We found Rb and Rd in bed within the canopy at 6:56 h. Rb coughed frequently and Rd appeared limp, although Rd still clung to the body of Rb, suggesting that both of them were unwell. When we found them, no other members of the PW group were nearby. Although Rb sometimes fed on fruits of *Musanga cecropioides*, she spent most of her time resting in the canopy.

At 10:26 h, Rb climbed down to the ground. Suddenly, Rb put the body of Rd on the ground. Rd screamed several times, while Rb kept about a 2 m distance from Rd and stayed motionless on the ground. At 10:36 h, Rb began to carry Rd again. They both returned to the canopy.

At 10:55 h, Rb climbed down to the ground again, and started to move around. At 11:08 h, Rb put the body of Rd on the ground again, then watched Rd from a branch approximately 2 m above the ground. At 11:18 h, Rb began to carry the body of Rd again and climbed up to the canopy.

At 13:28 h, we realized that Rd did not cling to the body of Rb, although Rb still held the body of Rd. At this time, Rd might have already been dead. At 13:45 h, Rb dropped the body of Rd, then climbed down to a position about 2 m from the corpse. Rb stared at the corpse while drinking water. Rb stayed near the corpse of Rd but returned to the canopy at 14:00 h, without carrying the corpse. At 15:00 h, we finished the observations, but before leaving we changed the posture of Rd to take a photograph.

January 14, 2016

We found Rb and the corpse of Rd at 6:56 h, at the same place where observations from the previous day had finished. Rb coughed often and seemed to still be unwell. As on the previous day, Rb sometimes fed on fruits of *Musanga cecropioides* but spent most of her time resting.

At 9:03 h, Rb climbed down to the ground and visited the corpse of Rd. Rb touched the corpse gently, grooming it for a few seconds. Rb stayed with the corpse until 9:11 h, before finally returning to the canopy.

At 12:25 h, Rb visited the corpse of Rd again. Rb started to groom the corpse (Figure 1). After Rb continued grooming for about one minute, she stopped and returned to the canopy (at 12:26 h).

At 13:30 h, members of the PW group appeared around Rb and the corpse of Rd. Rb joined the members of the group and started to range with them. Finally, Rb

Figure 1. Rb groomed her dead infant

left the corpse of Rd. Following the appearance of the other members of the PW group, neither they nor Rb responded at all towards the corpse, and eventually left. We followed the party, including Rb, and finished the observations at 15:00 h.

DISCUSSION

Previous reports on non-human primates have shown that mothers have continued to carry the bodies of their offspring (reviewed in Watson & Matsuzawa 2018; Goncalves & Carvalho 2019), whereas it is unclear whether Rb carried her dead infant until she released the corpse of Rd from the canopy. In this report, it was confirmed that Rd was alive at 11:18 h and her corpse was dropped at 13:45 h during the same day. This means that her corpse might be carried for a maximum of approximately 2 hours. This possible duration of carrying is similar to those reported in bonobos (Fowler & Hohmann 2010; Tokuyama *et al.* 2017). However, it is shorter than those reported in chimpanzees. For example, in Bossou, a mother chimpanzee carried her dead offspring for 27 days and groomed it regularly (Biro *et al.* 2010). In Mahale, a mother chimpanzee carried her dead infant for at least 111 days (Hosaka *et al.* 2000). Although the number of available data is still scarce, duration of maternal carriage of their dead offspring may be longer in chimpanzees than in bonobos. This may be because female bonobos are more social than female chimpanzees (Kano 1992; Furuichi 2009; Surbeck *et al.* 2017). Mother bonobos may choose to leave their dead offspring in order to perform intense social interactions with other alive conspecifics.

After the corpse of Rd was dropped down, Rb returned to the corpse at least twice. Although it is unclear whether she recognized the death of her offspring, at least she had remembered about her until the time of the second visit to the corpse. Moreover, Rb groomed her dead infant during these visits. This behavior may be maternal care which is sometimes continued after the death of her infant, as it is observed in various species of primates (reviewed in Watson & Matsuzawa 2018). On the other hands, the number of her grooming opportunities was only twice and she did not carry the corpse again. One possible reason for this may be that the dead offspring was her first offspring. Because her experience in maternal care was relatively short, carrying offspring might not be natural for Rb compared to other mothers who carried their dead offspring in the genus *Pan*. Another possible reason may be that her illness was too serious to permit her to carry the corpse. After she went to the corpse for the first time, she still coughed often and appeared to be unwell. Moreover, because Rd had been already dead at the time, the energetic costs for carrying must have been larger than when the infant had been alive. It might have been too hard for Rb to carry the corpse at the time.

Although female bonobos are highly gregarious (Furuichi 2011), Rb stayed alone after we started observations at 6:56 h on January 13, until members of her group visited her at 13:30 h on January 14. When members of bonobo groups become seriously unwell, they may stay by themselves. However, members of the group came to the place where Rb was staying, suggesting that they might have been searching for Rb and Rd. A similar case has been reported where members of a bonobo group returned to an individual captured by an artificial snare (Tokuyama *et al.* 2012). If any member of a bonobo group cannot follow the other members for several reasons, the group may search for the individual rather than abandoning it.

In chimpanzees, it has been recognized that mothers often carry their dead infants. However, this report suggests that mother bonobos may not be strongly engaged in carrying their dead infants. This implies potential interspecies differences in maternal response towards dead offspring in the genus *Pan*. For a better understanding of such differences, more observational reports are needed in both species.

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