

## 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 Gonçalves & 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.

## ACKNOWLEDGEMENTS

I thank the Research Centre for Ecology and Forestry and the Ministry of Scientific Research, Democratic Republic of the Congo for permitting our research. I also thank Dr. T. Furuichi, Dr. T. Sakamaki, and local assistants at Wamba for helps in my fieldworks, and Mr. A. Goncalves for valuable comments on my manuscript, and Mr. J. A. Pastrana for helps in my English writing, and Dr. K. Hosaka for reviewing and providing helpful comments on my manuscript. This study was financially supported by Japan Society for the Promotion of Science Grant-in-aid for JSPS fellows (17J09827 to Shintaro Ishizuka), and the Leading Graduate Program in Primatology and Wildlife Science of Kyoto University.

## REFERENCES

- Biro D, Humle T, Koops K, Sousa C, Hayashi M, Matsuzawa T 2010. Chimpanzee mothers at Bossou, Guinea carry the mummified remains of their dead infants. *Curr Biol* **20**: R351–R352. <https://doi.org/10.1016/j.cub.2010.02.031>
- Boesch C, Boesch-Achermann H 2000. *The Chimpanzees of the Tai Forest: Behavioural Ecology and Evolution*. Oxford University Press, Oxford.
- Fowler A, Hohmann G 2010. Cannibalism in wild bonobos (*Pan paniscus*) at Lui Kotale. *Am J Primatol* **72**:509–514. <https://doi.org/10.1002/ajp.20802>
- Furuichi T 2009. Factors underlying party size differences between chimpanzees and bonobos: A review and hypotheses for future study. *Primates* **50**:197–209. <https://doi.org/10.1007/s10329-009-0141-6>
- Furuichi T 2011. Female contributions to the peaceful nature of bonobo society. *Evol Anthropol* **20**:123–142. <https://doi.org/10.1002/evan.20308>

- Goncalves A, Biro D 2018. Comparative thanatology, an integrative approach: Exploring sensory/cognitive aspects of death recognition in vertebrates and invertebrates. *Phil Trans R Soc B* **373**:20170263. <https://doi.org/10.1098/rstb.2017.0263>.
- Goncalves A, Carvalho 2019. Death among primates: A critical review of non-human primate interactions towards their dead and dying. *Biol Rev* published online. <https://doi.org/10.1111/brv.12512>.
- Goodall J 1968. The behaviour of free-living chimpanzees in the Gombe Stream Reserve. *Anim Behav Monog* **1**:161–311. [https://doi.org/10.1016/S0066-1856\(68\)80003-2](https://doi.org/10.1016/S0066-1856(68)80003-2).
- Hosaka K, Matsumoto-Oda A, Huffman MA, Kawanaka K 2000. Reactions to dead bodies of conspecifics by wild chimpanzees in the Mahale Mountains, Tanzania. *Primate Res* **16**: 1–15 (in Japanese with an English summary).
- Kano T 1992. *The Last Ape: Pygmy Chimpanzee Behavior and Ecology*. Stanford University Press, Stanford.
- Kooriyama T 2009. The death of a newborn chimpanzee at Mahale: Reactions of its mother and other individuals to the body. *Pan Afr News* **16**:19–21. <https://doi.org/10.5134/143507>.
- Matsuzawa T 1997. The death of an infant chimpanzee at Bossou, Guinea. *Pan Afr News* **4**:4–6. <https://doi.org/10.5134/143350>.
- Nishida T 1973. *The Children of the Mountain Spirits: Search for the Social Structure of Chimpanzees*. Chikuma-shobo, Tokyo (in Japanese).
- Surbeck M, Girard-Buttoz C, Boesch C, Crockford C, Fruth B, Hohmann G, Langergraber KE, Zuberbühler K, Wittig RM, Mundry R 2017. Sex-specific association patterns in bonobos and chimpanzees reflect species differences in co-operation. *R Soc Open Sci* **4**:161081. <http://doi.org/10.1098/rsos.161081>.
- Tokuyama N, Emikey B, Bafike B, Isolumbo B, Iyokango B, Furuichi T 2012. Bonobos apparently search for a lost member injured by a snare. *Primates* **53**:215–219. <https://doi.org/10.1007/s10329-012-0298-2>.
- Tokuyama N, Lynn Moore D, Graham KE, Lokasola A, Furuichi T 2017. Cases of maternal cannibalism in wild bonobos (*Pan paniscus*) from two different field sites, Wamba and Kokolopori, Democratic Republic of the Congo. *Primates* **58**:7–12. <https://doi.org/10.1007/s10329-016-0582-7>.
- Watson CFI, Matsuzawa T 2018. Behaviour of nonhuman primate mothers toward their dead infants: Uncovering mechanisms. *Phil Trans R Soc B* **373**: 20170261. <https://doi.org/10.1098/rstb.2017.0261>.

*Received*: 13 April 2019

*Accepted*: 15 May 2019