

## Behavioral responses toward a conspecific corpse of wild bonobos (*Pan paniscus*) at Wamba

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### INTRODUCTION

Humans react to the dead in diverse ways and a wide range of behavioral responses can also be found in other non-human animals, including non-human primates which provide important insight for considering how various behavioral reactions toward the dead have evolved from our evolutionary ancestors (Anderson 2011, 2017). Here, we report the behavioral responses of wild bonobos around the corpse of an adult male group member at Wamba, Luo Scientific Reserve, Democratic Republic of the Congo. This is the first reported case recording behavioral observations of multiple individuals responding to a dead adult conspecific in wild bonobos.

### METHODS

Bonobos at the Wamba (0° 11' N, 22° 38' E), Luo Scientific Reserve, Democratic Republic of the Congo have been studied since 1973 (Kano 1980; Furuichi *et al.* 2012). Two groups (E1 and PE) have been studied continuously by researchers daily since 2003 for E1 and 2011 for PE. Two additional groups (BI and PW) have been surveyed several times a year for several weeks, as well as observed during encounters with bonobos of PE (Sakamaki *et al.* 2018). The bonobo that was found to be dead was a member of the BI group. Most of the individuals in BI group were not fully habituated and allowed human presence at a maximum distance of > 10 m, but it was challenging to follow them on the ground. Individual identification was ongoing at the time of the observations, although we had named most of the adult individuals (7 of 9 adult males and all 13 adult females). We were able to identify the corpse as an adult male tentatively named “AM2”, one of the unnamed adult males, judging from the fact that AM2 disappeared on the date the corpse was found. AM2 was approximately 15 to 20 years old based on his physical features. The Research Center for Ecology and Forestry (CREF) is the local governing organization of the reserve and following their protocol, the corpse was buried by CREF and local assistants at the point where it was laying on the same day of discovery.

On the following day of discovering the corpse, we conducted stationary observations at the location where the corpse was found. Face masks and gloves were used and the observation point was set 15 m away from the buried corpse — in order to reduce the risk of zoonotic disease transmission.

### OBSERVATIONS

On September 5th, 2018, SY left the base camp with two local assistants to start searching for bonobos of PE group at 05:00 h. We heard distant vocalizations of bonobos at 07:58 h. We followed their vocalizations and found the corpse of the adult male bonobo at 08:01 h. There were two adult females and one infant who belong to BI group around the corpse upon our first observation. One adult female (Ez, estimated to be 20 years old) was touching the arm of the corpse and her offspring (E1, 2 years old) was peering toward the corpse. Another adult female (Ko, estimated to be > 50 years old) was whisking off the flies that were swarming around the corpse. The other members of BI group were gathering around the surrounding area, but we could not count the total number of individuals. As we approached the corpse at around 10 m, Ez, Ko and E1 moved away from the corpse and the whole group traveled away. After members of BI group left the surrounding area, we heard their vocalizations for more than 15 min (Video 1 available online at <http://mahale.main.jp/PAN/2019/006.html>).

We left the site of the corpse at 08:25 h and went back to the base camp in order to report and discuss how to manage the dead body with the staff of CREF. Following the decision, the corpse was buried at the point where it was laying at 12:00 h.

Prior to burying, we inspected the corpse. There were no noticeable injuries other than one single bite on his right leg, which appeared to be inflicted by ants. The corpse was emitting a strong decomposing odor and given that a number of flies and ants were flocking to the corpse, we estimated that a couple of days had passed since the individual's death.

On September 6th, 2018, the authors and two local assistants returned to the location where the corpse was found and began collecting stationary observations at 06:42 h. Nineteen individuals of BI group including three adult males (GR, OA and YJ) and seven adult females (Ac, Bo, Ko, Og, Vc, Yr and Ze) appeared together at our location at 07:24 h, emitting “alarm calls” (Kuroda 1979). They continued to emit calls for about 10 min from adjacent trees (Video 2 available online at <http://mahale.main.jp/PAN/2019/006.html>). An adult male (OA), four adult females (Ko, Og, Vc and Ze) and two sub-adult females (Fa and Ym) climbed up and down the trees repeatedly and gazed at the location of the buried corpse. In particular, two adult females (Og and Vc) and two sub-adult females

(Fa and Ym) often approached within 6 m of the location where the corpse was buried. Some individuals were looking down at the same location from the trees and others were resting or grooming on the trees from 08:00 h to 08:52 h (Bo and GR; GR and Ze; Yr and Yz, her offspring; OA and YJ). All bonobos left the area at 09:06 h (Video 2 available online at <http://mahale.main.jp/PAN/2019/006.html>).

After all bonobos left the area, we inspected the surrounding area. We found 7 beds within 30 m of the corpse, including one that was located approximately 20 m directly above the corpse. The beds seemed to be a few days old, suggesting the bonobos slept there before we found the corpse partially decomposed. We also found broken-off branches on the ground, which were likely used by bonobos before we found the corpse for performing “branch drag” displays to signal the start of traveling (Kuroda 1980; Ingmanson 1996).

At 12:05 h on the same day, the same members returned to the location of the buried corpse by moving on the ground quietly. One adult male (YJ), three adult females (Ac, Ko and Yr) and two sub-adult females (Fa and Ym) sat independently on the exact location of the buried body for a few minutes, and they remained within 5 m for 26 min. Other members were resting around the buried location on the trees or on the ground. OA performed a “branch drag” display at 12:38 h and several individuals emitted vocalizations to start traveling at 12:50 h. All individuals left the location at 12:51 h. We continued to implement stationary observations until 15:00 h, but they did not return.

On September 7th, 2018, we conducted stationary observations again at the same location from 07:09 h to 15:00 h. We did not observe any bonobos at the site.

## DISCUSSION

Among non-human primates, various behaviors toward conspecific corpses have been reported such as guarding the dead body, vigils and direct interactions (Gonçalves & Carvalho 2019). It is rare to find the corpse of adults in wild conditions, but reports are growing. In this reported case, we could not confirm the individual’s cause of death, though he may have died of illness, or perhaps by falling down from the bed located above as was reported in one chimpanzee (*Pan troglodytes*) case (Teleki 1973).

Similar to our findings, chimpanzees have also been reported to show a wide range of reactions toward adult conspecific corpses. For example, resting near the corpse, but also tending to avoid contact with the corpse (Hosaka *et al.* 2000) and investigations (*e.g.*, gaze, sniff and touch) of corpses, likely to confirm if predation was the cause of death (Boesch 1991). In addition, a previous study suggested that male chimpanzees tend to be more curious than females and infants may be prevented from approaching the corpse (Anderson 2016). Female and infant bonobos may be able to access conspecific corpses easier than males because female bonobos aggregate more than males in order to maintain close social associations and female’s social rank tend to be higher or equal to males (Furuichi 2011).

We should carefully consider the differences in how bonobos react to the corpses of conspecifics and other animals. Bonobos have been observed to approach, peer, sniff and carry the corpse of other animals, as well as returning repeatedly to the same location (Hayashi *et al.* 2012; Toda *et al.* 2017; Tokuyama, personal communication). Wild chimpanzees have also been reported to interact with the corpses of other animals (van Lawick-Goodall 1968; Boesch & Boesch-Achermann 2000). To the date, we have little evidence that suggests *Pan* species treating conspecific corpses differently from the way they treat corpses of other animals.

Bonobos have been observed to return to the location of an injured group member (Tokuyama *et al.* 2012; Tokuyama 2019), suggesting that they may care for other injured members. In the current case also, bonobos returned repeatedly to the same location where the group member was dead, even after the corpse was buried, suggesting they care considerably for their dead and disappeared group members.

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