Chimpanzee Velu: the wild chimpanzee who passed away at the estimated age of 58

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This is a brief report about an old female chimpanzee who died recently in Bossou, Guinea, West Africa. We named this chimpanzee “Velu”. She died in March of 2017 and her corpse was buried, then exhumed, and her skeleton retained for future analyses. I would like to take this opportunity to look back over her life.

Yukimaru Sugiyama started the long-running study of Bossou chimpanzees back in 1976 (Matsuzawa et al. 2011). At that time, Velu had a young male infant named VU, about 4 years old. I should explain that the Bossou Research Community uses a naming convention of all uppercase letters for males and the first character only in uppercase for females. The following year, Velu gave birth to a second male infant, named VUNA. Based on birth records, Sugiyama estimated Velu to be 17 years of age when he began his field research at Bossou: thus her estimated birth year is 1959.

Therefore, Velu was approximately 58 years old in 2017. Towards the end of her life, she continued to look healthy and well (Fig. 1). She was found dead in the forest by Boniface Zogbila, current chief of the local Manon guides, on March 18, 2017. Boniface found Velu lying on the forest floor of the southern foothills of Mont Gban (7°38′32.4″ N, 8°29′50.0″ W). A detailed examination of her dead body revealed that she had died 3 days earlier. The still-fresh body had no wounds at all. The cause of death was unknown, but we considered it likely connected to her advanced age—she was very old for a chimpanzee. The local guides, following consultation with the Guinean authorities, decided to bury Velu in a location close to our Bossou field station. We followed the local ceremonial conventions for human

funerals; we wrapped the dead body in cloth and buried it in the ground.

When 9 months had passed following her death, we excavated Velu’s corpse. We received permission from the local Manon people, and the Guinean authorities, to exhume the corpse on December 30, 2017. Velu’s remains had decomposed, leaving the complete skeleton of a wild chimpanzee (Fig. 2).

This is not the first case of a dead chimpanzee being found at Bossou. I found the corpse of a young male chimpanzee, named NPEI, on January 1, 1988 (Matsuzawa et al. 1990). He was 6.5 years old at the time of his death. In 2003, this population suffered a flu-like epidemic and lost five chimpanzees at one time (two infants, one young adult male, and two older females). Following the epidemic, we succeeded in locating four out of the five dead individuals.

The long-term field site at Bossou spans more than four decades. Thus, we have been able to collect six complete skeleton specimens: Veve (1-year-old female and granddaughter of Velu), JIMATO (2-year-old male), NPEI (6.5-year-old male), PONI (11-year-old male), Kai (53-year-old female), and Velu (58-year-old female).

Just as my colleagues and I published a paper after finding the dead body of chimpanzee NPEI in 1988 (Matsuzawa et al. 1990), now might be the time to make a collective effort to analyze all these skeletons to discover more about aging and related issues such as left–right asymmetry in cranial volume and the bones of the hand used preferentially for hammering in nut-cracking. Furthermore, this could usefully include similar cases of retrieved skeletal specimens from other parts of Africa. Now might be a fitting time to promote a morphological comparison of wild chimpanzees throughout Africa. It also highlights the potential to compare the bones of extant wild chimpanzees with the paleoanthropological remains of fossil hominids.

Bossou specimens have a unique advantage compared to those from other field sites. We have accumulated a video archive of all the chimpanzees since 1988 when we first

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Fig. 1 Chimpanzee Velu, aged 58, feeding on figs (*Ficus umbellata*). This photo was taken at the summit of Mont Gban on January 14, 2017 (photo by Naruki Morimura)

Fig. 2 The skull of chimpanzee Velu, aged 58 years. Velu died on March 15, 2017, and was buried soon after. The corpse was exhumed 9 months later. Thus, we now have the complete skeleton of an old female chimpanzee. The condition of the teeth allows us to appreciate just how hard the life of a wild chimpanzee really is, from the heavy wear patterns on the incisors and premolars and the three missing molars on the left lower jaw. This photo was taken on December 30, 2017 (photo by Tetsuro Matsuzawa)

started using battery-powered SONY camcorders in the field. Therefore, we have video data for each individual chimpanzee over the past 3 decades.

You can view video of the chimpanzees whose skeletons we now retain, taken when they were alive, particularly in recordings of the field experiments carried out at the two locations we named “Bureau” and “Salon”. Thanks to the innovative layout of the outdoor laboratory setting, there is a clear view of the chimpanzees without obstruction, unlike the semi-observed view in thick undergrowth. The accumulation of still and moving images has been carried out in

identical locations over time, allowing us to view the developmental change and/or aging of specific individuals. This approach may have the potential to answer many interesting questions at the interface between wild chimpanzee behavior, adaptation to the environment, and paleoarcheology or paleoanthropology. Incidentally, I strongly believe that all specimens should be kept at Bossou, Guinea, not sent out elsewhere.

I want to share my feelings upon looking at the remains of chimpanzee Velu on the day of exhumation. I had known her for a very long time—since February 1986. I had observed

her almost every year for the past 31 years. Many thoughts entered my mind while holding her skull in my hands. First of all, that she was a charming chimpanzee, always using her right hand for hammering (Fig. 3) during nut-cracking. When I last saw Velu alive, in January 2017, on my precious last visit to her, she came to the Salon but she did not use any stone tools. Therefore, I asked Morgane Allanic, a PhD student, who witnessed the last occasions that Velu was seen to carry out nut-cracking behavior, towards the end of 2016, specifically November 6th to December 15th. According to Morgane, Velu visited the Salon seven times, along with other chimpanzees. Velu mostly ate the ripe red fruit surrounding the nuts of the oil palm tree (*Elaeis guineensis*) directly from the stems, but she also cracked nuts twice, on November 11th and 14th. This shows that Velu continued to crack nuts right up until the end of her life.

Focusing on Velu, you can see the behavioral repertoire of wild chimpanzees in Bossou. She used a variety of tools, including the stone tools that I have already mentioned, a stick to get at ants (Fig. 4), and a stick to scoop algae (Fig. 5). She lived mainly on fruits and young leaves in the forest, but sometimes entered cultivated fields to take agricultural products such as rice (Fig. 6) and papaya (Hockings et al. 2007).

In her lifetime, Velu gave birth to a total of five offspring, VU, VUNA, Vube, VUI, and Vuavua. Her daughter Vuavua was born in 1991, who, aged 10, herself gave birth to a daughter, named Veve. Therefore, Velu became a grandmother on May 1, 2001. There was a period of about 2 years

Fig. 4 Chimpanzee Velu at 50 years old. She is sitting on a thick vine and using a stick to break open an ant nest so that she can eat the ants and also the soil. This photo was taken on July 3, 2009 (photo by Michiko Fujisawa)

Fig. 3 Chimpanzee Velu at 56 years old. She is still able to use a pair of mobile stones as hammer and anvil to crack open the hard shell of oil palm nuts and get at the edible kernel inside. This is a cultural tradition of Bossou chimpanzees. A young 4-year-old male named FANWA watches the behavior carefully. This type of observational learning is called “education by master-apprenticeship”. The adult chimpanzee facing away is JEJE, the alpha male of the group. He is eating directly from an oil-palm ‘regime’—a bunch of about 300 ripe red fruits, each surrounding a hard nut. This photo was taken at the “Salon”, an outdoor laboratory for field experiments, on December 27, 2015 (photo by Tetsuro Matsuzawa)

Fig. 5 Chimpanzee Velu aged 58, uses a stick for algae scooping. This photo was taken on November 11, 2016 (photo by Morgane Allanic)

Fig. 6 Chimpanzee Velu, aged 52, is making a wadge of sweet rice pith (*Oriza* sp.). Kim Hockings and Boniface Zogbila were following Velu through the forest. As well as wild foods, Bossou chimpanzees also feed on human crops. This photo was taken on November 15, 2011 (photo by Kim Hockings)

during which mother–daughter–granddaughter were all alive (Velu–Vuavua–Veve). This ended on December 29, 2003, when the granddaughter passed away due to the flu-like epidemic. It was interesting for me to witness grand-mothering behavior in chimpanzees directly. A typical case is provided during stone tool use. The three chimpanzees came together at the outdoor laboratory. At that time, the granddaughter, Veve, sometimes preferred to stay with the grandmother, Velu, leaving the mother, Vuavua, free from nursing. Vuavua could then concentrate on using stone tools for nut-cracking, to reach the calorie-rich kernel. In this example, grand-mothering really helped the mother to increase her energy intake.

Besides grand-mothering behavior, another important issue is potential loneliness in the prolonged life of aging

chimpanzees. After Velu's daughter, Vuavua, left the community in March 2004, Velu no longer had any relatives at Bossou. Since then, she was alone for the remaining 13 years of her life and often moved together with another lonely old female named Yo, estimated to have been born in 1961. The two old female chimpanzees without nearby relatives spent comparatively longer in their nests, sleeping and resting. They moved together and no longer walked long distances as in their younger days. They sometimes joined the main group with other members of the Bossou community. Further analysis will likely illuminate the reality of long life, and the post-reproductive phase of life, in wild chimpanzees.

Let me end the paper by introducing an altruistic behavior in chimpanzees observed when they cross roads (also see Hockings et al. 2006). The particular episode I discuss here happened during the period of observation when both Osamu Sakura and I were at Bossou, in 1988. At that time, Velu was 29 years old, with two dependent offspring in her care. The older of the two was a female juvenile named Vube, aged about 6 years, born in 1982; the younger a male infant called VUI of about 2 years old, born in late 1986. In order to cross the risky road environment safely, Velu had to carry both her offspring at the same time. She did this by carrying the juvenile on her back and the infant ventrally. There was no exception during that period: Velu always carried both her offspring at once. It must have been a tough job. The key player in this episode was a 10-year-old young adult male named JIEZA. Velu and JIEZA had no kin relationship and the two offspring were not his, confirmed by multiple points of evidence.

The altruistic behavior seen was as follows (Fig. 7). When a group of chimpanzees crosses the road, the adult males often show a division of roles: taking the lead position to scan the road; 'guarding' the followers; or taking a rear position. JIEZA often took the lead role. One day, we witnessed

Fig. 7 Altruistic behavior during road-crossing. Chimpanzee Velu was 29 years old in these photos. She had two offspring at the time. A subadult chimpanzee named JIEZA helped Velu to escort her two infants while they crossed this risky road. These photos were taken in 1988 (photos by Tetsuro Matsuzawa and Osamu Sakura)

JIEZA holding VUI on his chest. JIEZA walked slowly from the undergrowth onto the road and then moved towards the opposite side of the road. JIEZA then paused. VUI continued to cling to JIEZA's chest. They waited for the other chimpanzees following them.

The pair, JIEZA and VUI, was followed by Velu, the mother, carrying VUBE, her elder offspring, on her back. The mother–infant pair, Velu with Vube, also reached the opposite side of the road successfully. At that moment, VUI the infant was given back to her mother by JIEZA. This behavior reminded me of the “throw forward” in rugby football. The young male infant was returned to the “home” position, the mother's breast. Safely across the road, the elder sister got down from her mother's back and walked away independently further into the undergrowth.

If you will allow me to use an anthropomorphic manner of expression, JIEZA gave Velu a hand, saying “It must be very difficult and heavy for you to carry both kids at once. I think that I would be happy to take care of one”. Altruistic behavior from mother to offspring is seen often, such as sharing food, carrying the offspring on her back, etc. However, this is a case of apparent altruistic behavior by a young adult male toward a mother–infant pair. This episode of Velu's family being assisted by JIEZA opened my eyes to the evolutionary origins of human altruistic behavior and the importance of the social network.

Taken all together, let me conclude this paper. Velu has passed away. However, the memory of her life, the archived visual records, her skeleton will remain with us to help us to uncover information about wild chimpanzees. I want to say a fond goodbye to this chimpanzee. Velu, I really enjoyed watching you and sharing the events of your life. Sleep well. Let us meet again in the next life. On that alternate plane, you may become a human while I may turn into a chimpanzee.

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