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RESEARCH REPORT

Case Report on the Death of a Wild Chimpanzee (*Pan troglodytes verus*)

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ABSTRACT. The present paper gives a case report on the death of a wild young chimpanzee (*Pan troglodytes verus*) at Bossou, Guinea. The corpse of a 6.5-year-old male was found, and an autopsy suggested that he had died from some non-epidemic disease or from poisoning. Morphological measurements of the skeleton revealed that the chimpanzee was much smaller than corresponding individuals in captivity. The dental formula of the chimpanzee coincided with those of 5- to 5.5-year-olds in captivity. The death of this chimpanzee suggests that some of the individuals who had disappeared at Bossou had died of natural causes.

Key Words: Chimpanzee; Death; Body growth; Osteometry.

INTRODUCTION

On 17th January 1988, TM and OS found the corpse of a young male chimpanzee (*Pan troglodytes verus*) at Bossou, Guinea, West Africa. The present paper deals with the somatometry and skeletal measurements of the chimpanzee which were undertaken because data for wild chimpanzees of known age are rare. We also report other cases of death found in the same area, and discuss the influence of mortality upon the population of wild chimpanzees.

When the corpse was found, there were 20 individuals in the Bossou group including infants. SUGIYAMA (1981, 1984, 1989) has published details of the Bossou group of chimpanzees.

DISCOVERY OF THE DEAD BODY

The dead body of a chimpanzee was found in the core area of the Bossou group. The physical features of the dead body, especially an old cut on the right ear, demonstrated that it was the young male named *Npei*. We estimated from the degree of decay that the chimpanzee had died several days earlier.

Five cases of death of chimpanzees, including the present one, have been confirmed at Bossou since 1976. Details of these cases are summarized in Table 1. The fifth and present case was *Npei*. We strongly estimated that he was at the age of 6.5 when he died. *Npei*'s

Table 1. Cases of death of chimpanzees at Bossou.

Year	Age/sex	Condition	Source
1978	Adult male	Dead body	Field assistant
1981	Adolescent male	Dead body	Field assistant
1983	Infant (*Yaka*)	Influenza or accident	SUGIYAMA (1984)
1983	Adolescent/juvenile	Skelton	Field assistant
1988	Juvenile male (*Npei*)	Dead body	This study

Table 2. Somatometrical data for *Npei*.

	Measurements (cm)
Maximum head breadth	15
Total head height	14
Total face height (nasion-gnathion)	13
Physiognomic upperface height (nasion-stomion)	8
Face breadth (bizygomatic breadth)	12
External binocular breadth	8
Physiognomic ear length	5
Physiognomic ear breadth	4
Anterior trunk length (suprasternale-symphysion)	32.5
Sitting height	60.5
Biacromial breadth	23
Transverse diameter of chest	25
Depth of chest	18
Bicristal diameter	18
Hand length	19.5
Length of middle finger	10

mother was confirmed to be in estrus and copulated in March 1980 (SUGIYAMA, 1984). When *Npei* was first found, in December 1982, his body size and active behavior suggested that he was born in the middle of 1981.

Npei's mother has deformed fingers on the left hand, the exact cause of which is unknown. An elder sister of *Npei* was handicapped (SUGIYAMA, 1984). *Npei* had no explicit deformation, nor did his elder brother. When *Npei* was last observed on 20th December 1987, he had no wounds and showed no symptoms of sickness. He appeared to be good in health from September to December 1987.

SOMATOMETRY AND AUTOPSY OF *NPEI*

Somatometrical data were collected on 17th January 1988, following the procedures defined by MARTIN and SALLER (1957). The measurements were made using conventional scales instead of specific calipers. The results are listed in Table 2.

Three days after the discovery of the corpse, an autopsy was performed by Dr. SEKOU CONDE, a surgeon, and Dr. MARTIN KOLIE, a veterinarian. The details can be summarized as follows: (1) no wound was found, so that the immediate cause of death was neither shooting nor falling from a tree; and (2) the presence of congestion in the intercostal muscles suggested that the chimpanzee had died either from some disease or from poisoning induced by food intake. Since the other members of the group were healthy during that period, the illness was probably non-epidemic.

OBSERVATION AND MEASUREMENT OF *NPEI*'S SKELETON

The entire skeleton of *Npei* was brought back to Japan with the permission of the Guinean Government. The results of the examinations undertaken by TK and YH can be summarized as follows:

Development of Dentition

Alveolar eruptions of the maxilla were observed as follows: $i^1i^2cm^1m^2M^1$; and of the mandible: $xi_2cm_1m_2M_1$. A radiograph of the teeth is shown in Figure 1. The observations made from radiographs of the permanent teeth are outlined in the Appendix (see page 640).

As estimated from the table of tooth eruptions given by Nissen and Riesen (1964), the age of *Npei* ranged between 3.32 years (maxillary M^1) and 5.62 years (maxillary I^1). The I^1 was almost completed and its crown was seen just beneath the alveolar level by surface observations, indicating an age estimate towards the older part of the range. Compared to the chart of Dean and Wood (1981), the radiographs of *Npei* showed that the development of M2 and M3 was further advanced than would be expected from the development of I1 and I2 both in the maxilla and in the mandible. The premolars also appeared to be developed more than expected from the incisors.

Yasui and Takahata (1983) examined the dentition of a wild infant (18- or 19-month-old) chimpanzee, *Amina* (*Pan troglodytes schweinfurthii*). They also reported a discrepancy between the eruption of the lower canines and the formation of permanent premolars both in the maxilla and in the mandible.

The growth of the facial skeleton of *Npei* fell behind that of artificially reared chimpanzees. It is possible that the eruption of the front teeth, I1 and I2 in this case, was postponed due to the slower skeletal growth. The formation of the molars appeared not to have suffered much from the restraint on growth.

Skeleton of *Npei*

The lengths of the long bones of the limbs are shown in Table 3, together with the data for

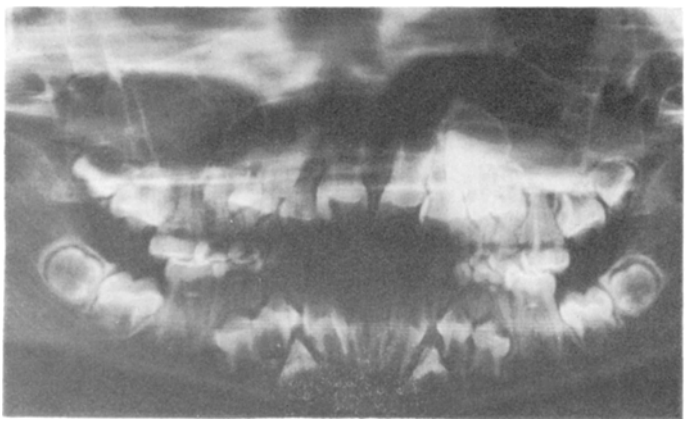

Fig. 1. Radiograph of *Npei* showing the tooth development (see Appendix for detailed observations).

Table 3. Maximum length of limb bones (mm).

	Npei		Males by SHEA (1981) Stage 3			Stage 4		
	Right	Left	*N*	Average	S.D.	*N*	Average	S.D.
Humerus	219	219	11	198.8	9.3	10	214.2	18.4
Radius	202	201	11	183.4	9.7	10	199.3	17.8
Femur	217	216	11	194.5	9.2	10	214.3	18.5
Tibia	180	180	11	159.9	7.9	10	179.1	18.5

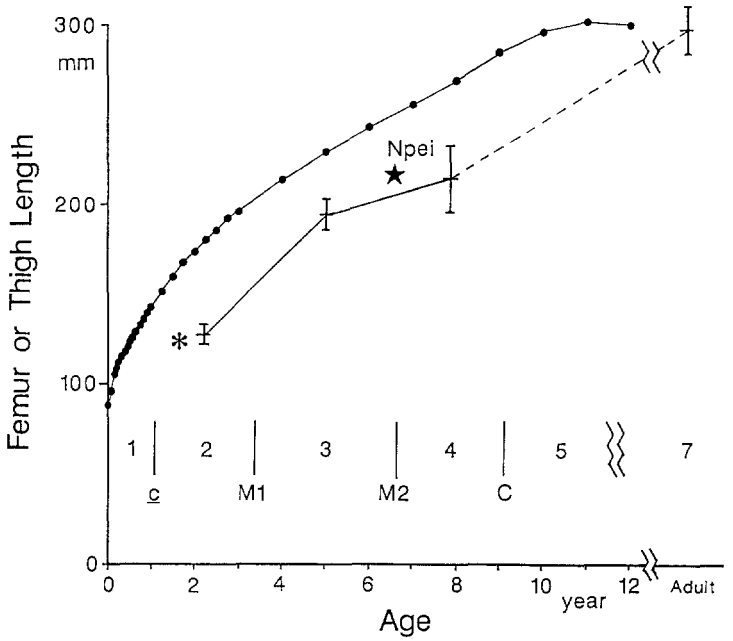

Fig. 2. Femur and thigh lengths of chimpanzees. Femur maximum length. ★: *Npei*; vertical lines with horizontal bars: average and S.D. of males reported by SHEA (1981), indicating the middle of the age range given by NISSEN and RIESEN (1945, 1964); *: *Amina*, a wild infant female from the Mahale Mountains, Tanzania (YASUI & TAKAHATA, 1983). Thigh length. ●: Average of males reported by GAVAN (1953a). Developmental stage. c, M1, M2, and C: average ages of eruption in male chimpanzees (NISSEN & RIESEN, 1945, 1964), the same materials as in GAVAN (1953a); 1–7: stages proposed by SHEA (1981) according to the data of NISSEN and RIESEN.

male wild chimpanzees of unknown age, from West Africa, reported by SHEA (1981). Based on the dentition, *Npei* was considered to be at the end of dentition Stage 3 of SHEA (the M2 of *Npei* should have erupted a few months later). In fact, the length of the long bones of *Npei* was longer than the average length for Stage 3, and almost the same as the average for Stage 4.

Figure 2 shows that the femur maximum length of *Npei* was much smaller than the thigh length of the 6.5-year-old laboratory-raised chimpanzees in the Yerkes Laboratories (GAVAN, 1953a, b). The osteometrical bone length of the wild juveniles (SHEA, 1981) was clearly smaller than the somatometrical limb length of the juveniles in the laboratory at least until 9 years of age. The differences were large even considering the different methods of measurement.

The femur length of *Amina* (YASUI & TAKAHATA, 1983; see above) was about the same as that of wild infant females, but much smaller than the somatometrical thigh length of the females in laboratories.

Similar results to those for the femur were also observed in the humerus, radius, and tibia. The lengths of the humerus and the tibia were compared with those of the arm and the lower leg reported by GAVAN (1953a, b), respectively.

It is concluded that wild juvenile chimpanzees are shorter in their limb length than juveniles raised in the laboratory. The age stages in Figure 2 based on laboratory animals cannot be applied directly to wild chimpanzees, since the rate of development of the dentition may differ in the wild and the laboratory. However, the difference in dentition does seem to be much smaller than that in bone length, and does not greatly influence the above inferences regarding the delay in long bone development.

A deformation and shortage was observed in the case of the left fifth metacarpal bone. This was interesting in view of the obvious deformation of the left fingers of *Npei*'s mother. There was, however, little possibility that this malformation could be related to his death.

DISCUSSION

CAUSE OF DEATH

The present study revealed that at least one adult male and three juveniles or adolescents including *Npei* had died during the last 11 years at Bossou. Four adult males and ten young had disappeared from the group during those years (SUGIYAMA, 1981, 1984, 1989). Some of these disappearances may have been due to death. The mortality of juvenile, adolescent, and subadult chimpanzees as a result of diseases or natural accidents must affect the population dynamics.

In Gombe and Mahale, East Africa, cases of young males' death from non-epidemic disease are rare (GOODALL, 1983, 1986; NISHIDA et al., 1985; HIRAIWA-HASEGAWA et al., 1984).

BODY GROWTH OF WILD CHIMPANZEES

Npei was normal and in good health until he died. In the Bossou group, there were two other male chimpanzees who were almost the same age and size as *Npei*. Therefore, *Npei* appeared to be an average-sized Bossou male juvenile. The present morphological examinations revealed that *Npei* was considerably smaller than captive male chimpanzees of similar age, which strongly suggests that body growth in wild chimpanzees, at least at Bossou, is one to two years behind that found in captivity. Data for wild-killed chimpanzees (SHEA, 1981) and one example from Mahale (YASUI & TAKAHATA, 1983) also support this conclusion.

The present findings together with those of other studies suggest that the growth of wild chimpanzees is retarded. In other words, we can postulate that chimpanzees in captivity tend to grow relatively faster.

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Appendix. Observations based on radiographs of the permanent teeth.

(1) Maxilla

I^1: The crown grew up to the neck of i^1 and pressed the root of i^1.

I^2: Developed to the same level as i^1.

C: The crown was situated at the neck of i^2, extending up to the upper part of the maxilla. The apex was round-shaped and open, and was not completely calcified.

P^1: The crown remained near the lower end of the root of m^1 and the upper half of the tooth was almost completed.

P^2: Developed to the same level as P^1.

M^2: The crown was situated at the neck of M^1. More than half of the tooth was completed including the cervical part of the roots. This developmental condition corresponded to that for 5.5–6 years of age in the chart of DEAN and WOOD (1981, Fig. 3).

M^3: Located deeper than M^2 in the maxilla. The crown was already completed. The condition of development could be compared to that for 6.5–7 years of age in the chart of DEAN and WOOD (1981).

(2) Mandibula

I_1: Same as I^1 of the maxilla.

I_2: Same as I^2 of the maxilla.

C: The crown was located at the depth of one half of the body of the mandible and was almost horizontal. The development was similar to that in the maxilla.

P_1: The crown was found at the level of the neck of c and pressed m_1. Two thirds of the crown were completed.

P_2: The crown was situated about 8 mm lower than that of P_1, but the formation was about the same as that of P_1.

M_2: The crown was situated just beneath the alveolar surface. It was slightly inclined medially. The development proceeded slightly ahead of the maxillary M^2.

M_3: The crown was already calcified and inclined medially, almost perpendicularly to the occlusal plane. The development was the same as that of the maxillary M^3.

Notes: The right i_1 was observed when the corpse was first discovered but was subsequently lost. The left i_1 was not seen at the time of discovery. The alveolar cavities of i_1 showed no trace of bone formation or bone absorption. The i_1 must have been about to be lost at the time of death.

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