

Healthy baboon with no upper jaw or nose: an extreme case of adaptability in the Kibale National Park, Uganda

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Abstract We describe and document with digital images an adult female baboon (*Papio anubis*) from the Kibale National Park, Uganda, who was missing all but the basal part of her upper jaw and nose, i.e., no premaxilla and very little of the maxilla and nasal bones. She appeared otherwise healthy, well integrated into a social group, and apparently reproducing, based on the fact that she was grooming a juvenile who suckled from her and that she appeared to be pregnant. Her extreme deformity raises numerous questions and demonstrates the highly adaptable capabilities of wild baboons.

Keywords Baboon · Deformity · Premaxilla · Maxilla · Nasal bones · Kibale National Park

Introduction

It is not uncommon to see wounds and limb deformities in wild primates. Many of these are likely to be a result of falls, fights, or wounding by predators (Crockett and Pope 1988); others are the consequence of being caught in snares set by poachers. For example, in some parts of the Kibale

National Park, Uganda poachers' snares maimed at least 20% (Basuta 1987) to 35% (Wrangham 2008) of the chimpanzees (*Pan troglodytes*). Damage to these chimpanzees ranged from mangled or missing digits to the amputation of entire hands or feet. The most extreme documented case was a female chimpanzee who was missing the entire tibia and fibula of one leg. Despite of this, she lived for many years and continued to reproduce (T.T. Struhsaker, personal observation; John Mitani and David Watts, personal communication). Similar cases are also known for platyrrhines. For example, a female red howler monkey (*Alouatta seniculus*), whose right arm was amputated at the middle of the humerus (cause unknown), gave birth to at least two offspring despite her deformity (Crockett and Pope 1988). In another case, an adult male spider monkey (*Ateles geoffroyi*) survived and was socially active at least 3 years with only one leg, having lost the other at the hip (cause unknown) (C.A. Chapman, personal observation). Impressive as these adaptations by wild primates to serious injuries are, we report here a deformity that appears to be the most serious and potentially fatal of any so far described because it involved the upper jaw and teeth, which are crucial to mastication and nutrition. As far as we know, no deformity like this has ever been described before in a wild non-human primate.

Methods

Observations of the baboon (*Papio anubis*) were made on the morning of 15 June 2010 in the Kibale National Park, Uganda by T.T. Struhsaker, C.A. Chapman, T.R. Pope, and Samuel P. Struhsaker. The location was approximately 700–800 m N. of the Dura River bridge along the main road between Fort Portal and Bigodi (circa. 0°28'N,

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30°22.5'E, elevation ~1,250 m a.s.l.). This was in mature, old-growth rain forest (the tree species have been described by Chapman et al. 2002). Observations were made from within a vehicle and lasted approximately 30 min. We encountered a female baboon (*Papio anubis*) in a social group of conspecifics while we were driving to conduct a primate survey elsewhere. Although the baboons were well habituated to humans who remained in a vehicle, they were less tolerant of humans on foot. Consequently, we were unable to follow the monkeys when they moved away into the forest.

The medical evaluation of this baboon's deformity was made by Jeffrey Marcus, Director of the Cleft and Craniofacial Program at the Duke University Medical Center, based on his examination of the digital images taken in the field.

Results

The subject of this report is an adult female baboon who was missing all but the most basal part of her upper jaw and nose, i.e., she possessed no premaxilla and very little of the maxilla and nasal bones. Her deformity was symmetrical in appearance. There was no sign of scar tissue, pus, or dried blood (Figs. 1, 2, 3). She differed markedly in appearance from "normal" baboons of the same social group (Fig. 4). Aside from this deformity, she appeared in excellent health. She groomed a medium to large-sized juvenile baboon who suckled from her throughout our observations. We concluded that this was likely to be her offspring because we are unaware of any case where a baboon suckles young other than her own. As she groomed the juvenile, her tongue frequently flicked back and forth as is typical of grooming among baboons. At no time did we see her apply her mouth to the areas she was grooming. The pink color of the skin around this female's ischial callosities and her enlarged abdomen indicated that she was pregnant. This female and her presumed juvenile were spatially integrated in a social group, i.e., not peripheral. Like other members of this group, she was well habituated to human observers who remained in a vehicle.

Discussion

This is the most severe and potentially debilitating deformity that any of us have ever seen in our field studies of primates, which span a cumulative-period of at least 85 person-years. We think it remarkable that she was surviving, healthy, and apparently reproducing. It raises a number of obvious questions, such as how does she eat, what do her

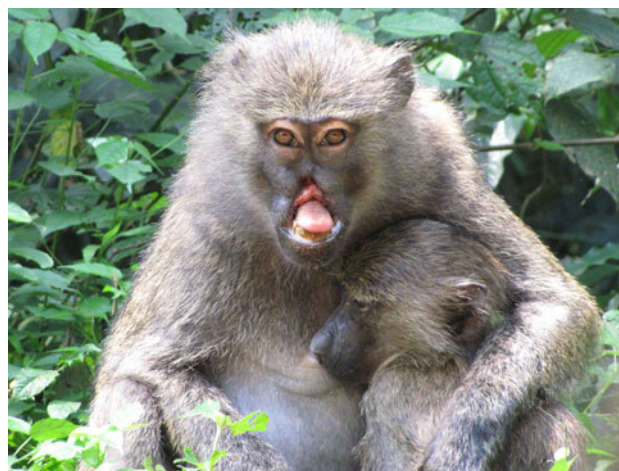


Fig. 1 Frontal view of the deformed adult female *Papio anubis* with suckling juvenile (photo: T.T. Struhsaker)

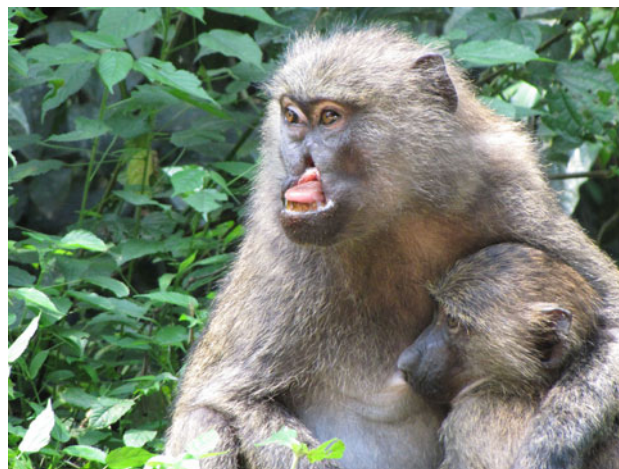


Fig. 2 Side view of the deformed adult female *Papio anubis* with suckling juvenile (photo: T.T. Struhsaker)



Fig. 3 Frontal view of the deformed adult female *Papio anubis* grooming a suckling juvenile with an adult male behind her (photo: T.T. Struhsaker)



Fig. 4 Normal adult female *Papio anubis* from same location as the deformed female (photo: T.T. Struhsaker)

vocalizations sound like, what does she do in social situations where lip smacking or grimacing are appropriate?

Although we do not know how this deformity originated, its symmetry and lack of obvious scar tissue indicate that it was probably congenital, i.e., a birth defect somewhat like a cleft deformity, but with the nasal bones missing also. In humans, the typical pattern of facial clefting occurs as a unilateral or bilateral cleft lip and palate. In these conditions, which result from either a failure of fusion or failure of mesenchymal penetration at the interface of the frontal prominence and the maxillary prominences, there generally is not a significant absence of tissue. However, in atypical clefts, the mechanism and result of the process are different; skeletal and/or soft tissue hypoplasia are commonly seen. In severe midline facial clefting there can be an absence of the premaxilla and of the nasal structures (De Myer 1975; Elias et al. 1992). The palate can be affected, but in theory could also be spared. In humans, severe midline facial clefting is frequently accompanied by hypertelorbitism (wide separation of the orbits) and can also be accompanied by severe, life-limiting brain abnormalities, for example holoprosencephaly. Neither of these conditions appeared to be present in this specimen. Arhinia (congenital absence of the nose) is another condition that can be seen in humans, and would not necessarily be accompanied by brain anomalies or hypertelorbitism (McGlone 2003). If this baboon's deformity was congenital, it would be likely to be more akin developmentally to the process leading to arhinia, which would be indicative of a developmental failure of structures in isolation. Part of her hard palate and all of her soft palate were intact, which would have enabled her to suckle as an infant if the nipple was placed far back into her mouth. Many human infants with complete clefts of the lip and

palate are able to breastfeed successfully, albeit with greater effort and adaptation. A comparison of a baboon skull with the digital images taken in the field indicate that enough of the posterior part of the maxilla remained to have held at least one set of molars, i.e., the third molar. If correct, it would allow some dental occlusion and mastication. This would partly explain the excellent physical and reproductive condition of this female.

Whatever the cause of this deformity, the fact that this female appeared healthy, was socially integrated, and was apparently reproducing is the most dramatic demonstration we have seen of primate adaptability to injury or congenital deformity.

We have no evidence that other members of the group treated this female preferentially (positively or negatively). This is consistent with our observations of other free-ranging primates having significant physical deformities. These individuals survived and reproduced without assistance from others. Among other things, these results indicate the need for caution in speculating about the evolution of "prosociality" or "altruistic" behavior based on deformities found in early hominids (DeGusta 2003; Dettwyler 1991; Hublin 2009; Lebel and Trinkaus 2002). For example, Lebel and Trinkaus (2002) concluded from half a mandible of a Middle Pleistocene Neandertal (Aubesier 11) that three to six teeth may have been lost before this individual died and that it could not have survived without social assistance. They also claim that extant non-human primates with substantial tooth loss do not survive long, implying that this is because others did not assist them. DeGusta (2002, 2003) rejected the argument and conclusions of Lebel and Trinkaus (2002) by presenting data from earlier publications showing that non-human primates are capable of living for many years after losing a substantial number of teeth and without assistance from conspecifics. Our observations of this female baboon strengthen DeGusta's (2002, 2003) conclusions because her deformity was more extreme than any of the examples he described.

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