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## Bilateral Retention of Deciduous Canines in an Olive Baboon

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**Key Words**

Dental development  
Baboon  
*Papio cynocephalus anubis*  
Deciduous canine  
Ontogeny  
Dental mechanics  
Dental anomaly  
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### Introduction

A set of cadavers of adult olive baboons (*Papio cynocephalus anubis*), obtained from the Kenya Primate Research Centre in 1982, has been used over several years in our undergraduate functional anatomy class. While preparing the skeletons, a case of bilateral retained deciduous canines came to light in a large adult male specimen. In this individual, the deciduous upper canines have been retained intact, lingually rotated approximately 90°, and display retention of a normal nerve and blood supply coupled with buccal surface wear from P<sub>3</sub>. The deciduous canines are solidly locked between the distal edge of the permanent canine and the mesial cervix of P<sub>3</sub> on each side. The resulting structural anomaly is attributed to a combination of genetic or physiological variation and mechanical forces.

### Description

It is thought to be very difficult to judge the age of a male baboon accurately on the basis of dental wear alone [1]. In this case, we can be confident that the male was of fully adult stature, although the age estimation technique of Relethford et al. [2] cannot be applied. All of his teeth were fully erupted, with moderate wear on the incisors and canines, a pattern also found by Smith [3] for fully adult males. There was moderate enamel chipping on I<sup>2</sup>, upper left and right permanent C, left P<sub>3</sub> and left M<sub>1</sub>, all of which appears to have resulted from chewing of cage bars. Strum's [1] conclusion '...when canines break, occlusion changes and canine damage is not age related' cannot be applied to aging of this specimen. It is impossible to estimate its age status accurately, but application of the attrition standards of Bramblett [4] to all 4 quadrants

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**Fig. 1.** Palatal view of the upper dentition of the adult male baboon. Both upper deciduous canines (arrows) have been retained and lingually rotated.



(scores  $rt_{max} = 16$ ,  $lf_{max} = 18.5$ ,  $rt_{mand.} = 17$  and  $lf_{mand.} = 19$ ) would yield an approximate age of 9 years. His molars were worn through the enamel cap on all M1s, and perforation had occurred on at least one cusp of each M2, while the M3s displayed only a degree of polishing with degradation of the sharp edges and slight flattening of the cusp points.

The upper deciduous canines, which are of interest in this paper, were found to be rotated nearly 90° lingually and locked between the fully erupted permanent canine and P<sup>3</sup> but to have retained a normal nerve and blood supply (fig. 1-3). The roots of both deciduous canines were covered by the gingival tissue, but the crowns remained exposed, with wear on the buccal surfaces reflecting periodic contact during mastication. The right deciduous canine also shows the beginnings of a carious lesion developing secondary to perforation of the pulp cavity. The lower dental arcade is

normal in most respects, and there are no supernumerary teeth, but both lower canines show cage bar wear, and the left is situated 3.5 mm lower in the mandible, buccally rotated by 15°.

### Discussion

Bilateral retention of deciduous canines in this individual indicates either genetic or physiological disruption. The genetic option would involve possible variation in dental lamina location, while the physiological possibility could involve a large range of potential aetiology ranging from trauma through disease to environmental stressors. However, the mechanics of this anomaly are of more immediate interest. As one of the major factors determining the pattern of shedding for deciduous teeth is the location and rate of develop-



**Fig. 2.** Buccal view of the lower dentition of the adult male baboon. The lower deciduous canine (arrow) is rotated buccally.

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**Fig. 2.** Buccal view of left retained deciduous canine (arrow). Original buccal surface of root visible.



**Fig. 3.** Lingual view of right retained deciduous canine (arrow). Worn crown with perforation and caries.

ment of any secondary tooth, we assume that in this case the secondary canine buds developed slightly anterior to the deciduous one so that their roots did not undergo normal resorption. As the permanent canines grew and began to erupt, the anterior walls of the deciduous canine alveoli were resorbed. It is likely that a majority of the lateral and medial alveolar walls were also resorbed as eruption continued. Friction (or more likely hysteresis forces) between the deciduous and the permanent canines drew the former downwards. Walker [5] notes that the permanent canine begins to contact the lower third premolar shortly after it erupts. In this case the deciduous canine would have remained in position

allowing contact with the third lower premolar, and substantial mechanical forces would have been applied to the deciduous crown. The deciduous canine crown would have come into contact with the sloped crown of  $P_3$ , and the resultant forces would have tended to rotate the retained tooth inward (lingually). As the permanent upper canines reached full eruption, the combination of mechanical forces crowded both deciduous canines into a locked position under the cervix of the  $P_3$ s and into solid contact with the distal edges of the upper canines. Locked in this position, wear through contact with  $P_3$  continued, eventually removing most of the enamel and a substantial portion of the dentine from

each deciduous canine. In the case of the right milk canine, the pulp cavity had been penetrated, and a carious lesion had begun to invade the tooth (fig. 3).

### Conclusion

This specimen shows an unusual pattern of retention of deciduous canine teeth. Other cases of retained deciduous teeth seen by the senior author have not displayed the same

pattern of mechanical force application and have remained vertically implanted. In most of the cases seen in juvenile and subadult long-tailed macaques (*Macaca fascicularis*), there is distortion of the tooth row alignment; but in this case the palate is normal and the alignment of the dental arcade is normal, as can be seen from the photographs (fig. 1-3). This specimen is one of the most unusual cases seen by the authors, and no comparable case has yet been noted in the literature.

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