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### Facial Widths in the Three Adult Morphs of Orangutans

FAYE S. HARWELL<sup>1</sup>, ZOE E. ALBERT<sup>1</sup>, CHERYL D. KNOTT<sup>1,2</sup>

1. Department of Anthropology, Boston University, USA
2. Department of Biology, Boston University, USA

Orangutans challenge our dichotomous perception of phenotypic sex seeing as they have three sexually mature adult morphs: females, unflanged males, and flanged males. In males, a significant increase in androgen levels is associated with numerous changes in physical characteristics and behavior that develop during the flanging process. While unflanged males lack these obvious secondary sexual characteristics, they still have higher testosterone levels compared to females. Here, we test whether captive unflanged males and females have similar facial ratios (facial width/bi-orbital distance), since flanges form from a facial compartment that contains androgen receptors and is present prior to flanging. When flanging, males deposit fat to these compartments. In the field, unflanged males can be hard to distinguish from female orangutans, without a clear view of the genitalia. Flanged males ( $3.9 \pm 0.5$ , range=2.7-5.1, N=20) have significantly wider facial ratios compared to unflanged males ( $2.4 \pm 0.3$ , range=2.1-3.0, N=9) and females ( $2.3 \pm 0.3$ , range=1.9-2.7, N=22;  $F(2,48)=98.18$ , p-value  $>0.0001$ ), who are similar in their facial ratios. Interobserver reliability between measurements (N=74) of the bi-orbital distance ( $V=1171$ ,  $p=0.3251$ ), facial width ( $V=1711$ ,  $p=0.04779$ ), and facial ratio ( $V=496.5$ ,  $p=0.2434$ ) are low. While there are other morphological differences between them, unflanged males and females do not differ in their facial ratios. The lack of significant differences in facial ratios between unflanged males and females, despite the higher testosterone levels in unflanged males, is consistent with them having an alternative 'sneaker' male reproductive strategy that includes mimicking female size and appearance.

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