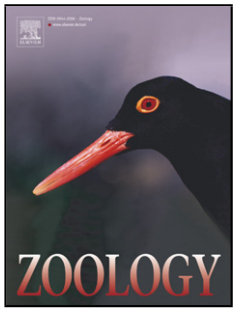


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**Revisiting size and scaling in the anthropoid temporomandibular joint**

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Highlights

- Temporomandibular joint shape is under selective pressure to maximize function while minimizing injury and pathology.
- Features of the TMJ primarily scale with positive allometry or isometry relative to body mass or mandible length.
- Patterns of allometry in the TMJ vary across taxonomic groups and between sexes.

**ABSTRACT**

Masticatory morphology in primates is likely under strong selective pressure to maximize feeding efficiency while simultaneously minimizing the occurrence of injury or pathology. As a result, masticatory shape, including aspects of temporomandibular joint (TMJ) morphology, varies widely across primates in relation to feeding behavior and body size. This study examines patterns of allometry in the TMJ of anthropoid primates, with the specific goal of evaluating how allometric patterns may reflect variation in loading and/or range of motion at this joint. Phylogenetic reduced major axis regressions were employed to examine how specific aspects of TMJ morphology scale in relation to body mass and mandible length. Patterns of shape variation across the entire masticatory apparatus were examined by utilizing geometric morphometric techniques. Results reveal that most aspects of TMJ shape scale with either isometry or positive allometry relative to body mass and/or mandible length, though several departures from these patterns were observed. In particular, male cercopithecoids tend to show distinct scaling patterns in TMJ height above the occlusal plane and condylar area, likely reflecting known trade-offs between increased range of motion and force production in this clade, as has been linked to selection for increased male canine size. The geometric morphometric analyses indicate that craniofacial and masticatory shape are strongly allometric, but that glenoid shape variation is less consistently allometric. Notably, different patterns of allometric shape variation were observed in platyrrhines, cercopithecoids, and hominoids, perhaps related to different, and potentially competing, selective pressures in each of these clades.

Abbreviations: FH, Frankfurt horizontal; OP, occlusal plane; A, anterior; I, inferior; P, posterior; S, superior.