

## Reconstruction of the cranial musculature of the paraceratheriid rhinocerotoid *Pappaceras meiomenus* and inferences of its feeding and chewing habits

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The paraceratheriid *Pappaceras* is the earliest unequivocal rhinocerotoid genus to date, for which the osteological morphology is relatively unique compared to other perissodactyls. Due to the poor preservation condition, paleobiological aspects of *Pappaceras* (or forstercooperiines), such as chewing and feeding behavior, still remain unknown. Under the Extant Phylogenetic Bracket, the cranial musculature of the newly erected *Pappaceras meiomenus* has been reconstructed using two-dimensional illustrations, drawings and interpretations of the position and general morphology of cranial muscles for which origins and insertions on the skull are visible. In this study, eight muscles are reconstructed, described and compared to the corresponding muscles known or inferred in other perissodactyls, including the m. levator nasolabialis, the m. levator labii superior, the m. caninus, the m. zygomaticus, the m. masseter, the m. temporalis, the m. buccinator and the m. pterygoid. The reconstruction of the masticatory muscles suggests that *Pappaceras meiomenus* is strictly herbivorous, probably folivorous, with a primary component of vertical biting. The relatively well-developed m. pterygoid (particularly the m. pterygoideus medialis) indicates that *Pappaceras meiomenus* is similar to hyracodontids, having more advantages in rotary chewing than other non-hyracodontid rhinocerotoids. The configuration of basicranial features shows differentiation between non-hyracodontids and hyracodontids, demonstrating that the well-developed, specialized postglenoid process and the wide glenoid fossa, along with the postcotyloid process of the mandible, serve as a strong fulcrum during the power stroke in non-hyracodontids. Based on its rostral morphology, we suggest that *Pappaceras meiomenus* was a general browser. The morphology of its incisors and canines further indicate the ability to feed on hard plants, using the postulated puncture-crushing and grinding function.

**Key words:** Mammalia, Perissodactyla, Paraceratheriidae, *Pappaceras meiomenus*, chewing, Eocene, China.

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