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BACULUM ONTOGENY IN WILD VIETNAMESE PRIMATES REVEALED BY MICRO-CT, 3D MORPHOMETRICS, AND INTERNAL MICROARCHITECTURE

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In primates, the baculum exhibits substantial morphological variability related to developmental and reproductive functions. Despite this, data on the presence, morphology, and internal structure of the baculum remain scarce for many primate taxa [1]. This study investigates baculum development in three genera of wild Vietnamese primates using high-resolution micro-computed tomography (micro-CT) [2] and 3D digital morphometric modeling [3]. Morphological parameters including length, volume and Vacuity index (Vi)4 were extracted from 3D reconstructions, while alpha-shape analysis was applied to quantify baculum surface complexity through the alpha complexity. A total of thirty-three wild males were analyzed (twenty-one with known age). Each variable was modeled using linear, logarithmic, sigmoidal, and polynomial functions, evaluated via R^2, AIC, BIC, and ANOVA. Sigmoidal models best described length and volume, whereas the alpha complexity and Vi were optimally fitted by a second-degree polynomial. Inverse modeling of length, volume, and Vi provided a new promising analytical technique for an estimation of relative age in specimens lacking chronological data, highlighting the greater discriminatory power of internal microarchitecture compared to external dimensions alone, particularly in adult individuals. Overall, this study supports the use of integrated 3D morphometric and microstructural analyses for non-invasive assessment of baculum ontogeny and age estimation in primates, providing new insights into baculum development and ossification patterns4.

References

1. Dixson AF. J Zool 1987;213:423-43.
2. Spani F et al. Sci Rep 2021;11:11245.
3. Spani F et al. PLoS One 2020;15:e0228131.
4. Spani F et al. Appl Sci 2022;12:2096.
5. Spani F et al. Int J Primatol 2025;46:823-41.