

NOT ALL NOSES ARE HOSES: AN APPRAISAL OF PROBOSCIS EVOLUTION IN MAMMALS

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Fossil mammals with modified bony nasal regions (particularly retracted nasal bones) are commonly reconstructed with fleshy probosces, typically a short tapirlike trunk. We studied a diversity of extant mammalian probosces and their osteological correlates to determine the relationships between skeletal and soft-tissue structures. Hooded seals, moose, saiga antelopes, rhinos, and outgroups were examined through computed tomography (CT), gross dissection, sectioning, and skeletonization. Results include the identification of relatively discrete anatomical conformations or morphotypes of probosces. Virtually all of these share retracted nasals, and thus this attribute is not sufficient to warrant reconstruction of a trunk-like proboscis. Hypertrophic narial anatomies are characterized by specialization of osseocartilaginous and muscular tissues. Moose and hooded seals show an enlargement of nasal cartilages accompanying modified musculature. Saiga exhibit a reduction of nasal cartilages and nasolabial musculature. Rhinos possess more basal features, providing data on the anatomical substrates available for proboscis construction in other perissodactyls. All proboscis-bearing species have highly developed intrinsic narial muscles. None of these probosces are tapirlike trunks, affirming that different styles of probosces have evolved in Mammalia. Indeed, retracted nasal bones serve only as a starting point in reconstruction of a proboscis. Osteological correlates for other major soft-tissue structures (e.g., cartilages, muscles) provide rules of construction for proboscis building and for discriminating among functionally divergent conformations. These data permit proboscis inference to more adequately characterize the narial specializations seen in fossil mammals and to clarify their behavioral and ecological roles.