

Megafaunal split ends: microscopical characterisation of hair structure and function in extinct woolly mammoth and woolly rhino

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The large extinct megafaunal species of the Late Pleistocene, *Mammuthus primigenius* (woolly mammoth) and *Coelodonta antiquitatis* (woolly rhino) are renowned for their pelage. Despite this, very little research has been conducted on the form and function of hair from these iconic species. Using permafrost preserved hair samples from seven extinct megafaunal remains, this study presents an in-depth microscopical characterisation of preservation, taphonomy, microbial damage, pigmentation and morphological features of more than 420 hairs (Tridico et al. 2014). The presence of unique structural features in hairs, from two extinct megafauna species, such as multiple medullae and unparalleled stiffness suggests evolution of traits that may have been critical for their survival in the harsh arctic environment. Lastly, despite popular depictions of red-haired and/or uniformly coloured mammoths, a closer examination of pigmentation reveals that mammoth coats may have exhibited a mottled/variegated appearance and that their 'true' colours were not the vivid red/orange colour

often depicted in reconstructions. Insights gained from microscopical examination of hundreds of extinct megafauna hairs demonstrate the value of extracting as much morphological data as possible from ancient hairs prior to destructive sampling for molecular analyses.

Reference

Tridico, S.R., Rigby, P., Kirkbride, K.P., Haile, J., Bunce, M., 2014. Megafaunal Split Ends: Microscopical characterisation of hair structure and function in extinct woolly mammoth and woolly rhino. *Quaternary Science Reviews* 83, 68-75.

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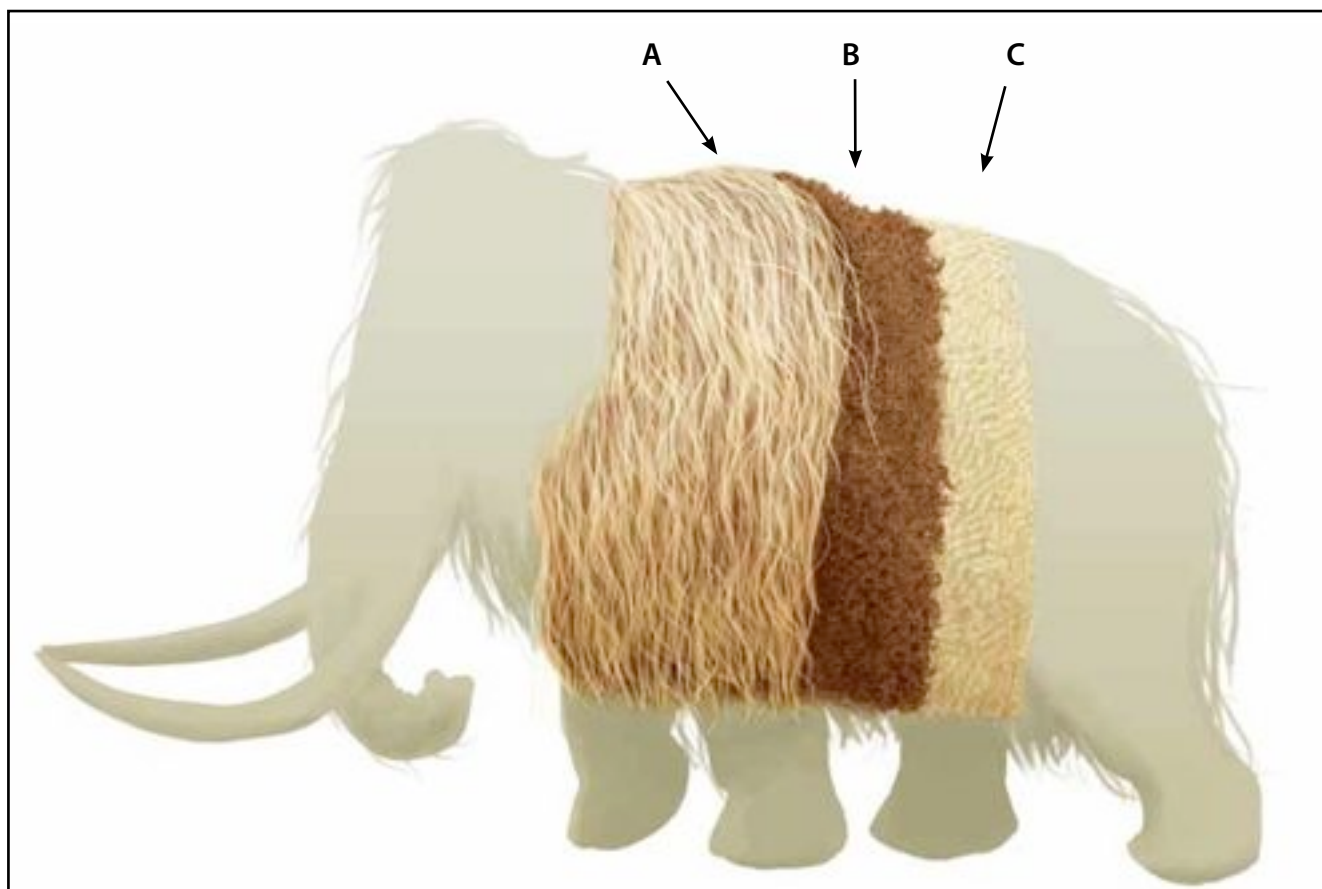


Fig. 1. Illustration showing a 'deconvoluted' view of extinct megafauna coats, based on the hairs examined in the present study. (A) The outermost hairs were colorless and devoid of pigmentation, these were very light (flyaway) and felt like fishing line, (B) shows the next layer of hairs which would be exposed (if the outermost hairs were pulled aside). These hairs showed a range of colors ranging from light, medium and dark brown; in addition to the uniformly colored hairs, some were variegated along the shaft (not shown). (C) shows the final, insulating, layer of hairs which were essentially colorless and very wavy and formed the bulk of the coat.