
Form and Function

Evolving teeth within a stable masticatory apparatus in Orkney mice

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Mice from the Orkney archipelago exhibit an important diversity regarding molar shape. While on some islands mice display a usual dental pattern, teeth from other islands display additional cusplets and unusual phenotypes that may constitute case studies for evaluating the potential functional relevance of dental changes. We developed a multifaceted approach combining 2D and 3D geometric morphometrics, dental topography, dental wear, biomechanics, estimations of masticatory muscles force, and in vivo bite force on wild-derived lab descendants exemplifying the two extreme dental morphologies. The two strains differed in the geometry of the upper and lower tooth rows, and in the topography of the upper row only. Surprisingly, the most derived tooth morphology appeared as the least complex because tooth simplification overwhelmed the signal provided by the occurrence of additional cusplets. No difference in bite force nor muscle force was evidenced, showing that the dental innovation was accommodated without changes in the rest of the masticatory apparatus. A 'non-disruptive pathway' may have facilitated the evolution of new phenotypes, together with the isolation of small populations on remote islands of the archipelago.

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6th International Conference of Rodent
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and
16th Rodens et Spatium

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