Food processing and nutritional assimilation in animals

A theme issue compiled and edited by Nicolai Konow, Myra F Laird, Victor Kang and Callum F Ross

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About this issue

Understanding how animals extract nutrients from their food is a fundamental question in biology. Currently, we lack a comprehensive understanding of intraoral food processing and post-esophageal nutrient extraction. This special issue aims to unify these two distinct approaches, treating them as a functional continuum. Moreover, there’s a bias toward vertebrate studies in feeding mechanics research. By incorporating insights from both vertebrate and invertebrate researchers, we hope to promote comprehensive, comparative research on food processing and nutrient absorption. The papers in this issue contribute in three areas: promoting a functional-comparative approach, quantifying performance, and emphasizing the impact of life history, food composition, and external factors in the study of oral food processing and nutrient assimilation.

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Introduction: food processing and nutritional assimilation in animals
Myra F Laird, Callum F Ross, Victor Kang and Nicolai Konow

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Using salamanders as model taxa to understand vertebrate feeding constraints during the late Devonian water-to-land transition
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Phillipa K Beale, William J Foley, Ben D Moore and Karen J Marsh

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Biomechanics of cutting: sharpness, wear sensitivity and the scaling of cutting forces in leaf-cutter ant mandibles
Frederik Püffel, OK Walthaus, Victor Kang and David Labonte

Three-dimensional kinematics of leafcutter ant mandibles: not all dicondylic joints are simple hinges
Victor Kang, Frederik Püffel and David Labonte

Front image: A Mexican salamander or Axolotl (Ambystoma mexicanum) with craniofacial bones (grey) and muscle (red) superimposed. The small blue and red circles represent metal implants that are used as marker pairs to measure skeletal movements via X-ray Reconstruction of Moving Morphology (XROMM) and muscle length-changes during chewing and transport. See Spence et al. in this issue for details. Image credit: Jacob Solomon.