

# PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B

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## Food processing and nutritional assimilation in animals

A theme issue compiled and edited by Nicolai Konow, Myra F Laird, Victor Kang  
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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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**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.

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

*Rhythmic chew cycles with distinct fast and slow phases are ancestral to gnathostomes* Brian A Richard *et al.*

*Do salamanders chew? An X-ray reconstruction of moving morphology analysis of ambystomatid intraoral feeding behaviours*  
Meghan Spence, Mateo Rull-Garza, Yonas Tolosa Roba and Nicolai Konow

*Using salamanders as model taxa to understand vertebrate feeding constraints during the late Devonian water-to-land transition*  
Daniel Schwarz, Egon Heiss, Todd W Pierson, Nicolai Konow and Rainer R Schoch

*Evolution, diversification and function of the maternal–infant dyad in mammalian feeding* Christopher J Mayerl and Rebecca Z German

*The feeding apparatus of ants: an overview of structure and function*  
Adrian Richter and Evan P Economo

*Teeth and the gastrointestinal tract in mammals: when 1 + 1 = 3*  
Marcus Clauss, Julia Fritz and Jürgen Hummel

*Food transport in Reptilia: a comparative viewpoint*  
Vincent Bels *et al.*

*Energetic costs of feeding in 12 species of small-bodied primates*  
Christine E Wall, Jandy B Hanna, Matthew C O'Neill, Maxx Toler and Myra F Laird

*Warmer ambient temperatures reduce protein intake by a mammalian folivore* Phillipa K Beale, William J Foley, Ben D Moore and Karen J Marsh

*Towards an integrated understanding of dietary phenotypes*  
David Raubenheimer, Rong Hou, Yunlong Dong, Cuiru Ren and Zhenwei Cui

*Three-dimensional mandibular kinematics of mastication in the marsupial *Didelphis virginiana** Kelsey T Stilson, Zhe-Xi Luo, Peishu Li, Selby Olson and Callum F Ross

*Dynamic finite-element modelling of the macaque mandible during a complete mastication gape cycle*  
Olga Panagiotopoulou *et al.*

*Characterizing tongue deformations during mastication using changes in planar components of three-dimensional angles*  
Rachel A Olson, Stephane J Montuelle and Susan H Williams

*Head posture impacts mammalian hyoid position and suprahyoid muscle length: implication for swallowing biomechanics*  
Peishu Li, Callum F Ross, Zhe-Xi Luo and Nicholas J Gidmark

*Gape drives regional variation in temporalis architectural dynamics in tufted capuchins* Myra F Laird *et al.*

*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