Chewing over skull mechanics in an unusual reptile from New Zealand

Tuesday 25 March 1pm – 2pm

Speaker

Dr. Marc Jones
University of Adelaide

Location

Gould Seminar Room
(Rm 235) Gould Building (Bldg. 116),
Linnaeus Way, ANU

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This lecture is free and open to the public

RSB event information:
biology.anu.edu.au/News/Events.php

Oral food processing (chewing) is often considered strongly linked to herbivory, a high metabolism, and/or a well developed cognitive ability. However, Sphenodon, the tuatara of New Zealand, has none of these attributes and yet does demonstrate complex oral food processing. During feeding the teeth on the lower jaw close between two upper rows of teeth before sliding forward to shear food apart (e.g. arthropods and juvenile sea birds). To investigate the jaw movements in more detail we built a sophisticated computer model of a *Sphenodon* head using data from anatomical dissections and detailed Computed Tomography. We find that the jaw movements, constrained by the muscles and shape of the jaw articulation, are more complex than previously appreciated involving a long axis rotation of the lower jaws, a flexible chin join, and precise tooth-on-tooth wear. Although today limited to *Sphenodon*, the fossil record indicates that a similar feeding mechanism (proal shearing) was present in the fossil relatives of *Sphenodon* (*Rhynchocephalia*) as much as 190 million years ago. Such food processing ability may have been advantageous in environments where food availability was unpredictable given that oral food processing: 1) increases food surface area reducing gut passage times, 2) allows more efficient internal food packing, 3) and enables access to food items too large to swallow whole. *Sphenodon* is important for showing that oral food processing is not necessarily associated with the evolution of high metabolism or highly complex cognition.

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