



Diets of giants: the nutritional value of herbivorous dinosaur diet during the Mesozoic

Fiona Gill (1), Juergen Hummel (2), Reza Sharifi (2), Alexandra Lee (3), and Barry Lomax (3)

(1) School of Earth and Environment, University of Leeds, Leeds, UK, (2) Department of Animal Sciences, Georg-August University, Göttingen, Germany, (3) The School of Biosciences, The University of Nottingham, Nottingham, UK

A major uncertainty in estimating energy budgets and population densities of extinct animals is the carrying capacity of their ecosystems, constrained by net primary productivity (NPP) and digestible energy content of that NPP. The hypothesis that increases in NPP of land plants due to elevated atmospheric CO₂ contributed to the unparalleled size of the sauropods, the largest ever land animals, has recently been rejected, based on modern studies on herbivorous insects. However, the nutritional value of plants grown under elevated CO₂ levels might be very different for vertebrate megaherbivores with more complex digestive systems and different protein:energy requirements than insects. Here we show that the metabolisable energy (ME) value of five species of potential dinosaur food plants does not decline consistently with increasing CO₂ growth concentrations, with maxima observed at 1200 ppm CO₂. Our data potentially rebut the hypothesis of constraints on herbivore diet quality in the Mesozoic due to CO₂ levels.