

Hawes, Joseph ORCID: <https://orcid.org/0000-0003-0053-2018> , Peres, Carlos A. and Smith, Andrew C. (2024) Reviewing primate dietary profiles worldwide: a continuum of dietary strategies. In: British Ecological Society (BES) Annual Meeting 2024, 10-13 December 2024, Liverpool, UK. (Unpublished)

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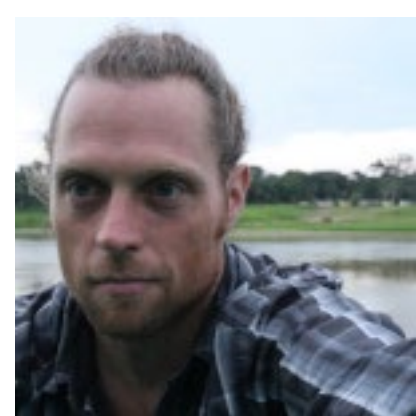
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Reviewing primate dietary profiles worldwide: a continuum of dietary strategies



Joseph E. Hawes¹
Carlos A. Peres²
Andrew C. Smith³

1. Institute of Science and Environment, University of Cumbria, Ambleside

2. School of Environmental Sciences, University of East Anglia, Norwich Research Park, Norwich

3. Animal and Environment Research Group, Department of Life Sciences, Anglia Ruskin University, Cambridge



Background

- Non-human primate diets have been the focus of a vast cumulative field observational effort which now enable an enhanced level of comparative analysis.
- Classification of dietary strategies into discrete categories inevitably leads to a loss of detail and often overlooks geographic, seasonal, and other forms of variation.
- Comparative analyses have been hampered by the inevitable concentration of cumulative efforts on restricted geographic areas and study species (Hawes *et al.*, 2013).
- Most primate dietary reviews have focussed on distinct primate taxa or on individual food resources, with few comprehensive large-scale comparative analyses (Hawes & Peres, 2014).

Objectives

- Review the feeding ecology and major dietary profiles of wild non-human primates worldwide.
- Assess the association between diet and the anatomical constraint of body size.



Figure 1. Major dietary classes for nonhuman primates worldwide. Clockwise from top left: chimpanzee (*Pan troglodytes*) feeding on figs (*Ficus sur*) in Kibale National Park, Uganda; Toppin's titi (*Callicebus toppini*) feeding on *Inga* sp. seeds in Tambopata National Reserve, Peru; Gursky's spectral tarsier (*Tarsius spectrumgurskyae*) feeding on an orthopteran (Orthoptera) in Tangkoko National Park, Indonesia; chacma baboon (*Papio ursinus*) feeding on guinea fowl (*Numida melegaris*) in Mashatu Game Reserve, Botswana; ring-tailed lemur (*Lemur catta*) feeding on tamarind (*Tamarindus indica*) leaves in Tsimanampetsotsa, Madagascar; golden bamboo lemur (*Haplemur aureus*) feeding on giant bamboo (*Cathariostachys madagascariensis*) shoots in Ranomafana National Park, Madagascar; Tarai gray langur (*Semnopithecus hector*) feeding on Indian elm (*Holoptelea integrifolia*) flowers in Shiwalik Forest Division, India; and moustached tamarin (*Saguinus mystax*) feeding on unidentified tree exudate at Estación Biológica Quebrada Blanco, Peru.

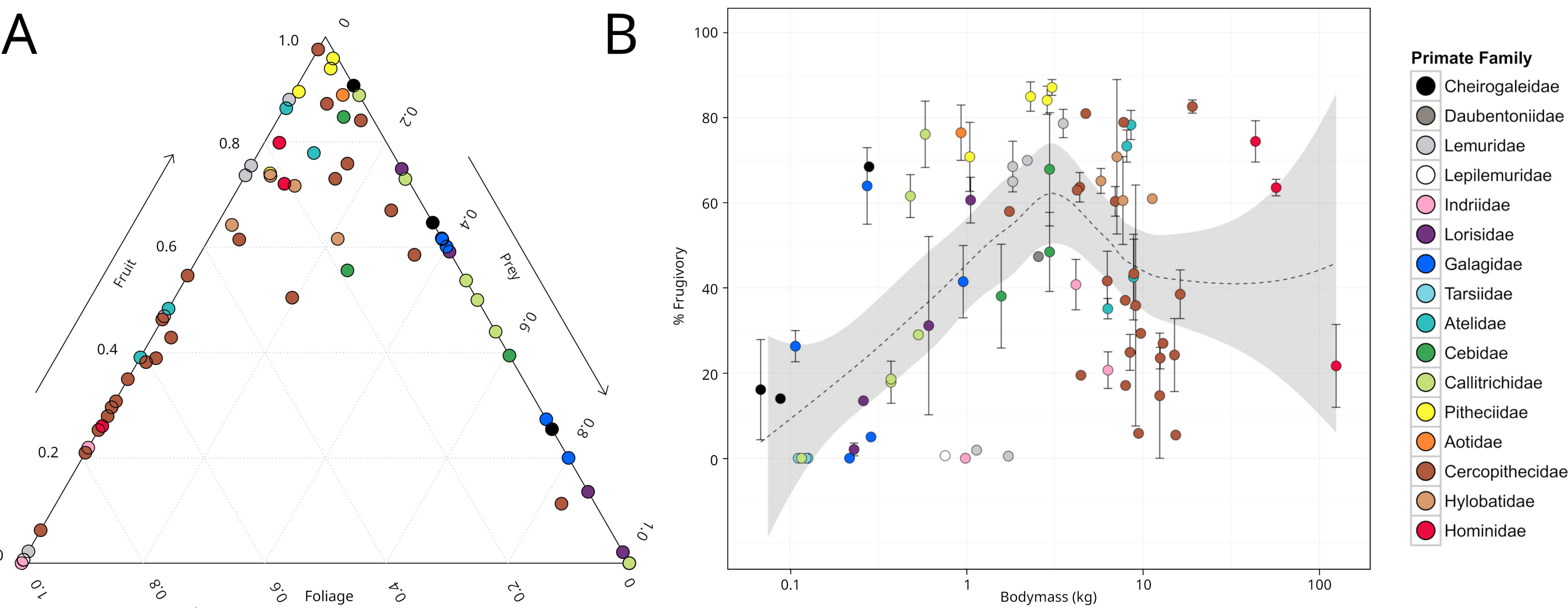


Figure 2. Dietary differences across 72 primate genera worldwide. A) Relative three-way contributions of folivory, frugivory, and faunivory (excluding other dietary classes). B) Relationship between body size and frugivory (percentage of the overall diet including fruits and seeds, mean \pm SE). Fill colours represent primate families, dashed line represents the smoothed mean, and grey shading represents 95% confidence intervals. Mean body mass values per genus are derived from Smith & Jungers (1997).

Results

- Primate diets worldwide are remarkably diverse and highly variable across families, with plant and animal food resources acquired from an array of fruits, seeds, leaves, flowers, exudates, and vertebrate and invertebrate prey, as well as a selection of minor food items.
- Fruits often comprise a unifying resource for all extant primates worldwide, but foliage and animal prey are often mutually exclusive.
- Further support is provided for a midrange peak in frugivory along the body size spectrum.

Conclusions

- The dietary flexibility demonstrated in specialist and generalist feeders highlights the challenge of assigning primate species into fixed, discrete categories, and the concept of a continuum of dietary strategies offers the possibility of a more informative approach.
- We hope to motivate more detailed regional assessments of primate diets, eventually culminating in a worldwide synthesis and accompanying database of primate feeding studies.

Methods

- Proportional dietary data collated from 307 studies, covering 72 non-human primate genera from 16 families (genera without data were *Callibella*, *Mirza*, *Oreonax*, *Phaner*, and *Pseudopotto*).
- Dietary data standardized into condensed categories:
 - fruits (including ripe and unripe fruit, as well as seeds)
 - foliage (including leaves, grass, and buds)
 - flowers (including nectar)
 - exudates (including gums and sap)
 - animal prey (including invertebrates and vertebrates)
 - any other food sources.
- Mean body mass calculated per primate genus, to assess the potential relationship between diet and body size.

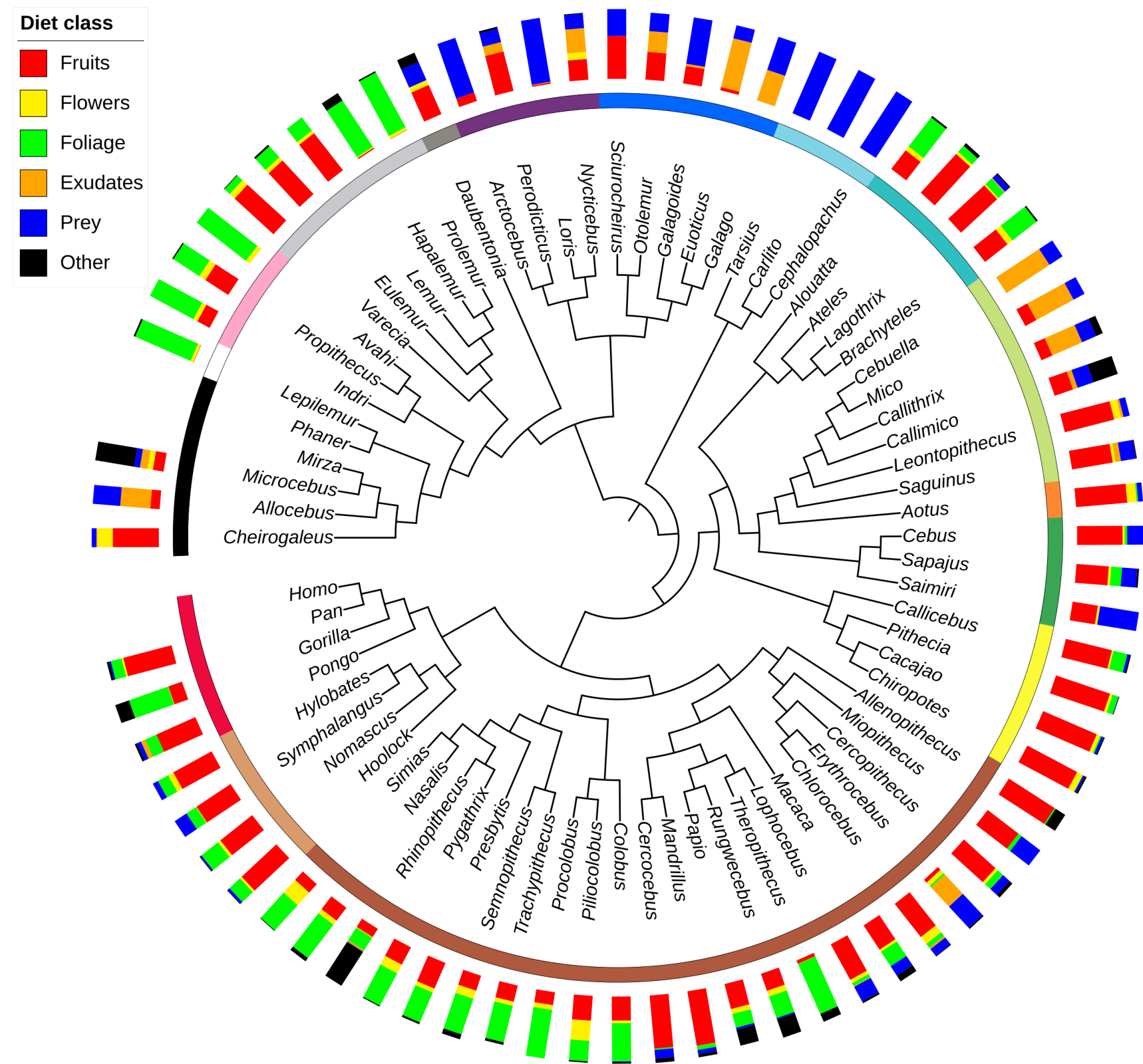
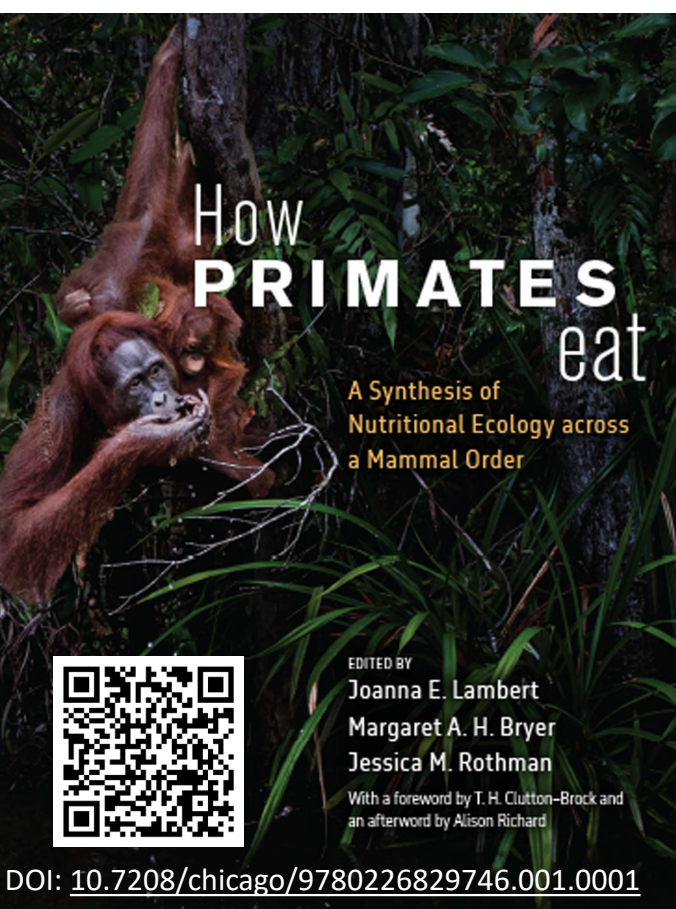


Figure 3. Phylogeny of primate genera worldwide showing the relative contributions of major dietary classes. Inner strip represents primate families, according to the legend in Figure 2. Phylogeny adapted from Arnold *et al.* (2010) and presented using the Interactive Tree of Life (Letunic & Bork, 2021).

Acknowledgments

All researchers who have contributed to the current knowledge of primate diets worldwide.



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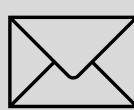
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joseph.hawes@cumbria.ac.uk



0000-0003-0053-2018



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