Brief Report

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Gut Passage Rate in Guenons and Mangabeys: Another Indicator of a Flexible Feeding Niche?

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Introduction

Recent work on the feeding ecology of arboreal guenons and mangabeys in Central Zaire showed that these normally frugivorous species [1, 2] fed largely on leaves, arils and seeds and ate only 5–12% fleshy fruit [3; unpubl. data]. Two main factors affect the level of available nutrients in a plant: firstly its digestibility, which depends largely on cell wall content and secondly the gut passage rate (GPR) of the consumer [4]. Leaves, which have a higher proportion of cell wall material than succulent fruit, require a longer time in the gut for efficient digestion [4, 5].

Studies of GPR conducted on primates [5–8], including both frugivorous and omnivorous species, show that (1) when monkeys are fed fresh plant material, a slower GPR is in general linked to larger body size; (2) among animals of similar size, more frugivorous species have a faster GPR than more folivorous species [4, 8].

GPR has never been studied in arboreal guenons and mangabeys. An experiment was thus conducted to see whether these species, which display high dietary flexibility, have a GPR within the range of 'typical' frugivores.

Methods

Trials were conducted with 2 male *Cercopithecus (mona) pogonias*, 1 male *C. (cephus) ascanius*, 1 male *C. (cephus) erythrotis* and 2 female *Lophocebus albigena*, all adults living at the breeding colony at the Station Biologique of Paimpont, France. These species are

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taxonomically very close to those of the Zaire Basin *[C. (mona) wolfi, C. (cephus) ascanius, L. aterrimus]*. The food types comprising their normal diet were individually weighed.

Known numbers of circles (5 × 0.09 mm) of coloured plastic ribbon were concealed in a banana and fed to the monkeys just before their daily meals. They were highly visible in faeces, easily quantified, and such flexible markers are known to have a GPR independent of their size [9]. Two trials were run: monkeys were given markers on day 1 at 11 h a.m. and (after all of the first batch of markers had been passed) on day 3, at 5 h p.m., as GPR can vary with meal times [8]. All faeces passed after feeding with markers were washed over a 1.5-mm screen. The time of each defecation and the number of markers in each batch of faeces were recorded until they had all been passed [10].

The following data were obtained: (1) mean retention time (MRT), calculated as follows: $MRT = \Sigma m_i t_i / \Sigma m_i$; where m_i = numbers of markers excreted at the ith defecation at time t_i after the marked food had been ingested [11]; MRT is considered to be the best measure of GPR [10]; (2) transit time (TT) = time between ingestion and appearance of the first marker.

Results

The food given to the captive monkeys consisted of 36% fresh fruit, 29% raw vegetables, 15% cooked potatoes and 20% commercial monkey chow (expressed as the percentage of total weight).

MRT and TT for mangabeys were 38 ± 6.5 and 22.7 ± 4.5 h, respectively (± standard error). The guenons had somewhat shorter GPRs; MRT was 26.7 ± 3.7 h for *C. (cephus) ascanius* and *erythrotis* and 26.9 ± 6.7 h for *C. pogonias*. TT was 20.6 ± 0.5 h for *C. (cephus)* spp. and 16.6 ± 2.6 h for *C. pogonias*.

Discussion

The GPRs of the guenon and mangabey species were much slower than those observed for 'frugivores' of similar size such as *Lagothrix* (TT of 6.7 h), *Ateles* (MRT of 8 h; TT of 4–5 h) or *Cebus* (TT of 3.5 h) [5]. They are closer to those found in more omnivorous species which are known to feed on over 40% leaves, such as *Alouatta palliata* and *A. seniculus* (MRT of 18–30 h; TT of 20.4 h) [5, 6] or *Nasalis larvatus* (MRT of 49 h; TT of 14 h) [7]. One cannot exclude the possibility that captivity modifies GPR, which is positively related to the proportion of dietary fibre in primates and other mammals [10, 12, 13]. However, it has been shown that captive monkeys fed on diets very similar to those of this study [5] had very different transit times depending on the species.

Although these results should be extended before using them to time digestibility assays, they provide a strong indication that free-living guenons and mangabeys are capable of coping with seasonally leaf-dominated diets; in Zaire they were observed to consume 31% leaves over a 3-month period [3, unpubl. data].

The results of this experiment, combined with those from field studies in Zaire [3], confirm that both the classification of primates into ecological 'grades' and inferred relationships between gut morphology and diet [14] need to be treated with caution [3]. They also support Chapman and Chapman's opinion [15] that primate diets are not tightly constrained by phylogeny or even by body size into these grades.

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