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Faecal analysis of the edible dormouse (*Glis glis*) in the northwest Iberian Peninsula

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The edible dormouse (*Glis glis* Linnaeus, 1766) is a tree-dwelling and exclusively crepuscular/nocturnal rodent. To date, there have been few studies of its diet in optimal habitats, and all such studies have been based either on analysis of stomach contents (Kahmann 1965; Holisova 1968; Castroviejo et al. 1974; Gigirey and Rey 1998) or on field observations, which require considerable effort and are very difficult in view of the species' habits (Vietinghoff-Riesch 1960; Rodolfi 1994). The aim of this study is to investigate the diet of *G. glis* through faecal analysis.

The study was carried out in the Parque Natural de Invernadeiro (Galicia, NW Spain). The study area (1000–1200 m) is a 4.1 ha area of mixed broad-leafed woodland, mainly of *Quercus robur*, with a well-developed understorey.

The diet studies were based on the analysis of 293 droppings collected in the study area in 1997, over the period June-October inclusively. All droppings were obtained inside or on top of nest-boxes specifically designed for *G. glis*. The model is similar to that of Morris et al. (1990) for *Muscardinus avellanarius*, but larger in size.

A total of 47 nest-boxes were distributed throughout the study area at regular intervals of about 25 m, at a height of 2–3 m above ground, and they were checked monthly. Since nest-boxes were not occupied until July, in May and June it was necessary to use Sherman traps, baited with apple and peanut butter, to obtain the droping. It should be stressed that this may have had some influence on the results. The method used for faecal analysis followed Watts (1968), Hansson (1970), and Richards et al. (1984). Samples were grouped into batches, each batch comprising all the droppings collected from a given nest-box or Sherman trap in a given month. A total of 21 batches of droppings was examined; each batch was pooled homogenized, and a total of 5 slides was prepared; within each slide, a total of 100 fields of view was examined at 40×, recording the food remains present in each field. Food remains were identified with the aid of a reference collection. Pollen, spores, and remains of the bait were not recorded in droppings from Sherman traps.

The results revealed a basically herbivorous diet (Tab. 1), with a marked variation over the activity period, as summarized in figure 1. The fleshy fruits detected were mainly blackberry and apple, and to lesser amounts bilberry and rowan-berry. Nuts included acorns and hazelnuts. Leaves identified were mostly from *Rubus ulmifolius*; other species were *Quercus robur*, *Betula celtiberica*, and *Ilex aquifolium*. Flowers were not identified at the species level. Animal-prey remains were exclusively insects (hymenoptera, coleop-

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Table 1. Diet of the edible dormouse in the Montes do Invernadeiro: pooled results for all 21 batches of droppings. N = total number of remains of the food type detected. %F = percentage frequency (N as a percentage of total N).

Food type	N	%F
Fleshy fruit	2614	46.5
Nuts	2077	37
Leaves/flowers	449	8
Arthrópods	385	6.9
Fungi	63	1.1
Briophytes	34	0.5

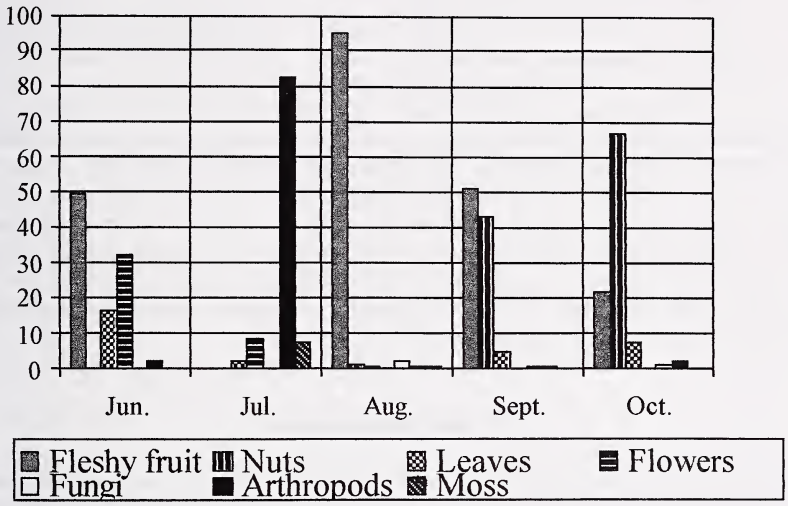

Fig. 1. Changes in the frequency of consumption of the different food types over the activity period (June–October). Values shown are frequencies of occurrence (number of batches of droppings containing that food type, as a percentage of the total number of batches in that month).

tera, and hemioptera), and/or arachnida. Fungus remains were mostly ascomycetes of the genus *Elaphomyces*. The consumption of moss was probably accidental.

These results are in accordance with previous reports. In Italy, Kahmann (1965) found that the June/July diet comprised plant remains, insects and *Rubus* flowers, whilst in July/August seeds of hornbeam, nuts, and blackberies. In Czechoslovakia, Holisova (1968) found that the early-summer diet comprised vegetative plant structures; in late-summer vegetative plant structures, fungi, hazelnuts, and dogwood fruits; and in autumn principally dogwood fruits, hawthorn fruits and sycamore seeds. In the Iberian Peninsula, Castroviejo et al. (1974) found that the June/July diet was comprised of insects, leaves, and fruits, the August diet leaves, fruit, and nuts, and the September/October diet fruit and nuts.

During May we did not find faeces either in nest-boxes or in traps. This suggests that in our study area the activity period does not begin until June, as has been reported for other regions (Kahmann 1965; Gaisler et al. 1977; Rodolfi 1994).

During September and particularly October (pre-hibernation period), the diet is dominated by nuts. This can be attributed to the need to accumulate the body fat required to survive the winter; indeed, their abundance may be an important determinant of population density (Vietinghoff-Riesch 1960; Castroviejro et al. 1974; Storch 1978).

We have not found any evidence of storage of food in larders, previously reported by Koenig (1960). However, food appears to have been þ brought to and eaten in nest-boxes, which may be a predator-avoidance behaviour. Our results also indicate that fruits are eaten regardless of their degree of ripeness (bilberries in June and hazel nuts in August), as has been reported previously by Sykora (1970) and Rodolfi (1994).

An evidence of food preference was provided by wild apple: only a single apple tree is present in the study area, but during August this food item constituted a major part of the diet, and in some cases we can infer that the dormouse moved 200 m to reach the tree. This preference has been noted in previous studies (Thompson 1952; Morris and Hoodless 1992). It seems obvious that dormice actively select apples as a source of carbohydrates, once the reproductive period has finished.

The large amounts of arthropod remains detected in July may be a response to the high energy demand over the sexual activity, in view of the fact that no energy-rich plant foods are available at this time, as previously suggested by Franco (1990). We did not detect any evidence of vertebrate prey, as has been cited in previous studies (Vietinghoff-Riesch 1960; Storch 1978; Robel and Leitenbacher 1993).

The genus *Elaphomyces*, comprises fungi with below-ground fruiting bodies, implying that dormice must have dug in the soil to reach this food source. It is possible that this reflects deliberate searching; alternatively, and particularly during September and October, this food item may have been found during searching for suitable hibernation sites.

Results from September and October are similar to those obtained by analysis of stomach contents of individuals captured in the same area (Gigirey and Rey 1998); but faecal analysis gave lower nut estimates. This difference can be attributed to the efficiency of the edible dormouse in digesting nuts for conversion into body fat (Gebczynski et al. 1972), leading to under-estimation in faeces.

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References

Castroviejo, J.; Garzon, J.; Palacios, F.; Castroviejo, S. (1974): Sobre el lirón gris (*Glis glis pyrenaicus* Cabrera, 1908) en España. Doñana, Acta Vert. **1**, 121–142.

Franco, D. (1990): Feeding habits of a dormouse population (*Myoxus glis*) of the Asiago Plateau (Venetian Prealps). Hystrix **2**, 11–22.

Gaisler, J.; Holas, V.; Homolka, M. (1977): Ecology and reproduction of Gliridae (Mammalia) in northern Moravia. Folia Zool. **26**, 213–228.

Gebczynski, M.; Gorecki, A.; Drozdz, A. (1972): Metabolism, food assimilation and bioenergetics of three species of dormice (Gliridae). Acta Theriol. **17**, 271–294.

Gigirey, A.; Rey, J. M. (1998): Autumn diet of the edible dormouse in Galicia, Northwest Spain. Acta Theriol. **43**, 325–328.

Hansson, L. (1970). Methods of morphological diet micro-analysis in rodents. Oikos **21**, 255–266.

Holisova, V. (1968): Notes on the food of dormice (Gliridae). Zool. Listy **17**, 109–114.

Kahmann (1965): Le loir (*Glis glis* L. 1776) dans les Monts Gargano Italie (Apulie). Mammalia **29**, 72–94.

Koenig, L. (1960): Das Aktionssystem des Siebenschläfers (*Glis glis* L.). Z. Tierpsychologie **17**, 427–505.

Morris, P. A.; Hoodless, A. (1992): Movements and hibernaculum site in the fat dormouse (*Glis glis*). J. Zool. (London) **228**, 685–687.

Morris, P. A.; Bright, P. W.; Woods, D. (1990): Use of nestboxes by the dormouse *Muscardinus avellanarius*. Biol. Conserv. **51**, 1–13.

Richards, C. G.; White, A. C.; Hurrell, E.; Price, E. F. (1984): The food of the common dormouse, *Muscardinus avellanarius*, in South Devon. Mammal Rev. **14**, 19–28.

Robel, K.; Leitenbacher, G. (1993): Der Einfluß des Siebenschläfers *Glis glis* auf die Höhlenbrüterpopulation in künstlichen Nisthöhlen am Surspeicher. Orn. Anz. **32**, 59–63.

Rodolfi, G. (1994): Dormice, *Glis glis*, activity and hazelnut consumption. Acta Theriol. **39**, 215–220.

Storch, G. (1978): *Glis glis* (Linnaeus 1776) – Edible dormouse (Siebenschläfer). In: Handbuch der Säugetiere Europas. Vol. 1/I, Ed. by J. Niethammer und F. Krapp. Wiesbaden: Akad. Verlagsges. Pp. 243–258.

Sykora, B. (1970): Erfahrungen mit Methoden zum Nachweis des Siebenschläfers (*Glis glis* L.) in den Waldgebieten des Altenburger Landes. Abh. Ber. Naturk. Mus. Mauritianum **6**, 227–233.

Thompson, H. (1952): The edible dormouse (*Glis glis* L.) in England, 1902–1951. Proc. Zool. Soc. Lond. **122**, 1017–1024.

Vietinghoff-Riesch, A. (1960): Der Siebenschläfer (*Glis glis* L.). Monographien der Wildsäugetiere, 14. Jena: Gustav Fischer Verlag.

Watts, C. H. S. (1968): The foods eaten by wood mice (*Apodemus sylvaticus*) and bank voles (*Clethrionomys glareolus*) in Wytham Woods, Berkshire. J. Anim. Ecol. **37**, 25–41.

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