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ORIGINAL PAPER

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Diet of the house mouse (*Mus musculus*) on Guillou Island, Kerguelen archipelago, Subantarctic

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Abstract The diet of the house mouse (*Mus musculus domesticus*), introduced to the Kerguelen archipelago in the 1800s, was studied at monthly intervals from August 1997 to July 1998 in the closed communities of *Acaena magellanica,* the main habitat of mice on Guillou Island. The analysis of 291 stomach contents showed that this opportunistic rodent included a variety of items in its diet: earthworms (*Dendrodrilus rubidus tenuis, Microscolex kerguelensis*), caterpillars of a flightless moth (*Pringleophaga kerguelensis*), weevil adults and larvae (*Ectemnorrhinus* spp.), seeds of *Acaena magellanica*, and floral parts of dandelion (*Taraxacum officinale*). The animal prey were dominant in its diet all year round, except in summer. Based on the presence of chaetae in the stomach contents, our results show that earthworms are an important prey for the house mouse at Kerguelen. The consequences of these food habits for the invertebrate communities of the subantarctic islands are discussed.

Introduction

On oceanic islands, plant and animal communities are generally species poor, and often show taxonomic and functional disharmony, and simplified food webs: predators are scarce in the terrestrial systems, and food-webs are often detritus-based (Elton 1958; Holdgate 1977; Smith 1977; Loope and Mueller-Dombois 1989; D'Antonio and Dudley 1995; Vernon et al. 1998). Introduction of herbivorous mammals such as rabbit (*Oryctolagus cuniculus*) on Kerguelen (Chapuis et al. 1994), cattle (*Bos taurus*) on Amsterdam (Tréhen et al. 1990) or reindeer (*Rangifer tarandus*) on South Georgia (Leader-Williams et al. 1987) have often profoundly altered ecosystem characteristics and plant communities. In comparison, the house mouse *Mus musculus*, which is one of the species most frequently introduced to the subantarctic islands (Berry and Peters 1975; Berry et al. 1978; Chapuis et al. 1994; Pisanu 1999), has a more scarcely visible impact on Kerguelen Islands. However, Crafford and Scholtz (1987) and Crafford (1990) clearly demonstrated that this rodent is the main predator of terrestrial invertebrates on Marion Island. This invertebrate fauna is dominated by decomposer species on the subantarctic islands (Vernon et al. 1998) and plays a fundamental role in organic matter dynamics. In spite of their apparently small impact on the insect fauna of the Kerguelen Islands, mice could induce important changes in the invertebrate communities and, consequently, in the whole ecosystem functioning (see Smith and Steenkamp 1990). Impact on plant communities could also occur, as demonstrated by Chown and Smith (1993) on Marion Island. This alien introduced mammal, added to key factors inducing current changes in the subantarctic environment, namely climatic changes and human activities (Chown et al. 1998; Bergstrom and Chown 1999; Frenot et al. 2001), could significantly enhance risks for native fauna and flora.

M. musculus domesticus was probably introduced to the Kerguelen Islands by sealers and whalers at the end of the nineteenth century (Lésel and Derenne 1975), and is currently present on the major part of the archipelago (Pisanu 1999). However, no studies have been done on its ecology and its impact in these French subantarctic islands.

Here we report on the diet of *M. musculus* on the Kerguelen Islands and, more precisely, on Guillou Island, a small island in the Golfe du Morbihan where an

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ecological restoration program has been carried out since 1994 following the eradication of rabbits (Chapuis 1995; Chapuis et al. 1995, 2001). Special attention is given to the respective proportions of plant and invertebrate fragments in mouse stomach contents. Prey items are identified to the species level wherever possible. The dietary changes over the course of a full year are analysed in relation to the availability of potential food. Finally, we compare our results to those obtained by other authors that have studied *M. musculus* in the Subantarctic. The work forms part of a more general study on the impact of mice on the terrestrial ecosystems of the Kerguelen Islands, and on their effect on community resilience processes where rabbits have been eradicated.

Materials and methods

Study area

The Kerguelen Archipelago (48°25'-50°S, 68°25'-70°35'E), located in the Southern Indian Ocean, consists of a main island (6,500 km^2) and about 60 other islands (700 km^2; Fig. 1). In its eastern part, the climate is characterised by low mean temperatures, ranging from 7.8°C in February to 2.3°C in July, by annual mean precipitation of 766 mm, by sparse winter snow-cover and very windy conditions (Météo France 1985–1997 records, Port-aux-Français).

The vegetation of Guillou Island (145 ha) has been strongly modified by rabbits which were introduced to the Kerguelen Islands in 1874 (Kidder 1876), but on an unknown date to Guillou Island. Changes in plant communities are mainly characterised by a reduction of the species diversity and by the dominance of *Acaena magellanica*, which forms monospecific communities on deep soil and sites sheltered from dominant winds (Chapuis and Boussès 1989; Chapuis et al. 1994). These *A. magellanica* communities occur on about 40% of the surface area of Guillou Island (Fig. 1) and show a vegetation cover close to 100%. They constitute the main habitat of mice. In addition to *A. magellanica,* only *Taraxacum officinale* was locally abundant on the study sites. Other species, such as *Ranunculus biternatus*, *Pringlea antiscorbutica*, *Sagina procumbens*, *Cerastium glomeratum*, *C. fontanum*, *Galium antarcticum*, *Senecio vulgaris*, *Agrostis magellanica* and *Poa annua* had a low cover, below 10%, or were very confined. Since the control of the cat population in 1994 (J.-L. Chapuis, unpublished data), the only potential predator of the house mouse was a pair of brown skuas (*Catharacta skua*) nesting on a neighbouring island. In this habitat, abundance of mice showed a high seasonal variability, with a peak of density at the end of summer, followed by a strong mortality in winter: for example, 216 mice were caught in 102 traps during 3 days in April 1998, against only 18 in July 1998 (Pisanu 1999).

Data collection

The mouse population was monitored monthly by trapping from August 1997 to July 1998 in a closed community of *Acaena magellanica* from the eastern part of Guillou Island (Fig. 1). This area, covering a total of 10 ha, was separated into six sectors which present similar topography, soil and vegetation. Mice were trapped with live-traps (INRA traps) adapted to prevent the taking of mice by the brown skua. Each month, 102 live-traps were set during 3 consecutive days and trapped mice collected every 24 h. Traps were baited using bread and vegetable oil. Mice were fixed in 5% formaldehyde.

Since January 1994, an invertebrate survey using pitfall-traps has been carried out monthly (5 days per month) in different habitats of Guillou Island (Y. Frenot and P. Vernon, unpublished data). These data revealed that the invertebrate communities in the trapping area were species poor and included mainly one spider species (*Myro kerguelensis*), one aphid species (*Myzus ascalonicus*), one species of flightless moth (*Pringleophaga kerguelensis*), several species of weevils (*Ectemnorhinus viridis*, *E. drygalskii*, *Bothrometopus angusticolis*), five dipterans (*Anatalanta aptera*, *Amalopteryx maritima*, *Calliphora vicina, Calycopteryx moseleyi, Fucellia maritima*), and an introduced carabid beetle (*Oopterus soledadinus*). Soil fauna sensu stricto (e.g. earthworms, snails and insects larvae) was not surveyed but some soil samples were occasionally hand-sorted, showing that two species of earthworms (*Dendrodrilus rubidus tenuis* and *Microscolex kerguelensis*) co-occur at that site. The results of the 1993–1998 invertebrate survey in the *Acaena*

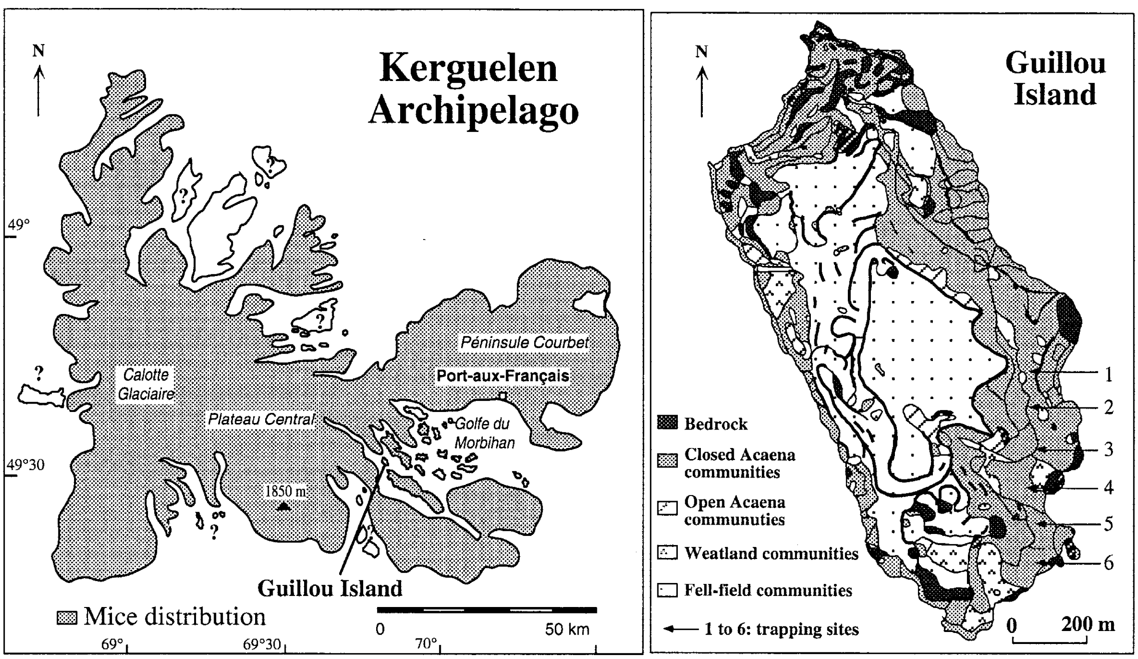

Fig. 1 Kerguelen archipelago, presentation of trapping areas of mice on Guillou Island

Table 1 Number of stomach contents analysed per month on Guillou Island from August 1997 to July 1998

Month	A	S	O	N	D	J	F	M	A	M	J	J
No. of stomach contents	39	42	13	15	40	19	15	15	40	32	14	7

magellanica vegetation community were used to estimate the activity of each species or group, and the seasonal changes of their availability as prey for mice.

The minimal number of stomach contents needed monthly to obtain a representative diet content (e.g. identification of >95% of the main items) was estimated from mice collected over 2 months in winter (August, September), 2 months in summer (December, January) and 2 months in autumn (April, May). During these test months 530 mice were trapped but 318 were unusable because stomachs were empty or less than a quarter full. These stomachs were not used to minimise the over-estimation of the remnants of some prey hard-parts. Only food items with frequencies higher than 10% (called "main items") were considered for statistical analysis. For each month, a curve showing the relationship between sample size and number of prey items was established using 100 randomisations of the data. The minimal number of stomachs needed to be obtained monthly was applied to the other months, except to July 1998 when only seven mice were trapped. In total 291 stomach contents were used (Table 1).

Data analysis

The relative proportions of plant items and animal prey were estimated for each stomach under binocular lenses, according to occupied surfaces in a gridded dish. After filtering (mesh 0.4 mm), fine and coarse fragments were analysed under binocular lenses or using a microscope. Results were expressed as monthly occurrence for each food item. For earthworms (*Microscolex kerguelensis* and/or *D. rubidus tenuis*), their presence was noted from observation of fragments of worms or, more frequently, of chaetae.

For animal prey, excluding earthworms, different organs or identifiable fragments (leg, antenna, head capsule) were counted in order to estimate the minimum number of consumed prey items. For each item, the number of identified prey was summed for each month. In order to estimate the abundance of prey items in the stomachs in terms of biomass, mean dry weights of adults and larvae of the main invertebrate species were used. These weights were obtained from invertebrates that were randomly hand-collected in the field (in order to have a representative collection of the individuals of different sizes), dried at 60°C to constant weight, and weighed (except for aphids which were weighed as a single set of 150 individuals).

Table 2 Minimal number of stomach contents to analyse in order to have a representative image of qualitative diet of mice for a precision of 90%, 95% or 100% of main items

Month	No. of stomach contents analysed	Minimal number of stomachs containing		
		90% of main items	95%	100%
August 97	39	7	11	25
September	42	6	9	27
December	40	7	10	27
January 98	19	7	9	16
April	40	9	13	28
May	32	5	6	16

Results

Validation of sample size

The preliminary inspection of the stomachs, in combination with the randomisation procedure, allowed us to determine the minimum sample size necessary to estimate the diet of mice. From the 212 remaining stomachs, analysis of 5–9 mice was sufficient to provide more than 90% of main prey items (Table 2; Fig. 2). One to four additional mice were needed to identify 95% of the main items. For each food item, comparisons with Fisher's test (Siegel and Castellan 1988) of the diet of 10 mice randomly drawn from the remaining samples ($n = 22$–32), repeated 10 times, showed significant differences for less than 10% of tests (Table 3). For the other months, 13–17 mice were analysed and only 7 in July 1998 (Table 1).

Seasonal variations of the diet

On Guillou Island, a large number of food items were found in the stomach contents of mice. Earthworms, spiders, aphids, weevils (larvae and adults), seeds of

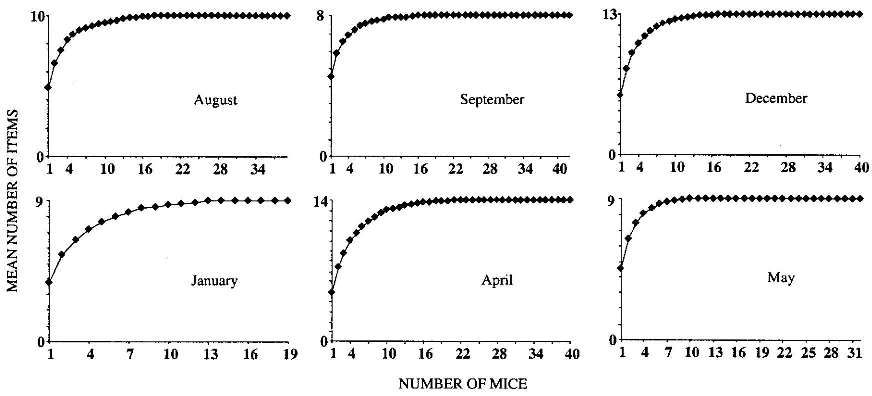

Fig. 2 Evolution of mean number of main items present in stomach contents of one, two, three and *n* mice from 100 random draws

Table 3 Comparison, per item, between diet of a sample of ten mice taken randomly, from the rest of samples (Fisher's test). Tests were carried out individually for each item, from ten random draws

Month	No. of stomach contents analysed	No. of items tested	No. of tests	No. of significant differences per items in % ($P<0.05$)
August 97	39	8	80	2.5 ($n=2$)
September	42	7	70	5.7 ($n=4$)
December	40	12	120	6.6 ($n=8$)
April 98	40	13	130	2.3 ($n=3$)
May	32	8	80	2.5 ($n=2$)

Acaena magellanica and floral parts of dandelion were the most frequently consumed items (Table 4). From August to December, mice feed on plant and animal prey almost in the same proportion (Fig. 3). In January and February, plants represented 85% and 94% of stomach contents, respectively, while from March to July, animal prey constituted from 71% to 98% of items. The range of item abundance in the stomach contents varied with time of the year, depending on their nature (Table 4). Earthworms were regularly ingested throughout the year with a maximum in October, November and June, whereas a decrease was observed in January–February. Spiders were also consumed every month principally during winter in July–August and less during summer. High frequency of consumption was observed in aphids at the end of summer (50% to 80% from January to May). Among the other animal prey, weevil adults were regularly ingested throughout the year whereas weevil larvae, as well as caterpillars of *Pringleophaga kerguelensis*, declined in the stomach contents in summer. Lastly, adults of the carabid beetle, *Oopterus soledadinus,* were occasionally consumed. Curiously, the fly *Anatalanta aptera*, which was always abundant in the invertebrate sampling, was rarely consumed by mice. Only three individuals of this species were recorded in mouse stomach contents in May.

Seeds and flowers/inflorescences of *Acaena magellanica* and *T. officinale* were the main plant items consumed, although seeds of *Poa annua* were occasionally taken at the onset and at the end of summer. *A. magellanica* was consumed throughout the year with two peaks in consumption, one in summer and one at the end of winter. *T. officinale* was mainly found in the stomach contents of mice trapped in spring and summer. Finally, bryophyte fragments were found in stomachs in several different seasons, but always at a low frequency.

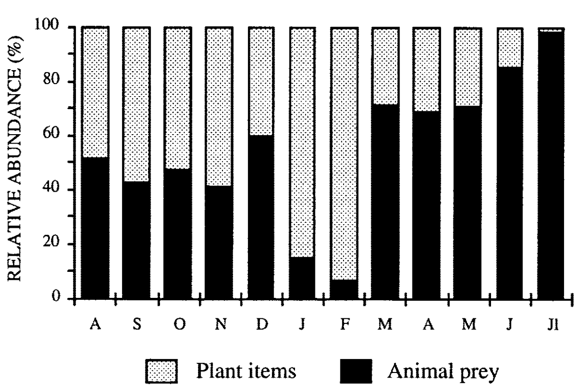

Fig. 3 Relative abundance of animal and plant items contained in the stomachs of mice trapped on Guillou Island from August 1997 to July 1998

Seasonal variations of animal prey biomass in the diet

Mean individual weight for each of the main prey items is shown in Table 5. We used these data to transform the number of prey to their contribution to the stomach contents in terms of biomass (Fig. 4). Following this transformation, it is clear that spiders and aphids are less important in the diet of mice, and could be considered minor resources. Conversely, moth larvae, expressed in terms of their biomass contribution, constituted an important part of the diet of mice from August to November and from March to June (Fig. 4). Similarly, weevil larvae were at the maximum in terms of biomass from March to July. The peak of weevil adult biomass occurred in December. As the presence of earthworms in the diet was mainly assessed by the occurrence of chaetae in the stomach content, it was not possible to estimate the abundance and, a fortiori, the biomass of this prey.

Seasonal variations of invertebrate prey

Changes in the number of invertebrates trapped throughout the year are shozwn in Fig. 5 for the most abundant species. The only significant seasonal difference in invertebrate number caught by pitfall-traps was observed in aphids. *Myzus ascalonicus* activity was obviously higher in summer, decreased in autumn, and no activity was detected in winter. Aphids have never been observed on plants during the cold season and individuals remain in the soil. Spider (*Myro kerguelensis*) abundance was also slightly higher in summer but it varied greatly among the years. Conversely, there is no clear-cut pattern of seasonal variation in abundance of *Anatalanta aptera* or adult weevils.

Discussion

On Guillou Island, where plant and animal communities are species poor, a sample of 5–9 stomach contents per

Table 4 Frequency of occurrence of prey items contained in stomachs of mice trapped on Guillou Island from August 1997 to July 1998

Month			A	S	O	N	D	J	F	M	A	M	J	J
Number of stomach contents analysed			39	42	13	15	40	19	15	15	40	32	14	7
Animal items														
Oligochaeta		*Microscolex kerguelarum. Dendrobaena rubida tenuis*	79.5	83.3	100	100	75.0	57.9	53.3	73.3	85.0	90.6	100	85,7
Nematoda	(Unidentified)			4.8		13.3	12.5		6.7		12.5			
Arachnida	Desidae	*Myro kerguelensis*	97.4	81.0	76.9	73.3	57.5	26.3	26.7	93.3	75.0	71.9	50.0	100
Decapoda	Hymenosomatidae	*Halicarcinus planatus*									5.0			
Collembola	Isotomidae	*Cryptopygus antarcticus*	5.1	14.3										
Hemiptera	Aphididae	*Myzus ascalonicus, Rhopalosiphum padi*	20.5	9.5	7.7	20.0	45.0	47.4	80.0	53.3	57.5	62.5	28.6	28.6
Lepidoptera	Tineidae	*Pringleophaga kerguelensis* (caterpillar)	38.5	23.8	23.1	13.3				40.0	25.0	6.3	21.4	
Coleoptera	Trechidae	*Oopterus soledadinus*				20.0		5.3			47.5			14.3
	Curculionidae	Larvae	30.8	50.0	53.8	6.7	25.0			73.3	35.0	75.0	57.1	85.7
	(*Ectemnorhinini*)	Adults	56.4	61.9	76.9	60.0	95.0	57.9	66.7	60.0	15.0	43.8	28.6	42.9
	Unidentified										10.0			
Diptera	Sphaeroceridae	*Anatalanta aptera*										9.4		
	Calliphoridae	*Calliphora vicina* (larvae)									2.5			
	Micropezidae	*Calycopteryx moseleyi*									2.5		7.1	
	Unidentified	Larvae	2.6								7.5	6.3		14,3
Gastropoda	Entodontidae	*Notodiscus hookeri*	2.6					5.3	6.7		5			
Unidentified		Arthropods	5.1	4.8				15.8						
		Invertebrate eggs	2.6									9.4		
Plant items														
Bryophytes		Unidentified	15.4			20.0	17.5	21.1		6.7	12.5	3.1		
Spermaphytes	Caryophyllaceae	*Cerastium* sp. (vegetative parts)		2.4				5.3		6.7	2.5			
	Rosaceae	*Acaena magellanica*												
		– veg. parts	10.3	4.8			10.0	5.3	6.7		5.0			
		– reproductive parts					2.5		6.7					
		– seeds	87.2	92.9	61.5	53.3	37.5	94.7	1.00	66.7	47.5	31.3	7.1	28.6
	Asteraceae	*Taraxacum*												
		– veg. parts	5.1	7.1	69.2	20.0	27.5	15.8		26.7	17.5	25.0	21.4	
		– reproductive parts				46.7	50.0	26.3		6.7	17.5	3.1		
		– seeds					25.0	5.3		13.3	2.5	9.4	7.1	
		Senecio												
		– veg. parts										3.1		
		– reproductive parts										9.4		
		Senecio or *Taraxacum* (veg. parts)	5.1			6.7					7.5			
	Poaceae	*Poa annua* (inflorescences, seeds)				6.7	17.5	5.3		6.7	30.0			
		Agrostis magellanica (veg. parts)		2.4										
		Unidentified (veg. parts)				6.7	7.5							
	Unidentified	Vegetative parts	5.1	16.7		33.3	7.5	5.3	6.7	6.7	12.5	18.8	7.1	14,3
		Seeds	2.6			6.7	5	5.3			2.5	28.1		

Table 5 Individual mean dry mass (± standard deviation) of main animal items consumed by mice on Guillou Island

Arachnida	Hemiptera	Lepidoptera	Coleoptera		
Myro kerguelensis (mg)	*Myzus ascalonicus* (mg)	*Pringleophaga kerguelensis* Caterpillar (mg)	*Oopterus soledadinus*	*Ectemnorhinini* group	
			Adults (mg)	Adults (mg)	Larvae (mg)
1.3 ± 0.8 $n = 30$	0.025 (plot of 150)	60.8 ± 21.8 $n = 26$	2.1 ± 0.9 $n = 10$	3.4 ± 0.9 $n = 15$	3.1 ± 1.0 $n = 30$

month allowed us to characterise mouse diets. By comparison, in Central Europe, Obrtel and Holisová (1977) recommended that at least 16 stomach content samples should be assessed to characterise the diet of rodents in that region. The low prey species richness enabled us to accurately identify the consumed food items. The sclerotised insects, exoskeletons of adult weevils, and head capsules from weevil and moth larvae are readily identified. Nonetheless, the contribution of these prey items may have been underestimated because the retention period of small and soft fragments in the stomach is lower than that of larger and harder fragments (Kostelecka-Myrcha and Myrcha 1964; Drozdz 1968; Rudge 1968; Hansson 1970). Earthworms are also usually quickly digested, and chaetae are the only elements which remain in the gut content long enough to allow the identification of worms in the diet of vertebrates (Wroot 1985).

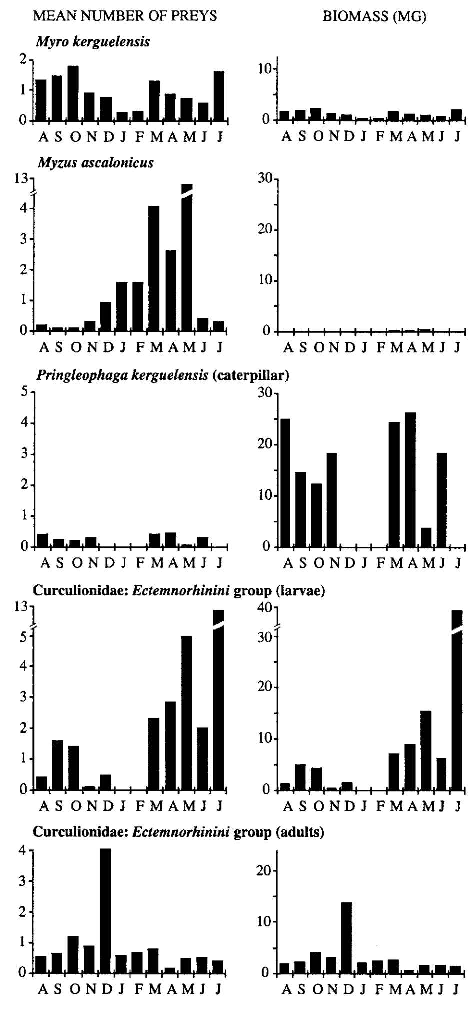

Fig. 4 Estimation of invertebrate number and biomass (dry mass in mg) excluding earthworms, ingested by mice on Guillou Island, from August 1997 to July 1998

The generalist and opportunist feeding behaviour of house mice in the Subantarctic (Rowe 1973; Gleeson and Van Rensburg 1982) was confirmed on Guillou Island, where the majority of available prey are consumed. Both plants and invertebrates formed food resources throughout the year. Nonetheless, mice showed a marked preference for plants in the summer months (January and February), whereas invertebrates formed nearly 100% of the prey items taken in July. House mice elsewhere generally show a mainly granivorous diet (Whitaker 1966; Newsome 1969), with some consumption of invertebrates in spring and summer (Whitaker 1966; Berry 1968). In Australia, Watts and Braithwaite (1978) showed that mice may be mainly insectivorous in some habitats. On the subantarctic islands, animal prey are an important part of the diet of mice (Gleeson and Van Rensburg 1982; Copson 1986; Rowe-Rowe et al. 1989; Crafford 1990; Chown and Smith 1993; Avenant 1999), although plants may also play a significant role (Copson 1986).

On Guillou Island, seeds of *Acaena magellanica* formed the main plant items in the diet. Clearly, this is a consequence of the dominance of this plant species in vegetation communities on the island. In summer, mice preferentially selected seeds that were not yet fully developed, most likely because they are not too tough at this stage. This food item was also present in stomach contents every month, even when *A. magellanica* was in a purely vegetative stage. In addition to the seed production period, another peak of seed in the stomach contents occurred in August and September. These features suggest a peculiar behaviour of seed storage and subsequent use of this resource in winter. Several observations in the field, such as seed stock in mouse burrows, confirm this behaviour. Vegetative and reproductive parts of *Taraxacum officinale* were also readily consumed, mainly just before and during the flowering season. Storage of *T. officinale* seeds was also observed, and constituted a small part of the resources in autumn. *Poa annua* was not common in the study area. It

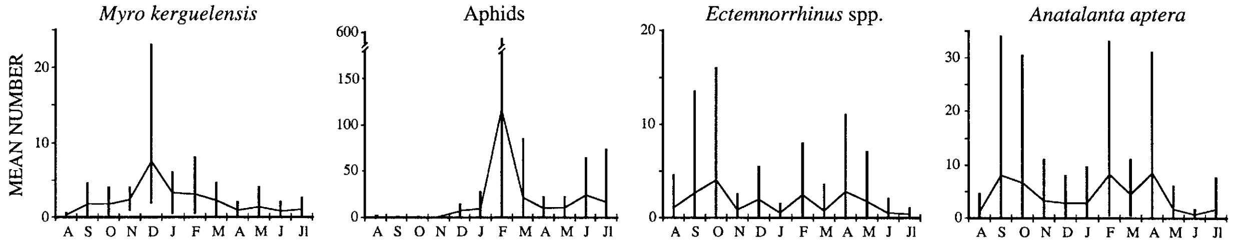

Fig. 5 Changes in the mean number of invertebrates trapped monthly from 1993 to 1998 in the *Acaena magellanica* communities on Guillou Island. Results expressed in number of individuals collected per day and per pitfall-trap. *Bars* indicate minimum and maximum values

occurred only in the trampling tracks and the presence of seeds in the diet suggests that this species was preferentially consumed. On Marion Island, seeds of grasses, such as *Agrostis magellanica* and *Poa cookii*, are also consumed by mice in the summer months (Gleeson and Van Rensburg 1982).

Our study has demonstrated that earthworms are likely to play a major role in the diet of mice at Guillou Island since chaetae were observed in nearly all the stomach contents. This food resource was previously considered of negligible importance on Marion Island (Gleeson and Van Rensburg 1982; Rowe-Rowe et al. 1989; Crafford 1990; Chown and Smith 1993) and on Macquarie Island (Copson 1986), despite the extremely high abundance of the Oligochaetae on the subantarctic islands (Burger 1978, 1985; Frenot 1987). One reason for this rather anomalous finding might be that these previous authors did not pay sufficient attention to the presence of chaetae in mouse stomach contents.

Aphids also formed an important food item for mice on the Kerguelen Islands. Chown and Smith (1993) recorded mice feeding on aphids on Marion Island, and Avenant (1999) showed that occurrence of aphids rises to 45% of the mouse stomach contents in biotically influenced habitats. We show in the present study that this prey occurred in the diet of mice throughout the year, even when the aphids are inactive during the winter season. This feature and the extremely high number of individuals found in the stomach contents suggest that this prey is preferentially collected by mice on the vegetation, from December to May, and in the soil litter during the other months. In spite of the nearly negligible biomass of aphids, these insects contain amino acids and sugars, derived from plant sap which could be attractive to mice.

The length of terrestrial invertebrate life cycles is rather long on the subantarctic islands (Convey 1997) and may extend to several years (e.g. *Pringleophaga kerguelensis*, Chauvin and Vernon 1982). In the richest biotic sites on Marion Island, Avenant (1999) found that the mean earthworm and caterpillar densities did not significantly differ between summer and winter. Similar observations on the earthworm fauna of Ile de la Possession (Crozet Islands) were reported by Frenot (1987). Thus, it may be expected that these invertebrates constitute a predictable and abundant food resource throughout the year. The slight decrease observed in the number of spiders trapped in winter in this study (Fig. 5) was probably due to the inactivity of individuals or to the ineffectiveness of the trapping method during this period rather than to a fluctuation in the spider abundance. This hypothesis seems to be supported by the presence of spiders in the stomach contents in winter.

Among invertebrates, caterpillars were consumed in small numbers but, in terms of biomass, they formed an important food resource, as is the case on several other subantarctic islands. On Marion Island, larvae of *Pringleophaga marioni* constituted the main prey (Gleeson and Van Rensburg 1982; Rowe-Rowe et al. 1989; Crafford 1990; Avenant 1999), whereas larvae of *Eudoria mawsoni* (Lepidoptera) and spiders were the most abundant in the diet of mouse on Macquarie Island (Copson 1986). On Guillou Island, the mouse diet is much more diversified and relatively few caterpillars were consumed in terms of the number of prey items. This might have been due to the low availability of caterpillars in this habitat, because larvae were found in none of 15 samples of litter and soil (20×20×10 cm) in February 1999. Conversely, this prey was abundant throughout the year on Marion Island (Gleeson and Van Rensburg 1982; Crafford 1990). Although mice apparently prefer *P. marioni* caterpillars on Marion Island, Chown and Smith (1993) showed a decrease in consumption of this species, and a switch to other prey items, when caterpillars are not available. Smith and Steenkamp (1990) suggested that climate change observed on Marion Island over the last 50 years could be the cause of the increase in mice densities, and subsequently, according to Chown and Smith (1993), of a decrease in the availability of *P. marioni* larvae. Current climate change on the Kerguelen Islands (Frenot et al. 1997) could also be responsible for such a modification in mouse and Lepidoptera populations on Guillou Island, but further research is needed to validate this hypothesis.

On the subantarctic islands, invertebrate communities are characterised by dominance of saprophagous species (Holdgate 1977; Smith 1977; Vernon et al. 1998) that are consumed by a very small number of invertebrate predator species (Burger 1985). As observed on other oceanic islands, introduction of alien species, namely mammals but also grasses or invertebrates, may induce important changes in the food webs and, consequently, in the structure of the communities (Bergstrom and Chown 1999). *Mus musculus* has been introduced to numerous islands (Berry and Peters 1975; Berry et al. 1978; Pye 1984; Watkins and Cooper 1986; Efford et al. 1988; Triggs 1991; Rowe-Rowe and Crafford 1992), but little is known about its impact in these new habitats. For example, Crafford and Scholtz (1987) have shown that *P. marioni* biomass and weevil numbers were significantly higher on the mouse-free Prince Edward Island than on Marion Island. They demonstrated the negative impact of this alien rodent on native insects. Our study has shown that the diet of mouse on the Kerguelen Islands concerns a greater number of invertebrates. So, the presence of *M. musculus* could have an important impact on the whole invertebrate community and, therefore, on the different components of the subantarctic terrestrial food web. For example, Huyser et al. (2000) mentioned the likely role of mice on the decrease in the lesser sheathbill (*Chionis minor*) populations on Marion Island where this indigenous terrestrial bird relies on invertebrates for winter survival.

Other introduced alien species also pose a threat to native invertebrate communities, such as the predatory beetle, *Oopterus soledadinus*, introduced to the Kerguelen Islands in 1913 (Chevrier 1996; Chevrier et al. 1997), and more recently (1997) to Guillou Island. A study is currently in progress to analyse the diet of *M. musculus* in the areas where the carabid beetle has occurred for a prolonged period and to determine the respective impact of mice and *Oopterus soledadinus* on the invertebrate fauna.

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