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# Basal metabolic rates in mammals: allometry, phylogeny and ecology

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**Abstract.** Basal metabolic rate in mammals increases allometrically with body weight, irrespective of the taxonomic level chosen for analysis. Species' deviations from the allometric curve (relative basal metabolic rates) are associated with differences in diet, habitat and taxonomic affinity. When correlations with taxonomy are controlled for, the only consistently significant association that remains is the higher relative basal metabolic rates of vertebrate eaters.

**Key-words:** Basal metabolic rates, diet and habitat, mammals, comparative studies

## Introduction

Interspecific comparisons demonstrate that mammalian metabolic rates increase with body weight, even under conditions of controlled activity and temperature. Kleiber (1932) and Brody & Proctor (1932) were the first to note that basal metabolic rates are proportional to the 0.75 power of body weight. Why the allometric exponent should take this particular value is unclear (but see McMahon, 1973, 1975; Calder, 1984). However, the allometric relationship is not perfect, and some taxa have appreciably different basal metabolic rates from those expected by their body weights (Hayssen & Lacy, 1985). Recently, attention has been given to explaining such deviations.

McNab (1980, 1983, 1986a,b) has argued that diet and habitat are important determinants of basal metabolic rates among eutherian mammals. Species feeding on vertebrates, herbs and nuts generally have higher basal metabolic rates for their weight (such species are referred to as having high relative basal metabolic rates) than those that feed on invertebrates, fruit and the leaves of woody plants (McNab, 1986a). In addition, moderately sized species that are predominantly arboreal have lower relative basal metabolic rates than similarly sized terrestrial species that forage on the same kind of food (McNab, 1986a). This association

between basal rate and diet is regarded by McNab as 'causative, in the sense that various properties of the foods may limit the rate at which energy is acquired by a mammal, and therefore the rate at which the mammal can expend energy' (McNab, 1986a, p.7). In attempting to explain these associations, McNab argues that mammals other than marsupials (see McNab, 1986b) exhibit the highest possible metabolic rates that their ecological and physiological requirements will allow, since higher rates yield higher reproductive output.

However, many of McNab's ecological correlates of relative metabolic rates may also be taxonomic associations. For example, species from the order Carnivora generally eat vertebrates while most primates feed on invertebrates, fruit and the leaves of woody plants. If carnivores have higher relative basal metabolic rates than do primates, and if there were many carnivores and primates in his sample, the associations McNab (1986a) described could result from a difference in relative metabolic rates between species from the two orders. Such differences in diet and metabolic rate could have arisen in the distant past and have been retained by inertia, rather than arising from evolutionary convergence (see Harvey & Mace, 1982; Ridley, 1983). Furthermore, there are many other differences between primates and carnivores in addition to diet, for example in life-history patterns. Any difference in relative basal metabolic rate between the two groups could be more closely associated with differences in life history than diet, in which case taxonomic affinity would merely stand as a surrogate for some other directly relevant variable. The comparison between primates and carnivores is illustrative rather than substantive, but we believe that statistical procedures can and should be used to help reveal possible taxonomic effects. This paper attempts to identify ecological and taxonomic correlates of relative basal metabolic rate among mammals.

## Methods

### *Body weight, metabolic rate and diet*

The basal metabolic rates and body weights of 265

species of mammals from 18 orders were extracted from the literature. Data and sources are given in the Appendix. Corbet & Hill's (1980) taxonomy has been followed (except that the Tupaiidae have been included within the Insectivora). In order to avoid statistical problems that might arise from comparing a variable (body weight) with a mathematical function of itself (metabolic rate divided by body weight), total basal metabolic rate was used for the analyses (measured as oxygen consumption per hour) rather than mass specific basal metabolic rate (which was used by McNab, 1986a).

Following McNab (1986a), each species was assigned to one of 10 diet categories (roots or tubers, grass, leaves, fruit, nuts or seeds, pollen, invertebrates, vertebrates, blood, and omnivorous) and one of four habitat categories (terrestrial, arboreal, aquatic and fossorial). Species in the same genus always had the same diet and habitat.

Analysis

Body weight and basal metabolic rate were logarithmically transformed before data manipulation and analysis. Nested analyses of variance were used to determine the taxonomic distribution of the variance in both body weight and basal metabolic rate, which according to Harvey & Clutton-Brock (1985) can indicate an appropriate level for statistical analysis. Analysis at lower taxonomic levels could spuriously increase the sample size, while analysis at higher levels would ignore appreciable amounts of variation in the original data set and unnecessarily reduce the sample size.

We tested for changes in the allometric exponent relating metabolic rate to body weight at each taxonomic level, by using average values of metabolic rate and body weight at successive taxonomic levels. Generic points were means of constituent species values. Higher-level estimates were calculated hierarchically from mean values at the lower levels. Major axis and conventional regression slopes (Sokal & Rohlf, 1981) were calculated for each taxon in which the number of subtaxa for which data were available exceeded two. For example, slopes were calculated only for those families with three or more genera. A 'common' major axis was then estimated as the sample-size-weighted mean of all the slopes at each taxonomic level. Our statistical protocol is similar to that used by Martin & Harvey (1985) in their analysis of brain-size allometry.

Deviations orthogonal to the slope of the major axis lines of log basal metabolic rate on log body weight were calculated and used as measures of relative metabolic rates.

Results

Basal metabolic rate and body weight

The allometric exponents relating basal metabolic rate to body weight (measured as major axis and conventional regression analysis slopes) for different taxonomic levels are given in Table 1. About 80% of the variation in both basal metabolic rate and body weight was found among orders within the class (see Table 2). That is, species

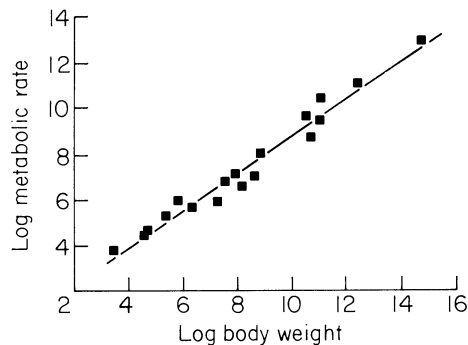
**Table 1.** Changes in allometric exponent between body weight and metabolic rate for different taxonomic levels, together with 95% confidence limits (CL).

Taxonomic level	df	Common correlation	Common major-axis (95% CL)	Common regression (95% CL)
Among orders within mammals	15	0.98	0.83 (0.76–0.92)	0.82 (0.74–0.90)
Among families within orders	47	0.96	0.73 (0.67–0.80)	0.71 (0.64–0.78)
Among genera within families	102	0.95	0.75 (0.70–0.80)	0.72 (0.67–0.77)
Among species within genera	53	0.80	0.73 (0.57–0.91)	0.60 (0.46–0.74)

**Table 2.** Distribution of variance in body weight, basal metabolic rate (BMR) and relative metabolic rate at different taxonomic levels. Percentage variance refers to the additional variance located at that taxonomic level. The method used is described by Sokal & Rohlf (1981). The zero values indicate that there was the same (or less) variance among generic values within families than among species values within genera.

Taxonomic level	df	Percentage variance		
		BMR	Body weight	Relative BMR
Among orders within mammals	17	81.84	80.65	43.40
Among families within orders	52	13.54	15.85	21.71
Among genera within families	122	0.00	0.00	0.00
Among species within genera	73	4.62	3.50	34.89

within genera, genera within families and families within orders varied relatively little on both measures. The order-level plot with its associated 0.83 exponent was therefore chosen as the base plot for relating metabolic rates to body weights (see Fig. 1).



**Fig. 1.** The relationship between metabolic rate and body weight for different orders of mammals (order values calculated as described in text). Nested analysis of variance (see Table 2) indicated that this is the appropriate level of analysis.

#### *Basal metabolic rate, diet and habitat*

The deviations of order values from the line of log metabolic rates on log body weight enable comparison of variation in metabolic rates, because differences in body weight have been accounted for. Positive deviations indicate that members of an order tend to have higher metabolic rates than would be expected for a 'typical' order of the same body weight, while negative deviations indicate that they have lower metabolic rates than expected. These deviations (which we refer to as 'relative metabolic rates') can then be correlated with either diet or habitat.

In order to compare our approach with the results described by McNab (1986a), relative basal metabolic rate was compared with diet at the species level (that is using species' deviations from the major axis line for the whole class set across species points). One-way analyses of variance revealed significant heterogeneity ( $F_{9,281} = 7.28$ ,  $P < 0.001$ ): species that feed on grass or vertebrates tend to have higher relative metabolic rates than species feeding on invertebrates, roots or leaves. The same analysis for habitat also revealed significant heterogeneity ( $F_{3,281} = 5.27$ ,  $P < 0.01$ ): aquatic species tend to have higher metabolic rates than fossorial species. The results of these analyses at the species level are comparable with McNab's (1986a).

If the differences in relative metabolic rate are directly associated with ecological variables, then

the patterns of variation should be found across taxonomic categories, such as orders. However, several orders contain families characterized by different diets and habitats (which we refer to as polytypic orders), and even some families are polytypic. In our sample, species within genera always have the same diet and habitats. In searching for taxon-independent ecological correlates of relative basal metabolic rates, it seems sensible to use monotypic order values as independent points for analysis. But how should polytypic orders be dealt with? Over one-half of the variation in relative metabolic rate is found below the order level (see Table 2). Extreme alternatives are (A) to calculate a single value for each diet or habitat category represented in each order, and to use these as independent data points, or (B) to use the highest taxonomic non-variable category as an independent datum point for analysis. For example, if an order contains two families, and the members of one are all herbivores while the other contains both herbivores and frugivores, under alternative A the order would contain just two independent points for analysis (one herbivore, one frugivore), while under alternative B there would be three points (two herbivore, one frugivore). If there were a complete phylogeny, one possible approach would be to decide between alternatives A and B according to the phylogeny (following Ridley, 1983); if herbivory was the diet in the most recent common ancestor, then alternative A would be chosen, whereas if frugivory was the ancestral diet, herbivory would have evolved at least twice and alternative B would be chosen.

The average relative basal metabolic rates for different diet and habitat categories within each order (calculated as under alternative A) are presented in Figs 2 and 3. Are some diet or habitat categories consistently associated with relatively high or relatively low basal metabolic rates after accounting for taxonomic effects? Standard statistical procedures cannot easily answer that question because of the unequal representation of diet and habitat categories among orders. In our search for pattern in Figs 2 and 3, we have performed a series of simulation studies that randomize relative metabolic rates, and habitat and diet categories subject to particular constraints. The simulated results were then compared with the original data.

First, the procedure for diet under alternative A is described to illustrate how our simulation tests were constructed:

- (1) The average relative metabolic rate was

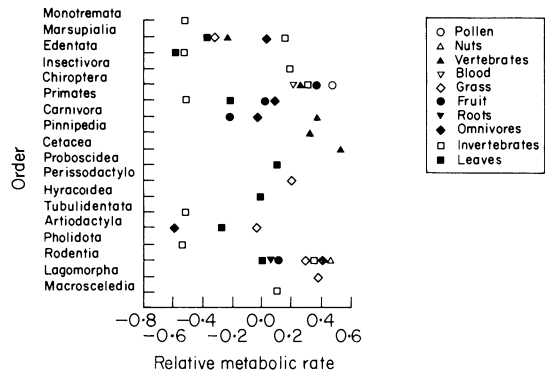


Fig. 2. The relative metabolic rates for different diet categories within 18 orders of mammals. The key shows ascending values of relative metabolic rate, with pollen high and leaves low (see text for details).

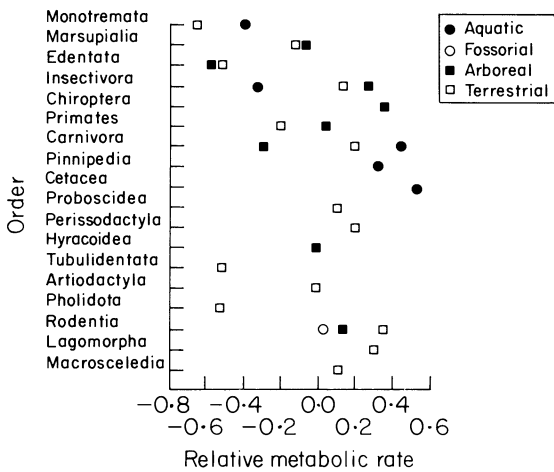


Fig. 3. The relative metabolic rates for different habitat categories within 18 orders of mammals. The key shows ascending values of relative metabolic rate, with aquatic high and terrestrial low (see text for details).

calculated for each of the 18 orders as the mean of the constituent points for a given diet on Fig. 2.

(2) These average order values were then randomly reassigned among the orders, so that perhaps Carnivora was given the value for Edentata.

(3) For each order containing more than one diet category, the deviations from the original order mean were calculated. These deviations were then randomly reassigned among groups within each order. For example, frugivorous primates had relative basal metabolic rates that were 0.19 above the primate mean, whereas the value for leaf-eating primates was 0.06 below the primate mean. In the reassignment, these values might be swapped, allotted to other diet categories within the primate order, or retain their original values.

(4) A new, simulated relative metabolic rate for each diet category in each order was calculated as the sum of the new order value and the new diet value within the order.

(5) The sum of the simulated relative metabolic needs for each diet category was calculated and compared with the sum calculated from the actual data given in Fig. 2.

(6) Procedures 1–5 were repeated 2000 times. Thus, the simulations generate a distribution of relative metabolic rate effects that would be obtained for diet and habitat if these ecological variables were not confounded with taxonomy. The number of occasions out of 2000 that the observed summed relative metabolic needs were greater or less than the simulated summed relative metabolic needs for each diet category are given in Table 3.

The simulation showed that relative metabolic rates of vertebrate eaters tend to be higher ( $P = 0.03$ ) and invertebrate eaters lower ( $P = 0.03$ ) than expected from the random patterns derived by the

Table 3. The proportion of times an actual diet or habitat category value was less than that derived from a simulation model. Simulations were repeated 2000 times (see text for details of procedure). Vertebrate eaters have higher and invertebrate eaters have lower relative metabolic rates.

Diet	Simulation		Habitat	Simulation	
	A	B		A	B
Vertebrates	0.029	0.031	Terrestrial	0.947	0.441
Grass	0.204	0.375	Arboreal	0.571	0.430
Seeds/nuts	0.095	0.073	Aquatic	0.213	0.272
Pollen	0.063	0.052	Fossorial	0.490	0.588
Fruit	0.288	0.358			
Omnivorous	0.527	0.278			
Leaves	0.910	0.928			
Invertebrates	0.974	0.887			
Blood	0.263	0.283			
Roots	0.428	0.516			

simulation (Table 3). An equivalent set of simulations was performed on the habitat data. This simulation failed to reveal any significant patterns.

The procedure for the simulation under alternative B was similar to that described above for alternative A, except that the constituent points used for the analysis were a mixture of order values (from monotypic orders), family values (from polytypic orders) and average generic values (from polytypic families) for each diet (or habitat) category. Simulation B indicated that for diet, only vertebrate eaters have significantly higher relative metabolic rates than expected ( $P = 0.03$ ), and there were no significant patterns for the habitat categories (Table 3).

## Discussion

The allometric exponent relating metabolic rate to body weight measured using major-axis analysis ranged between 0.73 at the generic level and 0.83 at the class level. Comparison of relative metabolic rates at the *species* level with ecological variables (diet and habitat) indicated that there are significant associations between relative metabolic rates and diet and habitat, as illustrated by McNab (1986a). For example, grass, nut and vertebrate eaters tend to have higher relative metabolic rates than frugivorous, leaf and invertebrate eaters. However, these patterns could arise through taxonomic associations.

Our simulations were designed to reveal any patterns of diet or habitat associations with relative metabolic rates that were independent of taxonomy (and, by inference, phylogeny). The results of these simulation studies do not support McNab's claim 'that basal rate of metabolism in eutherians is correlated with a finite set of factors, one of the most important being food habits' (McNab, 1986a, p. 10). Instead, we found that vertebrate eaters are the only diet category to have statistically higher metabolic rates for their body size under the conditions of both simulations. Invertebrate eaters tend to have lower relative metabolic rates, but this pattern must be regarded as tentative, since it depends upon the assumptions of the analysis performed (see below). We found no statistically significant habitat associations with relative metabolic rates.

The significant association between relative metabolic rate and a vertebrate diet that was revealed by the simulation may still be a consequence of taxonomic or other associations. For example, two monotypic orders (Cetacea and Pinipedia) were largely responsible for the signifi-

cant association between high relative metabolic rates and vertebrate diets. These high rates may be the result of the marine lifestyle of these orders. McNab (1986a) has suggested that marine mammals would be expected to have relatively higher metabolic rates as a consequence of greater heat loss to the environment. Examination of the patterns of polytypic orders may resolve this issue. If high relative metabolic rates are associated with a vertebrate diet, then the highest rates in polytypic orders should be found among vertebrate eaters. However, in two of the three polytypic orders (Marsupialia, Chiroptera and Carnivora), the highest rates are not found among vertebrate eaters (see Fig. 2). These data do not, therefore, support the view that the high relative metabolic rate found in vertebrate eaters is necessarily independent of taxonomic affiliation. Bennett & Harvey (in press) have examined the relationship between relative metabolic rate, diet and habitat in birds. Their analysis showed that aquatic seabird families have higher relative metabolic rates, but they failed to find any associations between relative metabolic rates and diet.

Why should diet affect metabolic rates? McNab (1986a) suggests that higher metabolic rates are associated with diets in which a high percentage of the food is easily digested, free from chemical deterrents, or generally available throughout the year. A diet consisting primarily of vertebrates usually has these features. According to McNab (1986a), lower relative metabolic rates are expected to be associated with foods that have chemical deterrent, low digestibility, or are only available in certain seasons. Not all invertebrates are characterized by these features, and this may partially explain the weaker association between low relative metabolic rates and an invertebrate diet.

Comparison between our alternative simulations highlights the underlying assumptions of independent data points for comparative studies. The simulation under alternative A showed that invertebrate eaters have significantly lower metabolic rates than would be expected for their body size. However, this pattern was not statistically significant under the less conservative alternative analysis B. Increasing the sample size by including families and genera from some orders (Marsupialia, Edentata, Chiroptera, Carnivora and Rodentia) to provide additional data points for statistical analyses raises the mean value of relative metabolic rates for invertebrate eaters to render the results for this diet category non-significant. This occurs because the points for three of the five orders are above the mean value (see Fig. 2), and

therefore add disproportionately to the sum of the diet values. This sum becomes less negative, and thus the probability of it exceeding a random expectation is reduced. Usually, an analysis with smaller sample sizes (such as alternative A) fails to reveal significant patterns, but this was not the case in our simulations; the lower relative metabolic rate of invertebrate eaters was no longer significant when the sample size was increased.

We conclude that many of the correlations between diet and relative metabolic rates can equally well be described by taxonomic associations, and therefore we are not persuaded by McNab's contention that 'the contribution of phylogeny to basal metabolic rates seems . . . to be modest, most of its apparent influence being due to a correlation of food habits with phylogeny' (McNab, 1986a, p. 8). We are not arguing here that taxonomic association should take precedence over ecological associations, merely that other variables may be relevant. The associations between diet and habitat with basal metabolic rates are not so convincing as McNab's (1980, 1986a) claim. In this paper, we have demonstrated that phylogeny must be taken into account when seeking associations between metabolic rate, behaviour and ecology.

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**Appendix: Basal metabolic rate (BMR), body weight, diet and habitat of 265 species of mammals from 18 orders.**  
Metabolic rate is given as mass specific, although for the statistical analysis it was measured as  $\text{O}_2 \text{ h}^{-1}$ .

Taxon	Habitat	Diet	Body weight (g)	BMR ( $\text{O}_2 \text{ g}^{-1} \text{ h}^{-1}$ )	Source
Monotremata					
Tachyglossidae					
<i>Tachyglossus aculeatus</i>	Terrestrial	Invertebrates	3410.0	0.17	McNab (1986a)
Ornithorhynchidae					
<i>Ornithorhynchus anatinus</i>	Aquatic	Invertebrates	690.0	0.31	McNab (1986a)
Marsupialia					
Didelphidae					
<i>Marmosa microtarsus</i>	Arboreal	Invertebrates	14.5	1.79	McNab (1986a)
<i>Didelphis marsupialis</i>	Terrestrial	Omnivorous	1350.0	0.45	McNab (1986a)
Dasyuridae					
<i>Planigale gilesi</i>	Terrestrial	Invertebrates	9.4	1.40	McNab (1986a)
<i>Planigale ingrami</i>	Terrestrial	Invertebrates	7.1	1.59	McNab (1986a)
<i>Planigale maculatus</i>	Terrestrial	Invertebrates	8.5	1.26	McNab (1986a)
<i>Antechinus macdonnellensis</i>	Terrestrial	Invertebrates	43.1	0.63	Eisenberg (1981)
<i>Antechinus stuartii</i>	Terrestrial	Invertebrates	37.0	0.99	Tyndale-Biscoe (1973)
<i>Phascogale tapoatafa</i>	Arboreal	Invertebrates	157.2	0.81	Eisenberg (1981)
<i>Dasyercus cristicauda</i>	Terrestrial	Vertebrates	88.8	0.52	Eisenberg (1981)
<i>Dasyurus geoffroyi</i>	Terrestrial	Invertebrates	1000.0	0.38	Tyndale-Biscoe (1973)
<i>Dasyurus hallacatus</i>	Terrestrial	Invertebrates	584.4	0.51	Eisenberg (1981)
<i>Dasyurus maculatus</i>	Terrestrial	Vertebrates	2000.0	0.30	Eisenberg (1981)
<i>Dasyurus viverrinus</i>	Terrestrial	Invertebrates	1100.0	0.45	Eisenberg (1981)
<i>Sarcophilus harrissi</i>	Terrestrial	Vertebrates	6700.0	0.28	Eisenberg (1981)
<i>Dasyuroides byrnei</i>	Terrestrial	Invertebrates	89.0	0.87	Eisenberg (1981)
<i>Sminthopsis crassicaudata</i>	Terrestrial	Invertebrates	14.0	1.34	Tyndale-Biscoe (1973)
<i>Antechinomys spenceri</i>	Terrestrial	Invertebrates	24.2	0.98	Eisenberg (1981)
Thylacomyidae					
<i>Macrotis lagotis</i>	Terrestrial	Grass	940.0	0.36	McNab (1986a)
Peramelidae					
<i>Perameles nasuta</i>	Terrestrial	Invertebrates	686.0	0.47	Tyndale-Biscoe (1973)
<i>Isoodon macrourus</i>	Terrestrial	Invertebrates	880.0	0.45	Tyndale-Biscoe (1973)
Phalangeridae					
<i>Trichosurus vulpecula</i>	Arboreal	Leaves	1982.0	0.32	McNab (1986a)
Burramyidae					
<i>Cercartetus nanus</i>	Arboreal	Omnivorous	70.0	0.86	Tyndale-Biscoe (1973)
Petauridae					
<i>Petaurus breviceps</i>	Arboreal	Omnivorous	128.0	0.69	Tyndale-Biscoe (1973)
<i>Pseudocheirus peregrinus</i>	Arboreal	Leaves	860.0	0.33	McNab (1986a)
Macropodidae					
<i>Lagorchestes conspicillatus</i>	Terrestrial	Grass	2700.0	0.32	McNab (1986a)
<i>Macropus eugenii</i>	Terrestrial	Grass	4796.0	0.29	Tyndale-Biscoe (1973)
<i>Macropus rufus</i>	Terrestrial	Grass	32490.0	0.18	Tyndale-Biscoe (1973)
<i>Dendrolagus matshiei</i>	Arboreal	Leaves	6960.0	0.21	McNab (1986a)
Phascolarctidae					
<i>Phascolarctos cinereus</i>	Arboreal	Leaves	4765.0	0.22	McNab (1986a)
Edentata					
Myrmecophagidae					
<i>Myrmecophaga tridactyla</i>	Terrestrial	Invertebrates	30600.0	0.09	McNab (1986a)
<i>Tamandua mexicana</i>	Terrestrial	Invertebrates	3500.0	0.26	McNab (1986a)
<i>Tamandua tetradactyla</i>	Terrestrial	Invertebrates	3500.0	0.25	McNab (1986a)
<i>Cyclopes didactylus</i>	Terrestrial	Invertebrates	240.0	0.48	McNab (1986a)
Bradypodidae					
<i>Bradypus variagatus</i>	Arboreal	Leaves	3790.0	0.18	McNab (1986a)
<i>Choloepus hoffmanni</i>	Arboreal	Leaves	4250.0	0.19	McNab (1986a)
Dasypodidae					
<i>Euphractus sexcinctus</i>	Terrestrial	Invertebrates	8190.0	0.15	McNab (1986a)
<i>Zaedyus pichiy</i>	Terrestrial	Invertebrates	1740.0	0.23	McNab (1986a)
<i>Priodontes maximus</i>	Terrestrial	Invertebrates	45190.0	0.07	McNab (1986a)
<i>Cabassous centralis</i>	Terrestrial	Invertebrates	3810.0	0.21	McNab (1986a)
<i>Tolypeutes matacus</i>	Terrestrial	Invertebrates	1160.0	0.18	McNab (1986a)
<i>Dasybus novemcinctus</i>	Terrestrial	Invertebrates	3320.0	0.24	McNab (1986a)



## Appendix: continued

Taxon	Habitat	Diet	Body weight (g)	BMR ( $\text{O}_2 \text{ g}^{-1} \text{ h}^{-1}$ )	Source
<i>Chaetophractus nationi</i>	Terrestrial	Invertebrates	2150.0	0.26	McNab (1986a)
<i>Chaetophractus vellerosus</i>	Terrestrial	Invertebrates	1110.0	0.28	McNab (1986a)
<i>Chaetophractus villosus</i>	Terrestrial	Invertebrates	4540.0	0.18	McNab (1986a)
Insectivora					
Tenrecidae					
<i>Tenrec ecaudatus</i>	Aquatic	Invertebrates	790.0	0.33	McNab (1986a)
<i>Setifer setosus</i>	Terrestrial	Invertebrates	530.0	0.23	McNab (1986a)
Chrysochloridae					
<i>Amblysomus hottentotus</i>	Terrestrial	Invertebrates	70.0	1.21	McNab (1986a)
Erinaceidae					
<i>Erinaceus albiventris</i>	Terrestrial	Invertebrates	450.0	0.33	McNab (1986a)
<i>Erinaceus europaeus</i>	Terrestrial	Invertebrates	889.0	0.48	McNab (1986a)
<i>Hemiechinus auritus</i>	Terrestrial	Invertebrates	400.0	0.38	McNab (1986a)
<i>Paraechinus aethiopus</i>	Terrestrial	Invertebrates	450.0	0.25	McNab (1986a)
Soricidae					
<i>Sorex araneus</i>	Terrestrial	Invertebrates	8.9	9.08	Hanski (1984)
<i>Sorex caecutiens</i>	Terrestrial	Invertebrates	4.9	11.67	Hanski (1984)
<i>Sorex cinereus</i>	Terrestrial	Invertebrates	3.0	9.00	McNab (1986a)
<i>Sorex isodon</i>	Terrestrial	Invertebrates	11.1	8.28	Hanski (1984)
<i>Sorex minutissimus</i>	Terrestrial	Invertebrates	2.5	15.48	Hanski (1984)
<i>Sorex minutus</i>	Terrestrial	Invertebrates	2.7	15.00	Hanski (1984)
<i>Neomys anomalus</i>	Terrestrial	Invertebrates	13.4	4.98	McNab (1986a)
<i>Neomys fodiens</i>	Terrestrial	Invertebrates	17.8	6.79	Hanski (1984)
<i>Blarina brevicauda</i>	Terrestrial	Invertebrates	21.0	2.50	McNab (1986a)
<i>Notiosorex crawfordi</i>	Terrestrial	Invertebrates	4.0	3.27	McNab (1986a)
<i>Crocidura russula</i>	Terrestrial	Invertebrates	13.7	1.9	McNab (1986a)
Talpidae					
<i>Scalopus aquaticus</i>	Terrestrial	Invertebrates	48.0	1.41	McNab (1986a)
Tupaiidae					
<i>Tupaia glis</i>	Arboreal	Invertebrates	180.0	0.93	McNab (1986a)
<i>Urogale everetti</i>	Arboreal	Invertebrates	252.0	0.86	McNab (1986a)
Chiroptera					
Pteropodidae					
<i>Rousettus aegypticus</i>	Arboreal	Fruit	146.0	0.84	McNab (1986a)
<i>Pteropus poliocephalus</i>	Arboreal	Fruit	598.0	0.53	McNab (1986a)
<i>Pteropus scapulatus</i>	Arboreal	Fruit	362.0	0.67	McNab (1986a)
<i>Dobsonia minor</i>	Arboreal	Fruit	87.0	1.26	McNab (1986a)
<i>Cynopterus brachyotis</i>	Arboreal	Fruit	37.0	1.27	McNab (1986a)
<i>Eonycteris spelaea</i>	Arboreal	Pollen	52.0	0.93	McNab (1986a)
<i>Synconycteris australis</i>	Arboreal	Pollen	17.5	1.93	McNab (1986a)
Rhinopomatidae					
<i>Megaloglossus woermanni</i>	Arboreal	Pollen	12.4	1.75	McNab (1986a)
Megadermatidae					
<i>Macroderma gigas</i>	Arboreal	Vertebrates	148.0	0.94	McNab (1986a)
Noctilionidae					
<i>Noctilio leporinus</i>	Arboreal	Vertebrates	61.0	1.16	McNab (1986a)
<i>Noctilio? labialis</i>	Arboreal		27.0	1.17	McNab (1986a)
Phyllostomatidae					
<i>Tonatia bidens</i>	Arboreal	Invertebrates	27.4	2.10	McNab (1986a)
<i>Phyllostomus discolor</i>	Arboreal	Invertebrates	33.5	1.43	McNab (1986a)
<i>Phyllostomus hastatus</i>	Arboreal	Invertebrates	84.2	1.19	McNab (1986a)
<i>Chrotopterus auritus</i>	Arboreal	Vertebrates	96.0	1.06	McNab (1986a)
<i>Glossophaga soricina</i>	Arboreal	Pollen	9.6	2.25	McNab (1986a)
<i>Leptonycteris sanborni</i>	Arboreal	Pollen	22.0	2.00	McNab (1986a)
<i>Anoura caudifer</i>	Arboreal	Pollen	11.5	3.05	McNab (1986a)
<i>Carollia perspicillata</i>	Arboreal	Fruit	14.9	2.11	McNab (1986a)
<i>Rhinophylla pumilio</i>	Arboreal	Fruit	9.5	1.71	McNab (1986a)
<i>Sturnira lilium</i>	Arboreal	Fruit	21.0	1.79	McNab (1986a)
<i>Uroderma bilobatum</i>	Arboreal	Fruit	16.2	1.64	McNab (1986a)
<i>Vampyrops lineatus</i>	Arboreal	Fruit	22.0	1.47	McNab (1986a)

Taxon	Habitat	Diet	Body weight (g)	BMR ( $\text{O}_2 \text{ g}^{-1} \text{ h}^{-1}$ )	Source
<i>Artibeus concolor</i>	Arboreal	Fruit	19.7	1.67	McNab (1986a)
<i>Artibeus jamaicensis</i>	Arboreal	Fruit	45.0	1.25	McNab (1986a)
<i>Artibeus lituratus</i>	Arboreal	Fruit	70.0	1.21	McNab (1986a)
Desmodontidae					
<i>Desmodus rotundus</i>	Arboreal	Blood	29.0	1.18	McNab (1986a)
<i>Diaemus youngi</i>	Arboreal	Blood	366.0	1.02	McNab (1986a)
<i>Diphylla ecaudata</i>	Arboreal	Blood	278.0	1.39	McNab (1986a)
Molossidae					
<i>Eumops perotis</i>	Arboreal	Invertebrates	56.0	0.71	McNab (1986a)
<i>Molossus molossus</i>	Arboreal	Invertebrates	16.0	1.44	McNab (1986a)
Vespertilionidae					
<i>Histiotus velatus</i>	Arboreal	Invertebrates	11.2	1.40	McNab (1986a)
Primates					
Lemuridae					
<i>Lemur fulvus</i>	Arboreal	Leaves	2419.0	0.32	McNab (1986a)
Lorisidae					
<i>Nycticebus coucang</i>	Terrestrial	Invertebrates	1300.0	0.24	McNab (1986a)
<i>Perodicticus potto</i>	Arboreal	Fruit	1000.0	0.36	McNab (1986a)
<i>Arctocebus calabarensis</i>	Arboreal	Omnivorous	206.0	0.64	Hildwein (1972)
<i>Euoticus elegantulus</i>	Arboreal	Omnivorous	262.0	0.82	Hildwein (1972)
Callitrichidae					
<i>Cebuella pygmaea</i>	Arboreal	Fruit	105.0	0.94	Morrison & Middleton (1967)
<i>Saguinus geoffroyi</i>	Arboreal	Omnivorous	225.0	1.04	Scholander <i>et al.</i> (1950)
Cebidae					
<i>Aotus trivirgatus</i>	Arboreal	Fruit	991.0	0.45	Goffart (1977)
<i>Saimiri sciureus</i>	Arboreal	Fruit	590.0	0.83	Eisenberg (1981)
Cercopithecidae					
<i>Macaca mulatta</i>	Arboreal	Fruit	5380.0	0.37	Bruhn (1934)
<i>Cercocebus torquatus</i>	Arboreal	Fruit	4100.0	0.41	Bruhn (1934)
<i>Papio anubis</i>	Terrestrial	Omnivorous	9500.0	0.30	Proppe & Gale (1970)
<i>Papio papio</i>	Terrestrial	Omnivorous	6230.0	0.41	Bruhn (1934)
Pongidae					
<i>Pongo pygmaeus</i>	Arboreal	Fruit	16200.0	0.30	Bruhn (1934)
<i>Pan troglodytes</i>	Arboreal	Omnivorous	36900.0	0.26	Bruhn (1934)
Hominidae					
<i>Homo sapiens</i>	Terrestrial	Omnivorous	70000.0	0.21	R.D. Martin, pers. comm.
Carnivora					
Canidae					
<i>Alopex lagopus</i>	Terrestrial	Vertebrates	6000.0	0.73	Eisenberg (1981)
<i>Vulpes vulpes</i>	Terrestrial	Vertebrates	9000.0	0.55	Eisenberg (1981)
<i>Lycan pictus</i>	Terrestrial	Vertebrates	8750.0	0.67	McNab (1986a)
<i>Fennecus zerda</i>	Terrestrial	Invertebrates	1106.0	0.36	McNab (1986a)
Ursidae					
<i>Ursus americanus</i>	Terrestrial	Omnivorous	77270.0	0.36	Eisenberg (1981)
Procyonidae					
<i>Potos flavus</i>	Arboreal	Fruit	2400.0	0.32	McNab (1986a)
Mustelidae					
<i>Mustela erminea</i>	Terrestrial	Vertebrates	227.0	1.88	McNab (1986a)
<i>Mustela frenata</i>	Terrestrial	Vertebrates	297.0	0.95	McNab (1986a)
<i>Mustela nivalis</i>	Terrestrial	Vertebrates	77.0	2.29	McNab (1986a)
<i>Mustela vison</i>	Terrestrial	Vertebrates	660.0	0.74	McNab (1986a)
<i>Martes americanus</i>	Terrestrial	Vertebrates	1038.0	0.66	McNab (1986a)
<i>Martes martes</i>	Terrestrial	Vertebrates	920.0	0.80	McNab (1986a)
<i>Gulo gulo</i>	Terrestrial	Vertebrates	12700.0	0.46	McNab (1986a)
<i>Meles meles</i>	Terrestrial	Invertebrates	11050.0	0.27	McNab (1986a)
<i>Lutra lutra</i>	Aquatic	Vertebrates	10000.0	0.45	McNab (1986a)
<i>Enhydra lutris</i>	Aquatic	Vertebrates	18000.0	0.72	McNab (1986a)
Viverridae					
<i>Nandinia binotata</i>	Arboreal	Omnivorous	4270.0	0.27	McNab (1986a)

## Appendix: continued

Taxon	Habitat	Diet	Body weight (g)	BMR ( $\text{O}_2 \text{ g}^{-1} \text{ h}^{-1}$ )	Source
<i>Arctogalidia trivirgata</i>	Arboreal	Omnivorous	2013·0	0·30	McNab (1986a)
<i>Paradoxurus hermaphroditus</i>	Arboreal	Omnivorous	3410·0	0·21	McNab (1986a)
<i>Arctictis binturong</i>	Arboreal	Omnivorous	14 280·0	0·16	McNab (1986a)
<i>Herpestes auro punctatus</i>	Terrestrial	Vertebrates	611·0	0·75	McNab (1986a)
Hyaenidae					
<i>Proteles cristata</i>	Terrestrial	Invertebrates	7710·0	0·25	McNab (1986a)
Felidae					
<i>Felis silvestris</i>	Terrestrial	Vertebrates	3260·0	0·71	Eisenberg (1981)
<i>Acinonyx jubatus</i>	Terrestrial	Vertebrates	39 000·0	0·35	McNab (1986a)
Pinnipedia					
Phocidae					
<i>Phoca fasciata</i>	Aquatic	Vertebrates	54 000·0	0·39	McNab (1986a)
<i>Phoca vitulina</i>	Aquatic	Vertebrates	27 400·0	0·48	McNab (1986a)
<i>Pagophilus groenlandicus</i>	Aquatic	Vertebrates	38 600·0	0·38	McNab (1986a)
Cetacea					
Delphinidae					
<i>Tursiops truncatus</i>	Aquatic	Vertebrates	175 000·0	0·34	McNab (1986a)
Phocoenidae					
<i>Phocoena phocoena</i>	Aquatic	Vertebrates	28 500·0	0·68	McNab (1986a)
Proboscidea					
Elephantidae					
<i>Elephas maximus</i>	Terrestrial	Leaves	2 730 000·0	0·15	Eisenberg (1981)
Perissodactyla					
Equidae					
<i>Equus caballus</i>	Terrestrial	Grass	260 000·0	0·25	Eisenberg (1981)
Hyracoidea					
Procaviidae					
<i>Dendrohyrax dorsalis</i>	Arboreal	Leaves	2210·0	0·42	McNab (1986a)
<i>Heterohyrax brucei</i>	Terrestrial	Leaves	1660·0	0·43	McNab (1986a)
<i>Procavia capensis</i>	Terrestrial	Leaves	2630·0	0·41	McNab (1986a)
<i>Procavia habessinica</i>	Terrestrial	Leaves	2250·0	0·41	McNab (1986a)
<i>Procavia johnstoni</i>	Terrestrial	Leaves	2750·0	0·45	McNab (1986a)
Tubulidentata					
Orycteropidae					
<i>Orycteropus afer</i>	Terrestrial	Invertebrates	48 000·0	0·13	McNab (1986a)
Artiodactyla					
Suidae					
<i>Sus scrofa</i>	Terrestrial	Omnivorous	75 000·0	0·11	Eisenberg (1981)
Tayassuidae					
<i>Tayassu tajacu</i>	Terrestrial	Grass	20 200·0	0·29	McNab (1986a)
Camelidae					
<i>Camelus dromedarius</i>	Terrestrial	Grass	407 000·0	0·10	McNab (1986a)
Cervidae					
<i>Cervus elaphus</i>	Terrestrial	Grass	58 000·0	0·28	McNab (1986a)
<i>Rangifer tarandus</i>	Terrestrial	Grass	94 000·0	0·25	McNab (1986a)
<i>Odocoileus virginianus</i>	Terrestrial	Grass	58 590·0	0·45	McNab (1986a)
<i>Capreolus capreolus</i>	Terrestrial	Grass	21 500·0	0·40	McNab (1986a)
Antilocapridae					
<i>Antilocapra americanus</i>	Terrestrial	Grass	32 000·0	0·28	McNab (1986a)
Bovidae					
<i>Tragelaphus oryx</i>	Terrestrial	Grass	150 000·0	0·24	McNab (1986a)
<i>Bos taurus</i>	Terrestrial	Grass	272 000·0	0·17	Eisenberg (1981)
<i>Kobus ellipsiprymnus</i>	Terrestrial	Grass	100 000·0	0·27	McNab (1986a)
<i>Connochaetus taurinus</i>	Terrestrial	Grass	140 000·0	0·20	McNab (1986a)
<i>Oreamnos americanus</i>	Terrestrial	Grass	32 000·0	0·26	McNab (1986a)
<i>Capra</i> sp.	Terrestrial	Grass	36 000·0	0·19	McNab (1986a)
<i>Ovis aries</i>	Terrestrial	Grass	30 000·0	0·34	Eisenberg (1981)
<i>Ovis canadensis</i>	Terrestrial	Grass	65 000·0	0·34	McNab (1986a)

## Appendix: continued

Taxon	Habitat	Diet	Body weight (g)	BMR ( $\text{O}_2 \text{ g}^{-1} \text{ h}^{-1}$ )	Source
Pholidota					
Manidae					
<i>Manis crassicaudata</i>	Terrestrial	Invertebrates	15 910.0	0.07	McNab (1986a)
<i>Manis javanica</i>	Terrestrial	Invertebrates	4220.0	0.26	McNab (1986a)
<i>Manis tricuspis</i>	Terrestrial	Invertebrates	2730.0	0.33	McNab (1986a)
Rodentia					
Sciuridae					
<i>Sciurus aberti</i>	Arboreal	Seeds/Nuts	624.0	0.69	McNab (1986a)
<i>Tamiasciurus hudsonicus</i>	Arboreal	Seeds/Nuts	224.0	1.09	McNab (1986a)
<i>Spermophilus citellus</i>	Terrestrial	Omnivorous	240.0	0.95	Hart (1971)
<i>Spermophilus leucums?</i>	Terrestrial	Omnivorous	96.0	1.00	Hart (1971)
<i>Spermophilus tereticaudus</i>	Terrestrial	Omnivorous	129.0	1.00	Hart (1971)
<i>Spermophilus undulatus</i>	Terrestrial	Omnivorous	750.0	0.90	Hart (1971)
<i>Tamias alpinus</i>	Arboreal	Seeds/Nuts	39.0	1.48	McNab (1986a)
<i>Tamias amoenus</i>	Arboreal	Seeds/Nuts	57.0	1.45	McNab (1986a)
<i>Tamias striatus</i>	Arboreal	Seeds/Nuts	107.0	1.25	McNab (1986a)
<i>Glaucomys volans</i>	Arboreal	Seeds/Nuts	70.0	1.29	McNab (1986a)
Geomyidae					
<i>Geomys pinetis</i>	Fossorial	Roots	203.0	0.67	Hart (1971)
Heteromyidae					
<i>Perognathus californicus</i>	Terrestrial	Seeds/Nuts	22.0	1.00	Hart (1971)
<i>Perognathus longimembrus</i>	Terrestrial	Seeds/Nuts	8.2	2.00	Hart (1971)
<i>Microdipodops pallidus</i>	Terrestrial	Seeds/Nuts	15.0	1.50	Hart (1971)
<i>Dipodomys agilis</i>	Terrestrial	Seeds/Nuts	61.0	1.02	Hart (1971)
<i>Dipodomys merriami</i>	Terrestrial	Seeds/Nuts	37.0	1.29	Hart (1971)
<i>Dipodomys microps</i>	Terrestrial	Leaves	57.0	1.17	McNab (1986a)
<i>Dipodomys panamintinus</i>	Terrestrial	Seeds/Nuts	57.0	1.20	Hart (1971)
<i>Liomys irroratus</i>	Terrestrial	Seeds/Nuts	48.0	1.10	Hart (1971)
<i>Liomys salvini</i>	Terrestrial	Seeds/Nuts	44.0	1.07	Hart (1971)
<i>Heteromys anomalus</i>	Arboreal	Seeds/Nuts	69.0	1.45	McNab (1986a)
Muridae					
<i>Reithrodontomys megalotis</i>	Terrestrial	Seeds/Nuts	9.0	1.94	Hart (1971)
<i>Peromyscus californicus</i>	Terrestrial	Seeds/Nuts	47.8	1.02	Hart (1971)
<i>Peromyscus crinitus</i>	Terrestrial	Seeds/Nuts	19.0	1.55	Hart (1971)
<i>Peromyscus eremicus</i>	Terrestrial	Seeds/Nuts	20.8	1.55	Hart (1971)
<i>Peromyscus leucopus</i>	Terrestrial	Seeds/Nuts	26.0	2.20	Eisenberg (1981)
<i>Peromyscus maniculatus</i>	Terrestrial	Seeds/Nuts	19.0	1.90	Hart (1971)
<i>Peromyscus megalops</i>	Terrestrial	Seeds/Nuts	66.0	1.40	Hart (1971)
<i>Peromyscus sitkensis</i>	Terrestrial	Seeds/Nuts	28.0	1.65	Hart (1971)
<i>Peromyscus thomasi</i>	Terrestrial	Seeds/Nuts	111.0	1.10	Hart (1971)
<i>Peromyscus truei</i>	Terrestrial	Seeds/Nuts	33.0	1.70	Hart (1971)
<i>Onychomys terridus</i>	Terrestrial	Invertebrates	19.0	1.55	McNab (1986a)
<i>Baiomys taylori</i>	Terrestrial	Grass	7.3	2.00	Hart (1971)
<i>Oxymycterus roberti</i>	Terrestrial	Invertebrates	84.0	1.09	McNab (1986a)
<i>Sigmodon hispidus</i>	Terrestrial	Grass	141.0	1.03	McNab (1986a)
<i>Neotoma cinerea</i>	Terrestrial	Leaves	321.0	0.78	McNab (1986a)
<i>Neotoma fuscipes</i>	Terrestrial	Leaves	187.0	0.79	McNab (1986a)
<i>Neotoma labigula</i>	Terrestrial	Leaves	194.0	0.73	McNab (1986a)
<i>Neotoma lepida</i>	Terrestrial	Leaves	120.0	0.71	Hart (1971)
<i>Cricetus cricetus</i>	Terrestrial	Omnivorous	400.0	0.57	Hart (1971)
<i>Mesocricetus auratus</i>	Terrestrial	Omnivorous	98.0	1.50	Hart (1971)
<i>Spalax leucodon</i>	Fossorial	Roots	208.0	0.77	Hart (1971)
<i>Tachyoryctes splendens</i>	Fossorial	Roots	203.0	0.77	Hart (1971)
<i>Dicrostonyx groenlandicus</i>	Terrestrial	Leaves	61.0	1.55	Hart (1971)
<i>Dicrostonyx torquatus</i>	Terrestrial	Leaves	47.0	1.97	McNab (1986a)
<i>Lemmus sibericus</i>	Terrestrial	Grass	64.0	2.47	McNab (1986a)
<i>Clethrionomys gapperi</i>	Terrestrial	Seeds/Nuts	16.5	3.60	Eisenberg (1981)
<i>Clethrionomys glareolus</i>	Terrestrial	Seeds/Nuts	19.8	2.80	Hart (1971)
<i>Clethrionomys rufocanus</i>	Terrestrial	Seeds/Nuts	27.5	2.00	Hart (1971)
<i>Alticola roylei</i>	Terrestrial	Grass	53.0	2.30	McNab (1986a)

Taxon	Habitat	Diet	Body weight (g)	BMR ( $\text{O}_2 \text{ g}^{-1} \text{ h}^{-1}$ )	Source
<i>Arvicola richardsoni</i>	Terrestrial	Grass	51.0	1.74	McNab (1986a)
<i>Arvicola terrestris</i>	Terrestrial	Grass	97.0	1.16	McNab (1986a)
<i>Ondatra zibethicus</i>	Terrestrial	Grass	842.0	0.82	McNab (1986a)
<i>Neofiber alleni</i>	Terrestrial	Grass	276.0	0.85	McNab (1986a)
<i>Phenacomys intermedius</i>	Terrestrial	Leaves	26.0	3.00	McNab (1986a)
<i>Microtus arvalis</i>	Terrestrial	Grass	20.0	2.50	Hart (1971)
<i>Microtus californicus</i>	Terrestrial	Grass	44.0	1.55	McNab (1986a)
<i>Microtus longicaudus</i>	Terrestrial	Grass	27.0	2.67	McNab (1986a)
<i>Microtus mexicanus</i>	Terrestrial	Grass	28.0	1.63	McNab (1986a)
<i>Microtus montanus</i>	Terrestrial	Grass	31.0	2.65	McNab (1986a)
<i>Microtus nivalis</i>	Terrestrial	Grass	35.0	3.06	McNab (1986a)
<i>Microtus ochragaster</i>	Terrestrial	Grass	51.0	1.18	McNab (1986a)
<i>Microtus oeconomus</i>	Terrestrial	Grass	32.0	2.50	McNab (1986a)
<i>Microtus pennsylvanicus</i>	Terrestrial	Grass	38.0	1.93	McNab (1986a)
<i>Microtus pinetorum</i>	Terrestrial	Grass	25.0	1.98	McNab (1986a)
<i>Microtus agrestis</i>	Terrestrial	Grass	22.0	2.99	McNab (1986a)
<i>Lagurus curtatus</i>	Terrestrial	Leaves	29.0	1.56	McNab (1986a)
<i>Meriones unguiculatus</i>	Terrestrial	Omnivorous	70.0	1.40	Hart (1971)
<i>Micromys minutus</i>	Terrestrial	Seeds/Nuts	6.0	6.70	Hart (1971)
<i>Golunda ellioti</i>	Terrestrial	Grass	56.0	1.08	McNab (1986a)
<i>Lemniscomys griselda</i>	Terrestrial	Grass	51.0	1.21	McNab (1986a)
<i>Rattus norvegicus</i>	Terrestrial	Omnivorous	237.0	1.32	Hart (1971)
<i>Mus musculus</i>	Terrestrial	Seeds/Nuts	20.5	3.40	Eisenberg (1981)
Zapodidae					
<i>Zapus hudsonius</i>	Terrestrial	Seeds/Nuts	25.0	1.50	Hart (1971)
<i>Napaeozapus insignia</i>	Terrestrial	Omnivorous	22.0	1.80	Hart (1971)
Caviidae					
<i>Cavia porcellus</i>	Terrestrial	Grass	570.0	0.70	Hart (1971)
Dasyproctidae					
<i>Cuniculus paca</i>	Arboreal	Fruit	4507.0	0.44	McNab (1986a)
<i>Dasyprocta azarea</i>	Arboreal	Seeds/Nuts	3849.0	0.49	McNab (1986a)
<i>Dasyprocta leporina</i>	Arboreal	Seeds/Nuts	2687.0	0.58	McNab (1986a)
Chinchillidae					
<i>Chinchilla lanigera</i>	Terrestrial	Grass	403.0	0.70	McNab (1986a)
Capromyidae					
<i>Capromys pilorides</i>	Arboreal	Leaves	2630.0	0.23	McNab (1986a)
<i>Myocaster coypus</i>	Terrestrial	Grass	4325.0	0.70	McNab (1986a)
Echimyidae					
<i>Proechimys semispinosus</i>	Arboreal	Fruit	498.0	0.63	McNab (1986a)
Bathyergidae					
<i>Heliophobius kapeti?</i>	Fossorial	Roots	89.0	0.87	Hart (1971)
<i>Heterocephalus glaber</i>	Fossorial	Roots	39.0	0.55	Hart (1971)
Lagomorpha					
Ochotonidae					
<i>Ochotona princeps</i>	Terrestrial	Grass	109.0	1.53	McNab (1986a)
Leporidae					
<i>Lepus alleni</i>	Terrestrial	Grass	3362.0	0.45	McNab (1986a)
<i>Lepus americanus</i>	Terrestrial	Grass	1581.0	0.90	McNab (1986a)
<i>Lepus californicus</i>	Terrestrial	Grass	1989.0	0.56	McNab (1986a)
<i>Lepus timidus</i>	Terrestrial	Grass	3004.0	0.36	McNab (1986a)
<i>Sylvilagus audubonii</i>	Terrestrial	Grass	702.0	0.63	McNab (1986a)
Macroscelidea					
Macroscelidiidae					
<i>Elephantulus edwardii</i>	Terrestrial	Invertebrates	50.0	1.09	McNab (1986a)
<i>Elephantulus rugescens</i>	Terrestrial	Invertebrates	53.0	1.07	McNab (1986a)
<i>Petrodromus tetradactylus</i>	Terrestrial	Invertebrates	210.0	0.61	McNab (1986a)