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A Gnawing Problem: Does Rodent Incisor Microwear Record Diet or Habitat?

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A Gnawing Problem: Does Rodent Incisor Microwear Record Diet or Habitat?

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by

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Abstract

Dental microwear has been shown to reflect food preferences and habitat in extant vertebrates, and its analysis has been applied to fossil assemblages to infer paleodiet and paleoenvironment. Such reconstructions are, of course, only as good as the extant baseline used to infer relationships between wear pattern and diet/habitat. This study tests, through dental microwear texture analysis, the potential of modern rodent lower incisors to reveal those relationships, and evaluates the extent to which effects of diet and habitat can be parsed from the signal. Microwear texture profiles were created for individual lower rodent incisors (*n*=430) using confocal profilometry and quantified using scale-sensitive fractal analysis. The museum sample used in this study includes omnivorous, herbivorous, and frugivorous species collected from African desert, savanna, woodland, and rainforest habitats. The effect of substrate (terrestrial versus arboreal) is also analyzed. Increasingly, attention had been directed toward rodents as a source of paleoenvironmental data due to their discrete home ranges and their ubiquity and abundance in many fossil and archaeological assemblages. Results presented here suggest that rodent incisor microwear pattern reflects different habitat types, through environmental factors or food availabilities, and holds potential as a proxy for paleoenvironmental reconstruction.

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1.1 Introduction

Dental microwear texture analysis has proven to be a reliable means of elucidating dietary behaviors and ecological interactions for many mammalian taxa. The bulk of analysis has been conducted on larger mammals, such as bovids and primates. Only a handful of studies have applied this approach to rodent taxa, and even fewer to rodent incisors. Here, we test the efficacy of a large sample of rodent incisors to record and preserve habitat, substrate, and diet information in microwear texture pattern.

Dental microwear analysis is the study of microscopic use-wear on teeth. This wear is usually associated with the acquisition and processing of food, and is the direct result of an organism's interaction with its surrounding biotic environment. This is even truer when considering the incisors, which are an initial contact point between an animal and its surroundings. Patterns of microscopic wear form on the surface of a tooth during food acquisition and processing. Because of the ability of dental microwear to record these ecological interactions, much attention has been placed on it as a proxy for paleoenvironmental reconstruction. The microwear textures produced are unlikely to reflect any single activity or cause; rather, they are the sum effect of food acquisition and processing. In order to use dental microwear as a proxy for environment reconstruction, it is therefore necessary to tease apart the ecological signals that result from different sources, to parse food preference and processing from effects of other factors within the environmental context.

1.2 Dietary and Environmental Causes of Microwear

Endogenous abrasives in food or exogenous ones on it, such as adherent grit, may cause microwear as they come into contact with a tooth during ingestion and mastication. In both cases, types of food available, and the ubiquity of exogenous abrasives in the environment, can provide insights into the habitat types in which past animals lived. Dental microwear, then, may hold some potential as an environmental proxy. There is disagreement in the literature regarding the relative roles of endogenous (phytoliths) and exogenous (dust, grit) abrasives in forming microwear (Baker et al., 1959; Fox et al., 1996; Laluezza Fox et al., 1994; Lucas et al., 2014, 2013; Peters, 1982; Rabenold and Pearson, 2011; Sanson et al., 2007; Ungar et al., 1995; Withnell and Ungar, 2014; Xia et al., 2015), though a recent study of microwear of rodents from a variety of habitats found diet to contribute more to pattern differences than did environmental grit (Gomes Rodrigues et al., 2009). While microwear caused by either phytoliths or grit can both reveal the jaw movements associated with different diet regimens (when considering molars), these abrasives vary by type and amount in environments, which could potentially impart environment specific microwear signatures.

Extramasticatory behaviors can also leave microwear signatures. Teeth are often used as "tools" for such tasks as gripping, grooming, or in the case of fossorial mammals, digging (see Ungar, 2010). These activities may abrade dental surfaces in the same manner as consuming foodstuffs, opening the door for possible conflation between diet signal and other interactions within the habitat. For rodents and other gliriform mammals, gnawing is likely a frequent microwear-producing extramasticatory behavior. Gnawing is so central to rodent ecology, that these mammals have evolved ever-growing incisors to counteract dental attrition. Obversely, rodents are obligated to gnaw in order to attrite their incisors to keep constant growth in check and maintain proper occlusal relationships. Extramasticatory behaviors, at least in the case of most rodents, likely create more microwear turnover on incisors than on cheek teeth. The ability to parse microwear signals associated with diet, non-diet tooth use and non-diet aspects of the environment is important if we are to use rodent incisors to understand the past.

1.3 Rodent Incisors as a Proxy

Rodents, the quintessential lab mammals, are also ready candidates for studies in the natural world. The principle obstacle to using faunal assemblages for reconstruction is taphonomic bias (Winder, 2012). However, rodents are typically *r*-selected organisms, and reproduce early and often (Churakov et al., 2010). This makes them, despite the taphonomic preservation issues related to their generally diminutive size, very common in faunal assemblages and as members of living communities. Large samples of modern specimens are attainable by trapping or as part of concentrated assemblages left by predators. Fossil assemblages of rodents are also common in the paleontological record. The general prevalence of rodents, as well as the durability of dentition tends to mitigate taphonomic bias against them.

Though analyses of dental microwear have been conducted on numerous mammals and other vertebrates, rodents evince several advantages for environmental reconstruction. Members of the order reside collectively in a broad range of habitat types with constituent species often occupying discrete and distinctive niches. Rodents are ubiquitous in many places and have an expansive distribution, with extant and fossil species occurring naturally on all continents except Antarctica. The distribution of rodents is also expansive in temporal terms, and they can be found in deposits spanning most of the Cenozoic. The first rodents definitively identified in the fossil record date from the late Paleocene, and the clade may extend back to the Cretaceous (Benton and Donoghue, 2007). The order is by far the most speciose among the mammals, accounting for more than 40 percent of all the extant species of mammals (Carleton and Musser, 2005). And murids, the family utilized in this study, is the most speciose in Rodentia (and in fact, in all Mammalia) (Michaux et al., 2001).

These attributes together suggest that rodents may be the ideal taxon for environmental reconstruction using dental microwear as a proxy. The success of rodents, measured in their adaptive versatility, speciocity, cosmopolitan distribution, and overall ubiquity, allows for a selection of samples capable of representing an array of factors, including diet, feeding behaviors, habitat, substrate and other variables. In this way, rodent dentition, when combined with dental microwear texture analysis, allows for evaluation of effects of single variables as well as complex interactions among them. Beyond the utilitarian benefits they provide for constructing models, rodents are important because they play an integral role in the larger community of life that surrounds them. Rodents tend to be keystone members of their habitats, either as individual species, such as beaver and prairie dog, or as members of guilds (Brown and Heske, 1990). Rodents act as the trophic glue that holds together food webs and serve as ecosystem engineers (Huntly and Inouye, 1988; Jones et al., 1994), affecting not only ecosystem structure through controlling the relative abundance of species in their roles as predator and prey (Howe et al., 2002; Hull Sieg, 1987; Hulme, 1996), but also by changing ecosystem function through a variety of processes (see discussion in Chew, 1978). Indeed, rodents have been shown to aerate and increase ground water recharge through soil turbation, aid in decomposition and nutrient cycling, control plant productivity and species richness and composition, promote ecological succession, and provide habitat for other species, to name but a few of the ways rodents alter their ecosystems (e.g., Potter, 1978; Grant et al., 1980; Inouye et al., 1987; Huntly and Inouye, 1988; Laundre, 1993, 1998; Jones et al., 1994; Hulme, 1996; Weltzin et al., 1997; Davidson and Lightfoot, 2008).

For these reasons, rodent abundance and diversity have been used in a variety of contexts as indicators of environment, environmental change through time, and the effects of environmental change on biota. There is no mammalian order more important to regulating biospheric activity, and perhaps none better suited for paleoenvironmental studies.

1.4 Dental Microwear as Proxy for Environmental and Diet

Microwear has been known to be a product of food processing with the potential to reveal aspects of paleobiology since the 1920s, when George Gaylord Simpson noted use-wear scratches on the molars of early multituberculate mammals (Simpson, 1926). Work on diet-related microscopic tooth wear followed in the 1950s, with contributions by Butler (1952 et seq.) and Mills (1955 et seq.). These studies set out to examine scratch distribution and direction on cheek teeth to work out details of mastication. Baker and colleagues (1959) followed with the first study of the etiology of microwear in sheep, concluding that environmental grit and phytoliths were both capable of abrading enamel. Work continued, and by late 1970's, focus had shifted to the reconstruction of diet. In 1978, Walker and colleagues performed a study comparing teeth of hyraxes that differ in seasonal availability of food, and found differences in microwear related to food availability and preferences. That year also saw the first published study to associate diet with microwear in rodents (Rensberger, 1978). Given the focus on diet, it is not surprising that most early analyses relied on cheek teeth, particularly molars, because they better reflect the mechanics of chewing than do the anterior teeth, which function in ingestion and other behaviors.

More recent studies have continued to focus on reconstructing diet through the characterization of molar microwear, and the variety of mammals examined has increased accordingly. To date, microwear researchers working on mammals have considered a range of taxa, living and fossil. These include ungulates such as pronghorns (Rivals and Semprebon, 2006), antelopes (Schulz et al., 2010; Solounias and Hayek, 1993), bovids (Merceron et al.,

2005) and equids (Hayek et al., 1991; Schulz et al., 2010; Solounias and Semprebon, 2002), as well as such small mammals as bats (Purnell et al., 2013; Strait, 1993), moles (Silcox and Teaford, 2002) and lagomorphs (Schulz et al., 2013), various marsupials (Prideaux et al., 2009; Robson and Young, 1989, 1986; Young et al., 1990), predators such as canids and large cats (DeSantis et al., 2012; Schubert et al., 2010; Ungar et al., 2010; Van Valkenburgh et al., 1990), various bear species (Donohue et al., 2013; Peigné et al., 2009; Pinto-Llona, 2013), and many others, including domesticated animals such as pigs and sheep (Hunter and Fortelius, 1994; Mainland, 1998; Organ et al., 2006; Ward and Mainland, 1999; Zolnierz, 2014). Results from such studies are clear: species reported or observed to consume harder items tend to have a higher ratio of pits to scratches on their cheek teeth than do closely-related ones that prefer tougher foods.

Studies of microwear on incisors, on the other hand, have focused mostly, though not exclusively, on primates. Walker (1976) compared Old World monkeys and related characteristics of microwear striations to both diet and substrate, but most analyses have been limited to correlating microwear with diet. These have included Old World monkeys and the greater and lesser apes, New World monkeys, and strepsirrhines (Jacobs, 1981; Kelley, 1990, 1986; Rose et al., 1981; Ryan, 1981; Schmid, 1983; Teaford, 1983; Ungar, 1996, 1994a, 1990). Considerable attention has been given to the anterior dentition of hominin species, including *Homo sapiens*, with implications for interpreting diet and subsistence-related behaviors in a variety of archaeological and palaeontological contexts (e.g., Dahlberg and Kinzey, 1962; Ryan, 1993, 1980, 1981; Lukacs and Pastor, 1988; Ryan and Johanson, 1989; Ungar and Grine, 1991; Lalueza Fox and Frayer, 1997; Bax and Ungar, 1999; Ungar and Spencer, 1999; Lozano et al., 2008; Krueger and Ungar, 2010, 2012; Krueger, 2015). Incisor microwear density, for example, tends to be more pronounced in species that are more dependent on anterior teeth for ingestion, or often in the case of the hominins, for non-diet functions, such as hide preparation.

A lesser number of studies have dealt with anterior dental microwear of non-primate mammals. Plains zebra (*Equus quagga*) incisors and molars have been compared against each other, with the finding that the two types of teeth record diet signals differently. Moose (*Alces alces*) dental microwear was used in conjunction with dental macrowear to differentiate pathological tooth wear from physiological tooth wear (Young and Marty, 1986). Incisor (tusk) microwear on dugongs (*Dugong dugon*) was suggested to relate to their use in the harvesting of seagrass (Domning and Beatty, 2007). Even incisiform teeth of sauropod diplodocoids (Diplodocoidea) analogous to mammalian incisors were analyzed in conjunction with snout shape to infer diet, foraging strategy, and broader paleoenvironmental context. Studies such as these have indicated incisor microwear can be linked to feeding and foraging behaviors. More recently, Withnell and Ungar (2014) examined the etiology of incisor microwear in shrews, using methods similar to those employed in this study. They found that small variation in diet could be discerned with microwear, whereas habitat had a lesser effect on its formation.

While the earliest studies of rodent microwear date back nearly four decades (Rensberger, 1978; Teaford and Byrd, 1989; Teaford and Walker, 1983a, 1983b, 1982), the early work focused mostly on the formation of microwear and its relationship to jaw movements. Studies have more recently shifted to comparisons of extant and fossil rodent microwear, and use of the latter as a paleoecological proxy. Microwear of extant squirrels has been used as a baseline to infer diet for Miocene and Pliocene species (Nelson et al., 2005). Dental microwear and carbon isotope analysis of teeth by Hopley and coauthors (2006) led to the conclusion that these proxies better reflected paleoenvironment than they did tooth morphology. Hautier, et al.

(2009) related microwear and mandible morphology of extant dormice to diet, and applied associations inferred to fossil species. Microwear from Pleistocene muskrats has been used to track shift in plant processing in response to environmental change (Gutierrez et al., 1998; Lewis et al., 2000). Murid rodents have been utilized in modeling insular paleoenvironments (Firmat et al., 2011, 2010). Using both mandibular outline and molar microwear, Firmat and coauthors (2010), concurred with Hopley's conclusion that microwear is a better indicator of feeding ecology than is tooth morphology. Modern New World caviomorph rodents have likewise been used to create baselines for paleoedietary reconstructions from fossil ones (Townsend and Croft, 2008). Using a significantly larger sample size than other researchers (213 specimens from extant genera), Gomes Rodrigues and colleagues (2009) were able to infer dietary habits for the fossil murid *Saidomys afarensis*. These studies have demonstrated the robustness of rodent dental microwear as a proxy for feeding ecology. Direct associations between dental microwear and the environment have been less well investigated, however, as such studies have relied on analyses of molars and have focused either on diet per se, or on inferring environment from diet.

Limited research has been conducted on rodent incisor microwear. Incisor and cheek teeth microwear from European beaver (*Castor fiber*), nutria (*Myocastor coypus*), and muskrat (*Ondrata zibethicus*) were compared by Stefen (2011) in order to identify markers of diet and wood chewing. While differences in the average number of pits and scratches between the molars of three species were used to interpret diet, those on incisors were only described qualitatively. Though incisors had indistinct microwear texture differences between species, they were described as having a microwear texture distinct from that found on the posterior dentition. Using techniques duplicated in this study, Belmaker and Ungar (2010) examined modern rodent incisors from North American species to test their utility as paleoecological proxy and found differences in microwear texture between granivorous and frugivorous groups of rodents.

In this study, we further evaluate the potential of rodent incisor microwear to reveal aspects of diet and environment with a large sample of individuals representing species with known differences in food, habitat, and substrate preferences. Results indicate that incisor microwear patterns reflect all three, and that the signals for each can be parsed and can provide a valuable tool for reconstructing the paleoecology of individual species and the paleoenvironmental context in which they lived.

2.1 Materials and Methods

This study examined incisor microwear in 430 specimens representing 16 species of extant rodent. Microwear texture attributes were compared for groups separated by diet, substrate, and habitat type. Groups were expected to vary independent of species classifications, and a taxon-free approach was employed in analysis (see Scott, 2012 for discussion). Basic information on diet and substrate were obtained from the literature, whereas habitat provenience came from recorded capture locations cross-referenced with Google Earth imagery. Summary details for each species are presented in Table 1.

Habitats were classified into basic desert, savanna, woodland, and rainforest. These habitats reflect generalized vegetation zones across the African continent that differ in plant community structure. Because of discrepancies in the way habitats were described by the original collectors and the resolution limitations of vegetation maps, precise definitions of habitat categories based upon published sources was not practical. Within this study, habitat categories are internally consistent, and are used in a heuristic manner only. Here savanna is defined as land where the groundcover is mostly grasses and other herbaceous plants with sparse or absent canopy (similar to White's (1983) "grassland"). Woodland applies to forests dominated by deciduous trees, while the term rainforest is used for tropical evergreen forest. Desert encompasses arid and semi-arid zones with relatively little vegetative groundcover. Preference was also given for species collected in large numbers from given locations within habitat types to maximize statistical power. Most specimens from individual species used in this study derived from a single habitat type. However, *Mastomys natalensis* specimens have been included from savanna, woodland, and rainforest habitats, and *Praomys jacksoni* specimens have been included from woodland and rainforest habitats.

2.2 Sample

Species	**Habitat**	**Diet**	**Substrate**	***n***
Acomys cahirinus	Desert	Omnivore[c]	Terrestrial[a]	29
Aethomys chrysophilus	Savanna	Herbivore[c]	Terrestrial[a,d]	29
Micaelamys namaquensis	Savanna	Herbivore[a]	Terrestrial[a]	18
Grammomys dolichurus	Woodland	Herbivore[b]	Arboreal[a,b,d]	25
Hybomys univittatus	Rainforest	Frugivore[c]	Terrestrial[a,]	26
Hylomyscus stella	Rainforest	Omnivore[c]	Arboreal[a,]	30
Mastomys natalensis	Rainforest	Omnivore[c,d]	Terrestrial[a,d]	22
Mastomys natalensis	Savanna	Omnivore[c,d]	Terrestrial[a,d]	26
Mastomys natalensis	Woodland	Omnivore[c,d]	Terrestrial[a,d]	26
Meriones crassus	Desert	Herbivore[c]	Terrestrial[a]	9
Meriones libyacus	Desert	Herbivore[c]	Terrestrial[a]	17
Mus minutoides	Savanna	Omnivore[c,d]	Terrestrial[a,c,d]	29
Mus triton	Woodland	Omnivore[a]	Terrestrial[a]	19
Parotomys brantsii	Desert	Herbivore[c,d]	Terrestrial[a]	29
Praomys jacksoni	Rainforest	Herbivore[c]	Terrestrial[a]	40
Praomys jacksoni	Woodland	Herbivore[c]	Terrestrial[a]	30
Rhabdomys pumilio	Desert	Herbivore[c]	Terrestrial[a]	26

[a]Happold, 2013; [b]Kingdon, 1984; [c]Kingdon,1997; [d]Skinner and Chimimba, 2005

Table 1. Summary of sampled species with habitat of collection and diet and substrate information as reported in the literature. Additional species information is in the supplemental material.

Individuals included in this study are stored in the Department of Mammalogy at the National Museum of Natural History in Washington, DC. Samples were limited to well-provenienced individuals of known species and location. Species sampled and specimen numbers for each are presented in Table 1. With the exception of *Merriones spp.*, which have ranges that extend outside of Africa, the species utilized within the study are endemic to Africa.

2.3 Specimen preparation and analysis

A single lower incisor was examined for each individual included in this analysis (preferentially the left unless unavailable). Teeth were cleaned with a cotton swab soaked in 95% isopropyl alcohol to remove any dirt or debris from the surface of the enamel. Impressions of each selected incisor's distolabial surface, from the tip to the alveolar bone margin, were taken using polyvinylsiloxane (President Jet Regular Body, Coltene/Whaledent) dental impression material. Resulting molds were then poured with a high-resolution epoxy (Epotek 301, Epoxy Technologies) to create replicas of each specimen.

Each cast was first examined using a Sensofar Plμ white-light scanning confocal imaging profiler at 10× magnification for postmortem tooth damage in the region of interest, the area on the distal edge of the labial enamel just below the incisal surface. This region has been shown in the past to preserve diet-related microwear features (Belmaker and Ungar, 2010). Specimens preserving unobscured antemortem microwear (criteria following Teaford, 1988) were then analyzed with the instrument using a 100× objective lens and white light. A planimetric area of 138 μm × 102 μm was then scanned to generate a three-dimensional data point representation of the surface. The lateral point spacing was 0.18 μm, and the published vertical resolution of the instrument is <.005 μm. Resultant point clouds were leveled using Solarmap Universal software (Solarius, Inc.), version 3.1, and any artifacts on the surface, such as dust particles, were deleted prior to analysis. The resulting data were then analyzed using the Toothfrax and Sfrax scale-sensitive fractal analysis (SSFA) software packages (SurFract Corp).

2.4 Scale-Sensitive Fractal Analysis

This study used the standard suite of SSFA texture variables: complexity (*Asfc*), scale of maximum complexity (*Smc*), heterogeneity ($HAsfc_9$, $HAsfc_{81}$), anisotropy (*epLsar*), and texture fill volume (*Tfv*). These attributes in aggregate offer a characterization of surface texture that often allows us to distinguish patterns by diet (see Scott et al., 2006 for a detailed description of each variable).

Fractal complexity is a measure of change of surface roughness with scale of observation. This requires the Relative Area (*RelA*) of the surface to be calculated at different scales of observation. Surfaces were measured at observation scales of 7200 μm^2 to 0.02 μm^2, by tessellating triangular tiles over the surface. At each scale, the number of triangular tiles is multiplied by the size of the tiles to estimate surface area. The summed surface area value is then divided by the projected two-dimensional (*x and y*) surface area to calculate the *RelA*. Logs of the *RelA* values are then plotted over logs of their corresponding scales. The *Asfc* value of a surface is calculated as the greatest derivative (e.g., rate of change) of the curve at 1 order of magnitude that was created by the plots (which have been multiplied at -1000). The more negative (steep) the slope, the more complex the surface is across those scales, and the greater the *Asfc* value (Briones et al., 2006). Surfaces with many features of different sizes (often highly pitted surfaces) have high *Asfc* values.

Scale of Maximum Complexity is an extension of the *Asfc* calculation. It is the scale at which the curve created by logs of *RelA* over logs of scale has the most negative slope at 1 order of magnitude (Briones et al., 2006). Higher values correspond to greatest complexity at a coarser scale of observation, and high values suggest that the surface is complex at larger scales only. Surfaces with many fine-scale features tend to have lower *Smc* values than those dominated by larger-scale ones.

Heterogeneity is the degree of uniformity of complexity over the sampled surface. It is measured as heterogeneity of Area-scale fractal complexity (*HAsfc*). *HAsfc* is determined by subdividing the surface into a grid with uniformly distributed cells of equal size. Every cell within the grid is then analyzed, independently of other cells, for fractal complexity and assigned an *Asfc* value. *HAsfc* is the median result of the median absolute deviation of the cells' *Asfc* values over the median *Asfc* value. For comparability with other studies, *HAsfc* values were calculated by subdividing each area into 3 × 3 ($HAsfc_9$) and 9 × 9 ($HAsfc_{81}$) cells. Surfaces with varying complexity from one end to the other have high *HAsfc* values.

Anisotropy is a measure of directionality of microwear texture on a surface. It is measured here by *exact proportion Length-scale anisotropy of relief*. Since surfaces are represented as three-dimensional elevation maps, lines that are straight in the horizontal plane but follow the topography in the vertical can be created and measured for relative lengths (*RelL*). In other words, vector lengths can be created by measuring a surface in profile. If microwear is anisotropic across a surface, vector lengths will vary if taken at different orientations. Thirty-six vector lengths are calculated by measuring profiles of the elevation map at 5° intervals (for a 180° arc) across the surface. Vector lengths are measured in this study at the 1.8 µm scale, following convention. Surface vectors are then normalized to give the exact proportion Relative Length (*epRelL*) for each measurement at an orientation. The *epLsar* value for the surface is the median normalized vector length. Higher values correspond to more directionality, such as when a surface is dominated by parallel linear scratches.

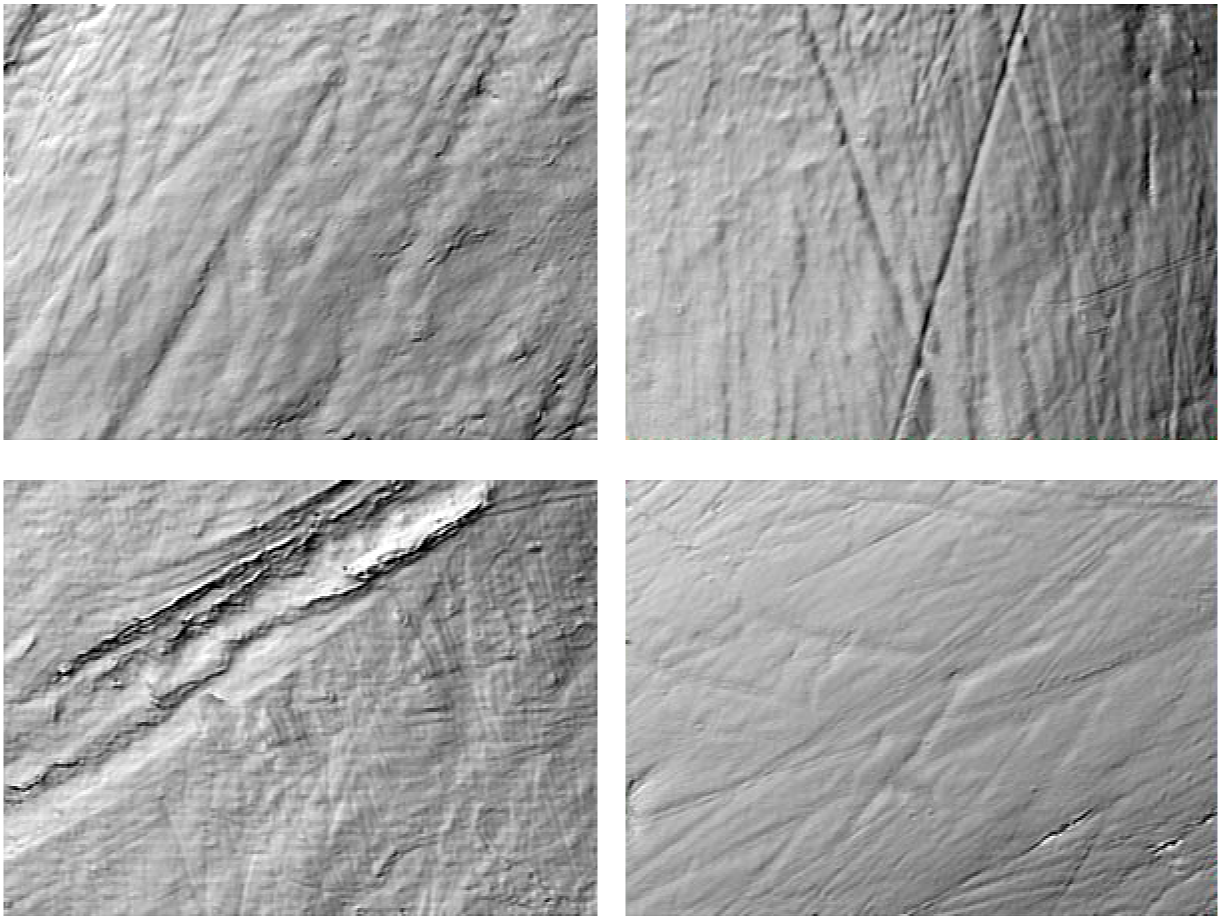

Figure 1. Photosimulated microwear surfaces of *Mastomys natalensis* from savanna (upper left), woodland (upper right), and rainforest (lower left) habitats and *Rhabdomys pumilio* from a desert habitat (lower right). Photosimulations are generated from point cloud data and represent a planimetric area of 138 µm × 102 µm.

Finally, texture fill volume is an estimate of the volume of microwear features on the surface. It is measured by the number of square cuboids that can fill the microwear features of a surface. In order to measure the volume of microwear features, they must be separated from Structural fill volume (*Sfv*), the amount of fill volume that results from the general shape of a surface at a course scale (in this case, the shape of the incisor). This can be done by determining the *Sfv* by filling the surface with large cuboids (in this case, 10 µm diameter square cuboids). Texture fill volume can then be determined by estimating the amount of volume fill with small cuboids (here, 2 μm diameter), and subtracting the amount from *Sfv* to estimate the amount of fill in only microwear features.

2.5 Statistical analyses

Statistical analyses employed a general linear model. First, data were rank transformed for each variable prior to analysis to mitigate the effects of violation of parametric test assumptions (Conover and Iman, 1981). Multivariate Analysis of Variance tests were employed separately for diet, habitat, and substrate, and each was followed by ANOVA tests to find the sources of significant variation in the models. These could not be considered using a factorial model because of multicollinearity (which is unsurprising given the large dataset). Both Tukey's honestly significant difference (HSD) and Fisher's least significant different (LSD) post-hoc tests were then used to identify sources of variation while balancing risks of Type I and Type II error (Cook and Farewell, 1996).

3.1 Results

Descriptive statistics are presented in Table 2, and analytic statistics are presented in Tables 3 through 5. Results showed significant variation among samples divided by diet, habitat, and substrate. While there was significant variation by diet (see Table 3), the differences between omnivores, herbivores and frugivores, as designated for species in the literature (see Table 1), were minimal compared to that typical for molars of mammals with radically differing diets (Donohue et al., 2013; Schubert et al., 2010; Scott, 2012; Scott et al., 2012). Still, omnivores did have significantly higher *epLsar* values on average than did herbivores. And omnivores had marginally higher average $HAsfc_{81}$ values than herbivores, and especially frugivores. While the ANOVA result indicated variation in heterogeneity by diet, pairwise

		Asfc	*Smc*	*Hasfc*	$Hasfc_{81}$	*epLsar*	*Tfv*
Diet							
omnivore	*n*=181						
	median	1.052	1.070	0.557	0.813	0.011	15,452.643
	mean	1.189	231.266	0.745	1.028	0.010	15,574.510
	s.d.	1.712	293.579	0.654	0.693	0.002	3,768.579
herbivore	*n*=223						
	median	1.217	0.417	0.488	0.723	0.010	15,474.149
	mean	1.298	154.697	0.686	0.900	0.010	15,529.799
	s.d.	1.365	264.375	0.579	0.537	0.001	3,071.633
frugivore	*n*=26						
	median	1.226	1.351	0.458	0.697	0.010	15,227.758
	mean	1.426	170.59	0.492	0.718	0.010	15,632.454
	s.d.	0.865	268.12	0.238	0.250	0.001	3,245.956
Habitat							
desert	*n*=110						
	median	1.197	0.268	0.547	0.822	0.011	15,587.594
	mean	1.292	139.850	0.722	0.950	0.011	15,706.979
	s.d.	1.475	257.471	0.572	0.502	0.002	3,204.140
savanna	*n*=102						
	median	1.349	0.267	0.519	0.697	0.011	16,028.010
	mean	1.666	130.595	0.682	0.985	0.010	16,237.366
	s.d.	1.443	244.003	0.505	0.686	0.002	3,827.777
woodland	*n*=100						
	median	0.949	1.355	0.456	0.693	0.010	14,807.965
	mean	1.127	243.794	0.572	0.801	0.010	14,967.125
	s.d.	1.379	295.367	0.497	0.447	0.002	3,086.655
rainforest	*n*=118						
	median	1.010	8.643	0.547	0.798	0.011	15,442.435
	mean	0.991	234.817	0.801	1.019	0.010	15,321.048
	s.d.	1.600	297.921	0.749	0.700	0.002	3,309.610
Substrate							
Terrestrial	*n*=375						
	median	1.204	0.422	0.505	0.735	0.010	15,344.922
	mean	1.344	166.512	0.670	0.934	0.010	15,425.768
	s.d.	1.397	269.280	0.527	0.596	0.002	3,432.713
Arboreal							
	n=55						
	median	0.847	413.531	0.616	0.810	0.011	16,741.174
	mean	0.686	333.635	0.900	1.003	0.011	16,434.770
	s.d.	1.979	303.148	0.943	0.636	0.001	2,915.002

Table 2. Summary statistics of *Asfc*, complexity; *epLsar*, anisotropy; *HAsfc*, heterogeneity of complexity; SD, standard deviation; *Smc*, scale of maximum complexity; *Tfv*, textural fill volume.

comparison tests were significant by Fisher's LSD but not Tukey's HSD tests and so we can consider these results "suggestive" or of marginal significance.

A. MANOVA results

	Wilks's λ	Pillai Trace	Hotelling's T^2
F	1.921	1.914	1.927
df	12, 844	12, 846	12, 842
p-value	0.029	0.029	0.028

B. ANOVA *results*

	Asfc	*Smc*	$Hasfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
F	0.621	2.356	2.801	3.550	6.263	0.033
df	2, 427	2, 427	2, 427	2, 427	2, 427	2, 427
p-value	0.538	0.096	0.062	0.03	0.002	0.968

C. Paired Comparisons

	$HAsfc_{81}$	*epLsar*
frugivore × herbivore	-33.471	11.685
frugivore × omnivore	-57.993**	-31.62
herbivore × omnivore	-24.522*	-43.305*

* result was significant for Fisher's LSD test

** result was significant for Tukey's HSD and Fischer's LSD test

Table 3. Diet Analytic Statistics.

There were more marked differences between groups divided by habitat (see Table 4). Rodents from savanna habitats had more complex microwear surfaces than those from either woodland or rainforest settings. Desert and savanna rodents had significantly lower average scale of maximum complexity than do woodland and rainforest individuals. Woodland rodents had less heterogeneity of complexity than either rainforest or desert individuals in most cases.

A. MANOVA results

	Wilks's λ	Pillai Trace	Hotelling's T^2
F	4.076	4.014	4.127
df	18, 1,191	18, 1,269	18, 1,259
p-value	0.00	0.00	0.00

(CONT.)

B. ANOVA *results*

	Asfc	*Smc*	*Hasfc*$_9$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
F	6.442	11.05	3.366	3.276	1.692	2.416
df	3, 426	3, 426	3, 426	3, 426	3, 426	3, 426
p-value	0.000	0.00	0.019	0.021	0.168	0.066

C. Paired Comparisons

	Asfc	*Smc*	*Hasfc*$_9$	*HAsfc*$_{81}$
desert × rainforest	27.674	-63.675**	-6.164	4.308
desert × savanna	-32.662	10.359	14.533	25.153
desert × woodland	33.731*	-58.332**	43.307*	47.403**
rainforest × savanna	-60.336**	74.034**	20.697	20.845
rainforest × woodland	6.057	5.343	49.472**	43.094**
savanna × woodland	66.393**	-68.691**	28.774	22.25

*	result was significant for Fisher's LSD test
**	result was significant for Tukey's HSD and Fischer's LSD test

Table 4. Habitat Analytic Statistics.

The rodents also varied in microwear texture by substrate (see Table 5). The arboreal species had less complex microwear textures on average, but more anisotropic ones and higher average scale of maximum complexity and texture fill volume.

A. MANOVA results

	Wilks's λ	Pillai Trace	Hotelling's T^2
F	5.429	5.429	5.429
df	6, 423	6, 423	6, 423
p-value	0.00	0.00	0.00

B. ANOVA *results*

	Asfc	*Smc*	*Hasfc*$_9$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
F	5.127	22.631	1.781	0.459	14.822	4.396
df	1, 428	1, 428	1, 428	1, 428	1, 428	1, 428
p-value	0.024	0.00	0.183	0.498	0.00	0.037

Table 5. Substrate Analytic Statistics.

4.1 Discussion

4.1.1 Potential of Rodent Incisor Dental Microwear as an Ecological Proxy

The results presented here corroborate previous research associating microwear pattern with ecological factors, though straightforward comparisons between past studies and this one are difficult given differences in methodology. Different microwear texture attributes separated the groups depending on whether diet, habitat, or substrate was considered. In some cases an attribute accounted for a great deal of variation within a category and in others, group type was not shown to have an effect. Most microwear studies have relied on analyzing diet or habitat, but not both. The current study has examined both aspects together, and supports the notion that microwear textures are amalgams resulting from interplay of multiple ecological factors. Given the noise habitat and diet impart on each other, the demonstration of significant variation is a testament to the robustness of the technique.

4.1.2 Diet

The least distinct signal was diet. This is partially at odds with previous research equating rodent microwear and diet. Gomes Rodriguez and colleagues (2009) found that in murids diet was the primary agent of microwear formation and environment (in this case exogenous grit) was of secondary importance to microwear formation. And though environmental factors could not be eliminated, studies of omnivorous ground and frugivorous tree squirrels (Nelson et al., 2005), as well as studies of caviomorph rodents (Townsend and Croft, 2008), found that microwear could be attributed in part to diet. However the results presented here are not surprising, as these other studies employed cheek teeth, whereas the current one used incisors. Mammals typically rely on their anterior dentition to prepare foods for ingestion, in addition to any extramasticatory behaviors, reserving the posterior dentition for mastication of foodstuffs (Ryan and Johanson, 1989). We expect diet-related signals associated with ingestive behaviors might not be as distinguishable as those associated with mastication, or that they would be obscured by other environmental factors and behaviors unrelated specifically to the fracture properties of foods eaten. While microwear comparisons between the anterior and posterior dentition of rodents have not been fully explored, work with rodents (Stefen, 2011) and ungulates (Rivals and Semprebon, 2006) has suggested that microwear features differs substantively between incisors and cheek teeth. Conversely, incisors have the capacity to record behavioral and potentially environmental factors that molars do not (Kelley, 1990; Rivals and Semprebon, 2010; Teaford, 1988b).

Nonetheless, incisor microwear surfaces of omnivores in this study were more anisotropic that those of herbivores and more heterogeneous than those of frugivores. Belmaker and Ungar (2010) likewise found incisor microwear from folivorous and granivorous rodents to differ by these variables, as well as by texture fill volume. Because the herbivore category in this study includes both folivores and granivores, however, direct comparisons to this previous work are difficult; though the potential of anisotropy and heterogeneity to separate rodents by diet is evident.

It is not surprising that omnivores have higher heterogeneity, as they likely require greater variation in how they use their incisors during ingestion than do rodents feeding solely on plant matter. Since the differences were not found between herbivores and frugivores, but were between these groups and omnivores, it may be suggested that ingestion of invertebrates accounts for these differences in anisotropy and heterogeneity. However, past research considering molar microwear has typically associated rodent and small mammal insectivory with pitted or coarse microwear (Firmat et al., 2010; Gomes Rodrigues et al., 2009; Hopley et al., 2006; Nelson et al., 2005; Purnell et al., 2013; Strait, 1993). This type of microwear is usually associated with the mastication of hard chitinous exoskeletons. Assuming that these conclusions would also apply to incisors, we would expect to see significantly different *Asfc* values between omnivores and those diet groups relying exclusively on plant materials. Still, Silcox and Teaford (2002) found that tenrecs and moles had microwear with parallel striations, caused by consuming soil covered soft bodied invertebrates. Since high *epLsar* results, as seen in the omnivorous rodents, are indicative of parallel striations, it is possible that ingestion of soft-bodied invertebrates is what is separating omnivores from the herbivores and frugivores.

The subtle differences in diet within groups, the overlap of diet between them, and characterization of rodent diet all likely confound efforts to parse groups by more variables. Compared to the species most frequently utilized for microwear studies (ungulates and primates), the diets of many rodents have received much less attention and are less well understood. Disparities in the methods used to assess diet, which have ranged from analyses of fecal materials to examination of stomach contents, and inconsistencies of how diet is reported, exacerbate the problem. Better control over food choice, and a focus on dietary specialists in future analyses, will hopefully lead to better discrimination.

4.1.3 Habitat

Samples were better parsed by habitat type. In pairwise comparisons, *Smc* was able to differentiate between all habitat categories except savanna from desert and woodland from rainforest. The pairwise comparisons for *Asfc* did not yield as many differences, but they did provide some. Again, neither savanna *versus* desert nor woodland *versus* rainforest comparisons yielded significant variation. These variables seem to be identifying habitat openness. Rodents from wetter, more closed settings also tend to have lower complexity and higher average scales of maximum complexity than those from more open habitats.

High *Asfc* values, as seen in the desert and savanna rodents, are typically representative of complex surfaces with rough features such as pits. It has been noted that vegetation in dry/open environments has more adherent grit than do wet/closed ones (Jardine et al., 2012; Solounias and Semprebon, 2002; Stirton, 1947). An increased prevalence of pitting and gouging has been attributed to browsing ungulates occupying grittier habitats ("dirty browsing") in both incisors and check teeth (Rivals and Semprebon, 2010, 2006; Semprebon and Rivals, 2010, 2007). Perhaps the same holds for rodent incisors – though Burgman and colleagues (submitted) found no such pattern for molars.

As compared to the high *Smc* observed for the wet and closed habitats, the lower *Smc* values for the arid and open habitats indicate rough surface texture at a finer scale. This variation may result in part to differences in abundance of grit between the more open and closed environments. Ungar (1994) suggested that the average breadth of microwear features observed on primate incisors might be related to the relative amount of phytoliths to grit ingested by primates feeding in different forest layers. Microwear textures resulting from differences in grit load between habitats might follow the same idea. While grit sizes can vary considerably, finer silt and clay particles are dwarfed by the size of most phytoliths. This is even truer when comparing grit to the phytoliths of monocotyledons that dominate savanna habitats. Breadth of microwear features might correspond to the sizes and/or shapes of the abrasive that formed them. Even in the presence of microwear formed by larger phytoliths, a preponderance of grit would create a rougher surface at a finer scale for food processed in a given manner. In this way, grit could account for both higher *Asfc* values and lower *Smc* in more arid-open habitats than the wet-closed ones as observed on incisors in this study.

It has been noted that microwear caused by hard-object feeding and that caused by extraneous grit can be difficult to differentiate in rodents (Nelson et al., 2005; Townsend and Croft, 2008). If it is the hardness of ubiquitous grit within habitat types that drives texture differences, then grit ingestion may act on teeth in the same way as hard food ingestion. While the roles environmental grit plays in microwear formation are debated among authors, its relative presence within an environment might contribute to at least some of the differences in *Asfc* and *Smc* values for incisors of individuals from more open and xeric habitats compared to those from more closed and mesic ones. While this does not preclude the intrinsic properties of processed hard-foods from contributing to microwear generation, an analysis of diet categories based upon the actual food consumed (e.g., hard seeds, grasses) rather than generalized categories of diet preferences (e.g., herbivore) is needed to better assess, and hopefully differentiate, microwear patterns resulting from specific items eaten.

Groups are separated by heterogeneity of complexity too, though there is no evidence for a consistent directional habitat-related gradient in *HAsfc* values (rainforest and desert samples were both more heterogeneous than those from the woodland). The implication of this is not clear since heterogeneity was also significant when considering diet.

Of course, rodent diet and environment are not so easily separated, as the former is dependent upon the latter. Because differences tend be seen between more closed, wetter environments as opposed to open, dry ones, it is possible that results reflect differences in the consumption of foods types that are differentially available between habitats, such as the availability of grass in more open settings. Much of the past research using rodent dental microwear for paleoenvironmental reconstruction has, in fact, focused on molars and used apparent diet to infer possible habitat (Burgman et al., submitted.; Gutierrez et al., 1998; Hautier et al., 2009; Hopley et al., 2006; Nelson et al., 2005).

Interestingly, the type and direction of SSFA attributes found to vary between habitats does correspond to that seen in environmental reconstructions using bovids, the most frequently sampled taxa for this method. Typically grazing species, which are associated with more open grassland environments, often have lower *Asfc* and higher *Smc* values than browsing bovids, which are more prone to inhabit closed ones (DeSantis et al., 2012; Scott, 2012; Ungar et al., 2012b, 2007). Studies have also found that differences in *epLsar* are significant, and higher for grazers (DeSantis et al., 2013; Scott, 2012; Ungar et al., 2007). Differences in results between this study and those on bovids using similar methods are likely a function of taxon-specific behaviors and proclivities, not to mention different tooth types (incisors *versus* molars).

4.1.4 Substrate

In addition to general habitat type, we examined substrate as a potential effect on microwear texture pattern, as Nelson et al. (2005) found in their analyses of squirrels. And indeed, terrestrial rodents had higher *Asfc* values, but arboreal ones had higher *Smc*, *epLsar,* and *Tfv* values. The arboreal substrate group consisted of two species, woodland *Grammomys dolichurus* and rainforest *Hylomyscus stella*, while the terrestrial group included species from all habitat types, so substrate results are clearly not independent of habitat. But because substrate variation was significant despite the presence of four closed-setting terrestrial species, there does appear to be an effect in this case. It is unclear why texture fill volume varies between terrestrial and arboreal samples, as neither habitat nor diet was shown to affect this attribute. The terrestrial group has high *Asfc* in conjunction with low *epLsar,* typical of highly-pitted surfaces (Delezene et al., 2013; Ungar et al., 2012a). This combination has been associated with hard-item consumption in molar microwear studies for a variety of mammalian taxa (DeSantis et al., 2013; Donohue et al., 2013; Schubert et al., 2010; Scott et al., 2006; Ungar et al., 2010). While anisotropy is also low for herbivores, no other SSFA variable is significant for both the diet and substrate groupings. This suggests diet does not directly account for differences in substrate, and leaves unanswered the question of which cause these differences arise from.

The few studies comparing substrate effects on rodent microwear have identified both endogenous silicates and exogenous grit (which is assumed to be greater terrestrially than arboreally) as providing the abrasives that create microwear. Though these studies are not directly comparable to the present one given differences in methods of surface characterization and analysis, results between them do appear to be consistent. Townsend and Croft (2008), examined caviomorph rodent molar microwear in the context of arboreal, terrestrial and fossorial substrates, and found that coarse microwear could be attributed to both hard-object feeding and the effects of substrate grit, depending on species ecology. Also, fossorial grass-leaf eaters were identified to have different microwear than non-fossorial grass-leaf eaters. Nelson and colleagues (2005) found that omnivorous terrestrial sciurid rodents had higher frequencies of gouges, pits, and course scratches on molar surfaces than did frugivorous arboreal ones. They attributed coarser microwear in part to omnivorous hard-food exploitation, but even more so to higher grit levels on the terrestrial substrate.

The current study found that terrestrial species had microwear textures consistent with pitted surfaces, and in this respect is in accord with findings of Nelson and colleagues. The associations between diet and substrate were the reverse of those seen in Nelson's study, though. The arboreal species were not frugivorous, but comprised the herbivorous *Grammomys* *dolichurus* and the omnivorous *Hylomyscus stella,* while the terrestrial sample included the only frugivorous species, *Hybomys univittatus*. Since both studies found that terrestrial species were prone to more pitted microwear than arboreal ones, despite differences in diet, it can be suggested that rodent incisor microwear differences between substrates might be more the result of exogenous grit than food itself.

5.1 Conclusion

These results suggest that rodent incisor microwear pattern differences reflect a mosaic of signals related to habitat, substrate, and diet. Nevertheless, they can be teased apart, with individual variables separating different sorts of groups in different ways. In this study, the habitat effect was strongest, affirming predictions that rodent incisor microwear signature reflects environment. This suggests that rodent incisor microwear can be a valuable addition to the slate of proxies available for paleoenvironmental reconstruction.

The results of this study at first may seem incongruent with previous research that drew strong connections between diet and dental microwear. It seems probable that this apparent incongruence relates to the fact that most microwear studies have utilized cheek teeth, in which microwear differences may be more the result of the properties of chewed food (and the direction of tooth-tooth movement during mastication – see Hua et al., 2015), whereas incisor microwear, at least in the case of rodents, is perhaps more prone to environmental factors associated with ingestion of food items or paramasticatory behaviors.

Texture complexity and scale of maximum complexity were the most efficacious for differentiating habitats. While it was not possible to identify differences between some of the habitats that were most similar, such as woodland and rainforest or desert and savanna, there is a clear pattern in which the more open habitats were distinct from more closed ones. The results of this study suggest that, at a minimum, rodent incisors can be used as a proxy to track some changes in habitat succession over time. That said, further work on more groups of rodents with better control over habitat, substrate use, and especially diet is needed to establish the limits of rodent incisor microwear as a proxy for each of these effects.

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7.1 Supplementary Material

Acomys cahirinus, the Cairo spiny mouse, ranges from Libya and Egypt southeast to Somalia. The specimens used in this study were collected from desert environments. The species is terrestrial and herbivorous (Happold, 2013; Kingdon, 1984). *Aethomys chrysophilus,* or red veld rat, has been recorded as far north as Kenya and south as Angola. It can be found in both savanna and woodland settings, though only specimens from savanna settings are used here. Infrequent occurrences of scansorial behavior has been observed for the species, but its predominant substrate preference is terrestrial. The species relies on vegetation (Kingdon, 1997, 1984), and has been classified here as an herbivore, though its diet can includes seeds and insects (Happold, 2013). *Michaelamys namaquensis,* the Namaqua veld rat, is endemic to southern Africa. It is tolerant of different types of habitat, but prefers open areas. The collection location of specimens in this study were classified as savanna. The species occasionally supplements with seeds, and on rarer instances insects, but relies mostly on green grass and leaves (Happold, 2013). *Grammomys dolichurus*, Smut's thicket rat, can be found from South Sudan to South Africa. In the southern extent of it range, it can be found as far west as Angola, where this arboreal species can be found in woodland environments (Happold, 2013; Skinner and Chimimba, 2005). The species is almost entirely herbivorous (Kingdon, 1997, 1984). *Hybomys univitatus*, the one striped forest mouse, has a range centered in central Africa, extending from Gabon and Cameroon in the west to Uganda in the east, where it occupies the floor levels of rainforests. While not exclusively frugivorous, it does eat considerable amounts of fruit (Happold, 2013; Kingdon, 1997). *Hylomyscus stella*, commonly Stella wood mouse, is an equatorial species ranging from Cameroon to Kenya. Its habitat preferences are rainforests, where it spends most of its life above the forest floor. It is omnivorous, though its feeding preferences change with season (Happold, 2013; Kingdon, 1997). *Mastomys natalensis,* the Natal multimammate mouse, is present in most of Sub-Saharan Africa. The species is terrestrial and can be found in grassland and woodland environments. It is an opportunistic omnivore (Kingdon, 1997). *Meriones (Pallasiomys) crassus*, Sundevall's Jird, is a Saharan species. Though this terrestrial species prefers sparsely vegetated areas, it is herbivorous (Happold, 2013; Kingdon, 1997). *Meriones (Pallasiomys) libyacus,* the Libyan jird, is another Saharan species and though also herbivorous and terrestrial, like *Meriones crassus,* it requires more vegetation and prefers grains (Happold, 2013; Kingdon, 1997). *Mus (Nannomys) minutoides*, the tiny pygmy mouse, is found in southern and eastern Africa. The species can inhabit a range of habitats, although the *M. minutoides* specimens used in this study are exclusively captured from savanna habitats. The species is omnivorous and terrestrial . *Mus (Nannomys) triton*, the grey-bellied pygmy mouse occupies savannas in Central and Eastern Africa. Though *Mus (Nannomys) triton* has a predilection for insects, its overall diet is omnivorous (Happold, 2013; Kingdon, 1997; Skinner and Chimimba, 2005). *Parotomys brantsii*, Brant's whistling rat, can be found in the deserts of Southern Africa (Skinner and Chimimba, 2005). Only occasionally scansorial, the species spends almost all of its life on the ground, where it feeds upon green plants (Happold, 2013; Kingdon, 1997; Skinner and Chimimba, 2005). *Praomys jacksoni,* Jackson's soft furred mouse, can be found in Central Africa and East Africa. The species favors rainforests, but can also exploit woodland environments (Happold, 2013). A broad range of foods can potentially be eaten by the species, it is generally herbivorous (Kingdon, 1997). *Rhabdomys pumilio,* or four-striped grass mouse, can be found in many habitats in Southern, Central and East Africa (Happold, 2013; Skinner and Chimimba, 2005). Desert dwelling specimens are used here. It is herbivorous (Kingdon, 1997). The species is capable of climbing above ground level, but is usually terrestrially bound.

8.1 Appendix

Originating localities and ssfa scores (raw) for individual specimens used in this study.

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Acomys cahirinus	325756	SSC3-1	Libya, Kufra Province, Al Jawf	1.71608	0.26805	0.70636	1.10226	0.009759	11948
Acomys cahirinus	325757	SSC3-2	Libya, Kufra Province, Al Jawf	0.891	539.633	0.56498	0.89797	0.012037	18214.7
Acomys cahirinus	325758	SSC3-3	Libya, Kufra Province, Al Jawf	0.42016	0.41633	0.39189	0.62228	0.011336	13313.9
Acomys cahirinus	325759	SSC3-4	Libya, Kufra Province, Al Jawf	0.89075	0.26646	0.55686	1.31775	0.008696	15063.9
Acomys cahirinus	325760	SSC3-5	Libya, Kufra Province, Al Jawf	0.6658	470.018	0.61194	0.64581	0.009673	20252.4
Acomys cahirinus	325761	PSU1-8	Libya, Kufra Province, Al Jawf	-1.7533	654.269	0.9429	0.94348	0.012007	16438.8
Acomys cahirinus	325762	PSU1-1	Libya, Kufra Province, Al Jawf	1.78153	0.15079	0.48107	1.23272	0.010786	22665
Acomys cahirinus	325763	PSU1-2	Libya, Kufra Province, Al Jawf	0.7068	0.59951	0.26311	0.47414	0.010018	14361.4
Acomys cahirinus	325764	PSU1-3	Libya, Kufra Province, Al Jawf	0.67514	126.596	0.38072	0.50909	0.011193	13929.8
Acomys cahirinus	325765	PSU1-4	Libya, Kufra Province, Al Jawf	0.75203	0.60051	0.38464	0.62962	0.011353	15452.6
Acomys cahirinus	325766	PSU1-5	Libya, Kufra Province, Al Jawf	1.002	0.5999	0.60129	0.64981	0.010757	12868.9
Acomys cahirinus	325768	PSU1-7	Libya, Kufra Province, Al Jawf	-1.5392	652.993	1.19085	1.32166	0.012441	15291.3
Acomys cahirinus	325769	PSU1-9	Libya, Kufra Province, Al Jawf	0.95602	56.0214	0.51655	0.52029	0.011935	18183.8

(Cont.)

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Acomys cahirinus	482464	SSC3-6	Algeria, Tamanrasset Province, Tanrasset	1.00726	1.06971	0.46876	0.60548	0.009183	12923.7
Acomys cahirinus	482465	SSC3-7	Algeria, Tamanrasset Province, Tanrasset	1.03617	11.2584	0.28217	0.76125	0.00905	17440.2
Acomys cahirinus	482466	SSC3-8	Algeria, Tamanrasset Province, Tanrasset	-1.2247	654.797	0.75119	0.81266	0.009584	14012.8
Acomys cahirinus	482467	SSC3-9	Algeria, Tamanrasset Province, Tanrasset	1.00136	0.26694	1.13991	1.52146	0.011355	18237.7
Acomys cahirinus	482468	SSC3-10	Algeria, Tamanrasset Province, Tanrasset	0.97259	1.0658	0.46779	0.65863	0.009722	16058.8
Acomys cahirinus	482469	PSU1-15	Algeria, Tamanrasset Province, Tanrasset	1.19046	0.60061	0.27289	0.4791	0.009941	13669.4
Acomys cahirinus	482470	PSU1-12	Algeria, Tamanrasset Province, Tanrasset	1.04621	0.14996	0.65808	0.93479	0.011839	19433
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Acomys cahirinus	482471	SSC3-11	Algeria, Tamanrasset Province, Tanrasset	2.52661	0.60608	0.38602	0.78168	0.009606	15451.2
Acomys cahirinus	482472	SSC3-12	Algeria, Tamanrasset Province, Tanrasset	1.31187	0.2666	0.42798	0.66831	0.011653	19424.2
Acomys cahirinus	482473	PSU1-13	Algeria, Tamanrasset Province, Tanrasset	-0.8089	653.474	0.51706	0.83307	0.011625	17424.7
Acomys cahirinus	482474	PSU1-14	Algeria, Tamanrasset Province, Tanrasset	-1.7236	626.758	0.51611	0.67094	0.012004	16873.4
Acomys cahirinus	482475	PSU1-10	Algeria, Tamanrasset Province, Tanrasset	-1.5361	653.504	0.41421	0.55401	0	21619
Acomys cahirinus	482476	PSU1-11	Algeria, Tamanrasset Province, Tanrasset	1.64759	0.15191	1.07453	1.76208	0.011992	15921.7
Acomys cahirinus	482477	SSC3-13	Algeria, Tamanrasset Province, Tanrasset	0.69361	0.26657	0.61397	0.83182	0.011839	16347.4

(Cont.)

species	USNM ID	project ID	locality	*Asfc*	*Smc*	*HAsfc*$_9$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
Acomys cahirinus	482478	SSC3-14	Algeria, Tamanrasset Province, Tanrasset	0.81125	2.40201	0.88731	1.2834	0.011215	15258.6
Acomys cahirinus	482479	SSC3-15	Algeria, Tamanrasset Province, Tanrasset	0.94118	576.348	0.7059	0.83889	0.009988	15885.5
Aethomys chrysophilus	376886	PSU8-15	South Africa, Limpopo province, Mokopane	1.21732	0.15135	0.71392	0.78995	0.011074	14008.3
Aethomys chrysophilus	376887	PSU8-14	South Africa, Limpopo province, Mokopane	1.1022	0.26646	0.2052	0.4954	0.009498	14894.8
Aethomys chrysophilus	376890	PSU8-12	South Africa, Limpopo province, Mokopane	1.5192	0.15178	0.76099	0.90435	0.010582	14399
Aethomys chrysophilus	376891	PSU8-11	South Africa, Limpopo province, Mokopane	1.30326	0.26841	0.22162	0.4298	0.00805	12268.9
Aethomys chrysophilus	376893	PSU8-9	South Africa, Limpopo province, Mokopane	2.50735	0.153	0.82843	1.82446	0.011328	20375.8
Aethomys chrysophilus	376895	PSU8-8	South Africa, Limpopo province, Mokopane	2.63388	0.15045	0.83302	1.08331	0.010413	18478.1
Aethomys chrysophilus	376897	PSU8-7	South Africa, Limpopo province, Mokopane	0.69667	1.35608	0.559	0.59205	0.01035	12601.4
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Aethomys chrysophilus	469065	PSU8-16	South Africa, Limpopo province, Thabazimbi	1.34313	0.26661	0.59068	1.05622	0.01042	14329.9
Aethomys chrysophilus	469067	PSU8-17	South Africa, Limpopo province, Thabazimbi	4.55947	0.15423	2.15971	2.30564	0.010166	22371.8
Aethomys chrysophilus	469068	PSU8-18	South Africa, Limpopo province, Thabazimbi	1.16981	0.26658	0.32388	0.64117	0.010555	16813.5
Aethomys chrysophilus	469072	PSU8-19	South Africa, Limpopo province, Thabazimbi	1.30631	475.696	0.80252	0.92674	0.009607	19242.9
Aethomys chrysophilus	469073	PSU8-20	South Africa, Limpopo province, Thabazimbi	1.05208	0.2671	0.39032	0.59562	0.008534	17854.6
Aethomys chrysophilus	469074	PSU8-21	South Africa, Limpopo province, Thabazimbi	5.70472	0.15063	1.0812	0.93878	0.008525	15344.9
Aethomys chrysophilus	469075	PSU8-22	South Africa, Limpopo province, Thabazimbi	1.49705	0.27032	0.84683	0.82993	0.009856	12209.8
Aethomys chrysophilus	469076	PSU8-23	South Africa, Limpopo province, Thabazimbi	1.09942	0.26681	0.36723	0.57747	0.009233	17971.8
Aethomys chrysophilus	469077	PSU8-24	South Africa, Limpopo province, Thabazimbi	1.21796	0.15195	0.46217	0.68939	0.011224	15474.1
Aethomys chrysophilus	469078	PSU8-25	South Africa, Limpopo province, Thabazimbi	0.78993	0.41849	0.42526	0.58228	0.010825	11621.1
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Aethomys chrysophilus	469079	PSU8-26	South Africa, Limpopo province, Thabazimbi	1.35448	0.15155	0.23478	0.46954	0.007663	14185.7
Aethomys chrysophilus	469080	PSU8-27	South Africa, Limpopo province, Thabazimbi	-2.7465	653.776	0.86204	0.99051	0.012088	19701.7
Aethomys chrysophilus	469081	PSU8-28	South Africa, Limpopo province, Thabazimbi	1.08728	1.35061	0.27257	0.45755	0.007714	16957.6
Aethomys chrysophilus	469082	PSU8-29	South Africa, Limpopo province, Thabazimbi	2.70456	0.1499	0.34433	0.52596	0.009587	16541.5
Aethomys chrysophilus	469083	PSU8-1	South Africa, Limpopo province, Thabazimbi	2.06351	0.15022	0.87184	1.12388	0.010908	11261.9
Aethomys chrysophilus	469084	PSU8-2	South Africa, Limpopo province, Thabazimbi	0.76783	0.26665	0.27833	0.37546	0.011006	13541.9
Aethomys chrysophilus	469085	PSU8-3	South Africa, Limpopo province, Thabazimbi	0.8892	117.509	0.45674	0.55496	0.012408	19105.2
Aethomys chrysophilus	469088	PSU8-4	South Africa, Limpopo province, Thabazimbi	0.48696	1.34905	0.47771	0.60693	0.008202	12709.5
Aethomys chrysophilus	469089	PSU8-5	South Africa, Limpopo province, Thabazimbi	1.31512	0.15068	0.51327	0.59442	0.008495	18938.7
Aethomys chrysophilus	469090	PSU8-6	South Africa, Limpopo province, Thabazimbi	1.28783	0.15068	0.52962	0.59972	0.008548	18297.5

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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Aethomys chrysophilus	597907	PSU8-30	South Africa, Limpopo province, Thabazimbi	0.91484	0.1501	0.15523	0.50933	0.007193	13271.7
Aethomys chrysophilus	597908	PSU8-31	South Africa, Limpopo province, Thabazimbi	1.26093	0.26785	0.63168	0.72019	0.010141	13247.3
Grammomys dolichurus	183707	SSC6-1	Kenya, Western Province, Kaimosi	3.71337	551.633	0.48974	1.26612	0.011658	19051.3
Grammomys dolichurus	183707	SSC6-2	Kenya, Western Province, Kaimosi	1.64585	0.41793	1.09411	1.28214	0.009862	20511.6
Grammomys dolichurus	183711	SSC6-4	Kenya, Western Province, Kaimosi	0.42375	1.06616	0.34117	0.40206	0.010324	16328.5
Grammomys dolichurus	183712	SSC6-5	Kenya, Western Province, Kaimosi	1.70091	0.26695	0.52643	0.76954	0.009457	18035
Grammomys dolichurus	183713	SSC6-6	Kenya, Western Province, Kaimosi	2.84476	653.012	2.38883	2.11342	0.009787	19145.3
Grammomys dolichurus	183715	SSC6-8	Kenya, Western Province, Kaimosi	-1.2983	653.962	0.34144	0.7003	0.010401	15957.1
Grammomys dolichurus	183716	SSC6-9	Kenya, Western Province, Kaimosi	1.6276	541.512	0.31908	0.60969	0.012026	13548.3
Grammomys dolichurus	183717	SSC6-10	Kenya, Western Province, Kaimosi	1.2471	0.26932	0.30562	0.46072	0.009955	14364.4
Grammomys dolichurus	183718	SSC6-11	Kenya, Western Province, Kaimosi	0.71536	413.531	0.61581	0.74773	0.0097	17332
Grammomys dolichurus	183719	SSC6-12	Kenya, Western Province, Kaimosi	1.27867	0.42069	1.11853	0.87477	0.00839	16671.3
Grammomys dolichurus	183720	SSC6-13	Kenya, Western Province, Kaimosi	1.39218	0.26977	0.45265	0.47093	0.007947	14607
Grammomys dolichurus	183721	SSC6-14	Kenya, Western Province, Kaimosi	1.33547	0.27115	0.31093	0.44768	0.008059	15876.7
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Grammomys dolichurus	183722	SSC6-15	Kenya, Western Province, Kaimosi	0.47932	52.4733	0.43304	0.62469	0.010391	17108.5
Grammomys dolichurus	183723	SSC6-16	Kenya, Western Province, Kaimosi	0.65455	57.9695	0.19983	0.55743	0.010751	18050.1
Grammomys dolichurus	183725	SSC6-17	Kenya, Western Province, Kaimosi	0.60168	0.26658	0.3036	0.46779	0.009449	18362
Grammomys dolichurus	183726	SSC6-18	Kenya, Western Province, Kaimosi	0.57475	0.26787	0.21552	0.42047	0.0084	11827.4
Grammomys dolichurus	183727	SSC6-19	Kenya, Western Province, Kaimosi	-1.2322	650.998	0.43894	0.75017	0.011152	14110.6
Grammomys dolichurus	183728	SSC6-20	Kenya, Western Province, Kaimosi	4.58782	0.14992	1.33608	1.22525	0.01036	24456.6
Grammomys dolichurus	183729	SSC6-21	Kenya, Western Province, Kaimosi	0.6719	350.557	0.2798	0.35079	0.009567	19250.5
Grammomys dolichurus	183730	SSC6-22	Kenya, Western Province, Kaimosi	-1.1286	654.788	0.72339	0.77902	0.010907	12808.8
Grammomys dolichurus	183731	SSC6-23	Kenya, Western Province, Kaimosi	0.53557	0.26646	0.26526	0.38857	0.008359	14322.8
Grammomys dolichurus	183732	SSC6-24	Kenya, Western Province, Kaimosi	0.77184	6.07101	0.6698	0.67282	0.011367	13143.4
Grammomys dolichurus	183736	SSC6-28	Kenya, Western Province, Kaimosi	1.49673	0.26659	0.29263	0.44904	0.009972	15142
Grammomys dolichurus	183737	SSC6-29	Kenya, Western Province, Kaimosi	2.05276	617.554	0.64313	0.8098	0.010864	19556.1
Grammomys dolichurus	183738	SSC6-30	Kenya, Western Province, Kaimosi	1.19106	0.60371	0.45434	0.76265	0.011213	17245.2
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Hybomys univittatus	535514	SSC4-1	Democratic Republic of the Congo, South-Kivu Province, Bogamanda	-0.6578	655.815	0.515	0.69069	0.010738	11580
Hybomys univittatus	535515	SSC4-2	Democratic Republic of the Congo, South-Kivu Province, Bogamanda	0.54308	0.26651	0.79649	0.93612	0.00984	14644.8
Hybomys univittatus	535516	SSC4-3	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.73328	1.06665	0.45791	0.76003	0.00986	21308.4
Hybomys univittatus	535517	SSC4-4	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.43799	11.4163	0.32355	0.37106	0.010341	13417
Hybomys univittatus	535518	SSC4-5	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.74085	0.26647	0.21704	0.37612	0.007433	13232
Hybomys univittatus	535519	SSC4-6	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.23545	0.26784	0.65689	0.86818	0.009165	12686.8

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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Hybomys univittatus	535520	SSC4-7	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.47596	0.14996	0.27458	0.66647	0.008573	17896.1
Hybomys univittatus	535522	SSC4-9	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.00908	0.15013	0.3187	0.41802	0.006879	17385.9
Hybomys univittatus	535523	SSC4-10	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.78749	56.4171	0.56173	0.49037	0.010359	6953.95
Hybomys univittatus	535524	SSC4-11	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.94711	166.532	0.32201	0.70241	0.012386	19242.1
Hybomys univittatus	535525	SSC4-12	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.75402	0.59957	0.23703	0.45947	0.00919	17979
Hybomys univittatus	535527	SSC4-14	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.20448	3.74753	0.4722	1.32811	0.010689	13151.9
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Hybomys univittatus	535528	SSC4-15	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.2166	1.35022	0.63696	0.72474	0.009862	14557.9
Hybomys univittatus	535529	SSC4-16	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.51344	0.26646	1.31583	1.37849	0.009731	19743.5
Hybomys univittatus	535530	SSC4-17	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.90725	603.001	0.41564	0.92539	0.011617	16801.7
Hybomys univittatus	535531	SSC4-18	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.29732	653.168	0.48594	0.59047	0.012108	17585.3
Hybomys univittatus	535532	SSC4-19	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.72764	4.82367	0.40095	0.6054	0.010266	14482.5
Hybomys univittatus	535533	SSC4-20	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.13239	1.3516	0.46668	0.54324	0.008881	15388

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species	USNM ID	project ID	locality	*Asfc*	*Smc*	*$HAsfc_9$*	*$HAsfc_{81}$*	*epLsar*	*Tfv*
Hybomys univittatus	535534	SSC4-21	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.77372	0.27438	0.92984	0.97934	0.010615	13304
Hybomys univittatus	535535	SSC4-22	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.75124	543.623	0.28669	0.78522	0.012097	15067.5
Hybomys univittatus	535536	SSC4-23	Democratic Republic of the Congo, North-Kivu Province, Irangi	3.04682	0.14988	0.53179	0.75944	0.01116	20833.3
Hybomys univittatus	535538	SSC4-25	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.86483	532.46	0.45788	0.77967	0.011949	20331.2
Hybomys univittatus	535539	SSC4-26	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.54705	653.576	0.37893	0.58088	0.010843	15513.4
Hybomys univittatus	535540	SSC4-27	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.0258	0.15001	0.34082	0.62161	0.010775	14611.2
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Hybomys univittatus	535541	SSC4-28	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.19942	544.222	0.38551	0.57704	0.011968	15496.9
Hybomys univittatus	535542	SSC4-29	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.87365	0.15022	0.60299	0.74049	0.010619	13249.4
Hylomyscus stella	37891	SSSC8-2	Democratic Republic of the Congo, Kinshasa Province, Kinshasa	1.12403	56.9292	0.65167	0.84749	0.012282	13878.5
Hylomyscus stella	535552	SSSC8-1	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.82303	653.722	0.21661	0.42823	0.011199	12203.3
Hylomyscus stella	535553	SSSC8-3	Democratic Republic of the Congo, North-Kivu Province, Irangi	-2.2284	650.582	5.95864	3.32505	0.012698	17450.4
Hylomyscus stella	535554	SSSC8-4	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.75957	519.12	0.72147	0.85079	0.012695	19017.5

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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Hylomyscus stella	535555	SSSC8-5	Democratic Republic of the Congo, North-Kivu Province, Irangi	-2.9766	653.076	1.12634	1.21501	0.012749	18820.8
Hylomyscus stella	535556	SSSC8-6	Democratic Republic of the Congo, North-Kivu Province, Irangi	-2.4594	651.135	1.44044	1.91682	0.012584	19477.1
Hylomyscus stella	535557	SSSC8-7	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.65498	0.26649	0.78454	0.78225	0.009878	17384.6
Hylomyscus stella	535558	SSSC8-8	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.58128	579.89	0.60676	1.25253	0.012433	19079.1
Hylomyscus stella	535559	SSSC8-9	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.03415	125.569	0.18579	0.36501	0.012538	16450.6
Hylomyscus stella	535560	SSSC8-10	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.16686	550.419	0.36067	0.48766	0.012287	18458.6
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	*HAsfc*$_9$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
Hylomyscus stella	535561	SSSC8-11	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.4828	0.27023	1.93317	2.86779	0.011569	13344.8
Hylomyscus stella	535562	SSSC8-12	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.97542	11.2763	0.21736	0.46956	0.011395	23017.6
Hylomyscus stella	535563	SSSC8-13	Democratic Republic of the Congo, North-Kivu Province, Irangi	3.47069	653.858	0.43188	0.82752	0.012587	17025.6
Hylomyscus stella	535564	SSSC8-14	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.84656	32.3269	0.57656	0.90734	0.011916	13187.6
Hylomyscus stella	535565	SSSC8-15	Democratic Republic of the Congo, North-Kivu Province, Irangi	-2.0071	649.514	1.44159	1.7706	0.012157	13391.6
Hylomyscus stella	535566	SSSC8-16	Democratic Republic of the Congo, North-Kivu Province, Irangi	-1.3818	650.525	1.89188	1.61546	0.012546	16741.2
(Cont.)									

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Hylomyscus stella	535567	SSSC8-17	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.21215	129.675	0.42169	0.78724	0.013055	16375.3
Hylomyscus stella	535568	SSSC8-18	Democratic Republic of the Congo, North-Kivu Province, Irangi	3.643	653.206	0.8867	0.9659	0.012237	19166.8
Hylomyscus stella	535569	SSSC8-19	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.24123	58.0883	1.03837	1.38868	0.011677	18413.1
Hylomyscus stella	535570	SSSC8-21	Democratic Republic of the Congo, North-Kivu Province, Irangi	-1.974	649.596	1.15157	1.28743	0.012682	14296.4
Hylomyscus stella	535622	SSSC8-20	Democratic Republic of the Congo, North-Kivu Province, Irangi	-1.0383	651.229	0.65211	0.85916	0.011878	17113.7
Hylomyscus stella	548727	SSSC8-22	Democratic Republic of the Congo, Orientale Province, Epulu	-0.8594	653.673	0.72392	0.60961	0.010418	18625.8
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Hylomyscus stella	548728	SSSC8-23	Democratic Republic of the Congo, Orientale Province, Epulu	6.62591	0.15042	0.42766	0.84707	0.00938	13684.5
Hylomyscus stella	548730	SSSC8-24	Democratic Republic of the Congo, Orientale Province, Epulu	-1.523	584.189	1.24014	1.3094	0.011313	13205.1
Hylomyscus stella	548731	SSSC8-25	Democratic Republic of the Congo, Orientale Province, Epulu	-1.8924	650.75	0.46447	0.73768	0.011746	13456.7
Hylomyscus stella	548732	SSSC8-26	Democratic Republic of the Congo, Orientale Province, Epulu	1.95027	58.1071	1.14095	1.02146	0.012259	19722.1
Hylomyscus stella	548733	SSSC8-27	Democratic Republic of the Congo, Orientale Province, Epulu	-1.1055	654.449	3.42227	1.65371	0.012748	13061.3
Hylomyscus stella	548734	SSSC8-28	Democratic Republic of the Congo, Orientale Province, Epulu	-2.6542	654.43	1.79361	2.13188	0.012853	18372.9
Hylomyscus stella	548736	SSSC8-29	Democratic Republic of the Congo, Orientale Province, Epulu	-1.6394	655.21	2.08007	2.35689	0.011964	9971.58
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Hylomyscus stella	548737	SSSC8-30	Democratic Republic of the Congo, North-Kivu Province, Irangi	-2.0297	649.839	0.96876	0.86301	0.011258	12705.9
Mastomys natalensis	376968	PSU5-22	South Africa, Limpopo, Waterberg District, Thabazimbi	0.95274	0.06704	2.43686	2.20876	0.011208	12792.9
Mastomys natalensis	376969	PSU5-23	South Africa, Limpopo, Waterberg District, Thabazimbi	1.63481	0.26772	0.38601	0.60571	0.010974	14896.1
Mastomys natalensis	376970	PSU5-24	South Africa, Limpopo, Waterberg District, Thabazimbi	2.3545	0.26735	0.52423	0.58941	0.009591	14272
Mastomys natalensis	376971	PSU5-25	South Africa, Limpopo, Waterberg District, Thabazimbi	1.79766	0.26669	0.96198	0.8753	0.009199	18067
Mastomys natalensis	376972	PSU5-26	South Africa, Limpopo, Waterberg District, Thabazimbi	2.31744	614.074	0.29671	0.44284	0.012235	17559.3
Mastomys natalensis	376973	PSU5-27	South Africa, Limpopo, Waterberg District, Thabazimbi	0.8773	0.41681	0.39002	0.54455	0.008818	6508.31
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	*HAsfc*$_{9}$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
Mastomys natalensis	376975	PSU5-28	South Africa, Limpopo, Waterberg District, Thabazimbi	2.8503	0.26674	0.66725	0.66194	0.008636	14240.1
Mastomys natalensis	469576	PSU5-1	South Africa, Limpopo, Waterberg District, Thabazimbi	1.99704	0.26647	1.02264	1.06319	0.00756	17800.5
Mastomys natalensis	469577	PSU5-2	South Africa, Limpopo, Waterberg District, Thabazimbi	1.24598	0.26645	0.37715	0.53084	0.01089	20684.1
Mastomys natalensis	469578	PSU5-3	South Africa, Limpopo, Waterberg District, Thabazimbi	1.70821	0.41653	0.37258	0.58494	0.007898	15396
Mastomys natalensis	469579	PSU5-4	South Africa, Limpopo, Waterberg District, Thabazimbi	1.66672	0.14988	2.04775	2.67036	0.006518	10105.3
Mastomys natalensis	469580	PSU5-5	South Africa, Limpopo, Waterberg District, Thabazimbi	3.40996	0.26645	0.28583	0.50915	0.00987	14616.1
Mastomys natalensis	469581	PSU5-6	South Africa, Limpopo, Waterberg District, Thabazimbi	1.74115	0.26831	0.41076	0.5523	0.010454	19459.6
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Mastomys natalensis	469582	PSU5-7	South Africa, Limpopo, Waterberg District, Thabazimbi	0.38345	0.60075	0.45111	0.39583	0.009625	13054.7
Mastomys natalensis	469583	PSU5-8	South Africa, Limpopo, Waterberg District, Thabazimbi	0.916	0.60122	0.57558	0.7047	0.011758	14845.4
Mastomys natalensis	469584	PSU5-9	South Africa, Limpopo, Waterberg District, Thabazimbi	1.45533	0.26918	0.52967	0.67282	0.008518	14060.3
Mastomys natalensis	469585	PSU5-10	South Africa, Limpopo, Waterberg District, Thabazimbi	1.17494	0.26651	0.58808	0.73446	0.009535	19609.3
Mastomys natalensis	469586	PSU5-11	South Africa, Limpopo, Waterberg District, Thabazimbi	5.07316	655.306	1.69174	3.68437	0.011968	14331.9
Mastomys natalensis	469587	PSU5-12	South Africa, Limpopo, Waterberg District, Thabazimbi	2.29335	0.15366	0.65818	1.08375	0.009584	16049.4
Mastomys natalensis	469588	PSU5-13	South Africa, Limpopo, Waterberg District, Thabazimbi	0.64998	0.15034	0.22171	0.44086	0.009272	13603.4
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	*HAsfc*$_9$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
Mastomys natalensis	469589	PSU5-14	South Africa, Limpopo, Waterberg District, Thabazimbi	1.04265	595.062	0.27487	0.43366	0.009634	16950.3
Mastomys natalensis	469590	PSU5-15	South Africa, Limpopo, Waterberg District, Thabazimbi	0.76182	1.67004	0.31348	0.54313	0.008937	11496.3
Mastomys natalensis	469593	PSU5-17	South Africa, North-West Province, the Zeerust	1.28562	0.15198	0.20285	0.37954	0.009435	12584.9
Mastomys natalensis	517916	PSU5-21	South Africa, Limpopo, Waterberg District, Thabazimbi	1.52751	0.60214	0.25561	0.52093	0.008843	17555.1
Mastomys natalensis	597912	PSU5-18	South Africa, Limpopo, Waterberg District, Thabazimbi	1.31711	0.26696	0.4759	0.67817	0.005962	12628.7
Mastomys natalensis	597915	PSU5-20	South Africa, Limpopo, Waterberg District, Thabazimbi	1.74333	0.26753	0.72562	0.99018	0.011161	19988.8
Mastomys natalensis	161882	PSU9-17	Kenya, Kiambu County, Juja	0.59295	0.15424	0.28586	0.39386	0.009121	10977.6
Mastomys natalensis	161883	PSU9-18	Kenya, Kiambu County, Juja	0.51924	600.09	0.31773	0.43837	0.010272	11855.4
Mastomys natalensis	161884	PSU9-19	Kenya, Kiambu County, Juja	0.98079	573.808	0.52466	0.77405	0.010646	12967.4
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Mastomys natalensis	161888	PSU9-22	Kenya, Kiambu County, Juja	1.43073	654.376	0.30727	0.52684	0.011944	20368.9
Mastomys natalensis	161889	PSU9-23	Kenya, Kiambu County, Juja	1.06924	129.367	0.47392	0.6641	0.00972	17208.3
Mastomys natalensis	161890	PSU9-24	Kenya, Kiambu County, Juja	0.38923	1.07212	0.3286	0.50973	0.009991	12678.2
Mastomys natalensis	161891	PSU9-25	Kenya, Kiambu County, Juja	0.31934	583.042	0.36624	0.55562	0.009248	12799.5
Mastomys natalensis	161892	PSU9-26	Kenya, Kiambu County, Juja	0.68103	0.15009	0.70191	1.09934	0.010466	16165
Mastomys natalensis	161893	PSU9-27	Kenya, Kiambu County, Juja	0.46063	0.26682	0.24316	0.41282	0.009479	15244.9
Mastomys natalensis	161894	PSU9-28	Kenya, Kiambu County, Juja	0.49268	0.41728	0.45843	0.52103	0.008456	13826.4
Mastomys natalensis	161895	PSU9-29	Kenya, Kiambu County, Juja	0.37401	544.429	0.44303	0.76044	0.008739	12858.5
Mastomys natalensis	161896	PSU9-30	Kenya, Kiambu County, Juja	0.50506	0.41688	0.44876	0.76539	0.010511	13341.1
Mastomys natalensis	161897	PSU9-16	Kenya, Kiambu County, Juja	2.34565	654.472	0.25475	0.63612	0.011834	7579.25
Mastomys natalensis	183295	PSU9-11	Kenya, Vihiga County, Kaimosi	1.05169	0.26647	0.4709	0.77317	0.007669	9204.57
Mastomys natalensis	183296	PSU9-12	Kenya, Vihiga County, Kaimosi	0.88375	0.15315	0.36067	0.75383	0.0062	11678.2
Mastomys natalensis	183297	PSU9-13	Kenya, Vihiga County, Kaimosi	1.47569	0.15558	0.31459	0.6593	0.006806	11081.8
Mastomys natalensis	183298	PSU9-14	Kenya, Vihiga County, Kaimosi	0.62983	0.60083	0.52295	0.65994	0.00944	11483.2
Mastomys natalensis	183301	PSU9-1	Kenya, Vihiga County, Kaimosi	0.97912	0.60189	0.50245	0.89681	0.01035	16467.2
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Mastomys natalensis	183302	PSU9-2	Kenya, Vihiga County, Kaimosi	0.83377	0.15274	0.35771	0.88648	0.007015	14124.9
Mastomys natalensis	183303	PSU9-3	Kenya, Vihiga County, Kaimosi	1.19675	652.481	0.25455	0.42671	0.009568	14606.6
Mastomys natalensis	183304	PSU9-4	Kenya, Vihiga County, Kaimosi	1.15742	0.14989	0.81476	1.03572	0.010464	11374
Mastomys natalensis	183306	PSU9-6	Kenya, Vihiga County, Kaimosi	2.11536	0.15202	0.80249	1.27825	0.00655	12473.5
Mastomys natalensis	183307	PSU9-7	Kenya, Vihiga County, Kaimosi	0.41884	0.60062	0.44881	0.67885	0.007906	16407.6
Mastomys natalensis	183308	PSU9-8	Kenya, Vihiga County, Kaimosi	0.3396	1.06587	0.50937	0.61501	0.009618	17883.9
Mastomys natalensis	183309	PSU9-10	Kenya, Vihiga County, Kaimosi	0.53867	0.26663	0.16683	0.44406	0.007597	10278.3
Mastomys natalensis	183311	PSU9-9	Kenya, Vihiga County, Kaimosi	0.40677	0.26726	0.47111	0.59402	0.010737	11090.2
Mastomys natalensis	537835	SSC5-17	Democratic Republic of the Congo, Orientale Province	0.7053	0.15162	0.9581	1.19677	0.00818	10215.2
Mastomys natalensis	537838	SSC5-20	Democratic Republic of the Congo, Orientale Province	1.88811	649.798	0.7726	1.38408	0.012026	16463.7
Mastomys natalensis	537839	SSC5-21	Democratic Republic of the Congo, Orientale Province	0.51057	15.1235	0.26724	0.67762	0.007484	3594.66
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Mastomys natalensis	537841	SSC5-23	Democratic Republic of the Congo, Orientale Province	1.43535	6.02677	0.67348	0.69124	0.01126	16650.1
Mastomys natalensis	537843	SSC5-25	Democratic Republic of the Congo, Orientale Province	0.3481	0.26855	0.38242	0.4891	0.006544	13805.1
Mastomys natalensis	537846	SSC5-28	Democratic Republic of the Congo, Orientale Province	0.5286	54.1825	0.49101	0.59511	0.00994	14850.6
Mastomys natalensis	537847	SSC5-1	Democratic Republic of the Congo, Equateur Province, Yalosemba	0.58512	0.26706	0.51309	0.67241	0.009671	7967.39
Mastomys natalensis	537848	SSC5-2	Democratic Republic of the Congo, Orientale Province	0.77714	1.0658	0.28923	0.33046	0.00758	14717.2
Mastomys natalensis	537849	SSC5-3	Democratic Republic of the Congo, Orientale Province	2.24638	0.15014	0.84866	1.41975	0.004156	17468.3
Mastomys natalensis	537850	SSC5-4	Democratic Republic of the Congo, Orientale Province	0.46604	0.26695	0.33409	0.59811	0.008375	11938.6
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Mastomys natalensis	537851	SSC5-5	Democratic Republic of the Congo, Orientale Province	0.44622	1.06778	0.26532	0.58513	0.007184	18522.5
Mastomys natalensis	537852	SSC5-6	Democratic Republic of the Congo, Orientale Province	0.55334	547.281	0.26047	0.38487	0.006635	7676.28
Mastomys natalensis	537853	SSC5-7	Democratic Republic of the Congo, Orientale Province	0.56676	0.60207	0.76318	1.5423	0.007262	12158.9
Mastomys natalensis	537854	SSC5-8	Democratic Republic of the Congo, Equateur Province, Tandala	0.57683	588.218	0.26151	0.58833	0.009445	10348.7
Mastomys natalensis	537855	SSC5-9	Democratic Republic of the Congo, Equateur Province, Tandala	0.39695	126.126	0.40614	0.5713	0.011754	13787.9
Mastomys natalensis	537856	SSC5-10	Democratic Republic of the Congo, Equateur Province, Tandala	3.56899	655.519	0.32706	0.66413	0.012551	19787.1
Mastomys natalensis	537857	SSC5-11	Democratic Republic of the Congo, Equateur Province, Tandala	0.9872	0.15072	3.06609	5.34198	0.004823	11177.8
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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Mastomys natalensis	537858	SSC5-12	Democratic Republic of the Congo, Equateur Province, Tandala	0.72158	653.699	0.4182	0.55123	0.006868	10115.4
Mastomys natalensis	537859	SSC5-13	Democratic Republic of the Congo, Equateur Province, Tandala	1.53872	0.15075	1.0512	1.02244	0.007416	20096.6
Mastomys natalensis	537860	SSC5-14	Democratic Republic of the Congo, Equateur Province, Tandala	1.72762	653.22	0.35019	0.85108	0.010362	17770.4
Mastomys natalensis	537861	SSC5-15	Democratic Republic of the Congo, Equateur Province, Tandala	0.82326	0.27201	0.6828	1.13819	0.00561	12633.4
Mastomys natalensis	537862	SSC5-16	Democratic Republic of the Congo, Equateur Province, Tandala	5.72674	653.097	0.78865	1.86668	0.012296	14694.8
Meriones crassus	481680	SSC9-20	Algeria, Bechar Province, Beni-Abbes	1.3513	0.15034	0.44944	0.66327	0.008699	10928.5
Meriones crassus	482446	SSC9-21	Algeria, Bechar Province, Beni-Abbes	0.88513	129.288	0.33989	0.51368	0.012192	17189.6
Meriones crassus	482447	SSC9-22	Algeria, Bechar Province, Beni-Abbes	1.33992	1.3561	0.45654	0.88372	0.008065	14162.3

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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Meriones crassus	482448	SSC9-23	Algeria, Bechar Province, Beni-Abbes	0.55252	0.61087	0.30225	0.56537	0.008749	12083.2
Meriones crassus	482449	SSC9-24	Algeria, Bechar Province, Beni-Abbes	1.7533	607.655	0.83339	0.92367	0.010524	17362.2
Meriones crassus	482450	SSC9-25	Algeria, Bechar Province, Beni-Abbes	-0.8462	653.577	0.4156	0.5993	0.011341	15668.5
Meriones crassus	482451	SSC9-26	Algeria, Bechar Province, Kerzaz	0.50546	0.41639	0.24819	0.44248	0.010361	16883
Meriones crassus	482452	SSC9-27	Algeria, Bechar Province, Beni-Abbes	0.54405	3.78164	0.28104	0.51513	0.009732	11825.8
Meriones crassus	482453	SSC9-28	Algeria, Tamanrasset Province, Salah	1.49408	649.587	0.33793	0.67534	0.011862	16394.7
Meriones libyacus	482428	SSC9-2	Algeria, Naâma Province, Ain-Sefra	1.67804	0.26646	0.56486	0.99287	0.011031	19064.2
Meriones libyacus	482429	SSC9-3	Algeria, Tamanrasset Province, Tamanrasset	1.16443	0.2676	0.32146	0.45666	0.008627	10387
Meriones libyacus	482430	SSC9-4	Algeria, Tamanrasset Province, Tamanrasset	1.08037	0.15043	0.54562	0.84966	0.009805	11823

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species	USNM ID	project ID	locality	*Asfc*	*Smc*	*HAsfc*$_9$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
Meriones libyacus	482431	SSC9-5	Algeria, Tamanrasset Province, Tamanrasset	1.39953	0.26705	0.47794	0.66196	0.01037	15090.3
Meriones libyacus	482432	SSC9-6	Algeria, Tamanrasset Province, Tamanrasset	0.92988	0.14994	0.18733	0.31239	0.0109	16532.2
Meriones libyacus	482434	SSC9-8	Algeria, Tamanrasset Province, Tamanrasset	1.17204	0.26649	0.34269	0.66797	0.010717	13892.7
Meriones libyacus	482435	SSC9-9	Algeria, Tamanrasset Province, Tamanrasset	3.01877	0.15022	0.33539	0.6408	0.007941	10947.4
Meriones libyacus	482436	SSC9-10	Algeria, Tamanrasset Province, Tamanrasset	2.21145	0.26654	0.33296	0.64552	0.009442	14214.5
Meriones libyacus	482437	SSC9-11	Algeria, Tamanrasset Province, Tamanrasset	2.7312	559.55	0.54926	0.88645	0.011282	16575.6
Meriones libyacus	482438	SSC9-12	Algeria, Tamanrasset Province, Tamanrasset	5.32886	0.15292	2.00525	1.95755	0.010436	19857.8
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Meriones libyacus	482439	SSC9-13	Algeria, Tamanrasset Province, Tamanrasset	1.91971	0.2666	0.38446	0.62704	0.011066	18090
Meriones libyacus	482440	SSC9-14	Algeria, Tamanrasset Province, Tamanrasset	4.66434	0.15162	2.34952	2.27021	0.009126	14828.7
Meriones libyacus	482441	SSC9-15	Algeria, Tamanrasset Province, Tamanrasset	1.27969	0.26668	0.37925	0.56602	0.010564	17116.4
Meriones libyacus	482442	SSC9-16	Algeria, Tamanrasset Province, Tamanrasset	0.48286	0.41667	0.39468	0.5043	0.010824	14362
Meriones libyacus	482443	SSC9-17	Algeria, Tamanrasset Province, Tamanrasset	1.49511	0.26653	0.30823	0.51379	0.009289	16536
Meriones libyacus	482444	SSC9-18	Algeria, Tamanrasset Province, Tamanrasset	2.26163	0.15006	0.55885	1.06716	0.008712	17747.8
Meriones libyacus	482445	SSC9-19	Algeria, Tamanrasset Province, Tamanrasset	1.82206	0.15318	0.33141	0.58126	0.008647	7274.15
Micaelamys namaquensis	376864	SSC7-2	South Africa, Limpopo province, the Rooiberg	1.04934	0.26648	0.25788	0.49397	0.009985	18501.4

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
(Cont.)									
Micaelamys namaquensis	376865	SSC7-3	South Africa, Limpopo province, the Rooiberg	0.3511	4.32218	0.36194	0.5781	0.005785	10271.8
Micaelamys namaquensis	376865	SSC7-4	South Africa, Limpopo province, the Rooiberg	0.40666	3.74813	0.1874	0.44039	0.00726	16203.1
Micaelamys namaquensis	469066	SSC7-5	South Africa, Limpopo province, the Rooiberg	0.93581	56.0473	0.13546	0.54545	0.011382	15478.8
Micaelamys namaquensis	469069	SSC7-6	South Africa, Limpopo province, the Rooiberg	1.99102	0.2694	0.38206	0.68697	0.008729	19517.2
Micaelamys namaquensis	469070	SSC7-7	South Africa, Limpopo province, the Rooiberg	0.46743	595.098	0.20246	0.49006	0.008945	9895.34
Micaelamys namaquensis	469091	SSC7-9	South Africa, Northern Province	1.32037	128.966	0.55411	0.63066	0.011128	18739.6
Micaelamys namaquensis	469330	SSC7-10	South Africa, Limpopo province, Groot Letaba Reserve	0.80866	0.26807	1.02512	1.50495	0.009979	11054
Micaelamys namaquensis	469333	SSC7-11	South Africa, Limpopo province, Groot Letaba Reserve	0.43374	32.2417	0.48675	0.47466	0.00805	15079.1
Micaelamys namaquensis	469334	SSC7-12	South Africa, Limpopo province, Groot Letaba Reserve	0.50118	0.42057	0.46111	0.60736	0.006456	13709.3
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Micaelamys namaquensis	469336	SSC7-13	South Africa, Limpopo province, Groot Letaba Reserve	1.22344	600.67	0.36368	0.6377	0.011161	16006.7
Micaelamys namaquensis	469338	SSC7-14	South Africa, Limpopo province, Groot Letaba Reserve	2.13879	655.141	0.35166	0.7156	0.008772	7773.94
Micaelamys namaquensis	469339	SSC7-15	South Africa, Limpopo province, Groot Letaba Reserve	1.16178	649.454	0.29594	0.43142	0.010946	17332.8
Micaelamys namaquensis	469342	SSC7-16	South Africa, Limpopo province, Groot Letaba Reserve	1.34331	599.5	0.38571	0.45181	0.010988	18030.6
Micaelamys namaquensis	469343	SSC7-17	South Africa, Limpopo province, Groot Letaba Reserve	1.30825	653.366	0.46204	0.59296	0.011079	15891.3
Micaelamys namaquensis	469344	SSC7-18	South Africa, Limpopo province, Groot Letaba Reserve	1.08272	0.42433	0.38657	0.79577	0.008439	12593.6
Micaelamys namaquensis	469345	SSC7-19	South Africa, Limpopo province, Groot Letaba Reserve	1.39299	580.598	0.27446	0.62526	0.012326	19385.5
Micaelamys namaquensis	unknown	SSC7-8	South Africa, Limpopo province, the Rooiberg	0.83456	501.43	0.50459	0.58193	0.011621	16111.3

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
(Cont.)									
Mus minutoides	376981	SSC10-1	South Africa, Limpopo province, the Rooiberg	1.87135	563.229	0.43588	0.80311	0.012742	15600.3
Mus minutoides	376982	SSC10-2	South Africa, Limpopo province, the Rooiberg	3.77917	595.776	0.28662	0.52436	0.012913	21339
Mus minutoides	376983	SSC10-3	South Africa, Limpopo province, the Rooiberg	2.20342	470.018	0.2882	0.58505	0.010906	18953.8
Mus minutoides	376984	SSC10-4	South Africa, Limpopo province, the Rooiberg	1.22796	0.26743	0.52602	0.82088	0.011784	16056.2
Mus minutoides	376992	SSC10-5	South Africa, Limpopo province, Mokopane	2.72685	0.15096	1.59587	1.8921	0.011397	8599.24
Mus minutoides	376993	SSC10-6	South Africa, Limpopo province, Mokopane	-1.6799	653.541	1.22169	1.15089	0.011542	18571.3
Mus minutoides	376994	SSC10-7	South Africa, Limpopo province, Mokopane	4.09435	0.15128	0.64641	1.2339	0.009874	17663
Mus minutoides	376995	SSC10-8	South Africa, Limpopo province, Mokopane	2.06	126.156	1.90105	2.36296	0.012637	22519.9
Mus minutoides	376996	SSC10-9	South Africa, Limpopo province, Mokopane	1.29434	127.02	0.55357	0.88149	0.01267	18148.7
Mus minutoides	376997	SSC10-10	South Africa, Limpopo province, Mokopane	-2.8645	652.998	0.46987	0.70743	0.012372	23326.3

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
(Cont.)									
Mus minutoides	376998	SSC10-11	South Africa, Limpopo province, Mokopane	2.72044	0.26651	1.43039	2.72073	0.011786	18638.6
Mus minutoides	376999	SSC10-12	South Africa, Limpopo province, Mokopane	2.64135	0.15023	1.40182	1.39044	0.011475	13590.1
Mus minutoides	377000	SSC10-13	South Africa, Limpopo province, Mokopane	4.11333	0.14992	1.76956	3.13512	0.012042	25561.4
Mus minutoides	377001	SSC10-14	South Africa, Limpopo province, Mokopane	1.8701	56.5179	0.87165	1.13471	0.012757	13402.5
Mus minutoides	382313	SSC10-15	South Africa, Mpumalanga province, Malelane	-3.075	653.78	1.51627	1.42428	0.011919	23426
Mus minutoides	382314	PSU11-1	South Africa, Mpumalanga province, Malelane	4.08304	0.14991	0.60407	1.46297	0.011363	20877.7
Mus minutoides	382315	PSU11-2	South Africa, Mpumalanga province, Malelane	4.41216	613.957	0.63257	1.17733	0.012115	23961.3
Mus minutoides	382317	PSU11-3	South Africa, Mpumalanga province, Malelane	4.41216	613.957	0.63257	1.17733	0.012115	23961.3
Mus minutoides	423103	PSU11-4	South Africa, Northern Cape, Bethulie	1.60365	0.15049	0.76606	0.91531	0.01133	14668.4
Mus minutoides	423104	PSU11-5	South Africa, Northern Cape, Bethulie	2.61517	0.14988	0.62783	1.33789	0.011102	20943.7

species	USNM ID	project ID	locality	*Asfc*	*Smc*	*HAsfc$_9$*	*HAsfc$_{81}$*	*epLsar*	*Tfv*
(Cont.)									
Mus minutoides	423105	PSU11-6	South Africa, Northern Cape, Bethulie	1.40339	0.14992	0.93645	2.04998	0.011469	19768.3
Mus minutoides	423106	PSU11-8	South Africa, Northern Cape, Bethulie	1.39385	0.15016	0.65211	1.21267	0.012209	20994.4
Mus minutoides	423107	PSU11-9	South Africa, Northern Cape, Bethulie	4.59016	0.15001	0.50189	2.63366	0.011418	12222.7
Mus minutoides	423108	PSU11-10	South Africa, Northern Cape, Bethulie	1.52725	0.15029	1.24334	1.0869	0.011887	17909.9
Mus minutoides	423109	PSU11-11	South Africa, Northern Cape, Bethulie	3.38835	0.14994	0.74741	1.81983	0.011277	22996.7
Mus minutoides	423110	PSU11-7	South Africa, Northern Cape, Bethulie	3.90411	0.1507	2.56862	3.20141	0.011127	15739
Mus minutoides	423111	PSU11-12	South Africa, Northern Cape, Bethulie	1.81262	0.26723	0.485	0.8077	0.009328	13621.7
Mus minutoides	423113	PSU11-14	South Africa, Northern Cape, Bethulie	4.01394	0.15073	1.35302	1.60256	0.011252	9435.18
Mus minutoides	423114	PSU11-15	South Africa, Northern Cape, Bethulie	2.80059	0.14989	1.43216	2.04527	0.011704	20963
Mus triton	183558	PSU10-9	Kenya, Western Province, Kaimosi	3.81618	582.171	0.8365	1.38666	0.012576	16654
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Mus triton	183559	PSU10-10	Kenya, Western Province, Kaimosi	1.42524	120.601	0.56402	0.79053	0.012287	18058.4
Mus triton	183565	PSU10-11	Kenya, Western Province, Kaimosi	5.62446	0.14988	0.91202	0.90442	0.011261	8753.25
Mus triton	183568	PSU10-12	Kenya, Western Province, Kaimosi	3.01123	615.587	0.35167	0.49969	0.011783	17569.5
Mus triton	183569	PSU10-13	Kenya, Western Province, Kaimosi	1.36071	1.35924	0.33622	0.5472	0.009839	15571.7
Mus triton	183570	PSU10-14	Kenya, Western Province, Kaimosi	3.00561	527.791	0.58145	1.06193	0.011938	14194.9
Mus triton	183571	PSU10-15	Kenya, Western Province, Kaimosi	4.75926	0.15032	0.61517	0.98528	0.006633	13214.4
Mus triton	183573	PSU10-16	Kenya, Western Province, Kaimosi	-1.0886	653.628	0.8574	0.95085	0.011979	10626.6
Mus triton	183574	PSU10-17	Kenya, Western Province, Kaimosi	0.54889	0.26727	0.60731	0.70104	0.012395	14865.9
Mus triton	183575	PSU10-18	Kenya, Western Province, Kaimosi	2.17988	569.962	0.36944	0.71948	0.01223	22021.9
Mus triton	183576	PSU10-19	Kenya, Western Province, Kaimosi	0.79414	126.542	0.32786	0.59663	0.012394	9095.66
Mus triton	183579	PSU10-22	Kenya, Western Province, Kaimosi	2.05209	571.944	0.57697	1.09546	0.012073	16431.5
Mus triton	183580	PSU10-1	Kenya, Western Province, Kaimosi	-2.2028	633.982	1.68	1.57436	0.01029	17834.4
Mus triton	183581	PSU10-2	Kenya, Western Province, Kaimosi	2.08085	652.935	0.50991	0.85866	0.009811	12666.5
Mus triton	183583	PSU10-4	Kenya, Western Province, Kaimosi	0.77615	0.42304	0.39659	0.60449	0.011435	16044.1
Mus triton	183584	PSU10-5	Kenya, Western Province, Kaimosi	1.0524	56.2933	0.82693	1.36719	0.012339	15958.1
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Mus triton	183585	PSU10-6	Kenya, Western Province, Kaimosi	-2.3757	653.146	0.68979	0.57282	0.012746	18677.5
Mus triton	183586	PSU10-7	Kenya, Western Province, Kaimosi	1.23945	604.18	0.65811	1.20927	0.011318	14533.2
Mus triton	183587	PSU10-8	Kenya, Western Province, Kaimosi	2.87999	653.311	0.41742	0.72711	0.012678	16068.8
Parotomys brantsii	343878	PSU6-21	Northern Cape, Port Nolloth	7.19457	0.15147	1.34079	1.75025	0.008917	15159.2
Parotomys brantsii	343879	PSU6-22	Northern Cape, Port Nolloth	2.97709	0.15008	0.50202	0.65353	0.010716	20342.8
Parotomys brantsii	343881	PSU6-24	Northern Cape, Port Nolloth	-0.9148	653.854	1.77288	1.59583	0.012833	18903.1
Parotomys brantsii	343882	PSU6-25	Northern Cape, Port Nolloth	-2.0504	653.677	0.54048	1.07319	0.011629	12532.7
Parotomys brantsii	343883	PSU6-26	Northern Cape, Port Nolloth	1.8853	0.15123	0.62254	0.71633	0.010642	16470.4
Parotomys brantsii	343884	PSU6-27	Northern Cape, Port Nolloth	0.93259	0.2682	0.96619	0.92057	0.011474	10986.4
Parotomys brantsii	343885	PSU6-28	Northern Cape, Port Nolloth	-1.4527	643.763	0.78651	1.14783	0.011199	12114
Parotomys brantsii	343886	PSU6-29	Northern Cape, Port Nolloth	2.02436	0.14989	3.61276	2.80082	0.011359	8386.6
Parotomys brantsii	343887	PSU6-30	Northern Cape, Port Nolloth	1.32245	0.15088	1.1428	1.20379	0.010541	13244.4
Parotomys brantsii	343888	PSU6-1	Northern Cape, Port Nolloth	1.32866	523.282	0.72759	0.91219	0.011937	17242.4
Parotomys brantsii	343889	PSU6-2	Northern Cape, Port Nolloth	-0.9588	653.272	1.02243	1.1191	0.010674	15938.7
Parotomys brantsii	343890	PSU6-3	Northern Cape, Port Nolloth	-1.5995	653.097	1.95064	0.92866	0.011659	16941.3
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Parotomys brantsii	343891	PSU6-4	Northern Cape, Port Nolloth	1.15536	0.26709	0.83735	0.98902	0.009544	14430.8
Parotomys brantsii	344065	PSU6-16	Northern Cape, Port Nolloth	3.78195	0.14988	0.47148	0.73457	0.011669	20052.6
Parotomys brantsii	452475	PSU6-17	South Africa, Northern Cape, Kalahari Gemsbok National Park	0.77606	0.26651	0.22314	0.53764	0.010495	13736.9
Parotomys brantsii	452476	PSU6-18	South Africa, Northern Cape, Kalahari Gemsbok National Park	1.93242	0.26924	1.33817	1.55945	0.011762	16590.1
Parotomys brantsii	452477	PSU6-19	South Africa, Northern Cape, Kalahari Gemsbok National Park	1.54072	0.26675	0.57844	0.58697	0.011131	19210.9
Parotomys brantsii	452478	PSU6-20	South Africa, Northern Cape, Kalahari Gemsbok National Park	0.69033	0.2688	0.66986	0.73487	0.010236	13735.3
Parotomys brantsii	452479	PSU6-5	South Africa, Northern Cape, Kalahari Gemsbok National Park	3.51162	0.15035	1.50279	1.71479	0.011862	20101.7
Parotomys brantsii	452480	PSU6-6	South Africa, Northern Cape, Kalahari Gemsbok National Park	-1.2808	652.237	0.71452	1.13019	0.011667	16423.2
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	*HAsfc*$_9$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
Parotomys brantsii	452481	PSU6-7	South Africa, Northern Cape, Kalahari Gemsbok National Park	1.75358	0.1505	3.66093	3.72993	0.011388	11470.1
Parotomys brantsii	452482	PSU6-8	South Africa, Northern Cape, Kalahari Gemsbok National Park	1.91323	0.15067	1.23389	1.45253	0.011705	17422.3
Parotomys brantsii	452484	PSU6-9	South Africa, Northern Cape, Kalahari Gemsbok National Park	4.28268	653.086	0.45715	0.72321	0.012379	24311.6
Parotomys brantsii	452485	PSU6-10	South Africa, Northern Cape, Kalahari Gemsbok National Park	2.81416	572.843	0.44943	0.68142	0.012712	21102.9
Parotomys brantsii	452486	PSU6-11	South Africa, Northern Cape, Kalahari Gemsbok National Park	3.83621	0.15166	0.80661	1.65329	0.010379	15793
Parotomys brantsii	452487	PSU6-12	South Africa, Northern Cape, Kalahari Gemsbok National Park	2.86405	0.14992	0.97128	1.52473	0.011763	18051.8
Parotomys brantsii	452488	PSU6-13	South Africa, Northern Cape, Kalahari Gemsbok National Park	1.67192	653.397	0.66114	0.76668	0.012198	19568.7
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Parotomys brantsii	452489	PSU6-14	South Africa, Northern Cape, Kalahari Gemsbok National Park	2.86195	0.14991	0.6677	1.16795	0.011033	9500.48
Parotomys brantsii	452490	PSU6-15	South Africa, Northern Cape, Kalahari Gemsbok National Park	2.59028	0.26646	0.66728	0.73715	0.010503	12995.1
Praomys jacksoni	535608	SSC1-1	Democratic Republic of the Congo,, South-Kivu, Buhengeri	0.42315	1.34994	0.3804	0.5536	0.008407	17148.3
Praomys jacksoni	535609	SSC1-2	Democratic Republic of the Congo, South-Kivu, Bukarabwa	0.82356	653.136	0.34543	0.44022	0.009209	17890.4
Praomys jacksoni	535610	SSC1-3	Democratic Republic of the Congo, South-Kivu, Bukarabwa	3.11672	0.14993	0.67558	0.86426	0.00201	15662.5
Praomys jacksoni	535611	SSC1-4	Democratic Republic of the Congo, North-Kivu Province, Rumangabo	0.85132	653.306	0.42675	0.56234	0.009489	17867.2
Praomys jacksoni	535612	SSC1-5	Democratic Republic of the Congo, North-Kivu Province, Rumangabo	1.02152	11.2584	0.50995	0.78782	0.008842	22220.8

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species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Praomys jacksoni	535613	SSC1-6	Democratic Republic of the Congo, North-Kivu Province, Rumangabo	-1.1557	654.327	0.36968	0.64326	0.009695	13483.4
Praomys jacksoni	535614	SSC1-7	Democratic Republic of the Congo, North-Kivu Province, Rumangabo	0.99142	0.41667	1.10784	1.06294	0.008949	19282
Praomys jacksoni	535616	SSC2-1	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.57031	0.15028	1.52158	1.3549	0.00844	12902.1
Praomys jacksoni	535617	SSC2-2	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.75287	0.41852	0.51873	0.81556	0.010555	12508.3
Praomys jacksoni	535618	SSC2-3	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.40243	0.15148	0.33488	0.45254	0.008803	16446.8
Praomys jacksoni	535619	SSC2-4	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.15	0.26812	0.60358	0.84588	0.010301	13294
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Praomys jacksoni	535620	SSC2-5	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.53516	103.933	0.57987	1.11676	0.011659	17489.6
Praomys jacksoni	535621	SSC2-6	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.0479	1.35456	0.73896	1.18307	0.009677	17606.9
Praomys jacksoni	535623	SSC2-7	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.5831	1.35215	0.84042	0.99738	0.010531	12381.7
Praomys jacksoni	535624	SSC2-8	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.34829	0.26701	1.82083	1.49401	0.010499	12178.8
Praomys jacksoni	535625	SSC2-9	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.44427	1.06621	1.17731	1.13177	0.008705	16055.2
Praomys jacksoni	535626	SSC2-10	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.03525	0.15013	0.70412	0.98953	0.005431	17981.8
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Praomys jacksoni	535627	SSC2-11	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.42742	0.14991	1.24869	2.14513	0.011134	18106.8
Praomys jacksoni	535628	SSC2-12	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.66005	1.35458	2.00791	2.05489	0.007855	10416.7
Praomys jacksoni	535629	SSC2-13	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.80338	0.26781	0.50393	0.7447	0.009538	11028.5
Praomys jacksoni	535630	SSC2-14	Democratic Republic of the Congo, North-Kivu Province, Irangi	-2.2958	654.559	0.94054	1.25201	0.012033	16591.3
Praomys jacksoni	535631	SSC2-15	Democratic Republic of the Congo, North-Kivu Province, Irangi	4.49437	0.15083	0.47467	1.36849	0.008143	12061
Praomys jacksoni		SSC1-8	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.01786	0.2675	0.48766	0.8085	0.008595	12845.2
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_9$	$HAsfc_{81}$	*epLsar*	*Tfv*
Praomys jacksoni	463574	PSU2-9	Democratic Republic of the Congo, Equateur Province,Yalosemba	0.79009	2.39823	0.29224	0.51673	0.010805	19106.6
Praomys jacksoni	463575	PSU2-10	Democratic Republic of the Congo, Equateur Province,Yalosemba	1.68328	0.42176	0.93393	1.0422	0.009513	11490.7
Praomys jacksoni	463577	PSU2-11	Democratic Republic of the Congo, Equateur Province,Yalosemba	1.09852	0.27106	0.39853	0.45499	0.007911	14484.2
Praomys jacksoni	463578	PSU2-16	Democratic Republic of the Congo, Equateur Province,Yalosemba	1.00848	1.34928	0.29025	0.52104	0.007594	14445.8
Praomys jacksoni	463579	PSU2-17	Democratic Republic of the Congo, Equateur Province,Yalosemba	1.78914	0.41744	0.5807	0.63261	0.010306	16437.6
Praomys jacksoni	535571	PSU2-8	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.1284	58.3496	0.47715	0.649	0.011564	16945.1

(Cont.)

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Praomys jacksoni	535632	PSU2-1	Democratic Republic of the Congo, North-Kivu Province, Irangi	0.40423	2.01515	0.42261	0.61729	0.009878	15089.4
Praomys jacksoni	535633	PSU2-3	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.3981	0.15051	1.46613	2.24291	0.011822	18576.8
Praomys jacksoni	535634	PSU2-4	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.42888	0.26774	1.96078	2.11471	0.010595	15884.8
Praomys jacksoni	535635	PSU2-5	Democratic Republic of the Congo, North-Kivu Province, Irangi	-2.8803	654.529	1.51676	1.56963	0.011482	14840.9
Praomys jacksoni	535636	PSU2-6	Democratic Republic of the Congo, North-Kivu Province, Irangi	2.12531	649.429	0.48759	0.6477	0.009861	13294.9
Praomys jacksoni	535637	PSU2-7	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.01195	107.28	0.38077	0.51385	0.011339	15712.3
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	*HAsfc*$_{9}$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
Praomys jacksoni	535638	PSU2-2	Democratic Republic of the Congo, North-Kivu Province, Irangi	1.38117	0.41786	0.95729	1.63371	0.010252	12354.3
Praomys jacksoni	537829	PSU2-12	Democratic Republic of the Congo, Equateur Province,Yalosemba	0.67955	0.41698	0.48379	0.54709	0.010358	13800.6
Praomys jacksoni	537830	PSU2-13	Democratic Republic of the Congo, Equateur Province,Yalosemba	3.09181	652.995	0.48956	0.6991	0.012338	17063.4
Praomys jacksoni	537831	PSU2-14	Democratic Republic of the Congo, Equateur Province,Yalosemba	1.72984	0.26779	2.51945	3.12779	0.01105	18793.1
Praomys jacksoni	537832	PSU2-15	Democratic Republic of the Congo, Equateur Province,Yalosemba	-1.0532	654.623	0.58383	0.51368	0.012204	16130
Praomys jacksoni	183448	PSU3-11	Kenya, Vihiga County, Kaimosi	1.99416	0.15027	0.5413	0.68658	0.010416	16790.7
Praomys jacksoni	183449	PSU3-10	Kenya, Vihiga County, Kaimosi	0.91795	1.35017	0.77241	1.10462	0.009823	13606.8
Praomys jacksoni	183450	PSU3-1	Kenya, Vihiga County, Kaimosi	-0.7896	655.658	0.41502	0.59561	0.009896	14691.1

species	USNM ID	project ID	locality	*Asfc*	*Smc*	*HAsfc*$_9$	*HAsfc*$_{81}$	*epLsar*	*Tfv*
(Cont.)									
Praomys jacksoni	183451	PSU3-2	Kenya, Vihiga County, Kaimosi	2.82786	652.871	0.52219	0.46027	0.010981	21687.8
Praomys jacksoni	183453	PSU3-3	Kenya, Vihiga County, Kaimosi	1.29344	0.26699	0.6152	1.02534	0.010244	11751
Praomys jacksoni	183454	PSU3-4	Kenya, Vihiga County, Kaimosi	1.05755	0.59951	0.48084	0.58034	0.0114	14750
Praomys jacksoni	183455	PSU3-5	Kenya, Vihiga County, Kaimosi	1.86756	0.14992	1.39784	1.57019	0.009549	10270.3
Praomys jacksoni	183456	PSU3-6	Kenya, Vihiga County, Kaimosi	0.9187	1.34898	0.29695	0.44616	0.008798	15399
Praomys jacksoni	183457	PSU3-7	Kenya, Vihiga County, Kaimosi	-1.1059	653.139	0.86365	1.34442	0.010105	13514.2
Praomys jacksoni	183458	PSU3-8	Kenya, Vihiga County, Kaimosi	5.79026	0.15031	4.33202	3.79705	0.010538	17663.9
Praomys jacksoni	183459	PSU3-9	Kenya, Vihiga County, Kaimosi	0.53333	0.2669	0.37956	0.63623	0.007255	11376.5
Praomys jacksoni	183462	PSU3-12	Kenya, Vihiga County, Kaimosi	1.65874	0.26696	0.62939	1.66444	0.00921	14468.5
Praomys jacksoni	183463	PSU3-13	Kenya, Vihiga County, Kaimosi	1.39649	0.26818	0.31143	0.68169	0.011019	16490.7
Praomys jacksoni	183464	PSU3-14	Kenya, Vihiga County, Kaimosi	-1.7873	654.622	0.32693	0.56913	0.011373	14705.1
Praomys jacksoni	183465	PSU3-15	Kenya, Vihiga County, Kaimosi	-0.5958	653.879	0.61301	0.62225	0.010204	11452.8
Praomys jacksoni	183466	PSU4-1	Kenya, Vihiga County, Kaimosi	0.87145	566.021	0.47007	0.8815	0.010869	14316
Praomys jacksoni	183467	PSU4-2	Kenya, Vihiga County, Kaimosi	1.93721	649.575	0.46383	0.76884	0.011081	17683.6
Praomys jacksoni	183468	PSU4-3	Kenya, Vihiga County, Kaimosi	1.2151	599.129	0.22428	0.53948	0.011981	16362.2

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
(Cont.)									
Praomys jacksoni	183470	PSU4-4	Kenya, Vihiga County, Kaimosi	0.74284	1.06912	0.33885	0.45781	0.007086	15400.9
Praomys jacksoni	183472	PSU4-5	Kenya, Vihiga County, Kaimosi	0.31014	0.81621	0.62832	0.79439	0.006526	11867.6
Praomys jacksoni	183473	PSU4-6	Kenya, Vihiga County, Kaimosi	0.90407	622.461	0.98679	1.49629	0.011211	12889.2
Praomys jacksoni	183474	PSU4-7	Kenya, Vihiga County, Kaimosi	1.33983	653.331	0.399	0.35201	0.011025	19983
Praomys jacksoni	183475	PSU4-8	Kenya, Vihiga County, Kaimosi	0.78732	0.81904	0.3903	0.77297	0.008216	11118.1
Praomys jacksoni	183477	PSU4-9	Kenya, Vihiga County, Kaimosi	0.64103	129.661	0.40998	0.65254	0.01061	15330.6
Praomys jacksoni	183478	PSU4-10	Kenya, Vihiga County, Kaimosi	0.58907	0.60454	0.25374	0.47243	0.010428	14575.1
Praomys jacksoni	183479	PSU4-11	Kenya, Vihiga County, Kaimosi	3.0665	0.26683	0.44103	1.09376	0.009685	17126.4
Praomys jacksoni	183480	PSU4-12	Kenya, Vihiga County, Kaimosi	1.27968	653.468	0.52228	0.79765	0.011269	14977.5
Praomys jacksoni	183482	PSU4-13	Kenya, Kakamega	0.49528	32.503	0.30203	0.50348	0.010465	14902.2
Praomys jacksoni	197966	PSU4-14	Kenya, Vihiga County, Kaimosi	1.11223	561.043	0.44554	0.60562	0.011387	17026.7
Praomys jacksoni	197967	PSU4-15	Kenya, Vihiga County, Kaimosi	0.45517	1.36328	0.63764	0.80906	0.010743	12858.2
Rhabdomys pumilio	342352	PSU7-16	Namibia, Gobabeb, Namib Desert Research Station	0.8224	1.34932	0.30721	0.55126	0.009722	12504.5
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Rhabdomys pumilio	342353	PSU7-18	Namibia, Gobabeb, Namib Desert Research Station	1.29269	0.26842	0.45259	0.59815	0.011046	15506.7
Rhabdomys pumilio	342354	PSU7-19	Namibia, Gobabeb, Namib Desert Research Station	2.60188	0.15112	0.58912	0.6984	0.009828	9796.49
Rhabdomys pumilio	342355	PSU7-20	Namibia, Gobabeb, Namib Desert Research Station	0.96482	1.35662	0.31892	0.71037	0.010838	15328.4
Rhabdomys pumilio	342356	PSU7-21	Namibia, Gobabeb, Namib Desert Research Station	3.61535	0.14996	0.50535	1.14955	0.009922	22654.3
Rhabdomys pumilio	342357	PSU7-22	Namibia, Gobabeb, Namib Desert Research Station	1.14249	1.66819	0.3882	0.90012	0.01078	13098
Rhabdomys pumilio	342358	PSU7-23	Namibia, Gobabeb, Namib Desert Research Station	1.834	0.26741	0.9494	0.99105	0.01078	13004.7
Rhabdomys pumilio	342362	PSU7-7	Namibia, Gobabeb, Namib Desert Research Station	1.51776	0.26799	1.83195	2.09302	0.009666	13178.9
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Rhabdomys pumilio	342363	PSU7-14	Namibia, Gobabeb, Namib Desert Research Station	1.79139	0.26704	1.32463	1.52365	0.010667	12181.8
Rhabdomys pumilio	342364	PSU7-2	Namibia, Gobabeb, Namib Desert Research Station	1.13708	0.14988	0.93458	1.05424	0.011032	18261.2
Rhabdomys pumilio	342365	PSU7-3	Namibia, Gobabeb, Namib Desert Research Station	0.97261	1.66535	0.39199	0.66938	0.010428	20024.6
Rhabdomys pumilio	342366	PSU7-4	Namibia, Gobabeb, Namib Desert Research Station	0.82974	48.6992	0.47692	0.83368	0.010864	14701.9
Rhabdomys pumilio	342368	PSU7-5	Namibia, Gobabeb, Namib Desert Research Station	-1.8742	652.879	0.63019	0.90172	0.011949	18433
Rhabdomys pumilio	342370	PSU7-6	Namibia, Gobabeb, Namib Desert Research Station	1.20357	0.15016	0.29009	0.73214	0.010035	10688.6
Rhabdomys pumilio	342372	PSU7-8	Namibia, Gobabeb, Namib Desert Research Station	1.01976	0.15021	1.20564	1.23324	0.01164	12108.9

(Cont.)

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Rhabdomys pumilio	342373	PSU7-9	Namibia, Gobabeb, Namib Desert Research Station	1.74096	0.15079	1.22162	1.28727	0.01055	15031.8
Rhabdomys pumilio	342374	PSU7-10	Namibia, Gobabeb, Namib Desert Research Station	0.88162	0.26645	0.28061	0.49577	0.010844	18342.7
Rhabdomys pumilio	342375	PSU7-11	Namibia, Gobabeb, Namib Desert Research Station	1.61011	0.14993	0.82288	1.05425	0.012024	18576.6
Rhabdomys pumilio	342376	PSU7-12	Namibia, Gobabeb, Namib Desert Research Station	1.3327	0.81954	1.03374	1.34127	0.010459	14131.3
Rhabdomys pumilio	342378	PSU7-13	Namibia, Gobabeb, Namib Desert Research Station	2.15345	2.3981	0.80251	1.23159	0.011266	19890.8
Rhabdomys pumilio	342380	PSU7-24	Namibia, Gobabeb, Namib Desert Research Station	1.81673	0.26772	0.67025	0.74691	0.009442	13266.6
Rhabdomys pumilio	342381	PSU7-25	Namibia, Gobabeb, Namib Desert Research Station	1.63686	1.6717	0.43873	0.86777	0.011054	19684.5
(Cont.)									

species	USNM ID	project ID	locality	*Asfc*	*Smc*	$HAsfc_{9}$	$HAsfc_{81}$	*epLsar*	*Tfv*
Rhabdomys pumilio	344071	PSU7-26	Namibia, Gobabeb, Namib Desert Research Station	0.61923	0.41633	0.36374	0.54452	0.011388	19162.3
Rhabdomys pumilio	344073	PSU7-27	Namibia, Gobabeb, Namib Desert Research Station	2.48904	0.1604	0.42149	0.75168	0.008851	14694.8
Rhabdomys pumilio	344076	PSU7-28	Namibia, Gobabeb, Namib Desert Research Station	2.41066	0.14988	0.24943	0.8365	0.008307	14486.5
Rhabdomys pumilio	344077	PSU7-1	Namibia, Gobabeb, Namib Desert Research Station	0.91057	56.4107	0.38797	0.62409	0.011987	15465.1