8-1-2024

ECOLOGICAL DRIVERS OF SIZE AND PREDICTORS OF POTENTIAL COMPETITION IN SORICIDAE

Wesley B. Holland
Southern Illinois University Carbondale, w.holland.phylogeny@gmail.com

ECOLOGICAL DRIVERS OF SIZE AND PREDICTORS OF POTENTIAL COMPETITION IN SORICIDAE

by

Wesley B. Holland

B.S., Auburn University, 2007

A Thesis
Submitted in Partial Fulfillment of the Requirements for the
Master of Science Degree

School of Biological Sciences
in the Graduate School
Southern Illinois University Carbondale
August 2024

THESIS APPROVAL

ECOLOGICAL DRIVERS OF SIZE AND PREDICTORS OF POTENTIAL COMPETITION IN SORICIDAE

by

Wesley B. Holland

A Thesis Submitted in Partial

Fulfillment of the Requirements

for the Degree of

Master of Science

in the field of Zoology

Approved by:

Dr. Justin Boyles, Chair

Dr. Frank E. Anderson

Dr. Guillaume Bastille-Rousseau

Graduate School
Southern Illinois University Carbondale
June 26, 2024

AN ABSTRACT OF THE THESIS OF

Wesley B. Holland, for the Master of Science degree in Zoology, presented on June 26, 2024, at Southern Illinois University Carbondale.

TITLE: ECOLOGICAL DRIVERS OF SIZE AND PREDICTORS OF POTENTIAL COMPETITION IN SORICIDAE

MAJOR PROFESSOR: Dr. Justin Boyles

The family Soricidae, encompassing shrews, represents a diverse group of small (head-body length 30-178 mm) omnivorous or carnivorous mammals distinguished by unique morphological and physiological traits. Ecologically, shrews are dominant small predators, significantly impacting invertebrate populations. Their foraging strategies are diverse, with species adapted to fossorial, psammophilic, scansorial, semiaquatic, semifossorial, and terrestrial guilds. High metabolic rates necessitate nearly constant food intake, influencing their prey selection and feeding behaviors. Physiologically, shrews exhibit adaptations for thermoregulation, with Soricinae generally having higher mass-specific metabolic rates compared to Crocidurinae, who can enter torpor to conserve energy. These metabolic differences are crucial for their ecological distribution and competition dynamics, particularly in regions where the ranges of subfamilies overlap.

Size plays a crucial role in shaping the biology of species, influencing aspects such as behavior, energy balance, thermoregulation, locomotion, and reproductive strategies. This study explores the ecological drivers of size variation with the family Soricidae. Using extensive skull and body measurements from a comprehensive literature review and detailed ecological data, this research examines the relationship between size and ecological factors such as foraging guild, biome, elevation, and venom presence. Larger sizes are observed in semiaquatic guilds and those with venom, while terrestrial species are generally smaller. Biome-related size variations align with metabolic and thermoregulatory adaptations. Additionally, range latitude and elevation significantly correlated with minimum and maximum size measures. These findings underscore the importance of ecological and evolutionary factors in shaping size within Soricidae, providing insights into niche partitioning and species coexistence in insectivorous mammal communities.

Competition is a critical driver of speciation and adaptation, significantly shaping ecological communities. This study investigates the predictors of potential competition among shrew species using morphological character displacement as a proxy. I collected skull length (SL) and head-body length (HBL) data for 456 and 457 shrew species, respectively, from an extensive literature review. Using spatial analyses and linear modeling, I examined the relationship between character displacement and factors such as species richness, elevation, and distance from the equator across 1,000 shrew assemblages worldwide.

The findings indicate that character displacement, and thus potential competition, increases with the number of shrew species, elevation, and distance from the equator. Conversely, the number of shrew genera negatively correlates with character displacement. Interestingly, the number of non-shrew insectivorous mammal species did not consistently predict competition levels. This study underscores the importance of morphological, ecological, and abiotic factors in shaping competition and adaptation in shrews. The complex interplay of these factors allows for the coexistence of numerous morphologically similar species, highlighting shrews as an ideal taxon for studying morphological diversification and niche differentiation.

ACKNOWLEDGMENTS

This project would not have been possible without my advisor, and I would like to express my deepest appreciation to Dr. Justin Boyles, who took a chance on me years ago and has continued to provide sage advice and counsel. I extremely grateful to my committee members, Dr. Andy Anderson, for sticking with me till the end and going out of his way to provide me with information to help make my project better, and for Dr. Guillaume Bastille-Rosseau who was kind enough to step in last minute and see that I finished.

I would like to extend my sincere thanks to the Zoology Department at Southern Illinois University Carbondale and every individual there during the time I was there. I learned so much from the professors and staff and formed strong friendships with my fellow graduate students which continue to this day.

This project went through several iterations early on, and I would like to thank Dr. Liam McGuire and Emily Brodbeck at Texas Tech and Dr. Lawrence Heaney and Dr. Julian Kerbis Peterhans at the Field Museum for reviewing my proposals, collecting data, and generally allowing me to take up their valuable time. Additionally, I'd like to acknowledge professors from my undergraduate studies at Auburn University; namely Dr. Troy Best, Dr. Craig Guyer, Dr. George Folkerts, and Dr. James Armstrong, who are titans in their respective fields, but were always willing to go out of their way to make sure their students not only learned but embraced all the wonderful aspects of the natural world.

I am fortunate to have had an incredible amount to support during this project. I could not have undertaken this journey without my beautiful wife Angela, for always encouraging me and for her invaluable assistance in reviewing the work and for statistical help. I would like to thank my little girls, Kara and Madelyn, for being the great joys in my life and unconsciously being the reason why I wanted to finish this even when I was discouraged.

I would like to thank my parents, Johnny and Karen Holland, for fostering a deep respect for the outdoors and teaching me to appreciate the natural world in all its glory, whether it be on beaches of some forgotten island in the Bahamas or a mountain top in the Smokey Mountains; and for my sister, Erica, who shared in those adventures and the memory of which I will carry forever.

I would like to thank my extended family, the Bennetts, Hollands, and Cheryl Loze for their continuing support and love. I would like to acknowledge and thank the men in my life who have since passed on, but their presence is felt to this day: Carl Bennett, Dennis Holland, Bill Loze, and Kenneth Wilkinson. Their values, wisdom, and inspiration live on through me, and I strive to honor their memory in all that I do. And finally, I would like to express my profound gratitude to God for His guidance, strength, and blessings throughout this journey.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

A BRIEF PRIMER ON THE BIOLOGY OF SHREWS (FAMILY SORICIDAE)

PHYLOGENETIC DIVERSITY

The family Soricidae consists of the shrews, a speciose group of tiny to small omnivorous or carnivorous mammals characterized by long, pointed snouts, long narrow skulls, small braincases, no zygomatic arch, a mandible possessing a double articulating surface, massive incisors, small eyes often reduced and hidden by dense fur, plantigrade locomotion, two lower leg bones that are fused with five toes that culminate in simple claws on each foot, primitive genital and urinary systems, and internal testes permanently retained within the abdominal cavity (Churchfield 1990, Nowak 1999*a*). Overwhelming genetic, morphological, and paleontological data agree that Soricidae is monophyletic (Brant and Orti 2002, Nikaido et al. 2003, Wilson and Reeder 2005, Ohdachi et al. 2006, Dubey et al. 2007), although there has been disagreement about their relationship to other laurasiatherian lineages in the past (Krettek et al. 1995, Stanhope et al. 1998, Mouchaty et al. 2000, Murphy et al. 2001, Douady et al. 2002, Grenyer and Purvis 2003, Nikaido et al. 2003, Roca et al. 2004, He et al. 2012). Despite soricids retaining the primitive mammalian body type, considerable paleontological, morphological, and molecular evidence show they are not the most primitive lineage of placental mammals (Butler 1988, Murphy et al. 2001, 2007, dos Reis et al. 2012, Song et al. 2012).

Soricidae includes three primary lineages: the white-toothed shrews, Crocidurinae (~10 genera) found throughout Europe, Asia, and Africa; the African shrews, Myosoricinae (3 genera) found in sub-Saharan Africa; and the red-toothed shrews, Soricinae (~16 genera) found throughout North America, northern South America, Europe, and Asia (Querouil et al. 2001, Hutterer 2005, but see Ohdachi et al. 2006, Dubey et al. 2007, Wilson and Mittermier 2018)

(Appendix A). The current presentation of genera is subject to potential changes as ongoing molecular and paleontological investigations, along with the discovery of new species, lead to revisions in classification.

ECOLOGY

Shrews are often considered wide-spectrum feeders on invertebrates and encounter rate, availability, and prey size may be the major driving forces for selection of prey (Churchfield 1991, 1993). Thus food resources may drive phenotypic plasticity of bite force and body size (Ochocińska and Taylor 2003). Additionally, shrews lack a zygomatic arch, an area of the skull linked to masticatory muscle attachment and therefore the feeding apparatus (Greaves 2012). Determining bite force might be critical for understanding prey choice and competition. Potentially, because shrews lack zygomatic arches, leverage for increasing bite force might fall to post-cranial processes, such as reinforcements to the spine or increased musculature (as in *Scutisorex*).

Shrews are the dominant small terrestrial mammalian predators throughout their range (Churchfield 1993) and their presence greatly reduces the total number of invertebrate prey in areas where they occur (Churchfield 1991). Due to their small size and high metabolic rates, shrews require nearly constant food intake (Churchfield 1993). Consequently, shrews often tackle proportionally larger prey than many larger carnivores in an attempt to satisfy these energetic demands (Dickman 1988, Dickman and Huang 1988).

There are 6 primary foraging guilds of shrews (Hutterer 1985). Fossorial species, including members of *Cryptotis, Sorex, Soriculus,* and *Surdisorex*, are specialized for pushing through soil. The single representative of the psammophilic guild *Diplomesodon* is specialized for swimming through sand in search of prey. Scansorial species (including members of

Chodsigoa, *Crocidura*, *Episoriculus*, *Psuedosoriculus*, *Sorex*, *Suncus*, and *Sylvisorex*) often feed in the understory and many have specialized tails or foot pads to facilitate climbing. Although all shrews are accomplished swimmers, only species that specifically dive underwater in search of prey are included in the semiaquatic guild and most have adaptations to aid in swimming; members include *Chimarrogale*, *Crossogale*, *Nectogale*, *Neomys*, *Ruwenzorisorex*, and *Sorex.* Semifossorial or hypogeal species are found in leaf litter and frequently make use of other animal burrows as they actively dig for prey. Members in this guild include: *Anourosorex*, *Blarina*, *Blarinella*, *Congosorex*, *Crocidura*, *Cryptotis*, *Episoriculus*, *Feroculus*, *Myosorex*, *Parablarinella*, *Scutisorex*, *Solisorex*, and *Sorex*. The last guild is the terrestrial or epigeal guild; most species of shrew belong to this group. Members of this group spend their time on the surface and while they forage in and under leaf litter, they do not actively dig. This guild includes species from *Chodsigoa*, *Crocidura*, *Cryptotis*, *Episoriculus*, *Megasorex*, *Notiosorex*, *Palawanosorex*, *Paracrocidura*, *Sorex*, *Suncus*, and *Sylvisorex*.

PHYSIOLOGY

Energetics appears to be one of the driving forces in shrew evolution. Small homeothermic mammals have a higher proclivity to heat loss since the surface area is large with respect to mass or volume. Some small mammals circumvent this particular problem by allowing body temperature to fluctuate on a seasonal or even daily basis, thus lowering the basal metabolic rate and conserving energy (Eisenberg 1981, Angilletta et al. 2010). The ability to physiologically regulate body temperature is thought to be an important driver in adaptive radiation and may precipitate speciation (Boyles et al. 2013). Mechanisms for thermoregulation have been studied in several shrew genera, including *Blarina* (Merritt 1986, Dawson and Olson 1987, Merritt and Adamerovich 1991, Hindle et al. 2003); *Crocidura* (Genoud 1985, Sparti 1992, Fontanillas et al. 2005); *Cryptotis* (Merritt and Zegers 2014); *Myosorex* (Brown et al. 1997); *Neomys* (Sparti 1992)*; Sorex* (Morrison et al. 1959, Genoud 1985, Sparti 1992, McDevitt and Andrews 1994, 1995, Ochocińska and Taylor 2003, 2005); and *Suncus* (Suzuki et al. 2007).

The evolutionary paths of Soricinae (a primarily Nearctic/Palearctic clade) and Crocidurinae (a primarily Afrotropical/Indomalayan clade) have led to the adoption of distinct biological strategies, a divergence attributed to their evolution in different climates (Vogel 1980). A notable contrast between the two subfamilies lies in their metabolic rates, with Soricinae exhibiting exceptionally high rates and Crocidurinae aligning closely with expected values based on size (Vogel 1976). Broadly speaking, Soricinae shrews have a higher mass-specific metabolic rate than Crocidurinae (Vogel 1976) and generally lack the ability to enter torpor (but see Lindstedt 1980). Conversely, numerous species within Crocidurinae can employ torpor as an energy-saving mechanism, enabling them to conserve energy efficiently while at rest or in response to adverse environmental conditions (Vogel 1976, 1980, Saarikko 1989). While this is a general observation, there are exceptions: desert-dwelling *Notiosorex* (Soricinae) display thermoregulation behavior more consistent with Crocidurinae than is typical of their subfamily (Lindstedt 1980). This metabolic divergence is a crucial factor influencing their ecological distributions, particularly observed in the European representatives where members of both subfamilies overlap in distribution.

The coexistence and distribution of these species appear intricately linked to their respective energy strategies and the dynamics of interspecific competition. *Crocidura* (predominantly found in milder temperate regions), evolved to satisfy their energy requirements with lower activity rates than seen in *Sorex*, maintaining higher foraging efficiency at specific ambient temperatures (Genoud 1985). The restricted home ranges of *Crocidura* species and the rapid consumption of available prey contribute to their habitat selection. Alternatively, *Sorex* species, with their high activity rates and expansive home ranges, are better suited for winter survival in colder habitats. Other small mammals exhibit similar trends of energetic strategies, with rodent families Muridae and Cricetidae employing analogous tendencies of higher BMRs and rigid homeothermy in higher latitudes versus lower BMRs and the ability to undergo torpor in lower latitudes (McNab 1992, Koteja and Weiner 1993, Degen et al. 1998).

CHAPTER 2

ECOLOGICAL DRIVERS OF SIZE IN FAMILY SORICIDAE

INTRODUCTION

Size affects almost every aspect of a species' biology, including behavior, energy balance, thermoregulation, locomotion, and reproductive strategies, among many others. For example, foraging and feeding behaviors are closely linked to morphology and vary wildly among mammals, from solitary hunting to complex social feeding behaviors (Brown and Maurer 1986). As a broad generalization, larger species within a taxon can eat larger prey, unless smaller species possess venom or exhibit social foraging behaviors. Larger endotherms tend to have lower metabolic rates per unit body mass and occupy higher trophic levels, while smaller species specialize in resource-limited niches (McNab 1971). Larger species tend to have slower life histories, maturing later in life and producing fewer offspring than smaller species. Because of the widespread importance of size in biology, understanding patterns in and determinants of size has been a longstanding interest to ecologists and evolutionary biologists.

The size of any organism is an emergent property based on the complex interaction of evolutionary history and ecological functioning. Evolutionary inertia may favor conservation of body size within lineages over time while natural selection may lead to an increase in body size over time (i.e., Cope's law; Brown and Maurer 1986). Ecological factors, both biotic and abiotic may drive changes in body sizes on ecological and geological timescales. Competition can lead to character displacement (Chapter 3 of this thesis). Environmental temperatures may act as a selective pressure driving increases or decreases in surface area-volume ratios (and therefore size) in a lineage. Limited prey availability may constrain maximum body sizes. The dynamic interplay of ecology and evolution is unique in every lineage, but detailing the broad patterns in traits like body size within taxa is useful for understanding which factors might be most generally important.

Shrews (family Soricidae) are a speciose group of tiny to small omnivorous or carnivorous mammals widely distributed around the world. They are an ideal taxon for testing hypotheses of determinants, especially ecological determinants, of body size variation for several reasons. Overwhelming genetic, morphological, and paleontological data agree that Soricidae is monophyletic (Brant and Orti 2002, Nikaido et al. 2003, Wilson and Reeder 2005, Ohdachi et al. 2006, Dubey et al. 2007), and the simple body plan is well conserved throughout, making comparisons of size straightforward. In addition to being widespread, shrews are found in nearly every biome and represent a wide array of foraging guilds (Hutterer 1985). There are fossorial species, a single psammophilic species (specialized for "swimming" through sand in search of prey), scansorial species, semiaquatic species, semifossorial or hypogeal species, and terrestrial or epigeal species. A number of shrews have venom, which may alter metabolism and prey capture (Kowalski and Rychlik 2021), thereby affecting size. Thus, members of Soricidae represent a broad array of ecological niches, all within a single family. Herein, my objectives were to 1) build one of the largest and most comprehensive databases of body size for a single mammalian family and 2) to evaluate relationships between size and several ecological factors, including foraging guild, biome, and elevation while accounting for species relatedness.

METHODOLOGY

I collected published skull lengths (hereafter referred to as SL and generally defined as measurement of the condylobasal or condylobasal plus incisor length) and head and body lengths (hereafter referred to as HBL and generally defined as the tip of the snout to the base of the tail; Martin et al. 2000) measurements through an extensive literature review including databases such as the Biodiversity Heritage Library and Google Scholar between 2020-2024 using keywords for genera (ex. *Suncus*) or geographic region (ex. Mammals of Vietnam). I adopted specific classifications based on authoritative taxonomic sources including Mammal Species of the World 3rd edition (2005); Handbook of the Mammals of the World Vol. 8 (2018); and the ASM Mammal Diversity Database (2023). I made some minor modifications to classifications based on recent literature. I created a grand mean of SL and HBL for each species using a weighted average based on the number of individuals from each source. I created a range for SL and HBL for each species using the minimum and maximum values of all recorded ranges. Finally, I calculated a head to body ratio for each species, determined by dividing skull length by body length (HBL minus SL). This was to determine if the proportional size of the head was different among foraging guilds. There were data on average SL for 456 species and range of SL for 429 species; and average HBL for 457 species and range of HBL for 437 species. This discrepancy arises because many species are known from a single specimen or an incomplete specimen in which only the skull or body survives. In total, I collected data on approximately 99% of all recognized shrew species.

I assigned foraging guilds (Appendix B) for each species based on the primary (Hutterer 1985, Saarikko 1989, Churchfield 1990, Woodman and Timm 1999, Woodman and Stabile 2015, Hooker 2016, Gainsbury et al. 2018, Woodman et al. 2019) and secondary literature (Nowak 1999*a*, Wilson and Mittermeier 2018). Species in which overlap was thought to occur (for example, a species known to be both terrestrial and scansorial) were included in the guild based on the most frequent behavior. I classified each species as either venomous or non-venomous based on the literature. Genera known or suspected to possess venom include species of *Blarina*, *Blarinella, Chimarrogale, Crocidura, Neomys, Notiosorex, Parablarinella, Scutisorex, Sorex,* *Suncus,* and *Surdisorex,* based upon either direct study or jaw morphology (Ligabue-Braun et al. 2012, Folinsbee 2013, Kowalski and Rychlik 2021). Each species was assigned to a biome region based on IUCN range maps. Species with overlapping distributions across biomes (e.g., species occurring in both Indomalayan and Palearctic biomes) were assigned to the biome which encompassed most of the species' range (Appendix C).

I used maps from the IUCN Red List for species ranges (IUCN 2023). For species without IUCN maps, I created new range maps in ArcGIS 10.8 (ESRI 2020) based upon the primary literature. As such, these maps are best considered approximations of the true range. In cases where a new species is known from a single location, I assumed the range to be a 10-km area surrounding the collection area of the holotype (if available). A list of species maps made for this study is found in Appendix D. I collected data on minimum and maximum elevation and latitude from each species range. I used the elevatr package (Hollister et al. 2023) in R 4.4.0 (R Core Team 2024), which downloads a raster elevation file from AWS Open Data Terrain Tiles. Data were collected at a zoom level of 5. I then identified the 5^{th} and 95^{th} percentile elevation to represent minimum and maximum elevation across the species range. This eliminated issues with minimum elevations falling within the ocean due to slight mismatch between IUCN range maps and terrestrial space, as well as generally removing outliers from the data. I identified the minimum and maximum latitude for each species by collecting the bounding box geometry for each species range polygon using the sf package in R (Pebesma 2018).

I used average SL, minimum SL, maximum SL, average HBL, minimum HBL, and maximum HBL as dependent variables in mixed effects linear models constructed using package lme4 (Bates et al. 2015) and lmerTest (Kuznetsova et al. 2017). I used foraging guild, venom presence, biome, minimum and maximum latitude, and minimum and maximum elevation as fixed effects with genus nested in subfamily as a random effect as independent variables for each. I included taxonomic status as a random effect to account for evolutionary effects, although they were not the main interest of the study. Further, the taxonomy and phylogenetic relationships among Soricidae are currently in a state of flux, so I decided against a fully phylogenetically controlled analysis. I evaluated the main effects using the ANOVA function in lmerTest and used emmeans to estimate marginal means (Lenth 2024), which are reported in text as EMM and the 95% confidence interval. I completed post-hoc contrasts on EMMs using the pairs function in emmeans.

RESULTS

Skull Length

Skull length varied significantly by foraging guild (p = 0.010), biome (p = 0.039), and presence of venom (p = 0.022). The semiaquatic guild had the largest mean skull lengths (24.6 mm; 95% CI: 21.2-28.0; Figure 2.1), while the psammophilic guild (20.9 mm; CI: 12.4-29.4; represented by a single species) and the terrestrial guild (21.1 mm; CI: 16.4-25.7) had the smallest. Only the difference between the semiaquatic and terrestrial guilds was significant (p = 0.0316).

The largest average skull lengths were found in species in the Afrotropical biome (23.7 mm; CI: 20.5-26.8), followed by Indomalayan (23 mm; CI: 19.8-26.2), Australasian (22.4 mm; CI: 19.3-25.6), Palearctic (22.1 mm; CI: 18.9-25.2), Neotropical (21.2 mm; 17.8-24.6), and Nearctic (20.8 mm; CI: 17.7-24.0l,) regions (Figure 2.2). Only the Afrotropical-Nearctic pairwise comparison was significant (p = 0.0387). Finally, species that have or are suspected to use venom have larger skulls (23.4 mm; CI: 20.1-26.7) than those that do not (21.0 mm, CI: 17.7-24.2). There were no significant relationships between average skull length and latitude or elevation.

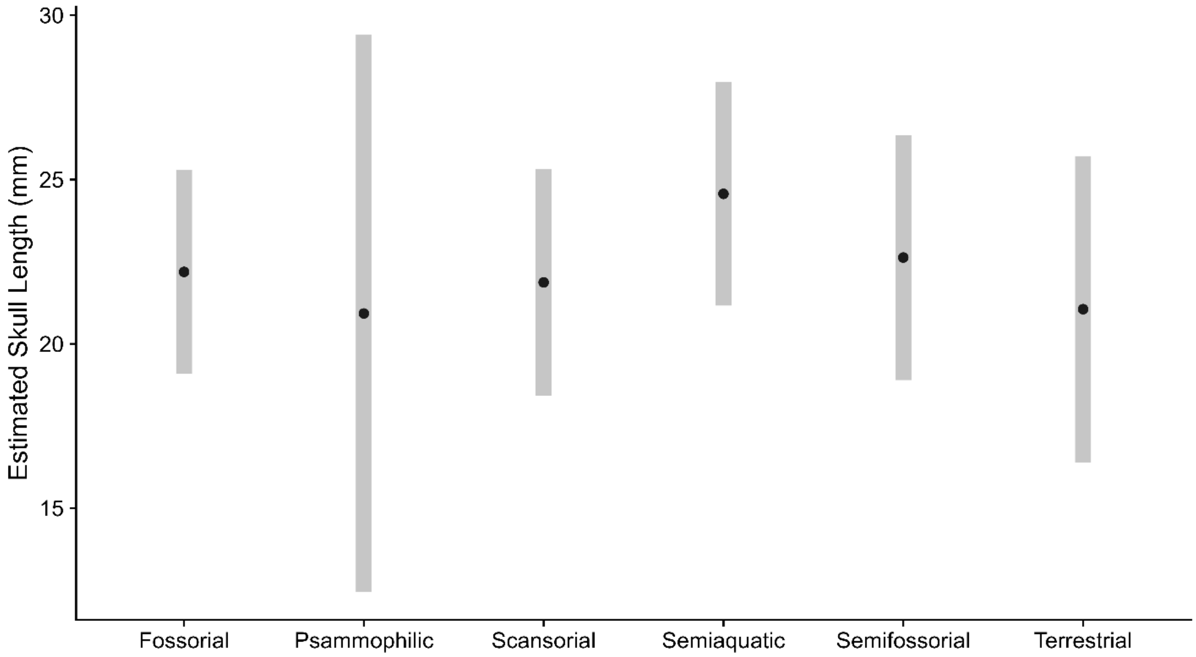


Figure 2.1. Estimated marginal means (EMM) of average skull length (SL) mm across foraging modes for shrews (family Soricidae). EMMs were calculated from the linear model described in text.

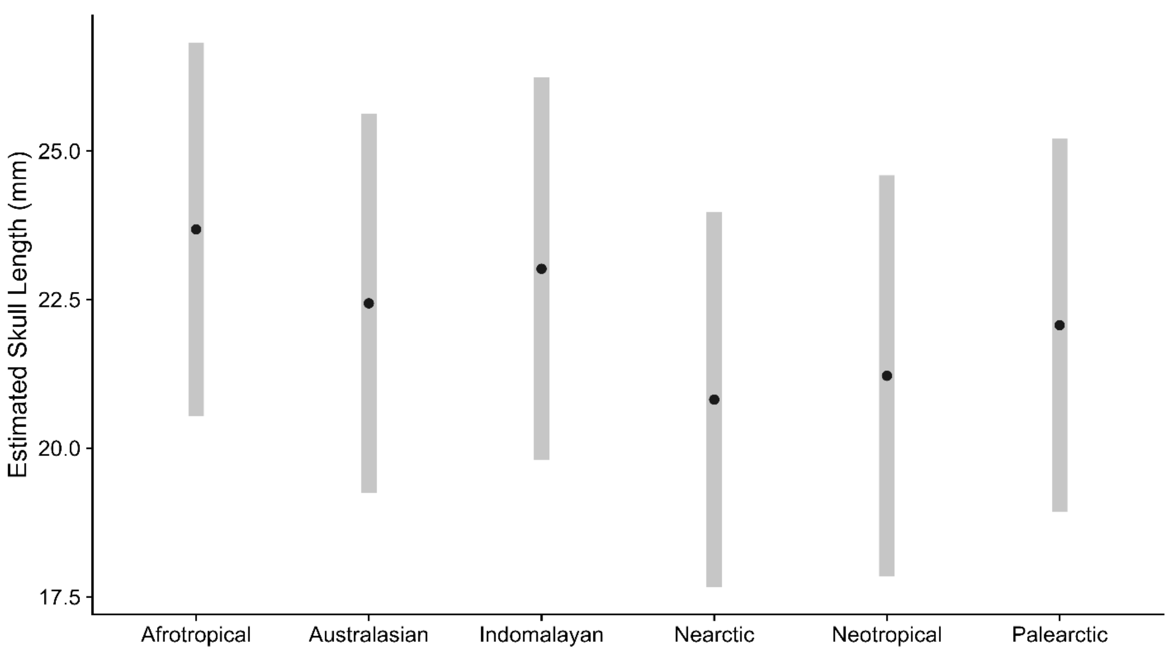


Figure 2.2. Estimated marginal means (EMM) of average skull length (SL) mm across biomes for shrews (family Soricidae). EMMs were calculated from the linear model described in text.

Minimum skull length varied significantly by minimum range latitude ($p = 0.010$), maximum range latitude ($p = 0.010$), and maximum range elevation ($p < 0.001$). Interestingly, minimum skull length increases as the southern edge of a species range moves north (β = 0.12, CI = 0.03 – 0.22) but decreases as the northern edge of a species range moves north (β = -0.13, CI = -0.23 – -0.03). I found that minimum SL increases as maximum elevation increases (β = 1.62, CI = 0.68 – 2.56).

Maximum skull size varied significantly by foraging mode ($p = 0.036$), presence of venom ($p = 0.012$), and minimum range latitude ($p = 0.002$). The guild with the largest maximum skull size was the semiaquatic guild (25.2 mm; CI: 21.8-28.6) and the smallest was psammophilic (21.2; CI: 12.6-29.8) followed by terrestrial (22.1; CI: 17.4-26.9), while the main effect of foraging mode was significant, no single pairwise comparison was significant. Species known or suspected to be venomous also have on average a larger maximum skull size (24.5; CI: 21.2-27.8) than those that do not (21.6; CI: 18.6-24.6). I found that maximum skull size decreases as the southern edge of a species' range moves north (β = -0.07, CI = -0.11 – -0.02) but no evidence for an effect as the northern edge of a species' range moves.

Head-body Length

Head-body length varied significantly by foraging guild ($p < 0.001$) and presence of venom ($p = 0.030$). Head-body length was greatest among semiaquatic species (98.2 mm; CI: 78.2-118) and least among terrestrial species (78.1 mm; CI: 52.7-103); only the pairwise comparison between these two guilds was significant ($p = 0.004$; Figure 2.3). I did not find any significant relationships between latitude and elevation for average head-body length or differences amongst biomes (Figure 2.4).

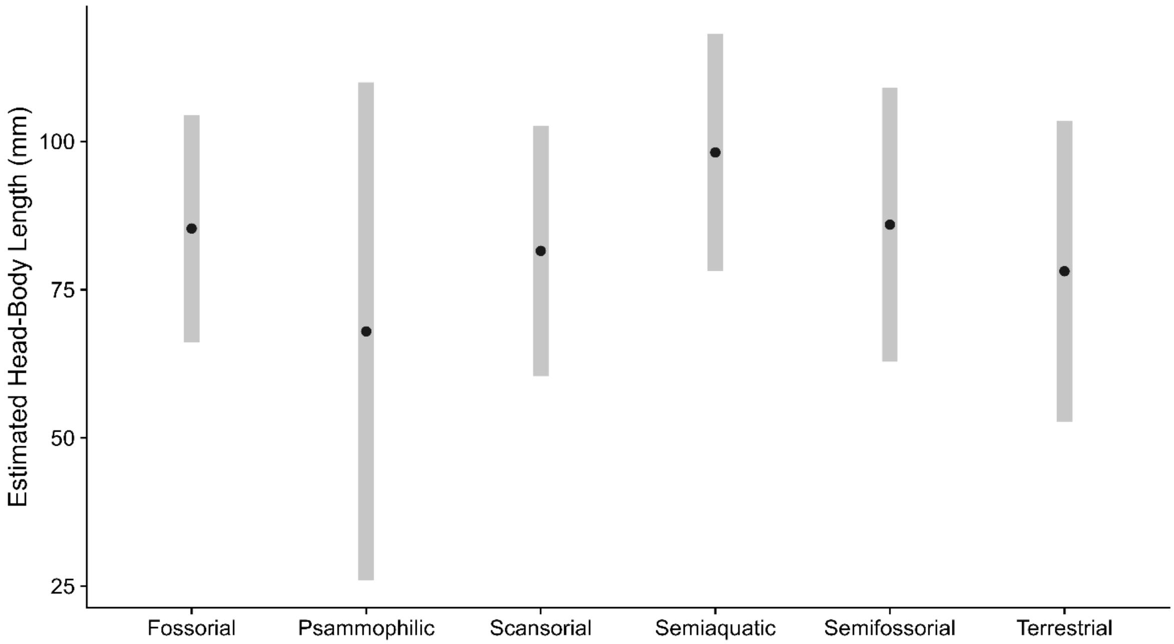


Figure 2.3. Estimated marginal means (EMM) of average Head-Body Length (HBL) mm across foraging modes for shrews (family Soricidae). EMMs were calculated from the linear model described in text.

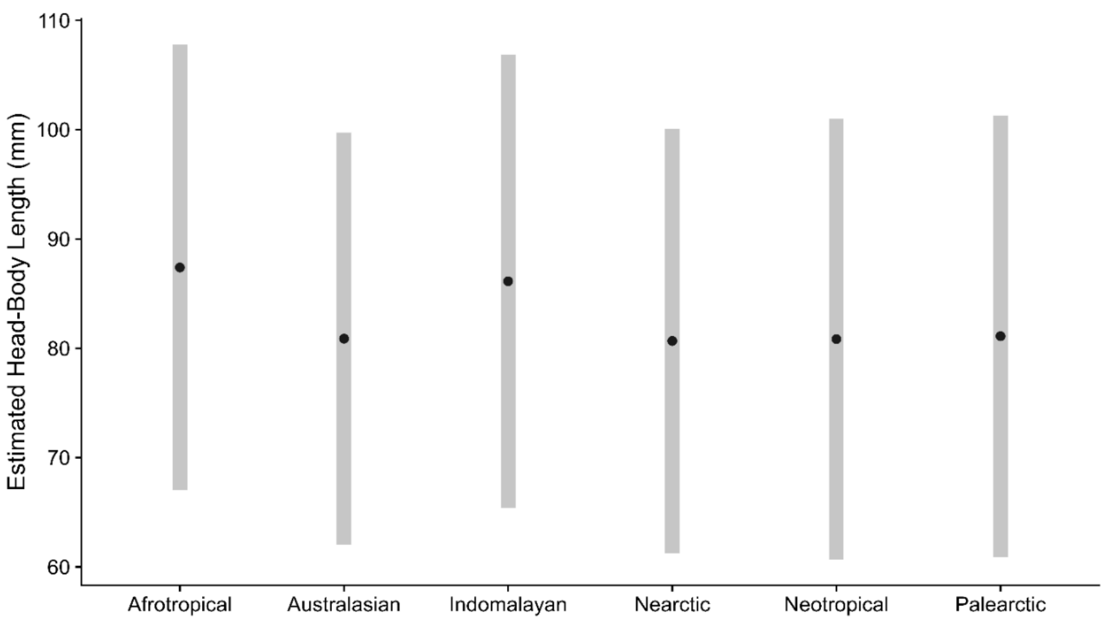


Figure 2.4. Estimated marginal means (EMM) of average Head-Body Length (HBL) mm across biomes for shrews (family Soricidae). EMMs were calculated from the linear model described in text.

Minimum head-body length varied significantly by foraging mode ($p = 0.001$), minimum range latitude ($p = 0.003$), and maximum range latitude ($p < 0.001$). In line with my previous results, semiaquatic species (83.2 mm; CI: 68.9-97.5) had the largest minimum body size and terrestrial species the lowest (64.8 mm; CI: 45.1-84.5). Similarly to minimum skull length, the minimum head-body length increases as the southern range of species distribution moves north ($\beta = 0.22$, CI = 0.08-0.37), but minimum head-body length decreases as the northern range of species distribution moves north ($\beta = -0.39$, CI = -0.53- -0.25).

Maximum head-body length varied significantly by foraging mode ($p = 0.015$), presence or suspected presence of venom ($p = 0.035$), minimum range latitude ($p < 0.001$), and maximum range latitude ($p = 0.005$). Again, semiaquatic species (111.9 mm; CI: 91.6-132.0) have the largest maximum head-body length while terrestrial species (91.8; CI: 60.7-123.0) have the smallest. This was the only pairwise foraging guild comparison that was significant ($p = 0.042$). Maximum head-body length decreased as the southern extent of a species range moved north ($\beta = -0.48$, CI = -0.68- -0.27) and increased as the northern extent of a species range moved north ($\beta = 0.30$, CI = 0.09-0.50).

Descriptive Analyses of Head to body Ratio

The average head-body ratio of all shrews was approximately 38% but varied depending on foraging guild. Range was greatest among terrestrial (mean 38.3%; range 27.0-57.7%), semifossorial (mean 37.5%; range 26.2-51.1%) and scansorial guilds (39.4%; range 31.6-46.6%), respectively. Ratios were most conserved among semiaquatic (mean 32.6%; range 28.8-35.6%)

and fossorial guilds (36%; range 32.0-42.9%). The single member of the psammophilic guild had a head-body ratio of 43.8% (Figure 2.5).

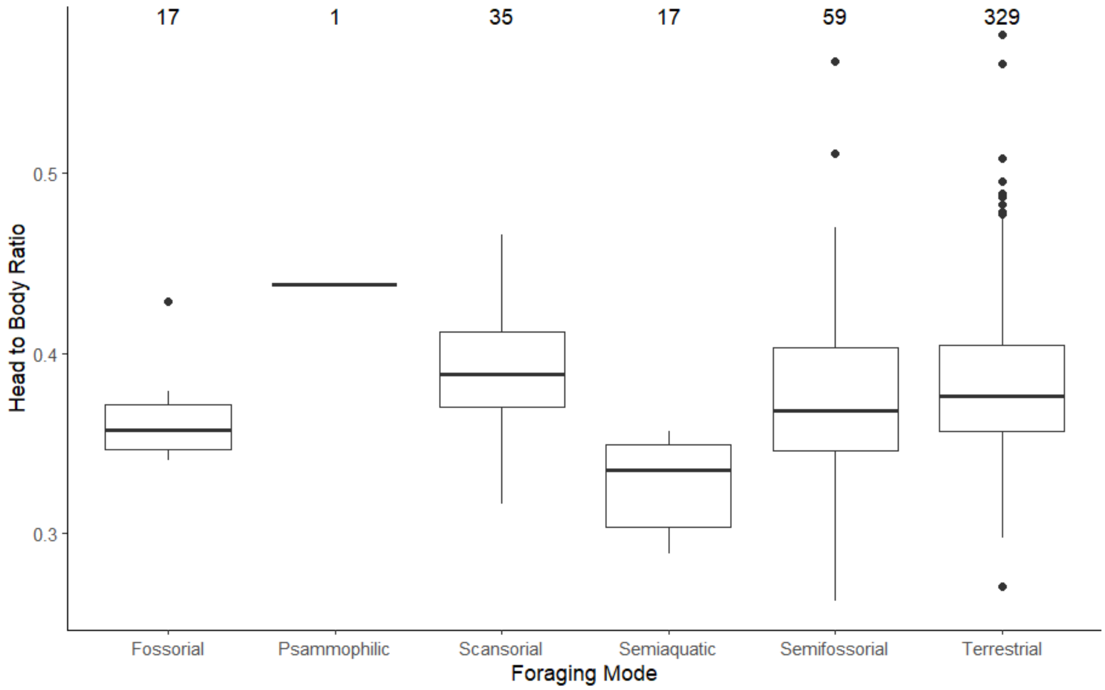


Figure 2.5. Distribution of average head to body ratio by foraging for all shrew species; number of species sampled for each group are along top of graph. Dark bar represents median value.

DISCUSSION

A number of ecological factors were related to average skull length and head-body length across shrews, with foraging guilds and venom being the most important predictors of size. Biome was also significantly related to skull length, but not head-body length. Elevation was unrelated to most measures of size, but interestingly, range latitudes were significantly related to several measures of maximum or minimum length, but not averages. Finally, venom was strongly positively related to average skull and head-body length, and maximum head-body length lengths, but not minimum lengths for either measurement.

Semiaquatic shrews were the largest by a wide margin in both skull length and head-body length, followed by semifossorial and fossorial shrews. Terrestrial species were consistently the smallest across most measures (apart from the single psammophilic species). This variation suggests a correlation between head and body size and niche. Larger skulls are likely beneficial for semiaquatic and semifossorial shrews because they allow for increased bite force. Postcranial studies of skeletal morphology, particularly of the scapula and associated arm bones, such as in Swiderski (1991), have been used to infer locomotory behavior among many genera of shrew including *Blarina* and *Blarinella* (Woodman and Wilken 2019); *Congosorex, Myosorex, Surdisorex* (Woodman and Stabile 2015); *Cryptotis* (Woodman and Timm 1999, Woodman 2015); *Crocidura* (Woodman et al. 2019); and *Sorex* (Reed 1951). Morphologically speaking, shrews with smaller heads and bodies are better equipped to efficiently search for small prey on the ground surface rather than larger prey in the soil. Foraging in soil demands a sturdiness found in larger species, necessary for penetrating substrates and capturing and overcoming sizable prey like earthworms. Semiaquatic shrews often tackle hard-bodied prey such as crayfish or strong prey such as frogs and fish which require increased bite force and larger body size (Churchfield 1990). Additionally, the physical demands of underwater swimming likely require larger body size.

Average skull length and head-body length were larger for species known to or suspected to have venom. While venom is not associated with a specific foraging mode, there is a strong correlation between venom use and food hoarding behavior, which may drive selection of larger prey. Practically all species that produce venom cache paralyzed prey for later consumption (Churchfield 1990). Venomous shrews use their venom not only as a means of subduing prey but also as a strategy to cache food, thereby mitigating competition and ensuring a steady food supply across varied environmental conditions. Generally speaking, larger species or trophic specialists of shrew tend to hoard more food than smaller species or generalist species (Rychlik and Jancewicz 2002); this is probably due to metabolic restraints on smaller species.

My analysis generally indicated larger average skull and body sizes for species biomes closer to the equator, such as Afrotropical and Indomalayan biomes, in comparison to those farther away such as Nearctic, Palearctic, and Australasian, however this pattern was only significant for average skull length and specifically for the pairwise comparison of Afrotropical to Nearctic. I suggest that thermoregulation plays a strong role in niche partitioning. Taylor (1998) summarized the evolution of energetic strategies in shrews and revealed fundamental differences between Soricinae and Crocidurinae. While exceptions occurred, the Soricinae exhibited higher metabolic rates and BMRs (Basal Metabolic Rate, defined as the rate at which an organism expends energy while at rest in a neutrally temperate environment; Hall and Hall 2020) than the Crocidurinae, which might have resulted from different evolutionary pathways; namely species originating in Afrotropical regions versus Holarctic regions or latitudinal differences. Those same patterns are revealed on a global scale, with species-rich Crocidurinae found primarily in the Afrotropical and Indomalayan biomes and Soricinae found primarily in the northern biomes of the Nearctic and Palearctic. In agreement with Taylor (1998), the analyses suggest that shrew assemblages in warmer, humid environments exhibit higher species richness and larger skull and body sizes (such as Crocidurinae), likely due to optimal conditions for metabolic activities which result in thermoregulation influencing competition and distribution.

Although I did not include an interaction between foraging guild and biome in my mixed effects linear models to statistically compare foraging guilds across biomes due to some group combinations having no or few species, I can distinguish patterns from the descriptive analysis.

Not surprisingly, guilds with the most species (Terrestrial for all biomes) and the most species (*Crocidura*) have the largest amount of variance. This is taken to an extreme in Indomalayan *Suncus*, where the largest terrestrial species are 6 times larger than the smallest. Similar variations are found in Afrotropical *Crocidura*, with the largest terrestrial species being 4.5 times the size of the smallest.

There was no relationship between average skull length or head-body length and the minimum or maximum latitude of a species range; however, the minimum and maximum range extents were significantly related to several measures of minimum and maximum skull length and head-body length. The patterns were consistent between skull length and head-body length with the minimum size of the species increasing if the southern range of the species was farther north while decreasing if the northern range of the species was farther north and the opposite pattern for the maximum size (however the northern extent was not significant for skull size). Taken as a whole, this pattern indicates that the latitudinal range of species similar in size is smaller for those species near the equator and increases for species found farther north.

In addition to an increase in size due to proximity to the equator, minimum skull length increased with maximum elevation. Elevation can influence minimum skull size in mammals through several ecological and physiological mechanisms. Higher elevations typically have lower oxygen levels, prompting mammals living at high altitudes to adapt with physiological changes, including modifications in skull size to optimize breathing efficiency and brain function (Storz et al. 2010). Additionally, higher elevations are generally colder, in which case larger skull sizes may be advantageous for maintaining body heat and reducing energy expenditure (Guralncik and Jackson 2009, Alhajeri et al. 2018).

My results are in concordance with studies suggesting that dietary distinctions among shrew species arise from vertical segregation associated with use of different structural components of microhabitats. The lack of morphological specializations coupled with high dietary diversity is typical of most soricids from both tropical and temperate communities (Churchfield and Sheftel 1994, Dickman 1995, Dudu et al. 2005). Within diverse shrew assemblages, the forest floor habitat is divided vertically based on variations in shrew size. While smaller species tend to target smaller prey found in surface litter, larger species focus on larger prey dwelling in deeper soil layers (Kirkland 1991, Churchfield 1993, Churchfield and Sheftel 1994, Castién and Gosálbez 1999). In areas where shrew and other insectivorous mammals overlap, the differences in microhabitat use appears to be the primary factor that enables the coexistence of small insectivorous mammal guilds (Castién and Gosálbez 1999, Churchfield and Rychlik 2006, Razgour et al. 2011). The results from this analysis suggests that vertical segregation within shrew assemblages based on body size and foraging behavior provides a mechanism for coexistence by minimizing direct competition for resources.

The data on skull length and head-body length among shrews exemplifies the importance of morphological adaptations for niche partitioning. Larger skull and body sizes correlate with greater bite force, facilitating the exploitation of diverse prey and habitats. Seasonal and environmental changes drive adaptive responses, enhancing shrew survival and reducing competition. These findings align with previous studies on shrews, emphasizing vertical segregation and morphological diversity in ecological separation and species coexistence. Building on this understanding of shrew adaptations and their role in reducing competition, it is essential to explore how these principles extend to other insectivorous mammals. By comparing the niche partitioning strategies of these mammals, I aim to provide a comprehensive understanding of the ecological dynamics that drive species diversity and coexistence in insectivorous communities.

CHAPTER 3

PREDICTORS OF POTENTIAL COMPETITION IN SORICIDAE

INTRODUCTION

Competition is a critical driver of speciation and adaptation. At its broadest level, competition is defined as the active demand by two or more organisms for a common resource (Wilson 2000). This can lead to changes in survivorship (Strain and Johnson 2009), growth (Meagher et al. 2000, Maestre et al. 2003), and reproduction (Meagher et al. 2000, Stockley and Bro-Jørgensen 2011). Competitive interactions between organisms can be interspecific or intraspecific (May 1973, Schoener 1973, Wilson 2000, Loreau 2010) and both intra- and interspecific competition occur in a wide range of taxa including invertebrates, fish, and tetrapods (Eccard and Ylönen 2003, Brumm 2006, Luiselli 2006, Wise 2006, Myers and Adams 2008, Svanbäck et al. 2008, Razgour et al. 2011, Dhondt 2012).

In theory, competitors whose niches overlap completely cannot coexist (competitive exclusion principle, Hardin 1960). That is, two competing species cannot coexist in a stable environment unless their realized niches differ on at least one axis (Hardin 1960, but see Leibold and McPeek 2006, Loreau 2010). Competitive exclusion and niche overlap determine how strongly two species might compete with one another (May 1973, Pianka 1974, Hurlbert 1978). If competition and niche overlap exert fixed pressure on members in an ecological community, the result may lead to niche differentiation which lessens direct competition. Differences in food type often serve as a basis for resource division when two species occur in the same habitat (Schoener 1974, Kiltie 1982). Consequently, resource partitioning can be a driving factor in niche differentiation (Carroll 1985, Jones and Barmuta 2000, Schneider et al. 2004, Siemers and Schnitzler 2004, Siemers and Swift 2006, Hunt et al. 2008). Morphological distinctions can also provide a pathway to niche differentiation among syntopic species (Dickman 1988, Churchfield and Sheftel 1994, Churchfield et al. 1999) and structures the dynamics of communities; at a broader scale, interspecific competition and niche differentiation are critical factors driving evolutionary changes within populations and in contributing to the overall function of an ecosystem (MacArthur 1972, May 1973, Christiansen and Fenchel 1977, Fenchel and Christiansen 1977).

Extreme and long-term niche differentiation can lead to character displacement in foraging behavior (Mooney and Agrawal 2008), morphology (McGill et al. 2006, Mooney and Agrawal 2008), or phenotypic responses to interactions with other species (Agrawal 2001, McGill et al. 2006, Mooney and Agrawal 2008). Morphological patterns are important aspects of community structure among sympatric species (Hutchinson 1959, Greene 1987, Juliano and Lawton 1990, Ackerly and Cornwell 2007, Kraft et al. 2007, Vamosi et al. 2009). Species that are similar in morphology often use similar resources in comparable ways and often compete more strongly than species that are less similar (Warren and Lawton 1987; Simberloff and Dayan 1991; McGill et al. 2006). There is a limit to how morphologically similar co-occurring species can be (Ricklefs and O'Rourke 1975, Horn and May 1977, Pearson 1980, Ricklefs and Travis 1980).

Evolutionary trade-offs allow species to respond to ecological heterogeneities in their environment by altering the abilities of species to interact with their environment (Chesson 2000, Leibold and McPeek 2006). Diversification in feeding habits and in the form and function of the feeding apparatus are persuasive examples of these evolutionary trade-offs (Simpson 1955, Eisenberg 1981, Schluter 2000*a*, *b*) in mammals (Santana and Dumont 2009, Santana et al. 2010, 2012), birds (Huber and Podos 2006), and amphibians and reptiles (Verwaijen et al. 2002, Claude et al. 2004, Lappin et al. 2006, Myers and Adams 2008).

Insectivorous mammals, characterized by their dependency on insect prey, often face intense competition for limited resources. Niche differentiation among various insectivorous mammals has underscored the pivotal role of distinct realized niches in promoting coexistence within these communities (Dickman 1988, Castién and Gosálbez 1999). Shrews, as insectivorous mammals, engage in intense competition for resources, particularly in habitats with limited prey availability (Churchfield 1991, 1993, Kirkland 1991, Churchfield et al. 2004). Beyond shrews, studies on bats (Aguirre et al. 2002, Delaval et al. 2005), moles (Loy et al. 2017, Wan et al. 2018), and other insectivorous mammals reveal fascinating adaptations in foraging behaviors, dietary preferences, and habitat utilization that contribute to the effective partitioning of ecological niches (Strait 1993, Castién and Gosálbez 1999, Ivanter et al. 2015). This not only highlights the versatility of strategies of insectivores that alleviate competitive pressures but also emphasizes the broader ecological principles shaping the coexistence of insectivorous mammal communities. Understanding these dynamics provides valuable insights into the intricate balance that governs biodiversity and resource utilization within insectivorous ecosystems.

Studies on shrew (family Soricidae) communities have explored how the broader themes of the competitive exclusion principle manifest in small mammals. Shrews exhibit various adaptations in their foraging strategies (Saarikko 1989), activity patterns (Baxter et al. 1979), and microhabitat preferences (Dickman 1988), which contribute to the partitioning of resources and potential mitigation of direct competition. While the competitive exclusion principle sets a theoretical framework, the nuances of shrew ecology, such as their ability to persist outside equilibrium, add complexity to the interplay between competition and coexistence within these communities. Examining the specific mechanisms through which competitive pressures are minimized provides valuable insights into the broader ecological principles governing their survival and diversity.

For this study, I used head size and body size to determine patterns of character displacement (as a proxy for competition) among all shrew species worldwide, not only with other species of shrew but among other insectivorous mammals as well. I hypothesized that character displacement in shrew assemblages is related to aspects of species richness and physiogeographical factors such as elevation that are likely related to competition.

METHODS

I collected published skull lengths (hereafter referred to as SL and generally defined as measurement of the condylobasal or condylobasal plus incisor length) and head and body lengths (hereafter referred to as HBL and generally defined as the tip of the snout to the base of the tail) (Martin et al. 2000) measurements through an extensive literature review including databases such as the Biodiversity Heritage Library and Google Scholar for papers published up to 2024 using keywords for genera (ex. *Suncus*) or geographic region (ex. Mammals of Vietnam). I adopted specific classifications based on authoritative taxonomic sources including Mammal Species of the World 3rd edition (2005), Handbook of the Mammals of the World Vol. 8 (2018), and the ASM Mammal Diversity Database (2023). I averaged SL and HBL measurements for each taxon using a weighted average based on the known number of individuals used to create the average from each source. I collected data on average SL for 456 species and average HBL for 457 species. Please see Appendix E for a complete taxonomy of species, subspecies, geographic races, and color morphs used in this study and subsequent references (Appendix F).

New species are constantly being discovered and the most recent finds (including Esselstyn et al. 2021, Chen et al. 2022, Woodman 2023*a*) have not been included in the analysis.

To choose shrew assemblages in which to estimate character displacement, I created a spatial layer by merging range maps of all shrew species (see below for details of maps). I then selected 3000 random points with a minimum distance of 5km between points to minimize crowding in ArcGIS 10.8 (ESRI 2020). All layers were projected to world equidistant cylindrical. Then in R 4.4.0 (R Core Team 2024), I used the sf package (Pebesma 2018) to identify which shrew species occurred at each point. I removed any points with duplicate species composition and used the first 1000 points with two or more shrew species.

I computed two measurements of morphological character displacement as proxies of competition, based on shrew SL and HBL. I estimated a character displacement index (CDI) by taking the negative of the cumulative differences in the dependent variable (SL or HBL) among species at each point. A negative value was used to create a positive relationship between the dependent variable and competition (i.e., points with higher CDI values represent a community comprised of species less different from each other, and therefore more likely to directly compete). I calculated a z-score for the resulting value based on a distribution of hypothetical n-species communities created with 5000 communities where n was equivalent to the number of species in the assemblage at that location. For example, if a geographic point had four species, I calculated the z-score for the estimate of CDI from a distribution built with 5000 samples created by using four randomly selected species. This process standardized the data to account for inherent variations in the number of species at each geographic point.

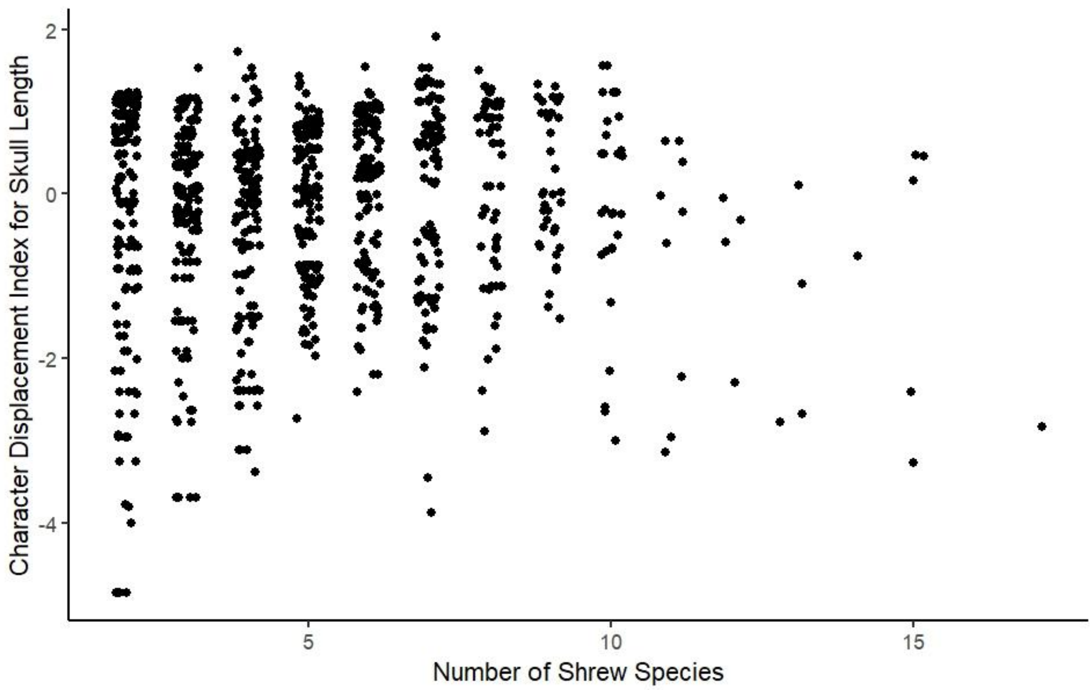
I also attempted to quantify the potential non-shrew mammalian competitors at each point. I defined potential competitors based on several characteristics, including: 1) geographic sympatry, 2) phylogenetic proximity (including all non-soricid members of the superorder Euliptotyphla apart from Solenodontidae), 3) size (< 1 kg), and 4) ecological niche (a primarily insectivorous diet with vertebrate prey either nonexistent or primarily non-mammalian in nature). I relied primarily on Gainsbury et al. (2018) to create this list. In total, 608 mammalian species met the requirements representing 12 orders and 32 families (Appendix G). I used maps from the IUCN Red List (2023) for each shrew and competitor species range to establish which species were potentially competing. For shrew species without IUCN maps, I created new range maps in GIS based upon the primary literature (Appendix D). As such, these maps are best considered approximations of the true range. In cases where a new species is known from a single location, I assumed the range to be a 10-km area surrounding the collection area of the holotype (if available). I did not include insectivorous species that did not have IUCN maps. Finally, I collected elevation at each point using the elevatr package in R which downloads a raster elevation file from AWS Open Data Terrain Tiles (Hollister et al. 2023). Data were collected at a zoom level of 5. Distance to the equator was the absolute value of the latitude for each point.

I built separate linear models (lm function) for CDI based on skull and head-body length using the number of shrew species, number of shrew genera, number of non-shrew insectivorous mammals, elevation, and distance to the equator as independent variables. This entire procedure, starting with selecting 3000 random geographic points, was iteratively executed 100 times for each dependent variable to mitigate potential bias inherent in the initial selection of 1000 random points. I used an α-value of 0.05 to establish variable importance and considered both the average and the range of values from all 100 iterations.

RESULTS

The model performance was good, accounting for 49.6% of the variability in CDI based on skull length and 51.3% of the variability in CDI based on head-body length. CDI of skull length was positively associated with the number of shrew species (Figure 3.1), elevation, and distance to the equator (Table 3.1). The number of shrew genera was negatively related to CDI, but not as strongly as the other predictors were. The number of insectivorous mammals did not consistently relate to CDI in shrews with beta estimates encompassing 0. Patterns for head and body length regression were broadly similar to skull length (Table 3.2). There are two exceptions: 1) the beta estimates for the number of insectivorous mammals were all positive, but the relationship was still weaker than with other predictors, and 2) the number of shrew genera was strongly and negatively related to CDI.

A.



B.

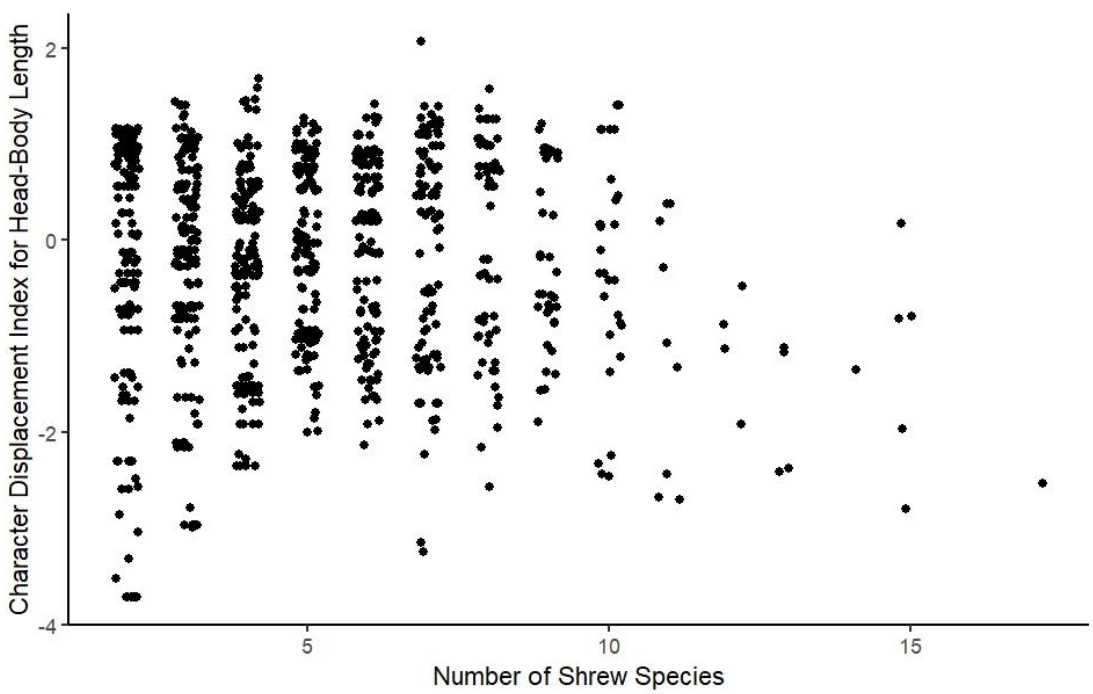


Figure 3.1. Raw data demonstrating the relationship between character displacement index based on skull length (A) and head-body length (B) to the number of shrew species at 1000 geographic points. This replicates a single iteration of the data used in the models described in text.

Table 3.1. Summary of model output of z-scores of the CDI calculated with skull length compared to a distribution with same number of random shrews predicted by number of shrew species, number of insectivorous species, number of shrew genera, elevation, and distance to equator. Each model was iterated 100 to create the range of values.

Parameter	Average Estimate	Range	Average Standard Error	Range	Average p-value	Range
Intercept	-1.999	-2.302 – -1.744	0.123	0.115 – 0.131	**7.18E-43**	4.10E-67 – 5.37E-41
Number of Shrew Species	0.079	0.056 – 0.102	0.013	0.012 – 0.014	**2.10E-07**	1.81E-14 – 6.07E-06
Number of Insectivorous Mammals	-0.002	-0.021 – 0.015	0.0067	0.006 – 0.007	0.501	0.002 – 0.992
Number of Shrew Genera	-0.089	-0.177 – -0.030	0.032	0.003 – 0.034	**0.025**	2.45E-08 – 0.330
Elevation	0.0003	0.0002 –0.0004	3.69E-05	3.29E-05 – 4.27E-05	**3.06E-10**	1.29E-24 – 8.48E-09
Distance to Equator	0.043	0.037 – 0.047	0.002	0.002 – 0.002	**4.44E-59**	2.42E-92 – 2.81E-57
Residual Error	0.851	0.793 –0.903				
R-squared	0.496	0.461 – 0.554				
Adjusted R-squared	0.494	0.459 – 0.552				

Table 3.2. Summary of model output of z-scores of the CDI calculated with head-body length compared to a distribution with same number of random shrews predicted by number of shrew species, number of insectivorous species, number of shrew genera, elevation, and distance to equator. Each model was iterated 100 to create the range of values.

Parameter	Average Estimate	Range	Average Standard Error	Range	Average p-value	Range
Intercept	-1.885	-2.129 – -1.671	0.112	0.103 – 0.118	**1.91E-45**	4.37E-72 – 1.86E-43
Number of Shrew Species	0.039	0.019 – 0.060	0.012	0.011 – 0.012	**7.15E-03**	5.79E-07 – 9.96E-02
Number of Insectivorous Mammals	0.016	0.003 – 0.032	0.006	0.006 – 0.007	**0.049**	4.11E-07 –0.581
Number of Shew Genera	-0.158	-0.240 – -0.102	0.029	0.026 – 0.031	**1.40E-05**	1.57E-16 – 7.67E-04
Elevation	0.0002	0.0002 – 0.0003	3.35E-05	3.05E-05 – 3.81E-05	**1.75E-07**	3.82E-24 – 7.24E-06
Distance to Equator	0.045	0.039 – 0.048	0.002	0.002 – 0.002	**6.20E-78**	5.52E-107 – 5.34E-76
Residual Error	0.773	0.725 – 0.820				
R-squared	0.513	0.483 – 0.559				
Adjusted R-squared	0.510	0.481 – 0.556				

DISCUSSION

I assessed character displacement as a proxy for competition in assemblages of shrews, with approximately 99% of currently recognized species of family Soricidae represented in the dataset. The number of shrew species in a given area, elevation, and distance from the equator were all positively related to CDI, suggesting the potential for higher levels of competition. The number of shrew genera was negatively related to CDI.

As shrew species in an area increased, CDI calculated on both skull and head-body lengths increased more rapidly than would be expected based on species richness alone, indicating greater potential for direct competition. In other words, shrew assemblages with many species tended to be comprised of similar-sized species as opposed to species of different sizes when compared to random, hypothetical shrew assemblages. Shrews exhibit territorial behavior and aggression, engaging in fights and biting during competitive interactions, which occur within their own species as well as between species (Kirkland 1991). Consequently, direct interspecific aggression may play an important role in structuring ecological niches in shrew assemblages. Interestingly, while shrew body size is related to foraging guild (Chapter 2), specific diets do not consistently align with body size, as shrews have broad dietary preferences driven by high energy needs and consumption rates. These broad dietary preferences may allow for coexistence among sympatric shrew species, especially if shrews avoid direct competition by exploiting different temporal niches (Rychlik 2005, Whitaker Jr and Feldhamer 2005, Hoole et al. 2017) or foraging behaviors. The ability to avoid direct competition despite similarities in morphological characteristics may explain how large numbers of shrew species, up to 20 at a single geographic point in this study, can coexist at the same location. Further, CDI decreased as the number of shrew genera represented in the assemblage increased, as might be expected as more distantly related species with divergent morphologies overlap geographically.

Elevation and distance from the equator also play strong roles in determining potential competition among species, with similar patterns emerging in analyses based on both skull and head-body lengths. Species richness can be higher in areas with abundant prey and favorable environmental conditions (Barrière et al. 2005). CDI increased with distance from the equator and with elevation. Niche differentiation and competition therefore seem related to environmental productivity, with more diverse shrew assemblages in tropical and low elevation areas and more homogenous shrew assemblages in temperate and high-altitude areas (Churchfield 1990). The increased diversification of shrew assemblages in higher productivity areas may reflect higher diversity in habitats or prey bases in high productivity areas. Conversely, cold or seasonably variable climates at high latitudes or altitudes may impose constraints on potential body size, especially for small mammals with high surface area-volume ratios and extraordinarily high metabolic rates.

The relationship between CDI and the number of other sympatric insectivorous mammals was the weakest relationship and inconsistent between analyses on skull and head-body lengths. There was no relationship with CDI based on skull length, but a negative relationship based on head-body length. The negative relationship with CDI based on head-body length may be due to higher levels of specialization in the other insectivorous mammals forcing the more generalist shrew species to differentiate to fill available niches, but it is difficult to explain why this pattern was not seen with skull length.

This study represents one of the most comprehensive analyses of character displacement in any taxon (covering ~99% of species in the family) and the first comprehensive analysis of character displacement and niche differentiation for Soricidae. It highlights the complex interplay of morphological, ecological, and abiotic factors that shape competition and adaptation in a widespread and ecologically important mammalian family. It suggests that potentially subtle differences in behavior (e.g., temporal niche partitioning or variation in prey selection), ecology (e.g., habitat or microhabitat selection), and physiology (e.g., variation in energy requirements) are sufficient to allow often large numbers of morphologically similar shrew species to coexist in a geographical area. Soricidae proves to be an ideal taxon on which to conduct studies of morphological diversification, and future questions abound that can be addressed with studies on shrews.

REFERENCES

Ackerly, D. D., and W. K. Cornwell. 2007. A trait-based approach to community assembly: Partitioning of species trait values into within-and among-community components. Ecology Letters 10:135–145.

Agrawal, A. A. 2001. Phenotypic plasticity in the interactions and evolution of species. Science 294:321–326.

Aguirre, L. F., A. Herrel, R. Van Damme, and E. Matthysen. 2002. Ecomorphological analysis of trophic niche partitioning in a tropical savannah bat community. Proceedings of the Royal Society of London. Series B: Biological Sciences 269:1271–1278.

Alhajeri, B. H., O. J. Hunt, and S. J. Steppan. 2018. Evolution of body size, diet, and sociality in the order Rodentia: A phylogenetic approach. Ecology and Evolution 8:8440–8458.

Angilletta, M., Jr., B. S. Cooper, M. S. Schuler, and J. G. Boyles. 2010. The evolution of thermal physiology in endotherms. Frontiers in Bioscience E2:861–881.

Barrière, P., R. Hutterer, V. Nicolas, and S. Quérouil. 2005. Investigating the role of natural gallery forests outside the Congolese rainforest as a refuge for African forest shrews. Belgian Journal of Zoology 135:21–29.

Bates, D., M. Machler, B. Bolker, and S. Walker. 2015. Fitting linear mixed-effects models using lme4. Journal of Statistical Software 67:1–48.

Baxter, R. M., E. A. Goulden, and J. Meester. 1979. The activity patterns of some southern African Crocidura in captivity. Acta Theriologica 24:61–68.

Boyles, J. G., A. B. Thompson, A. E. McKechnie, E. Malan, M. M. Humphries, and V. Careau. 2013. A global heterothermic continuum in mammals. Global Ecology and Biogeography 22:1029–1039.

Brant, S. V., and G. Ortí. 2002. Molecular Phylogeny of Short-Tailed Shrews, *Blarina* (Insectivora: Soricidae). Molecular Phylogenetics and Evolution 22:163–173.

Brown, C. R., E. M. Hunter, and R. M. Baxter. 1997. Metabolism and thermoregulation in the forest shrew *Myosorex varius* (Soricidae: Crocidurinae). Comparative Biochemistry and Physiology Part A: Physiology 118:1285–1290.

Brown, J. H., and B. A. Maurer. 1986. Body size, ecological dominance and Cope's Rule. Nature 324:248–250.

Brumm, H. 2006. Signalling through acoustic windows: nightingales avoid interspecific competition by short-term adjustment of song timing. Journal of Comparative Physiology A 192:1279–1285.

Butler, P. M. 1988. Phylogeny of the insectivores. M. J. Benton, editor. The phylogeny and classification of the tetrapods. Volume 2. Clarendon Press, Oxford, UK.

Carroll, G. R. 1985. Concentration and specialization: Dynamics of niche width in populations of organizations. American Journal of Sociology 90:1262–1283.

Castién, E., and J. Gosálbez. 1999. Habitat and food preferences in a guild of insectivorous mammals in the Western Pyrenees. Acta Theriologica 44:1–13.

Chen, Z., T. Hu, X. Pei, G. Yang, F. Yong, Z. Xu, W. Qu, K. O. Onditi, and B. Zhang. 2022. A new species of Asiatic shrew of the genus *Chodsigoa* (Soricidae, Eulipotyphla, Mammalia) from the Dabie Mountains, Anhui Province, eastern China. ZooKeys 1083:129–146.

Chesson, P. 2000. Mechanisms of maintenance of species diversity. Annual Review of Ecology and Systematics 31:343–366.

Christiansen, F. B., and T. M. Fenchel. 1977. Interactions between species. Springer, Berlin, GER.

Churchfield, S. 1990. The natural history of shrews. Comstock Publishing Associates, Ithica, New York, USA.

Churchfield, S. 1991. Niche dynamics, food resources, and feeding strategies in multispecies communities of shrews. Pages 23–34 *in* J. S. Findley and T. L. Yates, editors. The biology of the Soricidae. Volume 1. Special Publication: The Museum of Southwestern Biology.

Churchfield, S. 1993. Foraging strategies of shrews: interactions between small predators and their prey. Pages 235–252 *in* N. Dunstone and M. L. Gorman, editors. Mammals as Predators. Zoological Society of London Symposia 65, Oxford University Press, Oxford, UK.

Churchfield, S., P. Barrière, R. Hutterer, and M. Colyn. 2004. First results on the feeding ecology of sympatric shrews (Insectivora: Soricidae) in the Tai National Park, Ivory Coast. Acta Theriologica 49:1–15.

Churchfield, S., V. A. Nesterenko, and E. A. Shvarts. 1999. Food niche overlap and ecological separation amongst six species of coexisting forest shrews (Insectivora: Soricidae) in the Russian Far East. Journal of Zoology 248:349–359.

Churchfield, S., and L. Rychlik. 2006. Diets and coexistence in *Neomys* and *Sorex* shrews in Białowieża forest, eastern Poland. Journal of Zoology 269:381–390.

Churchfield, S., and B. I. Sheftel. 1994. Food niche overlap and ecological separation in a multi-species community of shrews in the Siberian taiga. Journal of Zoology 234:105–124.

Claude, J., P. C. H. Pritchard, H. Tong, E. Paradis, and J. C. Auffray. 2004. Ecological correlates and evolutionary divergence in the skull of turtles: a geometric morphometric assessment. Systematic biology 53:933–948.

Dawson, T. J., and J. M. Olson. 1987. The summit metabolism of the short-tailed shrew *Blarina brevicauda*: a high summit is further elevated by cold acclimation. Physiological Zoology 60:631–639.

Degen, A. A., M. Kam, I. S. Khokhlova, B. R. Krasnov, and T. G. Barraclough. 1998. Average daily metabolic rate of rodents: habitat and dietary comparisons. Functional Ecology 12:63–73.

Delaval, M., M. Henry, and P. Charles-Dominique. 2005. Interspecific competition and niche partitioning: example of a Neotropical rainforest bat community. Revue d’Ecologie, Terre et Vie 60:149–165.

Dhondt, A. A. 2012. Interspecific competition in birds. Volume 2. Oxford University Press, Oxford, UK.

Dickman, C. R. 1988. Body size, prey size, and community structure in insectivorous mammals. Ecology 69:569–580.

Dickman, C. R. 1995. Diets and habitat preferences of three species of Crocidurine shrews in arid southern Africa. Journal of Zoology 237:499–514.

Dickman, C. R., and C. Huang. 1988. The reliability of fecal analysis as a method for determining the diet of insectivorous mammals. Journal of Mammalogy 69:108–113.

Douady, C. J., P. I. Chatelier, O. Madsen, W. W. de Jong, F. Catzeflis, M. S. Springer, and M. J. Stanhope. 2002. Molecular phylogenetic evidence confirming the Eulipotyphla concept and in support of hedgehogs as the sister group to shrews. Molecular Phylogenetics and Evolution 25:200–209.

Dubey, S., N. Salamin, S. D. Ohdachi, P. Barrière, and P. Vogel. 2007. Molecular phylogenetics of shrews (Mammalia: Soricidae) reveal timing of transcontinental colonizations. Molecular Phylogenetics and Evolution 44:126–137.

Dudu, A., S. Churchfield, and R. Hutterer. 2005. Community structure and food niche relationships of coexisting rain-forest shrews in the Masako Forest, north-eastern Congo. Pages 229–239 *in* J. F. Meritt, S. Churchfield, R. Hutterer, and R. Sheftel, editors. Advances in the biology of shrews II, Special Publication No. 1. International Society of Shrew Biologists, New York, New York USA.

Eccard, J. A., and H. Ylönen. 2003. Interspecific competition in small rodents: from populations to individuals. Evolutionary Ecology 17:423–440.

Eisenberg, J. F. 1981. The mammalian radiations: An analysis of trends in evolution, adaptation, and behavior. The University of Chicago Press, Chicago, Illinois, USA.

ESRI. 2020. ArcGIS Desktop: Release 10. Environmental Systems Research Institute, Redlands, California, USA.

Esselstyn, J. A., A. S. Achmadi, H. Handika, M. T. Swanson, T. C. Giarla, and K. C. Rowe. 2021. Fourteen new, endemic species of shrew (genus *Crocidura*) from Sulawesi reveal a spectacular island radiation. Bulletin of the American Museum of Natural History 454:1–108.

Fenchel, T. M., and F. B. Christiansen. 1977. Selection and interspecific competition. Pages 477–498 *in* F. B. Christiansen and T. M. Fenchel, editors. Measuring selection in natural populations. Springer, New York, New York, USA.

Fontanillas, P., A. Depraz, M. S. Giorgi, and N. Perrin. 2005. Nonshivering thermogenesis capacity associated to mitochondrial DNA haplotypes and gender in the greater white-toothed shrew, *Crocidura russula*. Molecular Ecology 14:661–670.

Gainsbury, A. M., O. J. S. Tallowin, and S. Meiri. 2018. An updated global data set for diet preferences in terrestrial mammals: testing the validity of extrapolation. Mammal Review 48:160–167.

Genoud, M. 1985. Ecological energetics of two European shrews: *Crocidura russula* and *Sorex coronatus* (Soricidae: Mammalia). Journal of Zoology 207:63–85.

Greaves, W. S. 2012. The mammalian jaw: A mechanical analysis. Cambridge University Press, Cambridge, UK.

Greene, E. 1987. Sizing up size ratios. Trends in Ecology & Evolution 2:79–81.

Grenyer, R., and A. Purvis. 2003. A composite species-level phylogeny of the 'Insectivora' (Mammalia: Order Lipotyphla Haeckel, 1866). Journal of Zoology 260:245–257.

Guralncik, R. P., and S. T. Jackson. 2009. Geographic trends and the "new world of biogeography." Proceedings of the National Academy of Sciences 106 (Supplement 2):19637–19643.

Hall, J. E., and M. E. Hall. 2020. Guyton and Hall Textbook of Medical Physiology. 14th edition. Saunders.

Hardin, G. 1960. The competitive exclusion principle. Science 131:1292–1297.

He, K., J.-H. Chen, G. C. Gould, N. Yamaguchi, H.-S. Ai, Y.-X. Wang, Y.-P. Zhang, and X.-L. Jiang. 2012. An estimation of Erinaceidae phylogeny: A combined analysis approach. PLos One 7:1–15.

Hindle, A. G., I. W. McIntyre, K. L. Campbell, and R. A. MacArthur. 2003. The heat increment of feeding and its thermoregulatory implications in the short-tailed shrew (*Blarina brevicauda*). Canadian Journal of Zoology 81:1445–1453.

Hollister, J., T. Shah, J. Nowosad, A. L. Robitaille, M. W. Beck, and M. Johnson. 2023. elevatr: Access Elevation Data from Various APIs.

Hooker, J. J. 2016. Skeletal adaptations and phylogeny of the oldest mole *Eotalpa* (Talpidae, Lipotyphla, Mammalia) from the UK Eocene: the beginning of fossoriality in moles. Palaeontology 59:195–216.

Hoole, C., A. E. McKechnie, D. M. Parker, and N. C. Bennett. 2017. The activity patterns of two sympatric shrew species from the Eastern Cape Province, South Africa. Journal of Zoology 303:145–154.

Horn, H. S., and R. M. May. 1977. Limits to similarity among coexisting competitors. Nature 270:660–661.

Huber, S. K., and J. Podos. 2006. Beak morphology and song features covary in a population of Darwin's finches (*Geospiza fortis*). Biological Journal of the Linnean Society 88:489–498.

Hunt, D. E., L. A. David, D. Gevers, S. P. Preheim, E. J. Alm, and M. F. Polz. 2008. Resource partitioning and sympatric differentiation among closely related bacterioplankton. Science 320:1081–1085.

Hurlbert, S. H. 1978. The measurement of niche overlap and some relatives. Ecology 59:67–77.

Hutchinson, G. E. 1959. Homage to Santa Rosalia or why are there so many kinds of animals? The American Naturalist 93:145–159.

Hutterer, R. 1985. Anatomical adaptations of shrews. Mammal Review 15:43–55.

Hutterer, R. 2005. Order Soricomorpha. Pages 220–311 *in* D. E. Wilson and D. M. Reeder, editors. Mammal species of the world: a taxonomic and geographic reference. Johns Hopkins University Press, Baltimore, Maryland, USA.

IUCN. 2023. The IUCN Red List of Threatened Species. <https://www.iucnredlist.org>.

Ivanter, E. V., A. V. Korosov, and A. M. Makarov. 2015. Study of the trophic relations of small insectivorous mammals. Biology Bulletin 42:845–856.

Jones, M. E., and L. A. Barmuta. 2000. Niche differentiation among sympatric Australian dasyurid carnivores. Journal of Mammalogy 81:434–447.

Juliano, S. A., and J. H. Lawton. 1990. The relationship between competition and morphology. I. Morphological patterns among co-occurring Dytiscid beetles. Journal of Animal Ecology 59:403–419.

Kiltie, R. A. 1982. Bite force as a basis for niche differentiation between rain forest peccaries (*Tayassu tajacu* and *T. pecari*). Biotropica 14:188–195.

Kirkland, G. L., Jr. 1991. Competition and coexistence in shrews (Insectivora: Soricidae). Pages 16–22 *in* J. S. Findley and T. L. Yates, editors. The biology of the Soricidae. Volume 1. Special Publication: The Museum of Southwestern Biology.

Koteja, P., and J. Weiner. 1993. Mice, voles and hamsters: metabolic rates and adaptive strategies in muroid rodents. Oikos 66:505–514.

Kowalski, K., and L. Rychlik. 2021. Venom use in eulipotyphlans: an evolutionary and ecological approach. Toxins 13:231.

Kraft, N. J., W. K. Cornwell, C. O. Webb, and D. D. Ackerly. 2007. Trait evolution, community assembly, and the phylogenetic structure of ecological communities. The American Naturalist 170:271–283.

Krettek, A., A. Gullberg, and U. Arnason. 1995. Sequence analysis of the complete mitochondrial DNA molecule of the hedgehog, *Erinaceus europaeus*, and the phylogenetic position of the Lipotyphla. Journal of Molecular Evolution 41:952–957.

Kuznetsova, A., P. B. Brockhoff, and R. Christensen. 2017. ImerTest package: Tests in linear mixed effects models. Journal of Statistical Software 82:1–26.

Lappin, A. K., P. S. Hamilton, and B. K. Sullivan. 2006. Bite-force performance and head shape in a sexually dimorphic crevice-dwelling lizard, the common chuckwalla [*Sauromalus ater* (= obesus)]. Biological Journal of the Linnean Society 88:215–222.

Leibold, M. A., and M. A. McPeek. 2006. Coexistence of the niche and neutral perspectives in community ecology. Ecology 87:1399–1410.

Lenth, R. V. 2024. emmeans: Estimated marginal means, aka least-squares means. R Package version 1.10.2. <https://CRAN.R-project.org/package=emmeans>.

Lindstedt, S. L. 1980. Regulated hypothermia in the desert shrew. Journal of Comparative Physiology B 137:173–176.

Loreau, M. 2010. From populations to ecosystems theoretical foundations for a new ecological synthesis. Monographs in Population Biology 46, Princeton University Press, Princeton, New Jersey, USA.

Loy, A., M. H Cassini, P. Colangelo, and M. Di Febbraro. 2017. Distribution, spatial interaction and niche analysis in three species of European moles (genus *Talpa*, Soricomorpha: Mammalia) in Italy. Biological Journal of the Linnean Society 122:872–882.

Luiselli, L. 2006. Resource partitioning and interspecific competition in snakes: the search for general geographical and guild patterns. Oikos 114:193–211.

MacArthur, R. H. 1972. Geographical ecology: Patterns in the distribution of species. Princeton University Press, Princeton, New Jersey, USA.

Maestre, F. T., S. Bautista, and J. Cortina. 2003. Positive, negative, and net effects in grass–shrub interactions in Mediterranean semiarid grasslands. Ecology 84:3186–3197.

Mammal Diversity Database. 2024. Mammal Diversity Database (Version 1.12.1). Zenodo.

Martin, R. E., R. H. Pine, and A. F. DeBlase. 2011. A manual of mammalogy: with keys to families of the world. Waveland Press, Long Grove, Illinois, USA.

May, R. M. 1973. Stability and complexity in model ecosystems. Princeton University Press, Princeton, New Jersey, USA.

McDevitt, R., and J. F. Andrews. 1995. Seasonal variation in the metabolic rate of the Pygmy shrew, *Sorex minutus*: Can resting metabolic rate be measured in post-absorptive shrews? Journal of Thermal Biology 20:255–261.

McDevitt, R. M., and J. F. Andrews. 1994. The importance of nest utilization as a behavioural thermoregulatory strategy in *Sorex minutus* the pygmy shrew. Journal of Thermal Biology 19:97–102.

McGill, B. J., B. J. Enquist, E. Weiher, and M. Westoby. 2006. Rebuilding community ecology from functional traits. Trends in Ecology & Evolution 21:178–185.

McNab, B. K. 1971. On the ecological significance of Bergmann's Rule. Ecology 52:845–854.

McNab, B. K. 1992. A statistical analysis of mammalian rates of metabolism. Functional Ecology 6:672–679.

Meagher, S., D. J. Penn, and W. K. Potts. 2000. Male–male competition magnifies inbreeding depression in wild house mice. Proceedings of the National Academy of Sciences 97:3324–3329.

Merritt, J. F. 1986. Winter survival adaptations of the short-tailed shrew (*Blarina brevicauda*) in an Appalachian montane forest. Journal of Mammalogy 67:450–464.

Merritt, J. F., and A. Adamerovich. 1991. Winter thermoregulatory mechanisms of *Blarina brevicauda* as revealed by radiotelemetry. Pages 47–64 *in* J. S. Findley and T. L. Yates, editors. The biology of the Soricidae. Volume 1. Special Publication: The Museum of Southwestern Biology.

Merritt, J. F., and D. A. Zegers. 2014. Social thermoregulation in least shrews, *Cryptotis parva*. Mammalia 78:11–22.

Mooney, K. A., and A. A. Agrawal. 2008. Phenotypic plasticity. Pages 43–57 *in* K. Tilmon, editor. Specialization, speciation, and radiation: the evolutionary biology of herbivorous insects. University of California Press, Berkeley, California, USA.

Morrison, P., F. A. Ryser, and A. R. Dawe. 1959. Studies on the physiology of the masked shrew *Sorex cinereus*. Physiological Zoology 32:256–271.

Mouchaty, S. K., A. Gullberg, A. Janke, and U. Arnason. 2000. The phylogenetic position of the Talpidae within Eutheria based on analysis of complete mitochondrial sequences. Molecular Biology and Evolution 17:60–067.

Murphy, W. J., E. Eizirik, W. E. Johnson, Y. P. Zhang, O. A. Ryder, and S. J. O'Brien. 2001. Molecular phylogenetics and the origins of placental mammals. Nature 409:614–618.

Murphy, W. J., T. H. Pringle, T. A. Crider, M. S. Springer, and W. Miller. 2007. Using genomic data to unravel the root of the placental mammal phylogeny. Genome Research 17:413–421.

Myers, E. M., and D. C. Adams. 2008. Morphology is decoupled from interspecific competition in Plethodon salamanders in the Shenandoah Mountains, USA. Herpetologica 64:281–289.

Nikaido, M., Y. Cao, M. Harada, N. Okada, and M. Hasegawa. 2003. Mitochondrial phylogeny of hedgehogs and monophyly of Eulipotyphla. Molecular Phylogenetics and Evolution 28:276–284.

Nowak, R. M. 1999. Walker's Mammals of the World. Johns Hopkins University Press, Baltimore, Maryland, USA.

Ochocińska, D., and J. R. Taylor. 2003. Bergmann's rule in shrews: geographical variation of body size in Palearctic *Sorex species*. Biological Journal of the Linnean Society 78:365–381.

Ochocińska, D., and J. R. Taylor. 2005. Living at the physiological limits: field and maximum metabolic rates of the common shrew (*Sorex araneus*). Physiological and Biochemical Zoology 78:808–818.

Ohdachi, S. D., M. Hasegawa, M. A. Iwasa, P. Vogel, T. Oshida, L.-K. Lin, and H. Abe. 2006. Molecular phylogenetics of soricid shrews (Mammalia) based on mitochondrial cytochrome b gene sequences: with special reference to the Soricinae. Journal of Zoology 270:177–191.

Pearson, D. L. 1980. Patterns of limiting similarity in tropical forest tiger beetles (Coleoptera: Cicindelidae). Biotropica 12:195–204.

Pebesma, E. J. 2018. Simple features for R: Standardized support for spatial vector data. The R Journal 10:439–446.

Pianka, E. R. 1974. Niche overlap and diffuse competition. Proceedings of the National Academy of Sciences 71:2141–2145.

Querouil, S., R. Hutterer, P. Barriere, M. Colyn, J. C. Kerbis Peterhans, and E. Verheyen. 2001. Phylogeny and evolution of African shrews (Mammalia: Soricidae) inferred from 16s rRNA sequences. Molecular Phylogenetics and Evolution 20:185–195.

R Core Team. 2024. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.

Razgour, O., C. Korine, and D. Saltz. 2011. Does interspecific competition drive patterns of habitat use in desert bat communities? Oecologia 167:493–502.

Reed, C. A. 1951. Locomotion and appendicular anatomy in three soricoid insectivores. American Midland Naturalist 45:513–671.

dos Reis, M., J. Inoue, M. Hasegawa, R. J. Asher, P. C. Donoghue, and Z. Yang. 2012. Phylogenomic datasets provide both precision and accuracy in estimating the timescale of placental mammal phylogeny. Proceedings of the Royal Society of London B: Biological Sciences 279:3491–3500.

Ricklefs, R. E., and K. O'Rourke. 1975. Aspect diversity in moths: a temperate-tropical comparison. Evolution 29:313–324.

Ricklefs, R. E., and J. Travis. 1980. A morphological approach to the study of avian community organization. The Auk 97:321–338.

Roca, A. L., G. K. Bar-Gal, E. Eizirik, K. M. Helgen, R. Maria, M. S. Springer, S. J. O'Brien, and W. J. Murphy. 2004. Mesozoic origin for West Indian insectivores. Nature 429:649–651.

Rychlik, L. 2005. Overlap of temporal niches among four sympatric species of shrews. Acta Theriologica 50:175–188.

Rychlik, L., and E. Jancewicz. 2002. Prey size, prey nutrition, and food handling by shrews of different body sizes. Behavioral Ecology 13:216–223.

Saarikko, J. 1989. Foraging behaviour of shrews. Annals Zoologici Fennici 26:411–423.

Santana, S. E., and E. R. Dumont. 2009. Connecting behaviour and performance: The evolution of biting behaviour and bite performance in bats. Journal of Evolutionary Biology 22:2131–2145.

Santana, S. E., E. R. Dumont, and J. L. Davis. 2010. Mechanics of bite force production and its relationship to diet in bats. Functional Ecology 24:776–784.

Santana, S. E., I. R. Grosse, and E. R. Dumont. 2012. Dietary hardness, loading behavior, and the evolution of skull form in bats. Evolution 66:2587–2598.

Schluter, D. 2000*a*. Ecological character displacement in adaptive radiation. The American Naturalist 156:S4–S16.

Schluter, D. 2000*b*. The ecology of adaptive radiation. Oxford University Press, Oxford, UK.

Schneider, K., S. Migge, R. A. Norton, S. Scheu, R. Langel, A. Reineking, and M. Maraun. 2004. Trophic niche differentiation in soil microarthropods (Oribatida, Acari): evidence from stable isotope ratios (15 N/14 N). Soil Biology and Biochemistry 36:1769–1774.

Schoener, T. W. 1973. Population growth regulated by intraspecfic competition for energy or time: Some simple representations. Theoretical Population Biology 4:56–84.

Schoener, T. W. 1974. Resource partitioning in ecological communities. Science 185:27–39.

Siemers, B. M., and H.-U. Schnitzler. 2004. Echolocation signals reflect niche differentiation in five sympatric congeneric bat species. Nature 429:657–661.

Siemers, B. M., and S. M. Swift. 2006. Differences in sensory ecology contribute to resource partitioning in the bats *Myotis bechsteinii* and *Myotis nattereri* (Chiroptera: Vespertilionidae). Behavioral Ecology and Sociobiology 59:373–380.

Simberloff, D., and T. Dayan. 1991. The guild concept and the structure of ecological communities. Annual Review of Ecology and Systematics 22:115–143.

Simpson, G. G. 1953. The major features of evolution. Columbia University Press, New York, New York, USA.

Song, S., L. Liu, S. V. Edwards, and S. Wu. 2012. Resolving conflict in eutherian mammal phylogeny using phylogenomics and the multispecies coalescent model. Proceedings of the National Academy of Sciences 109:14942–14947.

Sparti, A. 1992. Thermogenic capacity of shrews (Mammalia, Soricidae) and its relationship with basal rate of metabolism. Physiological Zoology 65:77–96.

Stanhope, M. J., V. G. Waddell, O. Madsen, W. De Jong, S. B. Hedges, G. C. Cleven, D. Kao, and M. S. Springer. 1998. Molecular evidence for multiple origins of Insectivora and for a new order of endemic African insectivore mammals. Proceedings of the National Academy of Sciences 95:9967–9972.

Stockley, P., and J. Bro-Jørgensen. 2011. Female competition and its evolutionary consequences in mammals. Biological Reviews 86:341–366.

Storz, J. F., G. R. Scott, and Z. A. Cheviron. 2010. Phenotypic plasticity and genetic adaptation to high-altitude hypoxia in vertebrates. Journal of Experimental Biology 213:4125–4136.

Strain, E. M., and C. R. Johnson. 2009. Competition between an invasive urchin and commercially fished abalone: effect on body condition, reproduction and survivorship. Marine Ecology Progress Series 377:169–182.

Strait, S. G. 1993. Molar morphology and food texture among small-bodied insectivorous mammals. Journal of Mammalogy 74:391–402.

Suzuki, D., Y. Murata, and S. Oda. 2007. Changes in Ucp1, D2 (Dio2) and Glut4 (Slc2a4) mRNA expression in response to short-term cold exposure in the house musk shrew (*Suncus murinus*). Experimental Animals 56:279–288.

Svanbäck, R., P. Eklöv, R. Fransson, and K. Holmgren. 2008. Intraspecific competition drives multiple species resource polymorphism in fish communities. Oikos 117:114–124.

Swiderski, D. L. 1991. Morphology and evolution of the wrists of burrowing and nonburrowing shrews (Soricidae). Journal of Mammalogy 72:118–125.

Taylor, J. R. 1998. Evolution of energetic strategies in shrews. Pages 309–346 *in* J. M. Wojcik and M. Wolsan, editors. Evolution of shrews. Volume 30. Mammal Research Institute, Polish Academy of Sciences, Bialowieza, POL.

Vamosi, S. M., S. B. Heard, J. C. Vamosi, and C. O. Webb. 2009. Emerging patterns in the comparative analysis of phylogenetic community structure. Molecular Ecology 18:572–592.

Verwaijen, D., R. Van Damme, and A. Herrel. 2002. Relationships between head size, bite force, prey handling efficiency and diet in two sympatric lacertid lizards. Functional Ecology 16:842–850.

Vogel, P. 1976. Energy consumption of European and African shrews. Acta Theriologica 21:195–206.

Vogel, P. 1980. Metabolic levels and biological strategies in shrews. Pages 170–180 *in* K. Schmidt-Nielsen, L. Bolis, and C. R. Taylor, editors. Comparative physiology: Primitive mammals. Cambridge University Press, Cambridge, UK.

Wan, T., K. He, W. Jin, S. Liu, Z. Chen, B. Zhang, R. W. Murphy, and X. Jiang. 2018. Climate niche conservatism and complex topography illuminate the cryptic diversification of Asian shrew-like moles. Journal of Biogeography 45:2400–2414.

Warren, P. H., and J. H. Lawton. 1987. Invertebrate predator-prey body size relationships: an explanation for upper triangular food webs and patterns in food web structure? Oecologia 74:231–235.

Whitaker, J. O., Jr., and G. A. Feldhamer. 2005. Population dynamics and activity of southern short-tailed shrews (*Blarina carolinensis*) in southern Illinois. Journal of Mammalogy 86:294–301.

Wilson, D. E., and R. A. Mittermeier. 2018. Handbook of the mammals of the world: Insectivores, sloths and colugos. Volume 8. Lynx Edicions, Barcelona, ESP.

Wilson, D. E., and D. M. Reeder. 2005. Mammal species of the world: a taxonomic and geographic reference. Third edition. Johns Hopkins University Press, Baltimore, Maryland, USA.

Wilson, E. O. 2000. Sociobiology the new synthesis. Harvard University Press, Cambridge, Massachusetts, USA.

Wise, D. H. 2006. Cannibalism, food limitation, intraspecific competition, and the regulation of spider populations. Annual Review of Entomology 51:441–465.

Woodman, N. 2015. Morphological variation among broad-clawed shrews (Mammalia: Eulipotyphla: Soricidae: *Cryptotis* Pomel, 1848) from highlands of western Honduras, with descriptions of three new cryptic species. Annals of Carnegie Museum 83:95–119.

Woodman, N. 2023. Two new species of small-eared shrews of the genus *Cryptotis* Pomel, 1848, from the Colombian Andes (Mammalia: Eulipotyphla: Soricidae). Annals of Carnegie Museum 88:203–234.

Woodman, N., and F. A. Stabile. 2015. Functional skeletal morphology and its implications for locomotory behavior among three genera of myosoricine shrews (Mammalia: Eulipotyphla: Soricidae): Myosoricine Locomotory Adaptations. Journal of Morphology 276:550–563.

Woodman, N., and R. M. Timm. 1999. Geographic variation and evolutionary relationships among broad-clawed shrews of the *Cryptotis goldmani*–group (Mammalia: Insectivora: Soricidae). Fieldiana: Zoology, New Series 91:1–35.

Woodman, N., and A. T. Wilken. 2019. Comparative functional skeletal morphology among three genera of shrews: implications for the evolution of locomotor behavior in the Soricinae (Eulipotyphla: Soricidae). Journal of Mammalogy 100:1750–1764.

Woodman, N., A. T. Wilken, and S. Ikram. 2019. See how they ran: morphological and functional aspects of skeletons from ancient Egyptian shrew mummies (Eulipotyphla: Soricidae: Crocidurinae). Journal of Mammalogy 100:1199–1210.

APPENDIX A

SORICIDAE HIGHER TAXONOMY

Below is the higher taxonomy as used in this thesis. The arrangement is not correct, as numerous studies (Querouil et al. 2001, Dubey et al. 2007, 2008) have found African *Suncus* paraphyletic with regards to *Sylvisorex* and *Diplomesodon* to be a part of *Crocidura*, but no works (as of June 2024) have been published updating the taxonomy. Genera are listed by subfamily and then alphabetically for convenience.

Family Soricidae

Subfamily Crocidurinae

Crocidura Wagler, 1832

Diplomesodon Brandt, 1852

Feroculus Kelaat, 1852

Palawanosorex Hutterer et al. 2018

Paracrocidura de Balsac, 1956

Ruwenzorisorex Hutterer, 1986

Scutisorex Thomas, 1913

Solisorex Thomas, 1924

Suncus Ehrenberg, 1832

Sylvisorex Thomas, 1904

Subfamily Myosoricinae

Congosorex Heim de Balsac and Lamotte, 1956

Myosorex Gray 1838

Surdisorex Thomas, 1906

Subfamily Soricinae

Anourosorex Milne-Edwards, 1872

Blarina Gray, 1838

Blarinella Thomas, 1911

Chimarrogale J. Anderson, 1877

Chodsigoa Kastschenko, 1907

Crossogale Thomas, 1921

Cryptotis Pomel, 1848

Episoriculus Ellerman and Morrison-Scott, 1966

Megasorex Hibbard, 1950

Nectogale Milne-Edwards, 1870

Neomys Kaup, 1829

Notiosorex Coues, 1877

Parablarinella Bannikova et al., 2019

Pseudosoriculus Abramov et al., 2017

Sorex Linnaeus, 1758

Soriculus Blyth, 1854

APPENDIX B

SORICIDAE FORAGING GUILDS

Shrew foraging guilds follow Hutterer 1985 and are partitioned as follows:

Fossorial: This guild is essentially a more extreme continuation of the Semifossorial guild and slightly overlaps with another insectivorous lineage: the moles. These species may have skeletal adaptations for pushing through soil including reinforced heads and more robust shoulders and arm bones (Woodman and Timm 1999, He et al. 2015, Woodman 2015, 2023*b*, Woodman and Stabile 2015). Shrew genera that have members in this guild include: *Cryptotis*, *Sorex*, *Soriculus*, and *Surdisorex*.

Psammophilic: This highly specialized guild is essentially an amalgamation of the semiaquatic and semifossorial guilds. The single member of this guild has adaptations similar to semiaquatic shrews in that it has stiff hairs on the feet to facilitate paddling along with the enlarged claws and broad paws of the semifossorial guild. This combination effectively allows this shrew to "swim" through sand in search of prey. The single shrew genus included in this guild is *Diplomesodon*. *Notiosorex* of the desert southwest in North America approaches this guild, but I felt it best to place it in another guild due to the lack of these specific adaptations.

Scansorial: Members of this guild frequently take prey above the surface level of the ground in the understory/canopy or more mountainous/rocky habitats. (Hutterer 1985) found many members of this guild to have long, prehensile tails (naked or haired) to help facilitate climbing. Shrew genera that have members in this guild include *Chodsigoa, Crocidura, Episoriculus, Psuedosoriculus, Sorex, Suncus*, and *Sylvisorex*.

Semiaquatic: All shrews are accomplished swimmers (Churchfield 1990) but species that specifically dive underwater for prey are considered to belong to this guild. Most, but not necessarily all, show adaptations for a semiaquatic existence (Hutterer 1985) such as webbing or stiff hairs on the feet and tail or scales on the feet that increase grip on slippery surfaces. Shrew genera that have members in this guild include: *Chimarrogale*, *Crossogale*, *Nectogale*, *Neomys*, *Ruwenzorisorex,* and *Sorex.*

Semifossorial or Hypogeal: Shrews in this guild are typically thick-bodied and robust and are generally found in humus, top soil, leaf litter etc. and often make use of other animals' burrows and actively dig for prey (Churchfield 1990). Shrew genera that have members in this guild include: *Anourosorex*, *Blarina*, *Blarinella*, *Congosorex*, *Crocidura*, *Cryptotis*, *Episoriculus*, *Feroculus*, *Myosorex*, *Parablarinella*, *Scutisorex*, *Solisorex*, and *Sorex*.

Terrestrial or Epigeal: This is the most common form of foraging for shrew species. Terrestrial or epigeal shrews forage primarily or exclusively on the ground surface. These species are not active diggers of prey but may utilize leaf litter and surface soil to probe for food (Churchfield 1990). Shrew genera that have members in this guild include: *Chodsigoa*, *Crocidura*, *Cryptotis*, *Episoriculus*, *Megasorex*, *Notiosorex*, *Palawanosorex*, *Paracrocidura*, *Sorex*, *Suncus*, and *Sylvisorex*.

APPENDIX C

DESCRIPTIONS OF SORICIDAE BY BIOME AND FORAGING GUILD

Descriptive analyses by biome (genera known or expected to have venom are marked with an asterisk *); all measurements are in mm.

Biome	Foraging Guild	Subfamily	Genus	Species Number	SL Range	SL Average	HBL Range	HBL Average
Afrotropical	Fossorial	Myosoricinae	*Surdisorex*	3	24.4-26.8	25.1	82.0-110.0	92.1
	Psammophilic							
	Scansorial	Crocidurinae	*Crocidura*	2	18.6-19.5	19.2	59.0-90.2	71.0
			Suncus	1	16.3-18.6	17.6	55.0-76.0	62.9
			Sylvisorex	14	15.4-23.1	19.5	43.0-110.0	69.0
	Semiaquatic	Crocidurinae	*Ruwenzorisorex*	1	24.4-25.9	24.9	84.0-102.0	94.8
			*Scutisorex**	1	30.3-33.2	32.6	120.0-153.0	136.5
	Semifossorial or Hypogeal	Crocidurinae	*Crocidura*	1	25.0-27.0	26.1	80.0-101.0	89.9
			*Scutisorex**	2	30.3-33.2	31.5	120.0-153.0	141.3
		Myosoricinae	*Congosorex*	3	17.8-20.1	19.3	53.0-95.0	63.5
			Myosorex	19	19.7-25.5	21.9	50.0-105.0	80.0
	Terrestrial or Epigeal	Crocidurinae	*Crocidura*	109	14.3-38.9	21.8	40.0-178.0	79.8
			Paracrocidura	3	22.1-27.5	25.5	56.0-97.0	84.1
			*Scutisorex**	2	30.3-33.2	32.6	120.0-153.0	136.5
			Suncus	7	13.1-22.2	16.8	42.0-85.0	60.5
			Sylvisorex	1	13.9-15.0	14.6	39.0-61.0	46.0
Australasian	Fossorial							
	Psammophilic							
	Scansorial	Crocidurinae	*Crocidura*	2	19.6-24.2	22.3	66.0-88.0	82.9
			Suncus	1	19.3-19.9	19.7	62.0-68.0	65.5
	Semiaquatic							
	Semifossorial or Hypogeal							

	Terrestrial or Epigeal	Crocidurinae	*Crocidura*	8	15.8-25.0	20.1	54.0-88.0	71.7
Indomalayan	Fossorial	Soricinae	*Soriculus*	1	19.7-24.4	21.6	55.9-106.0	83.1
	Psammophilic							
	Scansorial	Crocidurinae	*Crocidura*	3	19.5-25.6	22.2	64.9-114.0	84.5
			Suncus	1	17.8-20.2	18.8	66.0-89.1	72.8
		Soricinae	*Chodsigoa*	2	18.0-21.0	19.1	54.0-91.4	67.9
			Episoriculus	4	15.0-21.0	18.8	47.0-82.0	64.3
			Pseudosoriculus	1	17.8-19.0	18.4	53.0-76.0	62.1
	Semiaquatic	Soricinae	*Chimarrogale**	3	23.0-28.5	25.1	80.0-152.4	109.3
			*Crossogale**	3	16.0-27.7	26.3	85.0-121.0	106.5
	Semifossorial or Hypogeal	Crocidurinae	*Crocidura*	1	NA	NA	100.0-107.0	103.1
			Feroculus	1	27.0-29.0	28.0	88.9-165.1	124.7
			Solisorex	1	30.0-32.0	31.0	120.0-150.0	129.3
		Soricinae	*Anourosorex*	4	21.5-30.5	26.4	50.7-130.0	92.2
			*Blarinella**	1	18.0-20.0	19.1	60.0-76.2	66.4
			Episoriculus	1	16.8-18.6	18.0	44.0-74.0	60.5
			*Parablarinella**	1	18.6-21.0	20.0	52.0-79.0	68.1
	Terrestrial or Epigeal	Crocidurinae	*Crocidura*	50	14.2-29.0	20.3	40.0-141.5	74.9
			Palawanosorex	2	13.9-25.3	21.1	75.0-99.0	82.8
			*Suncus**	9	11.4-45.7	20.4	31.4-190.5	76.0
		Soricinae	*Chodsigoa*	2	17.3-19.8	18.7	58.0-84.0	68.9
			Episoriculus	3	16.4-19.1	18.1	50.0-76.2	63.1
			Sorex	3	16.6-20.0	17.7	47.0-84.0	61.6
Nearctic	Fossorial	Soricinae	*Sorex*	1	14.5-18.5	17.0	48.0-79.0	62.4
	Psammophilic							
	Scansorial	Soricinae	*Sorex*	2	15.0-23.0	16.6	48.0-86.0	61.5
	Semiaquatic	Soricinae	*Sorex**	5	18.4-23.8	20.4	53.0-104.0	82.8
	Semifossorial or Hypogeal	Soricinae	*Blarina**	3	12.9-26.0	20.6	59.0-122.0	83.3
			Sorex	2	15.0-19.8	17.2	45.0-80.0	63.6

	Terrestrial or Epigeal	Soricinae	*Cryptotis*	2	14.3-19.1	16.2	42.0-78.0	61.3
			*Notiosorex**	3	15.0-18.4	16.6	48.0-73.0	61.3
			*Sorex**	25	13.0-23.5	16.8	38.0-109.0	63.5
Neotropical	Fossorial	Soricinae	*Cryptotis*	12	18.2-22.8	20.3	47.0-96.0	77.5
	Psammophilic							
	Scansorial							
	Semiaquatic							
	Semifossorial or Hypogeal	Soricinae	*Blarina**	2	18.0-21.6	20.3	64.0-120.0	82.1
			Cryptotis	8	17.4-23.7	20.2	47.3-100.00	75.0
			Sorex	5	18.0-20.6	19.0	58.0-84.0	72.3
	Terrestrial or Epigeal	Soricinae	*Cryptotis*	29	14.3-23.7	19.9	42.0-102.0	73.0
			Megasorex	1	22.2-22.8	22.5	78.0-93.0	85.4
			*Notiosorex**	4	15.0-18.4	16.9	48.0-73.0	61.4
			Sorex	16	13.6-21.8	17.7	44.0-89.0	65.3
Palearctic	Fossorial	Soricinae	*Soriculus*	1	19.7-24.4	21.6	55.9-106.0	83.1
	Psammophilic	Crocidurinae	*Diplomesodon*	1	17.9-19.0	18.8	50.7-76.0	61.7
	Scansorial	Soricinae	*Chodsigoa*	3	20.2-25.0	22.6	61.0-96.0	78.3
			Episoriculus	1	15.0-19.0	17.0	47.0-73.0	61.3
			Sorex	2	16.0-21.0	17.6	54.0-77.0	65.3
	Semiaquatic	Soricinae	*Chimarrogale**	4	23.0-29.2	25.7	80.0-152.4	111.4
			Nectogale	1	23.9-27.1	25.5	90.0-128.0	104.5
			*Neomys**	3	18.0-23.3	21.2	56.0-120.0	82.1
	Semifossorial or Hypogeal	Soricinae	*Anourosorex*	1	21.5-26.5	24.4	74.0-113.0	91.1
			*Blarinella**	2	18.0-22.0	20.0	60.0-81.0	68.5
			*Parablarinella**	1	18.6-21.0	20.0	52.0-79.0	68.1
			Sorex	3	19.8-23.5	21.3	52.3-97.0	76.5
	Terrestrial or Epigeal	Crocidurinae	*Crocidura**	34	14.0-26.6	18.8	42.0-147.0	68.0
			Suncus	1	11.4-15.7	13.0	31.4-54.0	44.1
		Soricinae	*Chodsigoa*	3	15.1-22.6	18.2	47.0-99.0	66.5
			Episoriculus	1	17.0-18.4	18.0	58.0-74.0	61.6
			*Sorex**	30	11.3-21.7	17.5	38.0-96.0	61.7

APPENDIX D

LIST OF SPECIES WITH NEW RANGE MAPS

Blarina peninsulae
Blarina shermani
Chimarrogale leander
Chodsigoa furva
Chodsigoa hoffmanni
Crocidura absconditus
Crocidura afeworkbekelei
Crocidura anhuiensis
Crocidura annamitensis
Crocidura batakorum
Crocidura cranbrooki
Crocidura dracula
Crocidura eburnea
Crocidura fingui
Crocidura gathornei
Crocidura gueldenstaedtii
Crocidura guy
Crocidura huangshanensis
Crocidura kegoensis
Crocidura lwiroensis
Crocidura makeda
Crocidura mdumai
Crocidura munissi
Crocidura narcondomica
Crocidura neglecta
Crocidura newmarki
Crocidura nimbasilvanus
Crocidura ninoyi
Crocidura panayensis
Crocidura rapax
Crocidura sapaensis
Crocidura similiturba
Crocidura suaveolens
Crocidura umbra
Crocidura yaldeni
Cryptotis aroensis
Cryptotis berlandieri
Cryptotis cavatorculus
Cryptotis celaque
Cryptotis dinirensis
Cryptotis evaristoi
Cryptotis lacandonensis
Cryptotis lacertosus
Cryptotis magnimanus
Cryptotis mam
Cryptotis mccarthyi
Cryptotis monteverdensis
Cryptotis niausa
Cryptotis oreoryctes
Cryptotis osgoodi
Cryptotis perijensis
Cryptotis pueblensis
Cryptotis soricina
Cryptotis venezuelensis
Episoriculus baileyi
Episoriculus gruberi
Episoriculus sacratus
Episoriculus soluensis
Episoriculus umbrinus
Myosorex kabogoensis
Myosorex meesteri
Palawanosorex muscorum
Scutisorex thori
Sorex albibarbis
Sorex altoensis
Sorex chiapensis
Sorex cristobalensis
Sorex fontinalis
Sorex ibarrai
Sorex madrensis
Sorex mccarthyi
Sorex mutabilis
Sorex navigator
Sorex salvini
Sorex veraepacis
Sorex yaquina
Suncus niger
Sylvisorex corbeti

APPENDIX E

SORICIDAE SPECIES, SUBSPECIES, GEOGRAPHIC RACES, AND COLOR MORPHS

The principal objective of this data collection was an attempt to assemble a comprehensive representation encompassing every recognized species and subspecies of shrew. To achieve this goal, the specific and subspecific classification adopted in this study draws primarily from authoritative taxonomic sources including Mammal Species of the World 3rd edition (2005), Handbook of the Mammals of the World Vol. 8 (2018), and the ASM Mammal Diversity Database (2023), through the use of original papers obtained through metadata scholarly literature search engines such as the Biodiversity Heritage Library, online museum collections, and Google Scholar. Species are alphabetically for convenience. Current accepted subspecies are listed in bold; synonymized names (including geographic races or color morphs) or subspecies described since Wilson and Mittermeier 2018 are not.

Anourosorex assamensis	***assamensis***
Anourosorex schmidi	***schmidi***
Anourosorex squamipes	*capito, capnias,* ***squamipes***
Anourosorex yamashinai	***yamashinai***
Blarina brevicaudus	***aloga, angusta, brevicaudus****,* ***churchi, compacta,*** *cumberlandensis, delmarvensis,* ***hooperi,*** *jerrrychoatei,* ***kirtlandi,*** *knoxjonesi,* ***manitobensis, pallida, talpoides, telmalestes***
Blarina carolinensis	***carolinensis, minima***
Blarina hulophaga (hylophaga)	***hulophaga (hylophaga), plumbea***
Blarina peninsulae	***peninsulae***
Blarina shermani	***shermani***

Blarinella quadricauda	***quadricauda***
Blarinella wardi	***wardi***
Chimarrogale himalayica	***himalayica, varennei***
Chimarrogale leander	***leander***
Chimarrogale platycephla	***platycephla***
Chimarrogale styani	***styani***
Chodsigoa caovansunga	***caovansunga***
Chodsigoa furva	***furva***
Chodsigoa hoffmanni	***hoffmanni***
Chodsigoa hypsibia	***hypsibia, lavarum***
Chodsigoa lamula	***lamula***
Chodsigoa parca	***lowei, parca***
Chodsigoa parva	***parva***
Chodsigoa salenskii	***salenskii***
Chodsigoa smithii	***smithii***
Chodsigoa sodalis	***sodalis***
Congosorex phillipsorum	***phillipsorum***
Congosorex polli	***polli***
Congosorex verheyeni	***verheyeni***
Crocidura abscondita	***abscondita***
Crocidura afeworkbekelei	***afeworkbekelei***
Crocidura aleksandrisi	***aleksandrisi***
Crocidura allex	***allex****, alpina*
Crocidura andamanensis	***andamanensis***
Crocidura anhuiensis	***anhuiensis***

Crocidura annamitensis	***annamitensis***
Crocidura ansellorum	***ansellorum***
Crocidura arabica	***arabica***
Crocidura arispa	***arispa***
Crocidura armenica	***armenica***
Crocidura attenuata	***attenuata****, grisea, grisescens, kingiana, rubricosa*
Crocidura attila	***atilla***
Crocidura baileyi	***baileyi***
Crocidura baluensis	***baluensis***
Crocidura batakorum	***batakorum***
Crocidura batesi	***batesi***
Crocidura beata	***beata***
Crocidura beccarii	***beccarii,*** *weberi*
Crocidura bottegi	***bottegi***
Crocidura bottegoides	***bottegoides***
Crocidura brunnea	*brevicauda,* ***brunnea****, melanorhyncha,* ***pudjonica***
Crocidura buettikoferi	***buettikoferi***
Crocidura caliginea	***caliginea***
Crocidura canariensis	***canariensis***
Crocidura capsica	***caspica***
Crocidura caudipilosa	***caudipilosa***
Crocidura cinderella	***cinderella***
Crocidura congobelgica	***congobelgica***
Crocidura cranbrooki	***cranbrooki***
Crocidura crenata	***crentata***
Crocidura crossei	***crossei***
Crocidura cyanea	*argentatus, capensoides, concolor,* ***cyanea****, electa, infumata, martensii, pondoensis, vryburgensis*
Crocidura denti	***denti***
Crocidura desperata	***desparata***

Crocidura dhofarensis	***dhofarensis***
Crocidura dolichura	***dolichura***
Crocidura douceti	***douceti***
Crocidura dracula	***dracula, mansumensis,*** *praedax*
Crocidura dsinezumi	*chisai,* ***dsinezumi****, intermedia, umbrinus*
Crocidura eburnea	***eburnea***
Crocidura eisentrauti	***eisentrauti***
Crocidura elgonius	***elgonius***
Crocidura elongata	***elgonata***
Crocidura erica	***erica***
Crocidura fingui	***fingui***
Crocidura fischeri	***fischeri***
Crocidura flavescens	*capensis, cinnamomeus,* ***flavescens****, knysnae, rutilus*
Crocidura floweri	***floweri***
Crocidura foetida	***doriae, foetida, kelabit***
Crocidura foxi	***foxi****, tephra*
Crocidura fuliginosa	***fuliginosa***
Crocidura fulvastra	*arethusa, beta, diana,* ***fulvastra****, marrensis, sericeus*
Crocidura fumosa	***fumosa***
Crocidura fuscomurina	*bicolor, bovei, cuninghamei,* ***fuscomurina****, glebula, hendersoni, marita, tephragaster, woosnami*
Crocidura gathornei	***gathornei***
Crocidura glassi	***glassi***
Crocidura goliath	***goliath***
Crocidura gracilipes	***gracilipes***
Crocidura grandiceps	***grandiceps***
Crocidura grandis	***grandis***
Crocidura grassei	***grassei***
Crocidura grayi	**grayi**, halconus
Crocidura greenwoodae	**greenwoodae**

Crocidura gueldenstaedtii	*cantabra,* ***cypria, gueldenstaedtii, iculisma, mimula***
Crocidura guy	***guy***
Crocidura harenna	***harenna***
Crocidura hikmiya	***hikmiya***
Crocidura hildegardeae	*altae,* ***hildegardeae****, ibeana, lutreola, maanjae, phaios, procera, rubecula*
Crocidura hilliana	***hilliana***
Crocidura hirta	*annellata, beirae, canescens, deserti, flavidula,* ***hirta,*** *luimbalensis, sacralis, velutina*
Crocidura hispida	***hispida***
Crocidura horsfieldii	***horsfieldii****, myoides, retusa*
Crocidura huangshanensis	***huangshanensis***
Crocidura hutanis	***hutanis***
Crocidura indochinensis	***indochinensis***
Crocidura jacksoni	*amalae,* ***jacksoni***
Crocidura jenkinsi	***jenkinsi***
Crocidura jouvenetae	*ebriensis,* ***jouvenetae***
Crocidura kegoensis	***keogensis***
Crocidura kivuana	***kivuana***
Crocidura lamottei	***lamottei***
Crocidura lanosa	***lanosa***
Crocidura lasiura	*campuslincolnensis,* ***lasiurua****, lizenkani, sodyi, thomasi, yamashinai*
Crocidura latona	***latona***
Crocidura lea	***lea***
Crocidura lepidura	***lepidura****, villosa*
Crocidura leucodon	***judaica, kuzjakini, lasia, leucodon, narentae, perisca***
Crocidura levicula	***levicula***
Crocidura littoralis	***littoralis****, oritis*
Crocidura longipes	***longipes***
Crocidura lucina	***lucina***

Crocidura ludia	***ludia***
Crocidura luna	*inyangai, johnstoni,* ***luna****, umbrosa*
Crocidura lusitania	***lusitania***
Crocidura lwiroensis	***lwiroensis***
Crocidura macarthuri	***macarthuri***
Crocidura macmillani	***macmillani***
Crocidura macowi	***macowi***
Crocidura makeda	***makeda***
Crocidura malayana	*aagardi, aoris, klossi,* ***malayana***
Crocidura manengubae	***manengubae***
Crocidura maquassiensis	*malani,* ***maquassiensis***
Crocidura mariquensis	***mariquensis****,* ***neavei****, pilosa,* ***shortridgei****, sylvia*
Crocidura maurisca	***maurisca***
Crocidura maxi	***maxi***
Crocidura mdumai	***mdumai***
Crocidura mindorus	***mindorus***
Crocidura miya	***miya***
Crocidura monax	***monax***
Crocidura monticola	*bartelsii,* ***monticola***
Crocidura montis	***montis***
Crocidura munissii	***munissii***
Crocidura muricauda	***muricauda***
Crocidura musseri	***musseri***
Crocidura mutesae	***mutesae****, suahelae*
Crocidura nana	***nana***
Crocidura nanilla	***nanilla***
Crocidura narcondamica	***narcondamica***
Crocidura neglecta	***neglecta***
Crocidura negligens	*maporensis,* ***negligens****, tionis*
Crocidura negrina	***negrina***

Crocidura newmarki	***newmarki***
Crocidura nicobarica	***nicobarica***
Crocidura nigeriae	***nigeriae***
Crocidura nigricans	***nigricans***
Crocidura nigripes	***lipara, nigripes***
Crocidura nigrofusca	*ansorgei, kempi, lakiundae,* ***nigrofusca****, nilotica, nyikae, provocax, zaodon, zena*
Crocidura nimbae	***nimbae***
Crocidura nimbasilvanus	***nimbasilvanus***
Crocidura ninoyi	***ninoyi***
Crocidura niobe	***niobe***
Crocidura obscurior	***obscurior***
Crocidura olivieri	*anchietae, atlantis, bueae, cara, cinereoaenea, daphnia, darfurea, deltae, doriana, fuscosa, giffardi, hansruppi, hedenborgiana, hera, herero, kijabae, kivu, luluana, manni, martiensseni, nyansae, occidentalis,* ***olivieri****, spurrelli, sururae, tatiana, toritensis, zuleika*
Crocidura orientalis	***lawuana, orientalis***
Crocidura orii	***orii***
Crocidura pachyura	*agilis, anthonyi,* ***pachyura***
Crocidura palawanensis	***palawanensis***
Crocidura panayensis	***panayensis***
Crocidura paradoxura	*aequicauda,* ***paradoxura***
Crocidura parvipes	*boydi, bulteri, chitauensis, cuanzensis, katharina, lutrella, nisa,* ***parvipes****, sansibarica*
Crocidura pasha	***pasha***
Crocidura pergrisea	***pergrisea***
Crocidura phaeura	***phaeura***
Crocidura phanluongi	***phanluongi***
Crocidura phuquocensis	***phuquocensis***

Crocidura picea	***picea***
Crocidura pitmani	***pitmani***
Crocidura planiceps	***planiceps***
Crocidura poensis	*calabarensis, pamela,* ***poensis****, schweitzeri, soricoides*
Crocidura polia	***polia***
Crocidura pullata	***pullata***
Crocidura raineyi	***raineyi***
Crocidura ramona	***ramona***
Crocidura rapax	***kurodai, lutaoensis, rapax, tadae***
Crocidura religiosa	***religosa***
Crocidura rhoditis	***rhoditis***
Crocidura roosevelti	***roosevelti***
Crocidura russula	*chaouianensis, cintrae, foucauldi, heljanensis, osorio, peta, pulchra,* ***russula****, safii,* ***yebalensis***
Crocidura sapaensis	***sapaensis***
Crocidura selina	*schistacea,* ***selina***
Crocidura serzkyensis	***serzkyensis***
Crocidura shantungensis	*coreae,* ***hosletti****, lar, longicaudata, orientis, phaeopus,* ***quelpartis****,* ***shantungensis****, utsuryoensis*
Crocidura sibirica	*ognevi,* ***sibirica***
Crocidura sicula	*aegatensis,* ***calypso****, caudata,* ***sicula***
Crocidura silacea	*holobrunneus,* ***silacea***
Crocidura similiturba	***semiliturba***
Crocidura smithii	***debalsaci, smithii***
Crocidura sokolovi	***sokolovi***
Crocidura somalica	***somalica***
Crocidura stenocephala	***stenocephala***
Crocidura suaveolens	*antipae, aralychensis, aranea, astrabadensis, balearica, bogdanowii, caneae, cassiteridum, corsicana, cypria, cyrnensis, debeauxi, dinnicki, fumigatus, gmelina, hyrcania,*

	iliensis*, italica, lignicolor, mimuloides, monacha, mordeni,* ***pamirensis****, portali, sarda,* ***suaveolens***
Crocidura susiana	***suisiana***
Crocidura tanakae	***tanakae***
Crocidura tansaniana	***tansaniana***
Crocidura tarella	***tarella***
Crocidura tarfayensis	*agadiri, gouliminensis,* ***tarfayensis****, tiznitensis*
Crocidura telfordi	***telfordi***
Crocidura tenuis	*macklotii,* ***tenuis***
Crocidura thalia	***thalia***
Crocidura theresae	***theresae***
Crocidura thomensis	***thomensis***
Crocidura trichura	***trichura***
Crocidura turba	*angolae,* ***turba***
Crocidura ultima	***ultima***
Crocidura umbra	***umbra***
Crocidura usambarae	***usambarae***
Crocidura viaria	*bolivari, hindei, tamrinensis,* ***viara***
Crocidura virgata	***virgata***
Crocidura voi	*percivali,* ***voi***
Crocidura vorax	***vorax***
Crocidura vosmaeri	***vosmaeri***
Crocidura watasei	***watasei***
Crocidura whitakeri	*essaouiransis, matruhensis, mesatanensis,* ***whitakeri****, zaianensis*
Crocidura wimmeri	***wimmeri***
Crocidura wuchihensis	***wuchihensis***
Crocidura xantippe	***xantippe***
Crocidura yaldeni	***yaldeni***
Crocidura yankariensis	***yankariensis***

Crocidura zaitsevi	***zaitsevi***
Crocidura zaphiri	*simiolus*, ***zaphiri***
Crocidura zarudnyi	*streetorum, tatianae*, ***zarudnyi***
Crocidura zimmeri	***zimmeri***
Crocidura zimmermanni	***zimmermanni***
Crossogale hantu	***hantu***
Crossogale phaeura	***phaeura***
Crossogale sumatrana	***sumatrana***
Cryptotis alticola	***alticola***
Cryptotis aroensis	***aroensis***
Cryptotis berlandieri	***berlandieri***, *macer*
Cryptotis brachyonyx	***brachyonyx***
Cryptotis cavatorculus	***cavatorculus***
Cryptotis celaque	***celaque***
Cryptotis colombianus	***colombianus***
Cryptotis dinirensis	***dinirensis***
Cryptotis endersi	***endersi***
Cryptotis equatoris	***equatoris***
Cryptotis evaristoi	***evaristoi***
Cryptotis goldmani	*fossor, frontailis*, ***goldmani***, ***machetes***
Cryptotis goodwini	***goodwini***
Cryptotis gracilis	***gracilis***
Cryptotis griseoventris	***griseoventris***
Cryptotis hondurensis	***hondurensis***
Cryptotis lacandonensis	***lacandonensis***
Cryptotis lacertosus	***lacertosus***
Cryptotis magnimana	***magnimana***
Cryptotis magnus	***magnus***

Cryptotis mam	***mam***
Cryptotis mayensis	***mayensis***
Cryptotis mccarthyi	***mccarthyi***
Cryptotis medellinius	***medellinius***
Cryptotis meridensis	***meridensis***
Cryptotis merriami	***merriami***
Cryptotis merus	***merus***
Cryptotis mexicanus	***mexicanus***
Cryptotis monteverdensis	***monteverdensis***
Cryptotis montivagus	***montivagus***
Cryptotis nelsoni	***nelsoni***
Cryptotis niausa	***niausa***
Cryptotis nigrescens	***nigrescens***
Cryptotis obscurus	***obscurus***
Cryptotis oreoryctes	***oreoryctes***
Cryptotis orphilus	*olivaceus,* ***orophilus***
Cryptotis osgoodi	***osgoodi***
Cryptotis parvus	*elasson,* ***floridanus****, harlani, pergracilis,* ***parvus***
Cryptotis peregrinus	***peregrinus***
Cryptotis perijensis	***perijensis***
Cryptotis peruviensis	***peruviensis***
Cryptotis phillipsii	***phillipsii***
Cryptotis pueblensis	***pueblensis***
Cryptotis soricinus	***soricinus***
Cryptotis squamipes	***squamipes***
Cryptotis tamensis	***tamensis***
Cryptotis thomasi	***thomasi***
Cryptotis tropicalis	***tropicalis***
Cryptotis venezuelensis	***venezuelensis***

Diplomesodon pulchellus	***pulchellus***
Episoriculus baileyi	***baileyi***
Episoriculus caudatus	***caudatus***
Episoriculus gruberi	***gruberi***
Episoriculus leucops	***leucops***
Episoriculus macrurus	***irene, macrurus***
Episoriculus sacratus	***sacratus***
Episoriculus soluensis	***soluensis***
Episoriculus umbrinus	***umbrinus***
Feroculus feroculus	***feroculus****, macropus*
Megasorex gigas	***gigas***
Myosorex babultii	***baultii***
Myosorex blarina	***blarina***
Myosorex bururiensis	***bururiensis***
Myosorex cafer	***cafer***
Myosorex eisentauti	***eisentauti***
Myosorex geata	***geata***
Myosorex gnoskei	***gnoskei***
Myosorex jejei	***jeje***
Myosorex kabogoensis	***kabogoensis***
Myosorex kihaulei	***kihaulei***
Myosorex longicaudatus	***boosnami, longicaudatus***
Myosorex meesteri	***meesteri***
Myosorex okuensis	***okuensis***
Myosorex rumpii	***rumpii***
Myosorex schalleri	***scalleri***

Myosorex sclateri	***sclateri***
Myosorex tenuis	***tenuis***
Myosorex varius	*pondoensis, transvaalensis,* ***varius***
Myosorex zinki	***zinki***
Nectogale elegans	***elegans***
Neomys anomalus	***anomalus, josti, milleri, mokrzeckii, rhenanus, soricoides***
Neomys fodiens	*argenteus,* ***bicolor****, brachyotis, dagestanicus,* ***fodiens****, minor, naias,* ***niethammeri****,* ***orientis****, watasei*
Neomys teres	***balkaricus, leptodactylus, schelkovnikovi, teres***
Notiosorex cockrumi	***cockrumi***
Notiosorex crawfordi	***crawfordi***
Notiosorex evotis	***evoits***
Notiosorex tataticuli	*arroyoi, ocanai, tataiculi*
Notiosorex villai	***villai***
Palawanosorex ater	***ater***
Palawanosorex muscorum	***muscorum***
Parablarinella griselda	***griselda***
Paracrocidura graueri	***graueri***
Paracrocidura maxima	***maxima***
Paracrocidura schoutedeni	*camerunensis,* ***schoutedeni***
Pseudosoriculus fumidus	***fumidus***
Ruwenzorisorex suncoides	***suncoides***

Scutisorex somereni	*congicus,* ***somereni***
Scutisorex thori	***thori***
Solisorex pearsoni	***pearsoni***
Sorex alaskanus	***alaskanus***
Sorex albibarbis	***albibarbis***
Sorex albibarbis	***gloveralleni, labradorensis, punctulatus, turneri***
Sorex alpinus	***alpinus, hercynicus, tatricus***
Sorex altoensis	***altoensis***
Sorex antinorii	***antinorii,*** *arunchi, averini, crassicaudatus*
Sorex araneus	*alticola,* ***araneus,*** *bergensis, bohemicus, bolkayi, carpathicus, castaneus, concinnus, csikii, daubentonii, eleonorae, grantii, hermanni, ignotus, iochanseni, labiosus, macrotrichus, marchicus, petrovi, peucinius, pulcher, pyrenaicus, quadricaudatus, Rhinolophus, rypheus, tetragonurus,* ***tomensis,*** *uralensis, vulgaris, wettsteini*
Sorex arcticus	***arcticus, laricorum,*** *richardsonii, sphangnicola*
Sorex arizonae	***arizonae***
Sorex asper	***asper***
Sorex bairdi	***bairdi, permiliensis***
Sorex bedfordiae	***bedfordiae,*** *fuemeolus****, gomphus, nepalensis, wardi***
Sorex bendirii	***albiventer, bendirii, palmeri***
Sorex buchariensis	***buchariensis***
Sorex caecutiens	*altaicus,* ***annexus,*** *araneoides,* ***caecutiens,*** *centralis, hallamontanus, insularis, karpinskii,* ***koreni, kunashirensis, lapponicus,*** *longicaudatus,* ***macropygmaeus,*** *okhotinae, orii,* ***pleskei,*** *rozanovi,* ***saevus****, tasicus, tungussensis*
Sorex camtschaticus	***camtschaticus***
Sorex cansulus	***cansulus***
Sorex chiapensis	***chiapensis***

Sorex cinereus	*acadicus,* ***cinereus, hollisteri, lesueurii, miscix, nigriculus, ohionensis,*** *personatus,* ***streatori***
Sorex coronatus	***coronatus,*** *euronotus, fretalis, personatus, santonus*
Sorex cristobalensis	***cristobalensis***
Sorex cylindricauda	***cylindricauda***
Sorex daphaenodon	***daphaenodon,*** *megalotis,* ***sanguinidens, scaloni***
Sorex dispar	***blitchi, dispar, gaspensis,*** *kirtlandi*
Sorex emarginatus	***emarginatus***
Sorex excelsus	***excelsus***
Sorex fontinalis	***fontinalis***
Sorex fumeus	***fumeus, umbrosus***
Sorex gracillimus	***gracillimus. granti,*** *hyojironis, kurodai,* ***minor,*** *natalae*
Sorex granaries	***granarius***
Sorex haydeni	***haydeni***
Sorex hosonoi	***honsonoi***
Sorex hoyi	***alnorum, eximius, hoyi,*** *intervectus,* ***montanus, thompsoni,*** *washingtoni,* ***winnemana***
Sorex ibarrai	***ibarrai***
Sorex isodon	***gravesi, isodon,*** *montanus, princeps,* ***ruthenus, sachalinensis***
Sorex ixtlanensis	***ixtlanensis***
Sorex jacksoni	***jacksoni***
Sorex leucogaster	*beringianus,* ***leucogaster***
Sorex longirostris	***eionis, fisheri, longirostris***
Sorex lyelli	***lyelli***
Sorex macrodon	***macrodon***
Sorex madrensis	***madrensis***
Sorex maritimensis	***maritimensis***
Sorex mccarthyi	***mccarthyi***
Sorex mediopua	***mediopua***
Sorex merriami	*leucogenys,* ***merriami***

Sorex milleri	***milleri***
Sorex minutissimus	***abnormis, barabensis,*** *burneyi,* ***caudata,*** *czekanovskii, hawkeri, ishikawai,* ***karelicus, minutissimus, neglectus, stroganovi, tscherskii, tschuktschorum, ussuriensis, yukonicus***
Sorex minutus	***becki,*** *canaliculatus,* ***carpetanus,*** *exilis,* ***gymnurus, heptapotamicus,*** *insulabellae, kastchenkoi,* ***lucanius,*** *melanderi, minimus,* ***minutus,*** *pumilio, pygmaeus, rusticus*
Sorex mirabilis	***kutscheruki, mirabilis***
Sorex monticolus	***alascensis, calvertensis,*** *dobsoni, durangae,* ***elassodon,*** *glacialis,* ***insularis, isolatus, longicauda,*** *longiquus,* ***malitiosus,*** *mixtus,* ***monticolus,*** *obscuroides,* ***obscurus, parvidens, prevostensis, setosus, shumaginensis, soperi***
Sorex mutabilis	***mutabilis***
Sorex nanus	***nanus***
Sorex navigator	***brooksi, navigator***
Sorex neomexicanus	***neomexicanus***
Sorex oreopolus	***oreopolus***
Sorex orizabae	***orizabae***
Sorex ornatus	***californicus, juncensis, lagunae, ornatus, relictus, salaries, salicornicus, sinuosus,*** *trigonirostris,* ***willetti,***
Sorex pacificus	***cascadensis, pacificus***
Sorex palustris	***hydrobadistes, palustris***
Sorex planiceps	***planiceps***
Sorex portenkoi	***portenkoi***
Sorex preblei	***preblei***
Sorex pribilofensis	*hydrodromus,* ***priblofensis***
Sorex raddei	*batis,* ***raddei***
Sorex roboratus	*dukelskiae,* ***juakutenis, platycranius, roboratus, thomasi,*** *turuchanensis,* ***vir***
Sorex rohweri	***rohweri***
Sorex salvini	***salvini***
Sorex samniticus	*garganicus, monsvairani,* ***samniticus***

Sorex satunini	***satunini, stavropolica***
Sorex saussurei	*godmani,* ***saussurei***
Sorex sclateri	***sclateri***
Sorex shinto	***sadonis, shikokensis, shinto***
Sorex sinalis	***sinalis***
Sorex sonomae	***sonomae, tenelliodus***
Sorex stizodon	***stizodon***
Sorex tenellus	*myops,* ***tenellus***
Sorex thibetanus	***kozlovi, thibetanus***
Sorex trowbridgii	***destruction, humboldtensis, mariposae, montereyensis, trowbridgii***
Sorex tundrensis	*amasari, amazari,* ***baikalensis, borealis, buxtoni,*** *irkutensis, jenissejensis, middendorfii,* ***parvicaudatus, petschorae, schnitnikovi, sibiriensis, transrypheus, tundrensis,*** *ultimus*
Sorex ugyunak	***ugyunak***
Sorex unguiculatus	***unguiculatus,*** *yesoensis*
Sorex vagrans	*amoenus,* ***halicoetes,*** *malitiosus, nevadensis,* ***paludivagus****, shastensis,* ***vagrans****, vancouverensis*
Sorex ventralis	***ventralis***
Sorex veraecrucis	***oaxacae, veraecrucis***
Sorex veraepacis	*caudatus,* ***veraepacis***
Sorex volnuchini	***colchicus,*** *dahli,* ***volnuchini***
Sorex yaquina	*yaquina*
Soriculus nigrescens	*caurinus, centralis,* ***minor, nigrescens,*** *pahari, radulus*
Suncus aequatorius	***aequatorius***
Suncus dayi	***dayi***
Suncus etruscus	***etruscus,*** *hodgsoni, macrotis,* ***madagascariensis,*** *coquerelii, melanodon,* ***micronyx, nanula,*** *nitidofulva,* ***nudipes****,* ***perrottetti,*** *pygmaeoides, subflava, travancorensis*
Suncus fellowesgordoni	***fellowesgordoni***

Suncus hosei	***hosei***
Suncus hututsi	***hututsi***
Suncus infinitesimus	*chriseos,* ***infinitesimus,*** *ubanguiensis*
Suncus lixa	*gratulus,* ***lixa***
Suncus malayanus	***malayanus***
Suncus megalurus	*angolensis, gemmeus, irene,* ***megalurus,*** *phaeopus, sorella*
Suncus mertensi	***mertensi***
Suncus montanus	*kelaarti,* ***montanus***
Suncus murinus	*blanfordi, caerulescens, caeruleus, crassicaudus, edwardsiana, fulvocinereus, giganteus, griffithii, indicus, kandianus, leucops, luzoniensis, mulleri,* ***murinus,*** *nemorivagus, occultidens, palawanensis, riukiuanus, rubicunda, sacer, saturatior, serpentarius, sindensis, soccatus, subfulva, sumatranus, swinhoei, temmincki, tytleri, unicolor, viridescens*
Suncus niger	*malabaricus,* ***niger***
Suncus remyi	***remyi***
Suncus stoliczkanus	*bidianus, leucogenys,* ***stoliczkanus,*** *subfulvus*
Suncus varilla	*minor, natalensis, orangiae, tulbaghensis,* ***varilla,*** *warreni*
Suncus zeylanicus	***zeylanicus***

Surdisorex norae	***norae***
Surdisorex polulus	***polulus***
Surdisorex schlitteri	***schlitteri***

Sylvisorex akaibei	***akaibei***
Sylvisorex camerunensis	***camerunensis***
Sylvisorex corbeti	***corbeti***
Sylvisorex granti	***granti, mundus***
Sylvisorex howelli	***howelli, usambarensis***
Sylvisorex isabellae	***isabellae***
Sylvisorex johnstoni	*dieterleni,* ***johnstoni***

Sylvisorex konganensis	***konganensis***
Sylvisorex lunaris	***lunaris,*** *ruandae*
Sylvisorex morio	***morio***
Sylvisorex ollula	***ollula***
Sylvisorex oriundus	***oriundus***
Sylvisorex pluvialis	***pluvialis***
Sylvisorex silvanorum	***silvanorum***
Sylvlisorex vulcanorum	***vulcanorum***

APPENDIX F

REFERENCES FOR SORICIDAE SPECIES, SUBSPECIES, GEOGRAPHIC RACES, AND COLOR MORPHS

Species	*Literature*
Anourosorex assamensis	(Anderson 1881, Blanford 1888, Tate 1947, Motokawa and Lin 2002)
Anourosorex schmidi	(Petter 1963, Motokawa and Lin 2002)
Anourosorex squamipes capito	(Allen 1923, Motokawa and Lin 2002)
Anourosorex squamipes capnias	(Allen 1923, Motokawa and Lin 2002)
Anourosorex squamipes squamipes	(Allen 1923, 1938, Motokawa and Lin 2002, Saito et al. 2021)
Annorosorex squamipes sp.	(Tate 1947, Stone 1995, Nowak 1999, Smith and Xie 2013)
Anourosorex yamashinai	(Tate 1947, Jameson and Jones 1977, Motokawa and Lin 2002, Smith and Xie 2013)
Blarina brevicaudus aloga	(Merriam 1895*a*, Bangs 1902, Anthony 1928, Bole and Moulthrop 1942, Whitaker and Hamilton 1998, Webster et al. 2011)
Blarina brevicaudus angusta	(van Zyll de Jong 1983, Webster et al. 2011)
Blarina brevicaudus brevicaudus	(Merriam 1895*a*, Anthony 1928, Lyon 1936, Bole and Moulthrop 1942, Jones 1964, Schlitter and Bowles 1967, Jones et al. 1983, van Zyll de Jong 1983, Schwartz and Schwartz 2001, Webster et al. 2011)
Blarina brevicaudus churchi	(Bole and Moulthrop 1942, Webster et al. 2011)
Blarina brevicaudus compacta	(Bangs 1902, Anthony 1928, Whitaker and Hamilton 1998, Webster et al. 2011)
Blarina brevicaudus cumberlandensis	(Webster et al. 2011, Best and Dusi 2014)
Blarina brevicaudus delmarvensis	(J. L. Paradiso 1969, Webster et al. 2011)
Blarina brevicaudus hooperi	(Bole and Moulthrop 1942, van Zyll de Jong 1983, Webster et al. 2011)
Blarina brevicaudus jerrychoatei	(Webster et al. 2011; Woodman and Wilken 2019)
Blarina brevicaudus kirtlandi	(Bole and Moulthrop 1942, Lindsay 1960, Mumford and Whitaker 1982, Webster et al. 1985, 2011, Merritt 1987, Whitaker and Hamilton 1998, Hoffmeister 2002)
Blarina brevicaudus knoxjonesi	(Webster et al. 2011, Hess 2016)
Blarina brevicaudus manitobensis	(van Zyll de Jong 1983, Webster et al. 2011)
Blarina brevicaudus pallida	(Bole and Moulthrop 1942, van Zyll de Jong 1983, Webster et al. 2011)
Blarina brevicaudus talpoides	(Merriam 1895*a*, Bole and Moulthrop 1942, Cockrum 1952, van Zyll de Jong 1983, Whitaker

	and Hamilton 1998, Webster et al. 2011, Hess 2016, Woodman and Wilken 2019)
Blarina brevicaudus telmalestes	(Merriam 1895*a*, Anthony 1928, Hall 1981, Whitaker and Hamilton 1998, Webster et al. 2011)
Blarina brevicaudus sp.	(Cory 1912, Hall 1981, Wilson and Ruff 1999, Reid 2006, Hofmann 2013, Hess 2016)
Blarina carolinensis carolinensis	(Merriam 1895*a*, Cory 1912, Anthony 1928, Lyon 1936, Bole and Moulthrop 1942, Hall 1955, 1981, Hamilton 1955, Golley 1962, Jones et al. 1983, Webster et al. 1985, Merritt et al. 1994, Genoways and Choate 1998, Whitaker and Hamilton 1998, McCay 2001, Schwartz and Schwartz 2001, Hoffmeister 2002, Reid 2006, Hofmann 2013, Best and Dusi 2014, Hess 2016)
Blarina carolinensis minima	(Davis 1941*a*, Lowery 1974, Genoways and Choate 1998, McCay 2001, Schwartz and Schwartz 2001)
Blarina carolinensis sp.	(Wilson and Ruff 1999, Reid 2006, Woodman and Wilken 2019)
Blarina hulophaga hulophaga	(Anthony 1928, Davis 1941*a*, Jones 1964, Schlitter and Bowles 1967, Thompson et al. 2011)
Blarina hulophaga plumbea	(Davis 1941*a*, Jones et al. 2007)
Blarina hulophaga sp.	(Cockrum 1952, Wilson and Ruff 1999, Reid 2006)
Blarina peninsulae	(Merriam 1895*a*, Anthony 1928, Hamilton 1955, Genoways and Choate 1998, Whitaker and Hamilton 1998, McCay 2001)
Blarina shermani	(Hamilton 1955, Whitaker and Hamilton 1998)
Blarinella quadraticauda	(Allen 1938, Tate 1947, Stone 1995, Lunde et al. 2003, Smith and Xie 2013, Woodman and Wilken 2019)
Blarinella wardi	(Allen 1938, Tate 1947, Lunde et al. 2003, Smith and Xie 2013)
Chimarrogale himalayica himalayica	(Blyth 1856, Anderson 1881, Blanford 1888, Allen 1938, Tate 1947, Harrison 1958, Jameson and Jones 1977, Arai et al. 1985, Motokawa et al. 2006)
Chimarrogale himalayica varennei	(Tate 1947, Harrison 1958, Van Peenen et al. 1969, Motokawa et al. 2006)
Chimarrogale himalayica sp.	(Stone 1995, Smith and Xie 2013)
Chimarrogale leander	(Allen 1938, Tate 1947, Harrison 1958, Arai et al. 1985, Motokawa et al. 2006)
Chimarrogale platycephla	(Tate 1947, Harrison 1958, Abe 1967, Arai et al. 1985, Stone 1995, Motokawa et al. 2006, Ohdachi et al. 2015)
Chimarrogale styani	(Allen 1938, Tate 1947, Harrison 1958, Smith and Xie 2013)
Chodsigoa caovansunga	(Lunde et al. 2003, He et al. 2013, Chen et al. 2017)
Chodsigoa furva	(Tate 1947, Hoffmann 1985*a*, Chen et al. 2017)

Chodsigoa hoffmanni	(Chen et al. 2017)
Chodsigoa hypsibia hypsibia	(Allen 1938, Tate 1947, Hoffmann 1985*a*)
Chodsigoa hypsibia larvarum	(Allen 1938, Tate 1947, Hoffmann 1985*a*)
Chodsigoa hypsibia sp.	(Smith and Xie 2013, Chen et al. 2017)
Chodsigoa lamula	(Allen 1938, Tate 1947, Hoffmann 1985*a*, Lunde et al. 2003, Smith and Xie 2013)
Chodsigoa parca lowei	(Tate 1947, Hoffmann 1985*a*, Lunde et al. 2003, Chen et al. 2017)
Chodsigoa parca parca	(Allen 1923, 1938, Tate 1947, Hoffmann 1985*a*, Lunde et al. 2003, Smith and Xie 2013, Chen et al. 2017)
Chodsigoa parca sp.	(Stone 1995)
Chodsigoa parva	(Allen 1923, 1938, Tate 1947, Hoffmann 1985*a*, Lunde et al. 2003, Chen et al. 2017)
Chodsigoa salenskii	(Allen 1938, Tate 1947, Hoffmann 1985*a*, Smith and Xie 2013)
Chodsigoa smithii	(Allen 1938, Tate 1947, Hoffmann 1985*a*, Stone 1995, Smith and Xie 2013, Chen et al. 2017)
Chodsigoa sodalis	(Smith and Xie 2013, Chen et al. 2017)
Congosorex phillipsorum	(Stanley et al. 2005, Kingdon et al. 2013)
Congosorex polli	(Stanley et al. 2005, Kingdon et al. 2013)
Congosorex verheyeni	(Stanley et al. 2005, Kingdon et al. 2013)
Crocidura abscondita	(Esselstyn et al. 2014, Demos et al. 2016)
Crocidura afeworkbekelei	(Lavrenchenko et al. 2016)
Crocidura aleksandrisi	(Vesmanis 1977, Aulagnier 2009, Kingdon et al. 2013)
Crocidura allex allex	(Dollman 1916*a*, Hollister 1918)
Crocidura allex alpina	(Dollman 1916*a*, Hollister 1918)
Crocidura allex sp.	(Osgood 1910, Kingdon et al. 2013)
Crocidura andamanensis	(Miller 1902, Jenkins 1976, Das 1999, Alfred and Chakraborty 2002, Venkataraman et al. 2013, Rangasamy et al. 2019)
Crocidura anhuiensis	(Yang et al. 2020)
Crocidura annamitensis	(Jenkins et al. 2009, Yang et al. 2020)
Crocidura ansellorum	(Hutterer and Dippenaar 1987, Kerbis Peterhans et al. 2013, Kingdon et al. 2013)
Crocidura arabica	(Hutterer and Harrison 1988, Hutterer and Kock 2002, Benda and Nasher 2006)
Crocidura arispa	(Spitzenberger 1971, Jenkins 1976, Tez and Kefelioglu 2000, Aulagnier 2009)
Crocidura armenica	(Aulagnier 2009)
Crocidura attenuata attenuata	(Anderson 1881, Allen 1938, Jenkins 1976, Heaney and Timm 1983, Jenkins and Smith 1995, Ruedi 1995, Jiang and Hoffmann 2001)
Crocidura attenuata grisea	(Tate 1947)

Crocidura attenuata grisecens	(Allen 1938, Tate 1947)
Crocidura attenuate kingiana	(Tate 1947)
Crocidura attenuata rubricosa	(Anderson 1881, Tate 1947, Jenkins 1976, Jenkins and Smith 1995)
Crocidura attenuata sp.	(Tate 1947, Jenkins 1982, 2013, Jenkins et al. 1998, 2009, 2010, Lunde et al. 2003, 2004, Hutterer 2007, Abramov et al. 2012, Smith and Xie 2013, Li et al. 2019, Yang et al. 2020)
Crocidura attenuata sp. Batan Island	(Hutterer 2007)
Crocidura attila	(Dollman 1915*a*, Hutterer et al. 1992, Kingdon et al. 2013)
Crocidura baileyi	(Osgood 1936, Hutterer 1980, Yalden and Largen 1992, Kingdon et al. 2013, Taborska 2014, Lavrenchenko et al. 2016, Konečný et al. 2020)
Crocidura baluensis	(Koller 1929, Jenkins 1976, Ruedi 1995, Earl of Cranbrook Hon FLS and Piper 2008, Phillipps 2016, Hinckley et al. 2022)
Crocidura batakorum	(Hutterer 2007, Esselstyn et al. 2011)
Crocidura batesi	(Dollman 1915*a*, Fisher 2004, Kingdon et al. 2013)
Crocidura beata	(Miller 1910, Merritt et al. 1994, Hutterer 2007, Esselstyn et al. 2011)
Crocidura beccarii beccarii	(Jentink 1888, Koller 1929)
Crocidura beccarii weberi	(Koller 1929)
Crocidura beccarii sp.	(Ruedi 1995)
Crocidura bottegi	(Dollman 1916*b*, Hutterer and Happold 1983, Hutterer and Dippenaar 1987, Hutterer and Kock 2002, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013, Konečný et al. 2020)
Crocidura bottegoides	(Yalden and Largen 1992, Hutterer and Kock 2002, Kingdon et al. 2013)
Crocidura brunnea brevicauda	(Koller 1929)
Crocidura brunnea brunnea	(Jentink 1888, Koller 1929, Ruedi 1995)
Crocidura brunnea melanorhyncha	(Koller 1929)
Crocidura brunnea pudjonica	(Ruedi 1995)
Crocidura brunnea sp.	(Esselstyn et al. 2014)
Crocidura buettikoferi	(Dollman 1915*b*, Hutterer 1983*a*, Hutterer and Happold 1983, Kingdon et al. 2013)
Crocidura caliginea	(Hollister 1916, Kingdon et al. 2013)
Crocidura canariensis	(Martin et al. 1984, Hutterer and Dippenaar 1987, Molina and Hutterer 1989, Aulagnier 2009)
Crocidura caspica	(Thomas 1907, Vereshchagin 1967, Jenkins 1976)
Crocidura caudipilosa	(Esselstyn et al. 2019)
Crocidura cinderella	(Dollman 1916*b*, Kingdon et al. 2013)
Crocidura congobelgica	(Hollister 1916, Kingdon et al. 2013)
Crocidura cranbrooki	(Jenkins et al. 2009, Yang et al. 2020)

Crocidura crenata	(Hutterer and Schlitter 1996, Fisher 2004, Kingdon et al. 2013)
Crocidura crossei	(Dollman 1916*a*, Hutterer and Happold 1983, Kingdon et al. 2013)
Crocidura cyanea argentatus	(Schlater 1901, Dollman 1915*c*)
Crocidura cyanea capensoides	(Dollman 1915*c*)
Crocidura cyanea cyanea	(Dollman 1915*c*, 1916*b*, Meester 1963)
Crocidura cyanea electa	(Dollman 1915*c*, Meester 1963)
Crocidura cyanea martensii	(Schlater 1901, Dollman 1915*c*, Meester 1963)
Crocidura cyanea pondoensis	(Dollman 1915*d*)
Crocidura cyanea vryburgensis	(Roberts 1946, Meester 1963)
Crocidura cyanea sp.	(Schlater 1901, Kingdon et al. 2013)
Crocidura denti	(Dollman 1915*c*, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura desperata	(Hutterer et al. 1991, Kingdon et al. 2013)
Crocidura dhofarensis	(Hutterer and Harrison 1988, Benda and Nasher 2006)
Crocidura dolichura	(Dollman 1916*b*, Hutterer and Happold 1983, Merritt et al. 1994, Hutterer and Schlitter 1996, Thorn and Kerbis Peterhans 2009, Kerbis Peterhans et al. 2013, Kingdon et al. 2013)
Crocidura douceti	(De Balsac and Aellen 1958, Hutterer and Happold 1983, Kingdon et al. 2013)
Crocidura dracula dracula	(Allen 1938, Tate 1947, Jenkins 1976, Heaney and Timm 1983, Jiang and Hoffmann 2001, Hai et al. 2017)
Crocidura dracula mansumensis	(Carter 1942, Tate 1947)
Crocidura dracula praedax	(Tate 1947, Ruedi 1995)
Crocidura dracula sp.	(Van Peenen et al. 1969, Jenkins et al. 2013)
Crocidura dsinezumi chisai	(Jameson and Jones 1977)
Crocidura dsinezumi dsinezumi	(Abe 1967, Ohdachi et al. 2015)
Crocidura dsinezumi intermedia	(Kuroda 1924, Ellerman and Morrison-Scott 1966)
Crocidura dsinezumi umbrinus	(Tate 1947, Abe 1967)
Crocidura dsinezumi sp.	(Tate 1947, Jenkins 1976, Stone 1995)
Crocidura eburnea	(De Balsac and Aellen 1958, Jacquet et al. 2014)
Crocidura eisentrauti	(Kingdon et al. 2013)
Crocidura elgonius	(Dollman 1916*b*, Hollister 1918, Hutterer and Dippenaar 1987, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura elongata	(Koller 1929, Ruedi 1995)
Crocidura erica	(Dollman 1915*a*, Kingdon et al. 2013)
Crocidura fingui	(Ceríaco et al. 2015)
Crocidura fischeri	(Dollman 1915*a*, Kingdon et al. 2013)
Crocidura flavescens cinnamomeus	(Schlater 1901, Meester 1963)

Crocidura flavescens flavescens	(Dollman 1915*e*, Roberts 1946, Meester 1963, De Balsac and Barloy 1966)
Crocidura flavescens knysnae	(Roberts 1946, Meester 1963)
Crocidura flavescens rutilus	(Meester 1963)
Crocidura flavescens sp.	(Kingdon et al. 2013)
Crocidura floweri	(Dollman 1916*b*, Osborn and Helmy 1980, Aulagnier 2009, Kingdon et al. 2013)
Crocidura foetida doriae	(Jentink 1888, Koller 1929, Ruedi 1995, Earl of Cranbrook Hon FLS and Piper 2008, Hinckley et al. 2022)
Crocidura foetida foetida	(Jentink 1888, Koller 1929, Ruedi 1995, Earl of Cranbrook Hon FLS and Piper 2008, Hinckley et al. 2022)
Crocidura foetida kelabit	(Ruedi 1995, Earl of Cranbrook Hon FLS and Piper 2008, Phillipps 2016, Hinckley et al. 2022)
Crocidura foxi foxi	(Dollman 1915*a*, Hutterer and Happold 1983)
Crocidura foxi tephra	(Setzer 1956)
Crocidura foxi sp.	(Kingdon et al. 2013)
Crocidura fuliginosa	(Blyth 1856, Anderson 1881, Blanford 1888, Koller 1929, Tate 1947, Medway 1978, Jenkins 1982, Jenkins and Smith 1995, Ruedi 1995, Lunde et al. 2003, 2004, Jenkins et al. 2009, 2010, Abramov et al. 2012, Smith and Xie 2013, Zhang et al. 2019, Yang et al. 2020)
Crocidura fulvastra arethusa	(Dollman 1915*a*)
Crocidura fulvastra beta	(Dollman 1915*d*)
Crocidura fulvastra diana	(Dollman 1915*d*)
Crocidura fulvastra fulvastra	(Dollman 1916*b*, Hutterer and Happold 1983)
Crocidura fulvastra marrensis	(Setzer 1956)
Crocidura fulvastra sericeus	(Dollman 1915*d*, Setzer 1956, Vesmanis and Vesmanis 1979)
Crocidura fulvastra sp.	(Kingdon et al. 2013)
Crocidura fumosa	(Dollman 1915*c*, Hollister 1918, Dippenaar and Meester 1989, Kingdon et al. 2013)
Crocidura fuscomurina bicolor	(Dollman 1916*b*, Meester 1963, Hutterer 1980, 1983*b*, Hutterer and Happold 1983, Kingdon et al. 2013)
Crocidura fuscomurina bovei	(Dollman 1915*c*)
Crocidura fuscomurina cuninghamei	(Dollman 1916*b*, Allen and Loveridge 1933, Hutterer 1983*b*)
Crocidura fuscomurina fuscomurina	(Dollman 1916*b*, Hutterer 1983*b*)
Crocidura fuscomurina glebula	(Dollman 1916*b*)
Crocidura fuscomurina herdersoni	(Dollman 1916*b*, Hutterer 1983*b*)
Crocidura fuscomurina marita	(Setzer 1956, Hutterer 1983*b*, Alfred and Chakraborty 2002)
Crocidura fuscomurina tephragaster	(Setzer 1956, Hutterer 1983*b*)

Crocidura fuscomurina woosnami	(Dollman 1916*b*, Roberts 1932, Meester 1963, Hutterer 1983*b*)
Crocidura fuscomurina sp.	(Thorn and Kerbis Peterhans 2009, Kerbis Peterhans et al. 2013)
Crocidura gathornei	(Jenkins 2013, Yang et al. 2020)
Crocidura glassi	(Hutterer 1980, Yalden and Largen 1992, Kingdon et al. 2013, Taborska 2014, Lavrenchenko et al. 2016)
Crocidura goliath	(De Balsac 1959, Fisher 2004, Jacquet et al. 2013, Kingdon et al. 2013)
Crocidura gracilipes	(Dollman 1915*c*, Kingdon et al. 2013)
Crocidura grandiceps	(Hutterer 1983*a*, Hutterer and Happold 1983, Hutterer and Schlitter 1996, Kingdon et al. 2013)
Crocidura grandis	(Miller 1910, Merritt et al. 1994, Hutterer 2007, Esselstyn and Goodman 2010, Esselstyn et al. 2011)
Crocidura grassei	(Merritt et al. 1994, Fisher 2004, Kingdon et al. 2013)
Crocidura grayi grayi	(Merritt et al. 1994, Esselstyn et al. 2011)
Crocidura grayi halconus	(Miller 1910, Jenkins 1976, Merritt et al. 1994, Esselstyn et al. 2011)
Crocidura grayi sp.	(Hutterer 2007)
Crocidura greenwoodae	(Kingdon et al. 2013)
Crocidura gueldenstaedtii cantabra	(Trouessart 1910, Miller 1912, Cabrera 1914)
Crocidura gueldenstaedtii cypria	(Catzeflis et al. 1985)
Crocidura gueldenstaedtii gueldenstaedtii	(Ognev 1928, Richter 1966, Lay 1967, Vereshchagin 1967, Spitzenberger 1970*a*, Jenkins 1976, Redding and Lay 1978, Catzeflis et al. 1985, Hutterer and Harrison 1988, Tez 1999, Hutterer and Kock 2002)
Crocidura gueldenstaedtii iculisma	(Trouessart 1910, Miller 1912, Ellerman and Morrison-Scott 1966, Mori et al. 2020)
Crocidura gueldenstaedtii mimula	(Trouessart 1910, Miller 1912, Bauer 1960, Witte 1964, Jenkins 1976, Catzeflis et al. 1985, Mori et al. 2020)
Crocidura guy	(Jenkins et al. 2009, 2013, Yang et al. 2020)
Crocidura harenna	(Yalden and Largen 1992, Kerbis Peterhans et al. 2013, Kingdon et al. 2013, Konečný et al. 2020)
Crocidura hikmiya	(Meegaskumbura et al. 2007, Yang et al. 2020)
Crocidura hildegardeae altae	(Heller 1912, Dollman 1916*a*, Hollister 1918)
Crocidura hildegardeae hildegardeae	(Dollman 1916*a*, Hollister 1918, Allen and Loveridge 1933)
Crocidura hildegardeae ibeana	(Dollman 1915*c*)
Crocidura hildegardeae lutreola	(Heller 1912, Dollman 1915*c*)
Crocidura hildegardeae maanjae	(Heller 1910, Dollman 1916*a*)
Crocidura hildegardeae phaios	(Setzer 1956)
Crocidura hildegardeae procera	(Heller 1912, Dollman 1916*a*)

Crocidura hildegardeae rubecula	(Dollman 1916*a*)
Crocidura hildegardeae sp.	(Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura hilliana	(Jenkins and Smith 1995)
Crocidura hirta annellata	(Dollman 1915*d*)
Crocidura hirta beirae	(Dollman 1915*d*, Meester 1963)
Crocidura hirta canescens	(Dollman 1915*d*)
Crocidura hirta deserti	(Dollman 1915*a*, Roberts 1932, Meester 1963)
Crocidura hirta flavidula	(Dollman 1915*d*, Meester 1963)
Crocidura hirta hirta	(Dollman 1915*d*, Meester 1963, Kingdon et al. 2013)
Crocidura hirta sacralis	(Dollman 1915*d*)
Crocidura hirta velutina	(Dollman 1915*d*)
Crocidura hispida	(Thomas 1913, Jenkins 1976, Alfred et al. 2006, Venkataraman et al. 2013)
Crocidura horsfieldii horsfieldii	(Blyth 1856, Anderson 1881, Blanford 1888, Jenkins 1976, Jameson and Jones 1977, Jiang and Hoffmann 2001, Zhang et al. 2019)
Crocidura horsfieldii myoides	(Anderson 1881, Ognev 1928, Tate 1947)
Crocidura horsfieldii retusa	(Anderson 1881)
Crocidura horsfieldii sp. Fukien	(Jameson and Jones 1977)
Crocidura horsfieldii sp.	(Jenkins 1982, Yang et al. 2020)
Crocidura huangshanensis	(Yang et al. 2020)
Crocidura hutanis	(Ruedi 1995)
Crocidura indochinensis	(Tate 1947, Van Peenen et al. 1969, Jenkins 1976, Jameson and Jones 1977, Heaney and Timm 1983, Lunde et al. 2004, Abramov et al. 2008, Jenkins et al. 2009, 2010, 2013, Smith and Xie 2013, Yang et al. 2020)
Crocidura jacksoni amalae	(Dollman 1915*c*)
Crocidura jacksoni jacksoni	(Dollman 1915*c*, Hollister 1918, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura jenkinsi	(Das 1999, Alfred and Chakraborty 2002, Venkataraman et al. 2013)
Crocidura jouvenetae ebriensis	(De Balsac and Aellen 1958)
Crocidura jouvenetae jouvenetae	(De Balsac and Aellen 1958, Kingdon et al. 2013)
Crocidura kegoensis	(Lunde et al. 2004, Jenkins et al. 2009, 2010, Yang et al. 2020)
Crocidura kivuana	(Merritt et al. 1994, Kingdon et al. 2013)
Crocidura lamottei	(Hutterer and Happold 1983, Hutterer and Schlitter 1996, Kingdon et al. 2013)
Crocidura lanosa	(Kingdon et al. 2013)
Crocidura lasiura lasiurua	(Jones and Johnson 1960, Lay 1967)
Crocidura lasiura sodyi	(Tate 1947, Jones and Johnson 1960)
Crocidura lasiura thomasi	(Tate 1947, Jenkins 1976)

Crocidura lasiura yamashinai	(Tate 1947)
Crocidura lasiura sp.	(Ognev 1928, Tate 1947, Smith and Xie 2013, Kovaleva et al. 2014, Lee 2014, Jo et al. 2018)
Crocidura latona	(Hollister 1916, Merritt et al. 1994, Kingdon et al. 2013)
Crocidura lea	(Koller 1929, Ruedi 1995, Hutterer 2007)
Crocidura lepidura lepidura	(Koller 1929)
Crocidura lepidura villosa	(Koller 1929)
Crocidura lepidura sp.	(Ruedi 1995)
Crocidura leucodon judaica	(Harrison 1964, Atallah and Harrison 1967, Spitzenberger 1970*a*, Jenkins 1976)
Crocidura leucodon kuzjakini	(Sokolov and Tembotov 1989)
Crocidura leucodon lasia	(Thomas 1906, Ognev 1928, Harrison 1964, Atallah and Harrison 1967, Spitzenberger 1970*a*, Jenkins 1976, Catzeflis et al. 1985, Tez 1999)
Crocidura leucodon leucodon	(Trouessart 1910, Miller 1912, Ognev 1928, Osborn 1965, Lay 1967, Spitzenberger 1970*a*, Jenkins 1976, Catzeflis et al. 1985)
Crocidura leucodon narentae	(Bauer 1960, Witte 1964, Jenkins 1976, Catzeflis et al. 1985, Mori et al. 2020)
Crocidura leucodon persica	(Thomas 1907, Ognev 1928, Lay 1967, Spitzenberger 1970*a*, Redding and Lay 1978)
Crocidura leucodon sp.	(Burton 1976, Benda and Nasher 2006, Aulagnier 2009)
Crocidura levicula	(Koller 1929, Ruedi 1995, Hutterer 2007)
Crocidura littoralis littoralis	(Heller 1910, Dollman 1916*b*, Hollister 1918, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura littoralis oritis	(Hollister 1916, 1918)
Crocidura longipes	(Hutterer and Happold 1983, Kingdon et al. 2013)
Crocidura lucina	(Yalden and Largen 1992, Kingdon et al. 2013, Taborska 2014, Lavrenchenko et al. 2016, Konečný et al. 2020)
Crocidura ludia	(Hollister 1916, Meester 1963, Hutterer and Dippenaar 1987, Merritt et al. 1994, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura luna johnstoni	(Dollman 1915*c*)
Crocidura luna luna	(Dollman 1915*c*, Meester 1963)
Crocidura luna umbrosa	(Dollman 1915*c*)
Crocidura luna sp.	(Dippenaar and Meester 1989, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura lusitania	(Dollman 1916*b*, Vesmanis and Vesmanis 1979, Hutterer and Happold 1983, Hutterer 1986*a*, Aulagnier 2009, Kingdon et al. 2013)
Crocidura lwiroensis	(Kerbis Peterhans et al. 2013)

Crocidura macarthuri	(Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura macmillani	(Dollman 1915*c*, Osgood 1936, Hutterer 1980, Yalden and Largen 1992, Kingdon et al. 2013, Lavrenchenko et al. 2016, Konečný et al. 2020)
Crocidura macowi	(Dollman 1915*c*, Kerbis Peterhans et al. 2013, Kingdon et al. 2013)
Crocidura makeda	(Konečný et al. 2020)
Crocidura malayana aagardi	(Tate 1947)
Crocidura malayana aoris	(Tate 1947)
Crocidura malayana malayana	(Koller 1929, Jenkins 1976, Ruedi 1995)
Crocidura manengubae	(Hutterer 1981*a*, Kingdon et al. 2013)
Crocidura maquassiensis malani	(Meester 1963)
Crocidura maquassiensis maquassiensis	(Roberts 1946, Meester 1963, Kingdon et al. 2013)
Crocidura mariquensis mariquensis	(Dollman 1915*d*, Dippenaar 1979)
Crocidura mariquensis neavei	(Dollman 1916*b*, Allen and Loveridge 1933, Meester 1963, Dippenaar 1979)
Crocidura mariquensis pilosa	(Schlater 1901, Dollman 1915*c*, Meester 1963)
Crocidura mariquensis shortridgei	(Meester 1963, Dippenaar 1977, 1979, Kingdon et al. 2013)
Crocidura mariquensis sylvia	(Dollman 1916*b*, Meester 1963)
Crocidura mariquensis sp.	(Schlater 1901)
Crocidura maurisca	(Dollman 1916*b*, Merritt et al. 1994, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura maxi	(Jenkins 1982, Esselstyn et al. 2014, Demos et al. 2016)
Crocidura mdumai	(Stanley et al. 2015)
Crocidura mindorus	(Miller 1910, Merritt et al. 1994, Hutterer 2007, Esselstyn and Goodman 2010, Esselstyn et al. 2011)
Crocidura miya	(Jenkins 1976)
Crocidura monax	(Dollman 1916*b*, Hutterer 1986*b*, Kingdon et al. 2013, Stanley et al. 2015)
Crocidura monticola bartelsii	(Koller 1929)
Crocidura monticola monticola	(Jentink 1888, Koller 1929, Kock 1974, Jenkins 1982)
Crocidura monticola sp.	(Jenkins 1976, Ruedi 1995, Lunde et al. 2004, Esselstyn et al. 2014, Demos et al. 2016, Phillipps 2016)
Crocidura montis	(Dollman 1915*c*, Dippenaar and Meester 1989, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013, Stanley et al. 2015)
Crocidura munissii	(Stanley et al. 2015)
Crocidura muricauda	(De Balsac and Aellen 1958, Merritt et al. 1994, Kingdon et al. 2013)
Crocidura musseri	(Ruedi 1995)
Crocidura mutesae mutesae	(Heller 1910, Dollman 1915*a*, Hollister 1918)

Crocidura mutesae suahelae	(Heller 1912, Hollister 1918, Allen and Loveridge 1933)
Crocidura mutesae sp.	(Kingdon et al. 2013)
Crocidura nana	(Dollman 1916*b*, Osgood 1936, Hutterer 1980, Osborn and Helmy 1980, Kingdon et al. 2013)
Crocidura nanilla	(Dollman 1916*b*, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura narcondamica	(Kamalakannan et al. 2021)
Crocidura neglecta	(Jentink 1888, Koller 1929)
Crocidura negligens	(Koller 1929, Tate 1947, Ruedi 1995)
Crocidura negrina	(Merritt et al. 1994, Hutterer 2007, Esselstyn and Goodman 2010, Esselstyn et al. 2011)
Crocidura newmarki	(Stanley et al. 2015)
Crocidura nicobarica	(Miller 1902, Jenkins 1976, Alfred and Chakraborty 2002, Venkataraman et al. 2013, Rangasamy et al. 2019)
Crocidura nigeriae	(Dollman 1915*b*, De Balsac and Barloy 1966, Hutterer 1983*a*, Hutterer and Happold 1983, Kingdon et al. 2013)
Crocidura nigricans	(Dollman 1915*c*, Kingdon et al. 2013)
Crocidura nigripes lipara	(Ruedi 1995, Hinckley et al. 2022)
Crocidura nigripes nigripes	(Koller 1929, Ruedi 1995, Hinckley et al. 2022)
Crocidura nigrofusca ansorgei	(Dollman 1915*a*)
Crocidura nigrofusca kempi	(Dollman 1915*a*, Thorn and Kerbis Peterhans 2009)
Crocidura nigrofusca lakiundae	(Heller 1912, Dollman 1915*a*)
Crocidura nigrofusca nigrofusca	(Dollman 1915*c*)
Crocidura nigrofusca nilotica	(Heller 1910, Dollman 1915*a*, Hollister 1918, Osgood 1936, Setzer 1956, Thorn and Kerbis Peterhans 2009)
Crocidura nigrofusca nyikae	(Dollman 1915*d*)
Crocidura nigrofusca provocax	(Dollman 1915*a*)
Crocidura nigrofusca zaodon	(Osgood 1910, Dollman 1915*a*, Hollister 1918)
Crocidura nigrofusca zena	(Dollman 1915*a*)
Crocidura nigrofusca sp.	(Kingdon et al. 2013)
Crocidura nimbae	(Hutterer 1983*a*, Kingdon et al. 2013)
Crocidura nimbasilvanus (C. olivieri odorata)	(Dollman 1915*b*, Hutterer and Happold 1983, Jacquet et al. 2013)
Crocidura ninoyi	(Merritt et al. 1994, Esselstyn and Goodman 2010, Esselstyn et al. 2011, Yang et al. 2020)
Crocidura niobe	(Dollman 1916*b*, Hutterer and Dippenaar 1987, Merritt et al. 1994, Thorn and Kerbis Peterhans 2009, Kerbis Peterhans et al. 2013, Kingdon et al. 2013)
Crocidura obscurior	(Hutterer and Kock 2002, Kingdon et al. 2013, Jacquet et al. 2014)

Crocidura olivieri anchietae	(Dollman 1915*e*, De Balsac and Barloy 1966)
Crocidura olivieri atlantis	(De Balsac and Barloy 1966)
Crocidura olivieri bueae	(Hutterer et al. 1992)
Crocidura olivieri cara	(Dollman 1915*b*, De Balsac and Barloy 1966)
Crocidura olivieri cinereoaenea	(Hutterer 1980)
Crocidura olivieri daphnia	(Hollister 1918)
Crocidura olivieri darfurea	(Setzer 1956, De Balsac and Barloy 1966)
Crocidura olivieri deltae	(De Balsac and Barloy 1966, De Balsac and Mein 1971, Vesmanis 1977, Osborn and Helmy 1980)
Crocidura olivieri doriana	(Dollman 1915*e*, Osgood 1936, De Balsac and Barloy 1966)
Crocidura olivieri fuscosa	(Dollman 1915*e*, Setzer 1956, De Balsac and Barloy 1966)
Crocidura olivieri giffardi	(Dollman 1915*b*, De Balsac 1959)
Crocidura olivieri hansruppi	(Hutterer 1980)
Crocidura olivieri hedenborgiana	(Dollman 1915*e*, 1916*b*, Setzer 1956, De Balsac and Barloy 1966)
Crocidura olivieri hera	(Dollman 1915*e*, Meester 1963, De Balsac and Barloy 1966)
Crocidura olivieri herero	(Meester 1963, De Balsac and Barloy 1966)
Crocidura olivieri kijabae	(Dollman 1915*e*, Hollister 1918, De Balsac and Barloy 1966, Thorn and Kerbis Peterhans 2009)
Crocidura olivieri kivu	(Dollman 1915*e*, Allen and Loveridge 1933, De Balsac and Barloy 1966, Thorn and Kerbis Peterhans 2009)
Crocidura olivieri luluana	(De Balsac and Barloy 1966)
Crocidura olivieri manni	(Dollman 1915*b*, De Balsac and Barloy 1966, Hutterer and Happold 1983, Kingdon et al. 2013)
Crocidura olivieri martiensseni	(Dollman 1915*e*, De Balsac and Barloy 1966)
Crocidura olivieri nyansae	(Dollman 1915*e*, Hollister 1918, Allen and Loveridge 1933, De Balsac and Barloy 1966, Thorn and Kerbis Peterhans 2009)
Crocidura olivieri occidentalis	(Dollman 1915*b*, De Balsac and Barloy 1966)
Crocidura olivieri olivieri	(Dollman 1915*d*, De Balsac and Barloy 1966)
Crocidura olivieri spurrelli	(Dollman 1915*b*, De Balsac and Aellen 1958, De Balsac and Barloy 1966)
Crocidura olivieri sururae	(Heller 1910, Dollman 1915*e*, Hollister 1918, Setzer 1956, De Balsac and Barloy 1966, Thorn and Kerbis Peterhans 2009)
Crocidura olivieri tatiana	(Dollman 1915*e*, De Balsac and Barloy 1966)
Crocidura olivieri toritensis	(Setzer 1956, De Balsac and Mein 1971)
Crocidura olivieri zuleika	(Dollman 1915*e*, Meester 1963, De Balsac and Barloy 1966, Kerbis Peterhans et al. 2013)
Crocidura olivieri Banana sp.	(De Balsac and Barloy 1966)
Crocidura olivieri Irangi sp.	(De Balsac and Barloy 1966)

Crocidura olivieri Mont Pesoba sp.	(De Balsac and Barloy 1966)
Crocidura olivieri Zimbabwe sp.	(Kingdon et al. 2013)
Crocidura olivieri sp.	(Aulagnier 2009)
Crocidura orientalis lawuana	(Ruedi 1995)
Crocidura orientalis orientalis	(Koller 1929, Ruedi 1995)
Crocidura orientalis sp.	(Esselstyn et al. 2014)
Crocidura orii	(Abe 1967, Ohdachi et al. 2015)
Crocidura pachyura agilis	(Jenkins 1976)
Crocidura pachyura (C.g. ichnusae)	(Jenkins 1976, Catzeflis et al. 1985, Aulagnier 2009)
Crocidura palawanensis	(Merritt et al. 1994, Hutterer 2007, Esselstyn et al. 2011, Hutterer et al. 2018)
Crocidura panayensis	(Hutterer 2007, Esselstyn and Goodman 2010, Esselstyn et al. 2011)
Crocidura paradoxura aequicauda	(Koller 1929)
Crocidura paradoxura paradoxura	(Jentink 1888, Koller 1929, Chasen 1940)
Crocidura paradoxura sp.	(Ruedi 1995, Esselstyn et al. 2014)
Crocidura parvipes boydi	(Dollman 1915*c*)
Crocidura parvipes butleri	(Setzer 1956)
Crocidura parvipes lutrella	(Heller 1910, Dollman 1915*d*, Hollister 1918, Setzer 1956)
Crocidura parvipes nisa	(Hollister 1918)
Crocidura parvipes parvipes	(Dollman 1915*c*, Hollister 1918)
Crocidura parvipes sansibarica	(Dollman 1915*c*, Hutterer 1983*b*, Kingdon et al. 2013)
Crocidura parvipes sp.	(Osgood 1910, Thorn and Kerbis Peterhans 2009, Taborska 2014)
Crocidura pasha	(Dollman 1916*b*, Setzer 1956, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura pergrisea	(Lay 1967, Hassinger 1970, 1973, Spitzenberger 1971, Jenkins 1976, Stone 1995, Alfred et al. 2006)
Crocidura phaeura	(Osgood 1936, Yalden and Largen 1992, Kerbis Peterhans et al. 2013, Kingdon et al. 2013)
Crocidura phanluongi	(Jenkins et al. 2010, Yang et al. 2020)
Crocidura phuquocensis	(Abramov et al. 2008, 2012, Jenkins et al. 2010)
Crocidura picea	(Kingdon et al. 2013)
Crocidura pitmani	(Kingdon et al. 2013)
Crocidura planiceps	(Heller 1910, Dollman 1916*a*, Hollister 1918, Hutterer 1980, Hutterer and Happold 1983, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura poensis calabarensis	(Hutterer and Happold 1983)
Crocidura poensis pamela	(Dollman 1915*a*, De Balsac and Aellen 1958)
Crocidura poensis poensis	(Dollman 1915*a*, De Balsac 1959, 1968, De Balsac and Hutterer 1982, Hutterer 1983*a*, Hutterer and Happold 1983, Hutterer and Schlitter 1996)

Crocidura poensis schweitzeri	(Dollman 1915*b*)
Crocidura poensis soricoides	(Dollman 1915*a*)
Crocidura poensis sp.	(Kingdon et al. 2013, Ceríaco et al. 2015)
Crocidura polia	(Hollister 1916, Merritt et al. 1994, Kingdon et al. 2013)
Crocidura pullata	(Tate 1947, Jenkins 1976, 2013, Jameson and Jones 1977, Jiang and Hoffmann 2001, Zhang et al. 2019)
Crocidura raineyi	(Heller 1912, Dollman 1915*c*, Hollister 1918, Dippenaar and Meester 1989, Kingdon et al. 2013)
Crocidura ramona	(Hutterer and Kock 2002, Benda and Nasher 2006, Aulagnier 2009)
Crocidura rapax kurodai	(Jameson and Jones 1977, Fang et al. 1997, Fang and Lee 2002)
Crocidura rapax lutaoensis	(Fang and Lee 2002)
Crocidura rapax rapax	(Allen 1923, 1938, Jameson and Jones 1977, Jiang and Hoffmann 2001, Zhang et al. 2019)
Crocidura rapax tadae	(Jenkins 1976, Jameson and Jones 1977, Fang and Lee 2002)
Crocidura rapax sp.	(Tate 1947, Abramov et al. 2008, Jenkins et al. 2009, Smith and Xie 2013, Yang et al. 2020)
Crocidura religiosa	(Dollman 1916*b*, Hutterer and Kock 2002, Aulagnier 2009, Kingdon et al. 2013)
Crocidura rhoditis	(Koller 1929, Ruedi 1995)
Crocidura roosevelti	(Heller 1910, Hollister 1918, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura russula chaoianensis	(Vesmanis and Vesmanis 1979)
Crocidura russula cintrae	(Miller 1907, 1912, Trouessart 1910, Cabrera 1914, Vesmanis 1981)
Crocidura russula foucauldi	(Vesmanis and Vesmanis 1979)
Crocidura russula heljanensis	(Vesmanis 1977, Vesmanis and Vesmanis 1979)
Crocidura russula osorio	(Molina and Hutterer 1989, Stone 1995)
Crocidura russula peta	(The Earl of Cranbrook and Crowcroft 1958, Delany and Healy 1966, Jenkins 1976)
Crocidura russula pulchra	(Cabrera 1907, 1914, Trouessart 1910, Jenkins 1976, Vesmanis 1981)
Crocidura russula russula	(Trouessart 1910, Miller 1912, Niethammer 1956, The Earl of Cranbrook and Crowcroft 1958, Bauer 1960, Osborn 1965, Jenkins 1976, Jameson and Jones 1977, Vesmanis 1981, Catzeflis et al. 1985, Mori et al. 2020)
Crocidura russula safii	(Vesmanis and Vesmanis 1979)
Crocidura russula yebalensis	(Vesmanis 1977, Vesmanis and Vesmanis 1979, Catzeflis et al. 1985, Hutterer 1986*a*, Molina and Hutterer 1989, Kingdon et al. 2013)
Crocidura russula sp.	(Stone 1995, Aulagnier 2009)
Crocidura sapaensis	(Jenkins et al. 2013, Yang et al. 2020)

Crocidura selina schistacea	(Osgood 1910, Dollman 1915*c*, Hollister 1918)
Crocidura selina selina	(Dollman 1915*c*, Hollister 1918)
Crocidura selina sp.	(Dippenaar and Meester 1989, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura serzkyensis	(Spitzenberger 1971, Aulagnier 2009)
Crocidura shantungensis coreae	(Tate 1947, Jones and Johnson 1960, Abe 1967)
Crocidura shantungensis hosletti	(Jameson and Jones 1977, Fang et al. 1997, Motokawa et al. 2003)
Crocidura shantungensis lar	(Allen 1938, Tate 1947, Jenkins 1976)
Crocidura shantungensis phaeopus	(Allen 1923, 1938)
Crocidura shantungensis quelpartis	(Jones 1959, Jones and Johnson 1960, Jameson and Jones 1977, Motokawa et al. 2003, Lee 2014, Jo et al. 2018)
Crocidura shantungensis shatungensis	(Allen 1938, Jenkins 1976, Jiang and Hoffmann 2001, Motokawa et al. 2003, Lee 2014, Zhang et al. 2019)
Crocidura shantungensis utsuryoensis	(Jones and Johnson 1960)
Crocidura shantungensis sp.	(Tate 1947, Lunde et al. 2004, Bannikova et al. 2009, Smith and Xie 2013, Kovaleva et al. 2014, Ohdachi et al. 2015, Yang et al. 2020)
Crocidura sibirica ogenvi	(Stroganov 1956*a*, Yudin 1989)
Crocidura sibirica sibirica	(Stroganov 1956*b*, Ellerman and Morrison-Scott 1966, Yudin 1989)
Crocidura sibirica sp.	(Tate 1947, Smith and Xie 2013, Kovaleva et al. 2014)
Crocidura sicula aegatensis	(Hutterer 1991)
Crocidura sicula calypso	(Hutterer 1991)
Crocidura sicula caudata	(Miller 1901, 1912, Trouessart 1910)
Crocidura sicula sicula	(Miller 1901, 1912, Trouessart 1910, Jenkins 1976, Hutterer 1991, Aulagnier 2009, Mori et al. 2020)
Crocidura silacea	(Schlater 1901, Dollman 1915*c*, Meester 1963, Kingdon et al. 2013)
Crocidura similiturba	(Konečný et al. 2020)
Crocidura smithiii debalsaci	(Hutterer 1981*b*)
Crocidura smithiii smithii	(Dollman 1915*a*, Meester 1963, Hutterer 1980, Kingdon et al. 2013)
Crocidura sokolovi	(Jenkins et al. 2009, Yang et al. 2020)
Crocidura somalica	(Dollman 1916*a*, Hutterer 1980, Kingdon et al. 2013)
Crocidura stenocephala	(Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura suaveolens antipae	(Trouessart 1910)
Crocidura suaveolens balearica	(Miller 1907, 1912, Trouessart 1910, Cabrera 1914)
Crocidura suaveolens caneae	(Miller 1909, 1912, Trouessart 1910, Vogel et al. 1986)

Crocidura suaveolens cassiteridum	(The Earl of Cranbrook and Crowcroft 1958, Jenkins 1976)
Crocidura suaveolens cyrnensis	(Miller 1907, 1912, Trouessart 1910, Jenkins 1976)
Crocidura suaveolens debeauxi	(Witte 1964)
Crocidura suaveolens dinniki	(Ognev 1928)
Crocidura suaveolens fumigatus	(Blanford 1888)
Crocidura suaveolens gmelini	(Ognev 1928, Hassinger 1973, Jiang and Hoffmann 2001, Hutterer and Kock 2002, Bannikova et al. 2009, Smith and Xie 2013)
Crocidura suaveolens ilensis	(Ognev 1928, Allen 1938, Tate 1947, Hassinger 1973)
Crocidura suaveolens italica	(Witte 1964)
Crocidura suaveolens monacha	(Thomas 1906, Harrison 1964, Vereshchagin 1967, Jenkins 1976)
Crocidura suaveolens orientis	(Ognev 1928)
Crocidura suaveolens pamirensis	(Ognev 1928)
Crocidura suaveolens portali	(Harrison 1964, Osborn and Helmy 1980)
Crocidura suaveolens suaveolens	(Trouessart 1910, Ognev 1928, The Earl of Cranbrook and Crowcroft 1958, Osborn 1965, Richter 1966, Humiński and Wójcik-Migała 1967, Spitzenberger 1970*a*)
Crocidura suaveolens sp.	(Burton 1976, Jenkins 1982, Stone 1995, Benda and Nasher 2006, Aulagnier 2009)
Crocidura susiana	(Redding and Lay 1978, Aulagnier 2009)
Crocidura tanakae	(Tate 1947, Jameson and Jones 1977, Merritt et al. 1994, Fang et al. 1997, Jenkins et al. 2013, Smith and Xie 2013, Li et al. 2019, Yang et al. 2020)
Crocidura tansaniana	(Hutterer 1986*b*, Kingdon et al. 2013, Stanley et al. 2015)
Crocidura tarella	(Dollman 1915*a*, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Crocidura tarfayensis agadiri	(Vesmanis and Vesmanis 1979)
Crocidura tarfayensis gouliminensis	(Vesmanis and Vesmanis 1979)
Crocidura tarfayensis tarfayensis	(Vesmanis and Vesmanis 1979, Hutterer 1986*a*, Molina and Hutterer 1989)
Crocidura tarfayensis tiznitensis	(Vesmanis and Vesmanis 1979)
Crocidura tarfayensis sp.	(Aulagnier 2009, Kingdon et al. 2013)
Crocidura telfordi	(Hutterer 1986*b*, Kingdon et al. 2013)
Crocidura tenuis macklotti	(Jentink 1888)
Crocidura tenuis	(Jentink 1888, Koller 1929)
Crocidura thalia	(Yalden and Largen 1992, Kingdon et al. 2013, Taborska 2014, Lavrenchenko et al. 2016)
Crocidura theresae	(Kingdon et al. 2013)
Crocidura thomensis	(De Balsac and Hutterer 1982, Hutterer 1983*a*, Ceríaco et al. 2015)
Crocidura trichura	(Jenkins 1976, Meek 2000)

Crocidura turba angolae	(Dollman 1915*a*)
Crocidura turba turba	(Dollman 1915*a*, Konečný et al. 2020)
Crocidura turb asp.	(Kingdon et al. 2013)
Crocidura ultima	(Dollman 1916*b*, Kingdon et al. 2013)
Crocidura umbra	(Demos et al. 2016, Yang et al. 2020)
Crocidura usambarae	(Hutterer 1986*b*, Kingdon et al. 2013, Stanley et al. 2015)
Crocidura viaria bolivari	(Vesmanis and Vesmanis 1979)
Crocidura viaria hindei	(Dollman 1915*d*, Hollister 1918)
Crocidura viaria tamrinensis	(Vesmanis and Vesmanis 1979)
Crocidura viaria viaria	(Dollman 1915*a*, Hutterer 1986*a*)
Crocidura viaria sp.	(Hutterer and Happold 1983, Aulagnier 2009, Kingdon et al. 2013)
Crocidura virgata	(Hutterer and Happold 1983, Kingdon et al. 2013)
Crocidura voi percivali	(Dollman 1915*a*, Hollister 1918)
Crocidura voi voi	(Dollman 1915*a*)
Crocidura voi sp.	(Osgood 1910, Kingdon et al. 2013)
Crocidura vorax	(Allen 1923, 1938, Tate 1947, Jameson and Jones 1977, Jiang and Hoffmann 2001, Jenkins et al. 2009, Smith and Xie 2013, Zhang et al. 2019, Yang et al. 2020)
Crocidura vosmaeri	(Jentink 1888, Ruedi 1995)
Crocidura watasei	(Abe 1967, Jenkins 1976, Jameson and Jones 1977, Ohdachi et al. 2015)
Crocidura whitakeri essaouiransis	(Vesmanis and Vesmanis 1979)
Crocidura whitakeri matruhensis	(Osborn and Helmy 1980)
Crocidura whitakeri mesatanensis	(Vesmanis and Vesmanis 1979)
Crocidura whitakeri whitakeri	(Vesmanis and Vesmanis 1979, Hutterer 1986*a*, Molina and Hutterer 1989)
Crocidura whitakeri zaianensis	(Vesmanis and Vesmanis 1979)
Crocidura whitakeri sp.	(Jenkins 1976, Aulagnier 2009, Kingdon et al. 2013)
Crocidura wimmeri	(De Balsac and Aellen 1958, Hutterer 1983*a*, Kingdon et al. 2013)
Crocidura wuchihensis	(Jenkins 1976, Lunde et al. 2003, 2004, Jenkins et al. 2009, 2010, 2013, Smith and Xie 2013, Yang et al. 2020)
Crocidura xantippe	(Osgood 1910, Dollman 1915*c*, Kingdon et al. 2013)
Crocidura yaldeni	(Lavrenchenko et al. 2016, Konečný et al. 2020)
Crocidura yankariensis	(Hutterer and Jenkins 1980, Hutterer and Happold 1983, Kingdon et al. 2013)
Crocidura zaitsevi	(Jenkins et al. 2009, 2010, 2013, Yang et al. 2020)
Crocidura zaphiri simiolus	(Hollister 1918)

Crocidura zaphiri zaphiri	(Dollman 1915*d*, Osgood 1936, Hutterer 1980, Yalden and Largen 1992, Kingdon et al. 2013)
Crocidura zarudnyi streetorum	(Hassinger 1970, 1973)
Crocidura zarudnyi zarudnyi	(Hassinger 1970, 1973, Spitzenberger 1971, Jenkins 1976)
Crocidura zarudnyi sp.	(Ognev 1928)
Crocidura zimmeri	(Osgood 1936, Kingdon et al. 2013)
Crocidura zimmermanni	(Vogel et al. 1986, Aulagnier 2009)
Crossogale (Chimarrogale) hantu	(Harrison 1958, Medway 1978)
Crossogale (Chimarrogale) phaeura	(Harrison 1958, Phillipps 2016)
Crossogale (Chimarrogale) sumatrana	(Harrison 1958)
Cryptotis alticola	(Merriam 1895*a*, Woodman and Timm 1999, Ramírez-Pulido et al. 2004, Carraway 2007, Woodman 2010)
Cryptotis aroensis	(Quiroga-Carmona and Molinari 2012, Quiroga-Carmona and Woodman 2015, Quiroga-Carmona and DoNascimiento 2016)
Cryptotis berlandieri berlandieri	(Merriam 1895*a*, Miller 1911, Elliot 1917, Anthony 1928, Davis 1941*b*, Reid 1997, Alvarez-Castaneda and Patton 1999, Ramírez-Pulido et al. 2004, Carraway 2007)
Cryptotis berlandieri macer	(Elliot 1917)
Cryptotis brachyonyx	(Woodman 2003)
Cryptotis cavatorculus	(Woodman 2015)
Cryptotis celaque	(Woodman 2015)
Cryptotis colombianus	(Woodman and Timm 1993, Woodman 2003, Gardner 2008)
Cryptotis dinirensis	(Quiroga-Carmona and DoNascimiento 2016)
Cryptotis eckerlini	(Woodman 2019)
Cryptotis endersi	(Hall 1981, Reid 1997, Woodman and Timm 2017)
Cryptotis equatoris	(Vivar et al. 1997, Gardner 2008, Moreno Cárdenas and Albuja V 2014, Zeballos et al. 2018)
Cryptotis evaristoi	(Zeballos et al. 2018)
Cryptotis goldmani fossor	(Merriam 1895*a*)
Cryptotis goldmani frontalis	(Merriam 1895*a*, Miller 1911, Elliot 1917)
Cryptotis goldmani goldmani	(Merriam 1895*a*)
Cryptotis goldmani machetes	(Merriam 1895*a*)
Cryptotis goldmani sp.	(Hall 1981, Reid 1997, Woodman and Timm 1999)
Cryptotis goodwini	(Hall 1981, Reid 1997, Woodman and Timm 1999, Carraway 2007, Woodman 2010, 2015, 2019, Woodman et al. 2012, Matson and Woodman 2019)
Cryptotis gracilis	(Miller 1911, Elliot 1917, Hall 1981, Reid 1997, Woodman and Timm 2017)
Cryptotis griseoventris	(Woodman and Timm 1999, Carraway 2007, Woodman 2010, Guevara et al. 2014)

Cryptotis hondurensis	(Woodman and Timm 1993, Reid 1997, Woodman 2015)
Cryptotis lacandonensis	(Guevara et al. 2014, Matson and Woodman 2019)
Cryptotis lacertosus	(Woodman 2010, 2019, Woodman et al. 2012, Matson and Woodman 2019, Woodman and Wilken 2019)
Cryptotis magnimana	(Woodman and Timm 1999, Woodman 2015)
Cryptotis magnus	(Merriam 1895*a*, Hall 1981, Woodman and Timm 1993, Ramírez-Pulido et al. 2004, Carraway 2007)
Cryptotis mam	(Woodman 2010, 2019, Woodman et al. 2012, Matson and Woodman 2019, Woodman and Wilken 2019)
Cryptotis matsoni	(Woodman 2019)
Cryptotis mayensis	(Woodman and Timm 1993, Reid 1997, Carraway 2007, Woodman 2010, 2019, Woodman et al. 2012, Guevara et al. 2014, Matson and Woodman 2019)
Cryptotis mccarthyi	(Woodman 2015)
Cryptotis medellinius	(Vivar et al. 1997, Woodman 2002, Gardner 2008, Quiroga-Carmona and Woodman 2015)
Cryptotis meridensis	(Woodman 2002, Gardner 2008, Quiroga-Carmona and Molinari 2012, Quiroga-Carmona and Woodman 2015, Quiroga-Carmona and DoNascimiento 2016, Woodman and Wilken 2019)
Cryptotis merriami	(Woodman and Timm 1993, 2017, Reid 1997, Carraway 2007, Woodman 2010, 2015, 2019, Woodman et al. 2012, Guevara et al. 2014, Matson and Woodman 2019, Woodman and Wilken 2019)
Cryptotis merus	(Elliot 1917, Woodman and Timm 1993, Reid 1997, Woodman 2003, Gardner 2008)
Cryptotis mexicanus	(Merriam 1895*a*, Hall 1981, Reid 1997, Woodman and Timm 1999, 2000, Ramírez-Pulido et al. 2004, Carraway 2007, Guevara et al. 2014)
Cryptotis montecristo	(Woodman 2019)
Cryptotis monteverdensis	(Woodman and Timm 2017)
Cryptotis montivagus	(Vivar et al. 1997, Gardner 2008, Moreno Cárdenas and Albuja V 2014, Zeballos et al. 2018)
Cryptotis nelsoni	(Merriam 1895*a*, Woodman and Timm 2000, Carraway 2007)
Cryptotis niausa	(Moreno Cárdenas and Albuja V 2014, Zeballos et al. 2018)
Cryptotis nigrescens	(Merriam 1895*a*, Hall 1981, Woodman and Timm 1993, 2017, Reid 1997, Woodman and Wilken 2019)
Cryptotis obscurus	(Merriam 1895*a*, Woodman and Timm 2000, Ramírez-Pulido et al. 2004, Carraway 2007)

Cryptotis oreoryctes	(Woodman et al. 2012, Woodman 2015, 2019, Matson and Woodman 2019, Woodman and Wilken 2019)
Cryptotis orophilus olivaceus	(Elliot 1917)
Cryptotis orophilus orophilus	(Merriam 1895*a*, Elliot 1917, Woodman 2010, 2015, 2019, Woodman et al. 2012, Woodman and Timm 2017, Matson and Woodman 2019)
Cryptotis osgoodi	(Vivar et al. 1997, Quiroga-Carmona and Molinari 2012, Moreno Cárdenas and Albuja V 2014, Zeballos et al. 2018)
Cryptotis parva elasson	(Bole and Moulthrop 1942)
Cryptotis parva floridanus	(Merriam 1895*a*, Anthony 1928, Merritt et al. 1994, Whitaker and Hamilton 1998)
Cryptotis parva harlani	(Bole and Moulthrop 1942, Lindsay 1960, Hoffmeister 2002)
Cryptotis parva parva	(Merriam 1895*a*, Cory 1912, Anthony 1928, Lyon 1936, Davis 1941*b*, Bole and Moulthrop 1942, Hamilton 1944, Hall 1955, Jones 1964, J. L. Paradiso 1969, Lowery 1974, Mumford and Whitaker 1982, Jones et al. 1983, van Zyll de Jong 1983, Webster et al. 1985, Merritt 1987, Merritt et al. 1994, Whitaker and Hamilton 1998, Schwartz and Schwartz 2001, Hoffmeister 2002, Best and Dusi 2014)
Cryptotis parva pergracillis	(Whitaker 1974)
Cryptotis parva sp.	(Golley 1962, Hall 1981, Wilson and Ruff 1999, Reid 2006, Hofmann 2013, Woodman and Wilken 2019)
Cryptotis peregrinus	(Merriam 1895*a*, Woodman and Timm 1999, 2000, Carraway 2007, Woodman 2010)
Cryptotis perijensis	(Quiroga-Carmona and Woodman 2015, Quiroga-Carmona and DoNascimiento 2016)
Cryptotis peruviensis	(Vivar et al. 1997, Gardner 2008, Zeballos et al. 2018)
Cryptotis phillipsii	(Woodman and Timm 2000, Carraway 2007)
Cryptotis pueblensis	(Ramírez-Pulido et al. 2004, Carraway 2007, Guevara et al. 2014)
Cryptotis soricinus	(Merriam 1895*a*, Ramírez-Pulido et al. 2004, Carraway 2007)
Cryptotis squamipes	(Gardner 2008, Quiroga-Carmona and Molinari 2012)
Cryptotis tamensis	(Woodman 2002, Gardner 2008, Quiroga-Carmona and Molinari 2012, Quiroga-Carmona and Woodman 2015, Quiroga-Carmona and DoNascimiento 2016)

Cryptotis thomasi	(Vivar et al. 1997, Woodman 2002, 2003, Gardner 2008, Quiroga-Carmona and Woodman 2015)
Cryptotis tropicalis	(Merriam 1895*a*, Carraway 2007, Woodman et al. 2012, Guevara et al. 2014, Matson and Woodman 2019, Woodman 2019, Woodman and Wilken 2019)
Cryptotis venzuelensis	(Quiroga-Carmona and Woodman 2015, Quiroga-Carmona and DoNascimiento 2016)
Diplomesodon pulchellus	(Ognev 1928, Nowak 1999, Aulagnier 2009)
Episoriculus baileyi	(Tate 1947, Abe 1977, Hoffmann 1985*a*)
Episoriculus caudatus	(Anderson 1881, Blanford 1888, Allen 1923, 1938, Tate 1947, Abe 1977, Hoffmann 1985*a*, Stone 1995, Motokawa et al. 2008, Smith and Xie 2013)
Episoriculus gruberi	(Weigel 1969)
Episoriculus leucops	(Tate 1947, Weigel 1969, Hoffmann 1985*a*, Smith and Xie 2013)
Episoriculus macrurus irene	(Tate 1947)
Episoriculus macrurus macrurus	(Blanford 1888, Allen 1938, Tate 1947, Hoffmann 1985*a*, Smith and Xie 2013)
Episoriculus macrurus sp.	(Stone 1995)
Episoriculus sacratus	(Allen 1938, Osgood 1941, Tate 1947, Hoffmann 1985*a*)
Episoriculus soluensis	(Abe 1977, Motokawa et al. 2008)
Episoriculus umbrinus	(Allen 1938, Tate 1947, Hoffmann 1985*a*)
Feroculus feroculus	(Blyth 1856, Blanford 1888, Stone 1995, Nowak 1999)
Megasorex gigas	(Hall 1981, Alvarez-Castaneda and Patton 1999, Nowak 1999, Carraway 2007)
Myosorex babultii	(Stanley and Hutterer 2000, Thorn and Kerbis Peterhans 2009, Kerbis Peterhans et al. 2010, Kingdon et al. 2013)
Myosorex blarina	(Stanley and Hutterer 2000, Thorn and Kerbis Peterhans 2009, Kerbis Peterhans et al. 2010, Kingdon et al. 2013)
Myosorex bururiensis	(Kerbis Peterhans et al. 2010)
Myosorex cafer	(Schlater 1901, Dippenaar 1995, Stanley and Hutterer 2000, Kerbis Peterhans et al. 2010, Kingdon et al. 2013, Taylor et al. 2013)
Myosorex eisentauti	(De Balsac 1968, 1975, Stanley and Hutterer 2000, Kerbis Peterhans et al. 2010, Kingdon et al. 2013)
Myosorex geata	(Stanley and Hutterer 2000, Kerbis Peterhans et al. 2008, 2010, Kingdon et al. 2013, Taylor et al. 2013)
Myosorex gnoskei	(Kerbis Peterhans et al. 2008, 2010)
Myosorex jejei	(Kerbis Peterhans et al. 2010)
Myosorex kabogoensis	(Kerbis Peterhans et al. 2013)

Myosorex kihaulei	(Stanley and Hutterer 2000, Stanley et al. 2005, Kerbis Peterhans et al. 2008, 2010, Kingdon et al. 2013, Taylor et al. 2013)
Myosorex longicaudatus boosnami	(Dippenaar 1995)
Myosorex longicaudatus longicaudatus	(Dippenaar 1995)
Myosorex longicaudatus sp.	(Stanley and Hutterer 2000, Kerbis Peterhans et al. 2010, Kingdon et al. 2013)
Myosorex meesteri	(Taylor et al. 2013)
Myosorex okuensis	(De Balsac 1968, Stanley and Hutterer 2000, Kerbis Peterhans et al. 2010, Kingdon et al. 2013)
Myosorex rumpii	(De Balsac 1968, Stanley and Hutterer 2000, Kerbis Peterhans et al. 2010, Kingdon et al. 2013)
Myosorex schalleri	(Stanley and Hutterer 2000, Kerbis Peterhans et al. 2008, 2010, Kingdon et al. 2013)
Myosorex sclateri	(Stanley and Hutterer 2000, Kerbis Peterhans et al. 2010, Kingdon et al. 2013)
Myosorex tenuis	(Stanley and Hutterer 2000, Kerbis Peterhans et al. 2010, Kingdon et al. 2013, Taylor et al. 2013)
Myosorex varius pondoensis	(Roberts 1946)
Myosorex varius transvaalensis	(Roberts 1946)
Myosorex varius varius	(Taylor et al. 2013)
Myosorex varius sp.	(Dippenaar 1995, Stanley and Hutterer 2000, Kerbis Peterhans et al. 2010, Kingdon et al. 2013, Taylor et al. 2013)
Myosorex zinki	(Stanley and Hutterer 2000, Kerbis Peterhans et al. 2010, Kingdon et al. 2013)
Nectogale elegans	(Blanford 1888, Allen 1938, Tate 1947, Nowak 1999, Smith and Xie 2013)
Neomys anomalus anomalus	(Cabrera 1907, 1914, Trouessart 1910, Miller 1912, Niethammer 1956, Witte 1964, Osborn 1965, Kefelioğlu and Selçuk 2016)
Neomys anomalus josti	(Krystufek et al. 1998, Kefelioğlu and Selçuk 2016)
Neomys anomalus milleri	(Trouessart 1910, Miller 1912, Bauer 1960, Buchalczyk and Raczynski 1961)
Neomys anomalus mokrzeckii	(Ognev 1928)
Neomys anomalus rhenanus	(Lehmann 1976)
Neomys anomalus soricoides	(Ognev 1928)
Neomys anomalus sp.	(Burton 1976, Stone 1995, Aulagnier 2009)
Neomys fodiens argenteus	(Tate 1947)
Neomys fodiens bicolor	(Miller 1912)
Neomys fodiens brachyotis	(Ognev 1928, Tate 1947)
Neomys fodiens fodiens	(Trouessart 1910, Miller 1912, Cabrera 1914, Ognev 1928, Bauer 1960, Buchalczyk and Raczynski 1961)
Neomys fodiens minor	(Miller 1901, Trouessart 1910)
Neomys fodiens naias	(Barrett-Hamilton 1905, Trouessart 1910)

Neomys fodiens niethammeri	(Buhler 1996)
Neomys fodiens orientis	(Thomas 1914, Lee 2014, Jo et al. 2018)
Neomys fodiens sp.	(Burton 1976, Stone 1995, Aulagnier 2009, Smith and Xie 2013, Kovaleva et al. 2014, Remm et al. 2015)
Neomys teres balkaricus	(Ognev 1928)
Neomys teres leptodactylus	(Ognev 1928)
Neomys teres schelkovnikovi	(Ognev 1928, Stone 1995, Krystufek et al. 1998)
Neomys teres teres	(Kefelioğlu and Selçuk 2016)
Neomys teres sp.	(Aulagnier 2009)
Notiosorex cockrumi	(Carraway 2007, 2010, Camargo and Álvarez-Castañeda 2020)
Notiosorex crawfordi	(Merriam 1895*a*, Anthony 1928, Bailey 1931, Hall 1946, Cockrum 1952, Hoffmeister and Goodpasters 1954, Ingles 1954, Hoffmeister 1971, Medway 1978, Hall 1981, Alvarez-Castaneda and Patton 1999, Nowak 1999, Wilson and Ruff 1999, Carraway and Timm 2000, Reid 2006, Carraway 2010, Camargo and Álvarez-Castañeda 2020)
Notiosorex evotis	(Merriam 1895*a*, Alvarez-Castaneda and Patton 1999, Carraway and Timm 2000, Carraway 2010, Camargo and Álvarez-Castañeda 2020)
Notiosorex tataticuli arroyoi	(Camargo and Álvarez-Castañeda 2020)
Notiosorex tataticuli ocanai	(Camargo and Álvarez-Castañeda 2020)
Notiosorex tataticuli tataiculi	(Camargo and Álvarez-Castañeda 2020)
Notiosorex villai	(Carraway and Timm 2000, Carraway 2010, Camargo and Álvarez-Castañeda 2020)
Palawanosorex (Sunucs) ater	(Stone 1995, Earl of Cranbrook Hon FLS and Piper 2008, Phillipps 2016)
Palawanosorex muscorum	(Hutterer et al. 2018)
Parablarinella (Blarinella) griselda	(Allen 1938, Tate 1947, Lunde et al. 2003, Smith and Xie 2013)
Paracrocidura graueri	(Hutterer 1986*c*, Kingdon et al. 2013)
Paracrocidura maxima	(Hutterer 1986*c*, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Paracrocidura schoutedeni camerunensis	(De Balsac 1959, Hutterer 1986*c*)
Paracrocidura schoutedeni schoutedeni	(Hutterer 1986*c*, Hutterer and Schlitter 1996, Fisher 2004)
Paracrocidura schoutedeni sp.	(Kingdon et al. 2013)
Pseudosoriculus (Episoriculus) fumidus	(Tate 1947, Jameson and Jones 1977, Hoffmann 1985*a*, Smith and Xie 2013)
Ruwenzorisorex suncoides	(Osgood 1936, Nowak 1999, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Scutisorex somereni congicus	(Hollister 1916, Allen et al. 1917)

Scutisorex somereni somereni	(Hollister 1916, Kingdon et al. 2013, Stanley et al. 2013)
Scutisorex somereni sp.	(Nowak 1999)
Scutisorex thori	(Stanley et al. 2013)
Solisorex pearsoni	(Stone 1995, Nowak 1999)
Sorex alaskanus	(Anthony 1928, Jackson 1928, Hall 1981)
Sorex albibarbis albibarbis	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Osgood 1938*a*, van Zyll de Jong 1983)
Sorex albibarbis gloveralleni	(Anthony 1928, Jackson 1928, Johnson 1951, van Zyll de Jong 1983)
Sorex albibarbis labradorensis	(Burt 1938, Johnson 1951, van Zyll de Jong 1983)
Sorex albibarbis punctulatus	(Hooper 1942, J. L. Paradiso 1969, Webster et al. 1985, Merritt 1987, Whitaker and Hamilton 1998)
Sorex albibarbis turneri	(Johnson 1951, van Zyll de Jong 1983)
Sorex alpinus alpinus	(Trouessart 1910, Miller 1912, Cabrera 1914, Dannelid 1990)
Sorex alpinus hercynicus	(Miller 1909, 1912, Trouessart 1910)
Sorex alpinus tatricus	(Dannelid 1990)
Sorex alpinus sp.	(Burton 1976, Merritt et al. 1994, Stone 1995, Aulagnier 2009)
Sorex altoensis	(Carraway 2007)
Sorex antinorii antinorii	(Brünner et al. 2002, Aulagnier 2009)
Sorex antinorii arunchi	(Lapini et al. 2001, Aulagnier 2009)
Sorex antinorii averini	(Zagorodniuk 1996)
Sorex araneus alticola	(Miller 1901)
Sorex araneus araneus	(Blanford 1888, Trouessart 1910, Miller 1912, Ognev 1928, Bauer 1960, Buchalczyk and Raczynski 1961, Skaren 1964, Osborn 1965, Passarge 1984, Hoffmann 1985*b*, Dannelid 1990)
Sorex araneus bergensis	(Miller 1909, 1912, Trouessart 1910, Skaren 1964)
Sorex araneus bolkayi	(Witte 1964)
Sorex araneus carpathicus	(Barrett-Hamilton 1905, Trouessart 1910)
Sorex araneus castaneus	(Miller 1912)
Sorex araneus csikii	(Bauer 1960)
Sorex araneus eleonorae	(Bauer 1960, Witte 1964)
Sorex araneus marchicus	(Passarge 1984)
Sorex araneus petrovi	(Witte 1964)
Sorex araneus peucinius	(Ognev 1928)
Sorex araneus pyrenaicus	(Miller 1909, 1912, Trouessart 1910, Cabrera 1914, Niethammer 1956)
Sorex araneus rypheus	(Yudin 1989, Polyakov et al. 2002)
Sorex araneus tetragonurus	(Miller 1909, 1912, Trouessart 1910, Bauer 1960)
Sorex araneus tomensis	(Ognev 1928, Hoffmann and Peterson 1967, Hoffmann 1985*b*)

Sorex araneus vulgaris	(Stroganov 1956*b*, Ellerman and Morrison-Scott 1966)
Sorex araneus wettsteini	(Bauer 1960)
Sorex araneus sp.	(Tate 1947, Burton 1976, Merritt et al. 1994, Stone 1995, Lapini et al. 2001, Brünner et al. 2002, Polyakov et al. 2002, Ochocińska and Taylor 2003, Mishta 2007, Aulagnier 2009, Margry 2013, Kovaleva et al. 2014, Remm et al. 2015, Bego et al. 2018)
Sorex arcticus arcticus	(Merriam 1895*b*, Anthony 1928, Jackson 1928, McTaggart-Cowan and Guiguet 1956, Youngman 1975, Jones et al. 1983, Junge et al. 1983, van Zyll de Jong 1983)
Sorex arcticus laricorum	(Jackson 1925*a*, 1928, Jones et al. 1983, Kirkland and Schmidt 1996, Whitaker and Hamilton 1998)
Sorex arcticus richardsonii	(Merriam 1895*b*, Cory 1912, Anthony 1928)
Sorex arcticus sphangnicola	(Merriam 1895*b*)
Sorex arcticus sp.	(Hall 1981, Wilson and Ruff 1999, Reid 2006)
Sorex arizonae	(Diersing and Hoffmeister 1977, Wilson and Ruff 1999, Reid 2006, Carraway 2007)
Sorex asper	(Thomas 1914, Ognev 1928, Stone 1995, Smith and Xie 2013)
Sorex bairdi bairdi	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Findley 1955, Carraway 1990)
Sorex bairdi permiliensis	(Anthony 1928, Jackson 1928, Findley 1955, Carraway 1990)
Sorex bairdi sp.	(Alexander 1994, Merritt et al. 1994, Wilson and Ruff 1999, Reid 2006)
Sorex bedfordiae bedfordiae	(Ellerman and Morrison-Scott 1966)
Sorex bedfordiae gomphus	(Allen 1923, 1926, 1938)
Sorex bedfordiae nepalensis	(Weigel 1969, Stone 1995)
Sorex bedfordiae wardi	(Allen 1938)
Sorex bedfordiae sp.	(Smith and Xie 2013, Chen et al. 2014)
Sorex bendirii albiventer	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Dalquest 1948, Hoffmann 1971, Pattie 1973)
Sorex bendirii bendirii	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Dalquest 1948, McTaggart-Cowan and Guiguet 1956, Hoffmann 1971, Pattie 1973, van Zyll de Jong 1983)
Sorex bendirii palmeri	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Ingles 1954, Hoffmann 1971)
Sorex bendirii sp.	(Hall 1981, Merritt et al. 1994, Wilson and Ruff 1999, Reid 2006)
Sorex buchariensis	(Ognev 1928, Hutterer 1979)
Sorex caecutiens altaicus	(Ognev 1928)

Sorex caecutiens annexus	(Goodwin 1933, Jones and Johnson 1960, Ohdachi et al. 2005)
Sorex caecutiens araneoides	(Ognev 1928)
Sorex caecutiens caecutiens	(Hoffmann and Peterson 1967, Yudin 1969, Passarge 1984, Lee 2014)
Sorex caecutiens centralis	(Ognev 1928)
Sorex caecutiens hallamontanus	(Ohdachi et al. 2005, Lee 2014, Jo et al. 2018)
Sorex caecutiens insularis	(Okhotina 1993)
Sorex caecutiens karpinskii	(Buchalczyk and Raczynski 1961)
Sorex caecutiens koreni	(Allen 1914, Ognev 1928)
Sorex caecutiens kunashirensis	(Dokuchaev et al. 1999, Ohdachi et al. 2005, 2015)
Sorex caecutiens lapponicus	(Melander 1941, Dannelid 1990)
Sorex caecutiens longicaudatus	(Okhotina 1993)
Sorex caecutiens macropygmaeus	(Ognev 1928, Tate 1947, Ohdachi et al. 2005)
Sorex caecutiens okhotinae	(Okhotina 1993)
Sorex caecutiens orii	(Okhotina 1993)
Sorex caecutiens pleskei	(Ognev 1928)
Sorex caecutiens rozanovi	(Ognev 1928)
Sorex caecutiens saevus	(Ognev 1928, Abe 1967, Ohdachi et al. 2005)
Sorex caecutiens sp.	(Burton 1976, Merritt et al. 1994, Stone 1995, Volpert and Shadrina 2002, Ochocińska and Taylor 2003, Aulagnier 2009, Smith and Xie 2013, Kovaleva et al. 2014, Remm et al. 2015)
Sorex camtschaticus	(van Zyll de Jong 1982, Kovaleva et al. 2014)
Sorex cansulus	(Allen 1938, Smith and Xie 2013)
Sorex chiapensis	(Jackson 1925*a*, 1928, Woodman et al. 2012, Matson and Woodman 2019)
Sorex cinereus acadicus	(van Zyll de Jong 1983, Woodman 2018)
Sorex cinereus cinereus	(Jackson 1928, Bailey 1931, Lyon 1936, Osgood 1938*a*, Bole and Moulthrop 1942, Dalquest 1948, McTaggart-Cowan and Guiguet 1956, Long 1965, Hoffmann and Peterson 1967, J. L. Paradiso 1969, Yudin 1969, Youngman 1975, van Zyll de Jong 1982, 1983, Merritt 1987, van Zyll de Jong and Kirkland 1989, Hoffmeister 2002, Whitaker Jr 2004, Woodman and Fisher 2016, Woodman 2018)
Sorex cinereus hollisteri	(Jackson 1928, van Zyll de Jong 1982, Kovaleva et al. 2014)
Sorex cinereus lesueurii	(Merriam 1895*b*, Gottschang 1965, Schlitter and Bowles 1967, Yudin 1969, Mumford and Whitaker 1982, van Zyll de Jong and Kirkland 1989, Hoffmeister 2002, Whitaker Jr 2004, Hofmann 2013)
Sorex cinereus miscix	(Anthony 1928, Jackson 1928, Harper 1961, van Zyll de Jong 1983)

Sorex cinereus nigriculus	(Green 1932)
Sorex cinereus ohionensis	(Bole and Moulthrop 1942, Lindsay 1960, van Zyll de Jong and Kirkland 1989)
Sorex cinereus personatus	(Merriam 1895*b*, Cory 1912, Anthony 1928)
Sorex cinereus streatori	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Dalquest 1948, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1982, 1983, Woodman and Fisher 2016)
Sorex cinereus sp.	(Hall 1981, Webster et al. 1985, Whitaker and Hamilton 1998, Wilson and Ruff 1999, Reid 2006)
Sorex coronatus coronatus	(Dannelid 1990, Brünner et al. 2002)
Sorex coronatus euronotus	(Miller 1901, Trouessart 1910)
Sorex coronatus fretalis	(Miller 1909, 1912, Trouessart 1910)
Sorex coronatus santonus	(Trouessart 1910, Miller 1912)
Sorex coronatus sp.	(Merritt et al. 1994, Aulagnier 2009)
Sorex cristobalensis	(Jackson 1925*a*, 1928, Carraway 2007, Matson and Ordóñez-Garza 2017)
Sorex cylindricauda	(Allen 1938, Smith and Xie 2013, Chen et al. 2014)
Sorex daphaenodon daphaenodon	(Kuroda 1928, Ognev 1928, Skaren 1964, Kovaleva et al. 2014)
Sorex daphaenodon sanguinidens	(Allen 1914, Ognev 1928, Mehlum and Potapov 1995)
Sorex daphaenodon scaloni	(Stroganov 1956*a*, Ellerman and Morrison-Scott 1966, Yudin 1989)
Sorex daphaenodon sp.	(Tate 1947, Merritt et al. 1994, Volpert and Shadrina 2002, Smith and Xie 2013, Lee 2014, Jo et al. 2018)
Sorex dispar blitchi	(Schwartz 1956, Webster et al. 1985, Whitaker and Hamilton 1998)
Sorex dispar dispar	(Elliot 1917, Anthony 1928, Jackson 1928, Osgood 1938*a*, Schwartz 1956, J. L. Paradiso 1969, Kirkland 1981, van Zyll de Jong 1983, Merritt 1987, Whitaker and Hamilton 1998)
Sorex dispar gaspensis	(Anthony 1928, Jackson 1928, Hall 1981, Kirkland 1981, van Zyll de Jong 1983, Wilson and Ruff 1999, Reid 2006, Diersing 2019)
Sorex dispar kirtlandi	(Hall 1981, Diersing 2019)
Sorex dispar sp.	(Wilson and Ruff 1999, Reid 2006, Diersing 2019)
Sorex emarginatus	(Jackson 1925*a*, 1928, Carraway 2007)
Sorex excelsus	(Allen 1923, 1938, Smith and Xie 2013)
Sorex fontinalis	(Elliot 1917, Anthony 1928, Jackson 1928, J. L. Paradiso 1969, Merritt 1987, van Zyll de Jong and Kirkland 1989, Whitaker and Hamilton 1998)
Sorex fumeus fumeus	(Merriam 1895*b*, Cory 1912, Anthony 1928, Jackson 1928, Lyon 1936, Osgood 1938*b*, Bole and Moulthrop 1942, Golley 1962, J. L. Paradiso 1969,

	van Zyll de Jong 1983, Owen 1984, Webster et al. 1985, Merritt 1987, Whitaker and Hamilton 1998, Best and Dusi 2014)
Sorex fumues sp.	(Hall 1981, Wilson and Ruff 1999, Reid 2006)
Sorex fumeus umbrosus	(Anthony 1928, Jackson 1928, Osgood 1938*b*, van Zyll de Jong 1983)
Sorex gracillimus granti	(Okhotina 1993)
Sorex gracillimus gracillimus	(Kuroda 1928, Goodwin 1933, Jones and Johnson 1960, Abe 1967)
Sorex gracillimus hyojironis	(Jo et al. 2018)
Sorex gracillimus kurodai	(Okhotina 1993)
Sorex gracillimus minor	(Okhotina 1993, Lee 2014)
Sorex gracillimus natalae	(Okhotina 1993)
Sorex gracillimus sp.	(Ognev 1928, Merritt et al. 1994, Stone 1995, Smith and Xie 2013, Kovaleva et al. 2014, Ohdachi et al. 2015)
Sorex granarius	(Miller 1912, Cabrera 1914, Niethammer 1956, Dannelid 1990, Merritt et al. 1994, García-Perea et al. 1997, Aulagnier 2009)
Sorex haydeni	(Anthony 1928, Jackson 1928, Jones 1964, Long 1965, Jones et al. 1983, van Zyll de Jong 1983, van Zyll de Jong and Kirkland 1989, Wilson and Ruff 1999, Schwartz and Schwartz 2001, Reid 2006)
Sorex hosonoi	(Abe 1967, Stone 1995, Ohdachi et al. 2015)
Sorex hoyi alnorum	(Anthony 1928, Jackson 1928, Harper 1961, Long 1971)
Sorex hoyi eximius	(Anthony 1928, Jackson 1928, Long 1971, Diersing 1980)
Sorex hoyi hoyi	(Merriam 1895*b*, Cory 1912, Anthony 1928, Jackson 1928, Lyon 1936, Long 1971, Diersing 1980, Jones et al. 1983, van Zyll de Jong 1983)
Sorex hoyi intervectus	(Jackson 1925*b*, 1928, Anthony 1928, McTaggart-Cowan and Guiguet 1956, Youngman 1975)
Sorex hoyi montanus	(Long 1971, Diersing 1980)
Sorex hoyi thompsoni	(Anthony 1928, Jackson 1928, Osgood 1938*b*, Long 1971, Diersing 1980, van Zyll de Jong 1983, Merritt 1987, Whitaker and Hamilton 1998, Hoffmeister 2002, Hofmann 2013)
Sorex hoyi washingtoni	(Jackson 1925*b*, 1928, Anthony 1928, Dalquest 1948, Long 1971)
Sorex hoyi winnemana	(Cory 1912, Elliot 1917, Anthony 1928, Jackson 1928, J. L. Paradiso 1969, Long 1971, Diersing 1980, Webster et al. 1985, Whitaker and Hamilton 1998, Best and Dusi 2014)
Sorex hoy sp.	(Hall 1981, Wilson and Ruff 1999, Reid 2006)

Sorex ibarrai	(Woodman et al. 2012, Matson and Ordóñez-Garza 2017, Matson and Woodman 2019)
Sorex isodon gravesi	(Goodwin 1933)
Sorex isodon isodon	(Passarge 1984, Jo et al. 2018)
Sorex isodon ruthenus	(Skaren 1964, Passarge 1984, Dannelid 1990, Margry 2013)
Sorex isodon sachalinensis	(Okhotina 1993)
Sorex isodon sp.	(Merritt et al. 1994, Han et al. 2000, Volpert and Shadrina 2002, Ochocińska and Taylor 2003, Aulagnier 2009, Smith and Xie 2013, Kovaleva et al. 2014, Lee 2014)
Sorex ixtlanensis	(Carraway 2007)
Sorex jacksoni	(Hoffmann and Peterson 1967, van Zyll de Jong 1982, Wilson and Ruff 1999, Reid 2006)
Sorex leucogaster beringianus	(Yudin 1969, Okhotina 1977)
Sorex leucogaster leucogaster	(Okhotina 1977, van Zyll de Jong 1982)
Sorex longirostris eionis	(Davis 1957)
Sorex longirostris fisheri	(Merriam 1895*b*, Anthony 1928, Jackson 1928, French 1980, Merritt et al. 1994)
Sorex longirostris longirostris	(Merriam 1895*b*, Cory 1912, Anthony 1928, Jackson 1928, Lyon 1936, Davis 1957, Lindsay 1960, Golley 1962, J. L. Paradiso 1969, Lowery 1974, French 1980, Mumford and Whitaker 1982, Webster et al. 1985, Merritt et al. 1994, Whitaker and Hamilton 1998, Schwartz and Schwartz 2001, Hoffmeister 2002, Hofmann 2013, Best and Dusi 2014)
Sorex longirostris sp.	(Hall 1981, Wilson and Ruff 1999, Reid 2006)
Sorex lyelli	(Merriam 1902, Anthony 1928, Jackson 1928, Ingles 1954, Hall 1981, Wilson and Ruff 1999, Reid 2006)
Sorex macrodon	(Merriam 1895*b*, Jackson 1928, Hall 1981, Carraway 2007)
Sorex madrensis	(Matson and Ordóñez-Garza 2017, Matson and Woodman 2019)
Sorex maritimensis	(van Zyll de Jong 1983, Reid 2006, Henderson and Forbes 2012)
Sorex mccarthyi	(Matson and Ordóñez-Garza 2017)
Sorex mediopua	(Wilson and Mittermeier 2018)
Sorex merriami leucogenys	(Elliot 1917, Anthony 1928, Jackson 1928, E. Raymond Hall 1946, Durrant 1952, Long 1965, Hoffmeister 1971, Jones et al. 1983)
Sorex merriami merriami	(Merriam 1895*b*, Anthony 1928, Jackson 1928, E. Raymond Hall 1946, Dalquest 1948, Ingles 1954, Diersing and Hoffmeister 1977, Hafner and Stahlecker 2002)

Sorex merriami sp.	(Hall 1981, Merritt et al. 1994, Wilson and Ruff 1999, Reid 2006)
Sorex milleri	(Baker 1956, Hall 1981, van Zyll de Jong and Kirkland 1989, Carraway 2007)
Sorex minutissimus abnormis	(Judin 1964)
Sorex minutissimus barabensis	(Judin 1964)
Sorex minutissimus burneyi	(Ognev 1928)
Sorex minutissimus caudata	(Judin 1964)
Sorex minutissimus hawkeri	(Ognev 1928, Abe 1967, Ohdachi et al. 2015)
Sorex minutissimus ishikawai	(Yoshiyuki 1988, Lee 2014, Jo et al. 2018)
Sorex minutissimus karelicus	(Stroganov 1949)
Sorex minutissimus minutissimus	(Judin 1964)
Sorex minutissimus neglictus	(Ognev 1928, Dannelid 1990)
Sorex minutissimus stroganovi	(Judin 1964)
Sorex minutissimus tscherskii	(Ognev 1928)
Sorex minutissimus tschuktschorum	(Hutterer 1979)
Sorex minutissimus ussuriensis	(Ognev 1928, Tate 1947)
Sorex minutissimus yukonicus	(Dokuchaev 1997, Reid 2006)
Sorex minutissimus sp.	(Burton 1976, Merritt et al. 1994, Dokuchaev 1997, Volpert and Shadrina 2002, Aulagnier 2009, Smith and Xie 2013, Kovaleva et al. 2014, Ohdachi et al. 2015, Remm et al. 2015)
Sorex minutus becki	(Dannelid 1990)
Sorex minutus carpetanus	(Rey 1971)
Sorex minutus gymnurus	(Chaworth-Musters 1932)
Sorex minutus heptapotamicus	(Stroganov 1956*b*)
Sorex minutus lucanius	(Miller 1909, 1912, Trouessart 1910)
Sorex minutus melanderi	(Ognev 1928)
Sorex minutus minutus	(Trouessart 1910, Miller 1912, Ognev 1928, Bauer 1960, Buchalczyk and Raczynski 1961, Osborn 1965, Rey 1971, Hutterer 1979, Dannelid 1990, Kovaleva et al. 2014)
Sorex minutus sp.	(Tate 1947, Burton 1976, Merritt et al. 1994, Stone 1995, Ochocińska and Taylor 2003, Aulagnier 2009, Smith and Xie 2013, Remm et al. 2015, Bego et al. 2018)
Sorex mirabilis kutscheruki	(Jones and Johnson 1960, Han et al. 2000, Lee 2014, Jo et al. 2018)
Sorex mirabilis mirabilis	(Hoffmann 1971, Kovaleva et al. 2014)
Sorex mirabilis sp.	(Tate 1947, Smith and Xie 2013)
Sorex monticolus alascensis	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Findley 1955, Alexander 1994, Merritt et al. 1994)
Sorex monticolus calvertensis	(Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, Alexander 1994)
Sorex monticolus dobsoni	(Anthony 1928)

Sorex monticolus durangae	(Jackson 1925*a*, 1928, Carraway 2007)
Sorex monticolus elassodon	(Anthony 1928, Jackson 1928, Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, Alexander 1994)
Sorex monticolus glacialis	(Anthony 1928)
Sorex monticolus insularis	(Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, Alexander 1994)
Sorex monticolus isolatus	(Jackson 1922, 1928, Anthony 1928, Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, George and Smith 1991, Alexander 1994)
Sorex monticolus longicauda	(Merriam 1895*b*, Swarth 1913, Jackson 1928, Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, Alexander 1994)
Sorex monticolus longiquus	(Findley 1955)
Sorex monticolus malitiosus	(Jackson 1919, 1928, Anthony 1928, Findley 1955, Alexander 1994)
Sorex monticolus mixtus	(Hall 1938, Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, George and Smith 1991)
Sorex monticolus monticolus	(Merriam 1895*b*, Jackson 1928, Bailey 1931, E. Raymond Hall 1946, Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, Alexander 1994, Maldonado et al. 2004, Woodman 2012)
Sorex monticolus obscuroides	(Ingles 1954, Findley 1955)
Sorex monticolus obscurus	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Bailey 1931, E. Raymond Hall 1946, Dalquest 1948, Durrant 1952, Findley 1955, Bee and Hall 1956, McTaggart-Cowan and Guiguet 1956, Long 1965, Youngman 1975, Carraway 1990, Alexander 1994, Woodman 2012)
Sorex monticolus parvidens	(Anthony 1928, Jackson 1928, Findley 1955, Alexander 1994, Woodman 2012)
Sorex monticolus prevostensis	(Anthony 1928, Jackson 1928, Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, Alexander 1994)
Sorex monticolus setosus	(Anthony 1928, Jackson 1928, Hall 1938, Dalquest 1948, Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, Carraway 1990, George and Smith 1991, Alexander 1994, Merritt et al. 1994)
Sorex monticolus shumaginensis	(Anthony 1928, Jackson 1928, Findley 1955, Alexander 1994)
Sorex monticolus soperi	(Durrant 1952, Findley 1955, van Zyll de Jong 1983, Alexander 1994)

Sorex monticolus sp.	(Dalquest 1948, Wilson and Ruff 1999, Reid 2006)
Sorex mutabilis	(Merriam 1895*b*, Jackson 1928)
Sorex nanus	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Long 1965, Hoffmeister 1971, Hall 1981, Jones et al. 1983, Wilson and Ruff 1999, Hafner and Stahlecker 2002, Reid 2006)
Sorex navigator brooksi	(McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983)
Sorex navigator navigator	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Bailey 1931, E. Raymond Hall 1946, Dalquest 1948, Durrant 1952, Ingles 1954, Long 1965, Youngman 1975, van Zyll de Jong 1983, Nagorsen et al. 2017)
Sorex neomexicanus	(Elliot 1917, Anthony 1928, Jackson 1928, Bailey 1931, Findley 1955, Alexander 1994, Reid 2006)
Sorex oreopolus	(Merriam 1895*b*, Jackson 1928, Hall 1981, Carraway 2007)
Sorex orizabae	(Merriam 1895*b*, Jackson 1928, Hoffmeister and Goodpasters 1954, Findley 1955, Hall and Dalquest 1960, Carraway 2007)
Sorex ornatus californicus	(Merriam 1895*b*, Grinnell 1913, Anthony 1928, Jackson 1928)
Sorex ornatus juncensis	(Elliot 1917, Jackson 1928, Hall 1981, Alvarez-Castaneda and Patton 1999, Carraway 2007, Camargo and Álvarez-Castañeda 2019)
Sorex ornatus lagunae	(Elliot 1917, Jackson 1928, Alvarez-Castaneda and Patton 1999, Carraway 2007)
Sorex ornatus ornatus	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Alvarez-Castaneda and Patton 1999, Carraway 2007, Woodman 2012, Camargo and Álvarez-Castañeda 2019)
Sorex ornatus relictus	(Grinnell 1932)
Sorex ornatus salarius	(von Bloeker 1939)
Sorex ornatus salicornicus	(von Bloeker 1932)
Sorex ornatus sinuosus	(Grinnell 1913, Elliot 1917, Anthony 1928, Jackson 1928, Ingles 1954, Hall 1981)
Sorex ornatus trigonirostris	(Jackson 1922, 1928, Anthony 1928, Hall 1981, Carraway 1990)
Sorex ornatus willetti	(von Bloeker 1942)
Sorex ornatus sp.	(Ingles 1954, Hall 1981, Owen and Hoffmann 1983, Wilson and Ruff 1999, Maldonado et al. 2004, Reid 2006)
Sorex pacificus cascadensis	(Carraway 1990)
Sorex pacificus pacificus	(Anthony 1928, Jackson 1928, Ingles 1954, Findley 1955, Carraway 1985, 1990)

Sorex pacificus sp.	(Grinnell 1913, Merritt et al. 1994, Wilson and Ruff 1999, Reid 2006)
Sorex palustris hydrobadistes	(Merriam 1895*b*, Cory 1912, Anthony 1928, Jackson 1928, Jones et al. 1983, van Zyll de Jong 1983)
Sorex palustris palustris	(Merriam 1895*b*, Anthony 1928, Jackson 1928, van Zyll de Jong 1983, Whitaker and Hamilton 1998, Nagorsen et al. 2017)
Sorex palustris sp.	(Hall 1981, Merritt et al. 1994, Wilson and Ruff 1999, Reid 2006)
Sorex planiceps	(Hutterer 1979, Smith and Xie 2013)
Sorex portenkoi	(van Zyll de Jong 1982, Kovaleva et al. 2014)
Sorex preblei	(Jackson 1922, 1928, Anthony 1928, Hoffmann and Fisher 1978, Hall 1981, Cornely et al. 1992, Merritt et al. 1994, Wilson and Ruff 1999, Reid 2006, Shohfi et al. 2006)
Sorex pribilofensis hydrodromus	(Anthony 1928, Jackson 1928, Musie 1959, Hall 1981, Wilson and Ruff 1999, Reid 2006)
Sorex pribilofensis pribilofensis	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Hoffmann and Peterson 1967, van Zyll de Jong 1982)
Sorex raddei	(Ognev 1928, Merritt et al. 1994, Aulagnier 2009)
Sorex roboratus dukelskiae	(Skaren 1964)
Sorex roboratus jakutensis	(Stroganov 1956*b*)
Sorex roboratus platycranius	(Ognev 1928, Hoffmann 1985*b*)
Sorex roboratus roboratus	(Hollister 1913, Hoffmann 1985*b*, Stone 1995)
Sorex roboratus thomasi	(Ognev 1928, Hoffmann 1985*b*)
Sorex roboratus vir	(Allen 1914, Ognev 1928, Tate 1947, Hoffmann 1985*b*, Mehlum and Potapov 1995)
Sorex roboratus sp.	(Merritt et al. 1994, Volpert and Shadrina 2002, Smith and Xie 2013, Kovaleva et al. 2014)
Sorex rohweri	(Woodman and Fisher 2016)
Sorex salvini	(Jackson 1928, Woodman et al. 2012, Matson and Ordóñez-Garza 2017, Matson and Woodman 2019)
Sorex samniticus garganicus	(Witte 1964)
Sorex samniticus samniticus	(Witte 1964, Graf et al. 1979, Dannelid 1990, Brünner et al. 2002)
Sorex samniticus sp.	(Merritt et al. 1994, Aulagnier 2009)
Sorex satunini satunini	(Ognev 1928)
Sorex satunini stavropolica	(Sokolov and Tembotov 1989)
Sorex satunini sp.	(Merritt et al. 1994, Aulagnier 2009)
Sorex saussurei godmani	(Jackson 1928, Matson and Ordóñez-Garza 2017)
Sorex saussurei saussurei	(Merriam 1895*b*, Jackson 1928, Baker 1956, Carraway 2007)
Sorex saussurei sp.	(Hall 1981, Reid 1997)

Sorex sclateri	(Jackson 1928, Hall 1981, Reid 1997, Carraway 2007, Matson and Ordóñez-Garza 2017)
Sorex shinto sadonis	(Ohdachi et al. 2005, 2015)
Sorex shinto shikokensis	(Abe 1967, Ohdachi et al. 2005, 2015)
Sorex shinto shinto	(Kuroda 1928, Abe 1967, Ohdachi et al. 2005, 2015)
Sorex shinto sp.	(Stone 1995, Dokuchaev et al. 1999, Kovaleva et al. 2014)
Sorex sinalis	(Allen 1938, Stone 1995, Smith and Xie 2013)
Sorex sonomae sonomae	(Anthony 1928, Jackson 1928, Findley 1955, Carraway 1985, 1990, Merritt et al. 1994)
Sorex sonomae tenelliodus	(Carraway 1990, Merritt et al. 1994)
Sorex sonomae sp.	(Wilson and Ruff 1999, Reid 2006)
Sorex stizodon	(Merriam 1895*b*, Jackson 1928, Hall 1981, Reid 1997, Carraway 2007, Matson and Ordóñez-Garza 2017)
Sorex tenellus myops	(Merriam 1902, Anthony 1928, Jackson 1928)
Sorex tenellus tenellus	(Merriam 1895*b*, Anthony 1928, Jackson 1928, E. Raymond Hall 1946)
Sorex tenellus sp.	(Ingles 1954, Hall 1981, Wilson and Ruff 1999, Reid 2006, Shohfi et al. 2006)
Sorex thibetanus kozlovi	(Hutterer 1979)
Sorex thibetanus thibetanus	(Allen 1938)
Sorex thibetanus sp.	(Smith and Xie 2013)
Sorex trowbridgii destructioni	(Scheffer and Dalquest 1942, Dalquest 1948, Carraway and Verts 2005)
Sorex trowbridgii humboldtensis	(Grinnell 1913, Jackson 1922, 1928, Anthony 1928, George 1989, Carraway and Verts 2005)
Sorex trowbridgii mariposae	(Grinnell 1913, Elliot 1917, Anthony 1928, Jackson 1928, E. Raymond Hall 1946, George 1989, Carraway and Verts 2005)
Sorex trowbridgii montereyensis	(Merriam 1895*b*, Grinnell 1913, Anthony 1928, Jackson 1928, George 1989, Carraway and Verts 2005)
Sorex trowbridgii trowbridgii	(Merriam 1895*b*, Anthony 1928, Jackson 1928, Scheffer and Dalquest 1942, Dalquest 1948, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, George 1989, Carraway and Verts 2005)
Sorex trowbridgii sp.	(Ingles 1954, Hall 1981, Merritt et al. 1994, Wilson and Ruff 1999, Reid 2006)
Sorex tundrensis amazari	(Ognev 1928)
Sorex tundrensis baikalensis	(Ognev 1928)
Sorex tundrensis borealis	(Hollister 1913, Goodwin 1933, Allen 1938)
Sorex tundrensis buxtoni	(Allen 1938, Ellerman and Morrison-Scott 1966)
Sorex tundrensis parvicaudatus	(Okhotina 1976)
Sorex tundrensis petschorae	(Ognev 1928)

Sorex tundrensis schnitnikovi	(Ognev 1928, Hoffmann 1985*b*)
Sorex tundrensis sibiriensis	(Ognev 1928, Hoffmann and Peterson 1967, Hoffmann 1985*b*)
Sorex tundrensis transrypheus	(Stroganov 1956*a*, Yudin 1989)
Sorex tundrensis tundrensis	(Anthony 1928, Jackson 1928, Bee and Hall 1956, Hoffmann and Peterson 1967, Youngman 1975, Junge et al. 1983)
Sorex tundrensis ultimus	(Allen 1914, Ognev 1928, Mehlum and Potapov 1995)
Sorex tundrensis sp.	(Junge et al. 1983, van Zyll de Jong 1983, Merritt et al. 1994, Wilson and Ruff 1999, Volpert and Shadrina 2002, Ochocińska and Taylor 2003, Reid 2006, Smith and Xie 2013, Kovaleva et al. 2014)
Sorex ugyunak	(Bee and Hall 1956, Youngman 1975, van Zyll de Jong 1982, 1983, Wilson and Ruff 1999, Reid 2006)
Sorex unguiculatus unguiculatus	(Kuroda 1928, Goodwin 1933, Skaren 1964, Abe 1967)
Sorex unguiculatus yesoensis	(Kuroda 1928, Abe 1967, Lee 2014)
Sorex unguiculatus sp.	(Ognev 1928, Tate 1947, Merritt et al. 1994, Stone 1995, Smith and Xie 2013, Kovaleva et al. 2014, Ohdachi et al. 2015)
Sorex vagrans amoenus	(Anthony 1928, Jackson 1928, E. Raymond Hall 1946)
Sorex vagrans halicoetes	(Grinnell 1913, Elliot 1917, Anthony 1928, Jackson 1928, Findley 1955)
Sorex vagrans malitiosus	(Jackson 1919)
Sorex vagrans paludivagus	(von Bloeker 1939)
Sorex vagrans shastensis	(Anthony 1928)
Sorex vagrans vagrans	(Merriam 1895*b*, Grinnell 1913, Anthony 1928, Jackson 1928, Dalquest 1948, Ingles 1954, Findley 1955, McTaggart-Cowan and Guiguet 1956, Long 1965, Yudin 1969, van Zyll de Jong 1983, George and Smith 1991, Maldonado et al. 2004)
Sorex vagrans sp.	(Hall 1981, Merritt et al. 1994, Wilson and Ruff 1999, Gillihan and Foresman 2004, Reid 2006, Woodman and Fisher 2016)
Sorex vagrans vancouverensis	(Anthony 1928, Jackson 1928, Findley 1955, McTaggart-Cowan and Guiguet 1956, van Zyll de Jong 1983, George and Smith 1991)
Sorex ventralis	(Merriam 1895*b*, Jackson 1928, Carraway 2007)
Sorex veraecrucis oaxacae	(Jackson 1925*a*, 1928, Carraway 2007)
Sorex veraecrucis veraecrucis	(Jackson 1925*a*, 1928, Carraway 2007)
Sorex veraepacis caudatus	(Merriam 1895*b*)

Sorex veraepacis veraepacis	(Merriam 1895*b*, Jackson 1928, Reid 1997, Carraway 2007, Woodman et al. 2012, Matson and Ordóñez-Garza 2017, Matson and Woodman 2019)
Sorex veraepacis sp.	(Hall 1981)
Sorex volnuchini colchicus	(Sokolov and Tembotov 1989)
Sorex volnuchini dahli	(Zagorodniuk 1996)
Sorex volnuchini volnuchini	(Ognev 1928)
Sorex volnuchini sp.	(Merritt et al. 1994, Aulagnier 2009)
Sorex yaquina	(Anthony 1928, Jackson 1928, Findley 1955, Carraway 1985)
Soriculus nigrescens caurinus	(Tate 1947, Hoffmann 1985*a*)
Soriculus nigrescens centralis	(Tate 1947, Weigel 1969, Hoffmann 1985*a*)
Soriculus nigrescens minor	(Osgood 1941)
Soriculus nigrescens nigrescens	(Blyth 1856, Anderson 1881, Blanford 1888, Tate 1947, Abe 1977, Hoffmann 1985*a*)
Soriculus nigrescens pahari	(Tate 1947, Hoffmann 1985*a*)
Soriculus nigrescens radulus	(Tate 1947, Hoffmann 1985*a*, Hutterer 1986*b*)
Soriculus nigrescens sp.	(Stone 1995, Smith and Xie 2013)
Suncus aequatorius	(Heller 1912, Hollister 1918, Meester and Lambrechts 1971, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Suncus dayi	(Blanford 1888, Jenkins et al. 1998, Alfred and Chakraborty 2002, Venkataraman et al. 2013, Kundu et al. 2023)
Suncus etruscus coquerelii	(Trouessart 1880)
Suncus etruscus etruscus	(Trouessart 1910, Miller 1912, Cabrera 1914, Niethammer 1956, Witte 1964, Spitzenberger 1970*b*, Meester and Lambrechts 1971)
Suncus etruscus hodgsoni	(Blanford 1888)
Suncus etruscus macrotis	(Anderson 1881)
Suncus etruscus madagascariensis	(Trouessart 1880)
Suncus etruscus melanodon	(Blyth 1856)
Suncus etruscus micronyx	(Blyth 1856, Anderson 1881, Tate 1947)
Suncus etruscus nanula	(Stroganov 1941)
Suncus etruscus nitidofulva	(Lindsay 1929)
Suncus etruscus nudipes	(Blyth 1856, Tate 1947)
Suncus etruscus perrottetti	(Blyth 1856, Anderson 1881, Blanford 1888, Tate 1947)
Suncus etruscus pygmaeoides	(Anderson 1881, Tate 1947)
Suncus etruscus pygmaeus	(Harrison 1964)
Suncus etruscus subflava	(Anderson 1881)
Suncus etruscus travancorensis	(Anderson 1881)
Suncus etruscus sp.	(Ognev 1928, Burton 1976, Hutterer and Happold 1983, Martin et al. 1984, Stone 1995, Aulagnier

	2009, Meegaskumbura et al. 2012, Kingdon et al. 2013, Smith and Xie 2013, Kundu et al. 2023)
Suncus fellowesgordoni	(Meegaskumbura et al. 2012, Kundu et al. 2023)
Suncus hosei	(Phillipps 2016)
Suncus hututsi	(Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Suncus infinitesimus chriseos	(Meester and Lambrechts 1971, Kingdon et al. 2013)
Suncus infinitesimus infinitesimus	(Heller 1912, Meester and Lambrechts 1971)
Suncus infinitesimus ubanguiensis	(Meester and Lambrechts 1971)
Suncus lixa gratulus	(Meester and Lambrechts 1971)
Suncus lixa lixa	(Allen and Loveridge 1933, Meester and Lambrechts 1971)
Suncus lixa sp.	(Kingdon et al. 2013)
Suncus malayanus	(Tate 1947, Medway 1978)
Suncus megalurus angolensis	(Roberts 1929)
Suncus megalurus gemmeus	(Heller 1910, Hollister 1916, 1918, Thorn and Kerbis Peterhans 2009)
Suncus megalurus irene	(Hollister 1916, Thorn and Kerbis Peterhans 2009)
Suncus megalurus megalurus	(Osgood 1936, Hutterer 1980, Hutterer and Happold 1983, Hutterer and Schlitter 1996)
Suncus megalurus phaeopus	(Osgood 1936:193)
Suncus megalurus sorella	(Konečný et al. 2020)
Suncus megalurus sp.	(Kingdon et al. 2013)
Suncus megalurus sp. E Nig. And Cam.	(Hutterer et al. 1992)
Suncus mertensi	(Kock 1974)
Suncus montanus kelaarti	(Anderson 1881, Lindsay 1929)
Suncus montanus montanus	(Blyth 1856, Anderson 1881)
Suncus montanus sp.	(Meegaskumbura and Schneider 2009, Meegaskumbura et al. 2010, Kundu et al. 2023)
Suncus murinus blanfordi	(Lindsay 1929)
Suncus murinus caerulescens	(Blyth 1856, Anderson 1881, Blanford 1888, Meegaskumbura et al. 2010)
Suncus murinus caeruleus	(Lindsay 1929, Tate 1947)
Suncus murinus crassicaudus	(Harrison 1964)
Suncus murinus edwardsiana	(Jentink 1888)
Suncus murinus fulvocinereus	(Lindsay 1929)
Suncus murinus giganteus	(Lindsay 1929)
Suncus murinus griffithii	(Blyth 1856, Anderson 1881, Hassinger 1973)
Suncus murinus indicus	(Blyth 1856, Jentink 1888, Koller 1929)
Suncus murinus kandianus	(Blyth 1856, Meegaskumbura et al. 2010)
Suncus murinus luzoniensis	(Hutterer et al. 2018)
Suncus murinus mulleri	(Jentink 1888)
Suncus murinus murinus	(Allen 1938, Medway 1978, Meegaskumbura et al. 2010)

Suncus murinus occultidens	(Hutterer 2007)
Suncus murinus palawanensis	(Hutterer 2007)
Suncus murinus riukiuanus	(Abe 1967)
Suncus murinus rubicunda	(Anderson 1881, Blanford 1888)
Suncus murinus sacer	(Harrison 1964, Osborn and Helmy 1980)
Suncus murinus saturatior	(Lindsay 1929)
Suncus murinus serpentarius	(Blyth 1856)
Suncus murinus sindensis	(Ellerman and Morrison-Scott 1966)
Suncus murinus soccatus	(Blyth 1856, Lindsay 1929, Weigel 1969, Hassinger 1973)
Suncus murinus subfulva	(Anderson 1881)
Suncus murinus sumatranus	(Jentink 1888)
Suncus murinus swinhoei	(Anderson 1881, Jameson and Jones 1977)
Suncus murinus temmincki	(Ohdachi et al. 2015)
Suncus murinus tytleri	(Lindsay 1929)
Suncus murinus unicolor	(Jentink 1888)
Suncus murinus viridescens	(Lindsay 1929)
Suncus murinus sp. Saudi Arabia	(Hutterer and Harrison 1988)
Suncus murinus sp.	(Allen 1938, Van Peenen et al. 1969, Hutterer 2007, Aulagnier 2009, Kingdon et al. 2013, Smith and Xie 2013, Phillipps 2016, Kundu et al. 2023)
Suncus niger malabaricus	(Lindsay 1929)
Suncus niger niger	(Blyth 1856, Lindsay 1929)
Suncus niger sp.	(Meegaskumbura and Schneider 2009, Kundu et al. 2023)
Suncus remyi	(Meester and Lambrechts 1971, Fisher 2004, Kingdon et al. 2013)
Suncus stoliczkanus bidianus	(Anderson 1881, Blanford 1888)
Suncus stoliczkanus leucogenys	(Blanford 1888, Lindsay 1929)
Suncus stoliczkanus stoliczkanus	(Anderson 1881, Blanford 1888)
Suncus stoliczkanus subfulvus	(Lindsay 1929)
Suncus stoliczkanus sp.	(Jenkins et al. 1998, Kundu et al. 2023)
Suncus varilla minor	(Allen and Loveridge 1933, Meester and Lambrechts 1971)
Suncus varilla natalensis	(Roberts 1946)
Suncus varilla orangiae	(Roberts 1924)
Suncus varilla tulbaghensis	(Roberts 1946)
Suncus varilla varilla	(Meester and Lambrechts 1971)
Suncus varilla warreni	(Roberts 1929)
Suncus varilla sp.	(Schlater 1901, Kingdon et al. 2013)
Suncus zeylanicus	(Kundu et al. 2023)
Surdisorex norae	(Hollister 1918, Meester 1953, Duncan and Wrangham 1971, Kerbis Peterhans et al. 2009, Kingdon et al. 2013)

Surdisorex polulus	(Hollister 1918, Meester 1953, Duncan and Wrangham 1971, Kerbis Peterhans et al. 2009, Kingdon et al. 2013)
Surdisorex schlitteri	(Kerbis Peterhans et al. 2009)
Sylvisorex akaibei	(Mukinzi et al. 2009)
Sylvisorex camerunensis	(De Balsac 1968, 1975, Hutterer et al. 1992, 2009, Kingdon et al. 2013)
Sylvisorex corbeti	(Hutterer and Montermann 2009)
Sylvisorex granti granti	(Osgood 1936, De Balsac 1968)
Sylvisorex granti mundus	(Osgood 1910, Hollister 1918)
Syvisorex granti sp.	(Hutterer et al. 2009, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Sylvisorex howelli howelli	(Hutterer 1986*b*, Ray and Hutterer 1995)
Sylvisorex howelli usambarensis	(Hutterer 1986*b*, Ray and Hutterer 1995, Kingdon et al. 2013)
Sylvisorex isabellae	(De Balsac 1968, Hutterer et al. 2009, Kingdon et al. 2013)
Sylvisorex johnstoni dieterleni	(Hutterer 1986*b*)
Sylvisorex johnstoni johnstoni	(Hutterer 1986*b*, Hutterer and Schlitter 1996, Fisher 2004, Hutterer et al. 2009, Mukinzi et al. 2009, Thorn and Kerbis Peterhans 2009)
Sylvisorex johnstoni sp.	(Kingdon et al. 2013)
Sylvisorex konganensis	(Ray and Hutterer 1995)
Sylvisorex lunaris lunaris	(Hutterer and Schlitter 1996, Mukinzi et al. 2009, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)
Sylvisorex lunaris ruandae	(Mukinzi et al. 2009)
Sylvisorex lunaris sp.	(Kingdon et al. 2013)
Sylvisorex morio	(De Balsac 1968, Hutterer and Schlitter 1996, Jenkins et al. 1998, Hutterer et al. 2009, Mukinzi et al. 2009, Kingdon et al. 2013)
Sylvisorex ollula	(Hutterer et al. 1992, Hutterer and Schlitter 1996, Fisher 2004, Hutterer and Montermann 2009, Kingdon et al. 2013)
Sylvisorex oriundus	(Hollister 1916, Hutterer and Schlitter 1996, Mukinzi et al. 2009, Kingdon et al. 2013)
Sylvisorex pluvialis	(Hutterer and Schlitter 1996, Kingdon et al. 2013)
Sylvisorex silvanorum	(Hutterer et al. 2009)
Sylvlisorex vulcanorum	(Hutterer et al. 2009, Thorn and Kerbis Peterhans 2009, Kingdon et al. 2013)

APPENDIX G

POTENTIAL INSECTIVOROUS MAMMALIAN COMPETITORS OF SORICIDAE

A brief description of each genus and any additional information for inclusion is summarized below. Classification and family arrangement follow Nowak (2018) and Reeder and Wilson (in press). Ordinal arrangement for afrotherians follows Arnason et al. (2008). Common names are provided by the IUCN Red List (2023) and the ASM Mammal Diversity Database (2023) except for Scandentia. Species are listed alphabetically by genus for quick reference.

Class Mammalia

Subclass Theria

Infraclass Metatheria

Order Didelphimorphia

Most New World Opossums are generally small and possess morphological characteristics consistent with a generalized omnivorous diet, including elongate muzzles, grasping appendages and jaws designed to chew/tear a wide variety of organic material (Nowak 2018). Some groups are more specialized for aquatic or arboreal existences and are insectivorous or piscivorous. For this study, 9 species were selected following Nowak 2018 with regard to the IUCN's Red List of Threatened Species 2023.

Family Didelphidae

Gracilinanus dryas	Wood Sprite Gracile Mouse Opossum
Gracilinarus marica	Northern Gracile Mouse Opossum
Marmosa (Micoureus) alstoni	Alston's Woolly Mouse Opossum
Marmosa (Micoureus) demerarae	Woolly Mouse Opossum
Marmosa (Micoureus) phaea	Little Woolly Mouse Opossum
Marmosa (Micoureus) regina	Short-furred Woolly Mouse Opossum
Monodephis adusta	Sepia Short-tailed Opossum

Monodephis palliolata	Hooded Red-sided Opossum
Tlacuatzin canescens	Gray Mouse Opossum

Order Paucituberculata

Shrew Opossums or Caenolestids are small, shrew-like marsupials that inhabit western South America. These animals are strongly convergent with placental soricids and have habits that strongly resemble large forest shrews (Nowak 2018). For this study, 3 species were selected following Nowak 2018 with regard to the IUCN's Red List of Threatened Species 2023.

Family Caenolestidae

Caenolestes caniventer	Gray-bellied Shrew Opossum (Caenolestid)
Caenolestes convelatus	Blackish Shrew Opossum (Caenolestid)
Caenolestes fuliginosus	Silky Shrew Opossum (Caenolestid)

Order Dasyuromorpha

This large radiation of Australasian carnivorous mammals is found throughout Australia, Tasmania, New Guinea, and some nearby islands. All species are specialized for insectivory or carnivory, and historically are convergent with eutherian carnivores and eulipotyphlans (Nowak 2018). For the purposes of this study, a single species was selected based upon geography; no other dasyuromorphs occur in proximity with soricids.

Family Dasyuridae

Sminthopsis virginiae	Red-cheeked Dunnart

Order Peramelemorphia

Bandicoots include a small radiation of syndactylous mammals that occur in Australia, Tasmania, New Guinea, and some nearby islands. Although morphologically they draw comparisons to lagomorphs, their behavior and dietary preferences suggest a closer convergent affinity to eulipotyphlans. For this study, two species were selected based upon geography.

Family Peramelidae

Echymipera rufescens	Long-nosed New Guinean Spiny Bandicoot
Rhynchomeles prattorum	Seram Island Long-nosed Bandicoot

Subclass Theria

Infraclass Eutheria

Superorder Afrotheria

Order Chrysochloridea

The Golden Moles are a strictly African clade. Species are primarily fossorial but will follow prey to the surface after a rain. Several genera may forage above ground during the night. This unique clade convergently resembles laurasiatherian talpids, including reduced or absent eyes, reduced outer ears, muscular digging forelimbs, and teeth designed for crushing prey (Nowak 2018). For this study, all 21 species of the order were included. The sequence of genera follows Asher and Seiffert (2010) with regard to the IUCN's Red List of Threatened Species 2023.

Family Chrysocholoridae

Amblysomus corriae	Fynbos Golden Mole
Amblysomus hottentotus	Hottentot's Golden Mole
Amblysomus marleyi	Marley's Golden Mole
Amblysomus robustus	Robust Golden Mole
Amblysomus septentrionalis	Highveld Golden Mole
Calcochloris obtusirostris	Yellow Golden Mole
Carpitalpa arendsi	Arend's Golden Mole
Chlorotalpa duthieae	Duthie's Golden Mole
Chlorotalpa sclateri	Sclater's Golden Mole
Chrysochloris asiatica	Cape Golden Mole
Chrysochloris visagiei	Visagie's Golden Mole
Chrysochloris stuhlmanni	Stuhlmann's Golden Mole

Chryptochloris wintoni	De Winton's Golden Mole
Chryptochloris zyli	Van Zyl's Golden Mole
Chrysospalax trevelyani	Giant Golden Mole
Chrysospalax villosus	Rough-haired Golden Mole
Eremitalpa granti	Grant's Golden Mole
Huetia leucorhina	Congo Golden Mole
Huetia tytonis	Somali Golden Mole
Neamblysomus gunning	Gunning's Golden Mole
Neamblysomus julianae	Juliana's Golden Mole

Order Tenrecidea

Tenrecs and Otter-shrews are another strictly African clade and are the sister group to the Golden moles. Tenrecidae is a diverse omnivorous clade that is restricted to Madagascar while Potamogalidae is found in the equatorial rain forests of Central Africa. Members of Tenrecidae include species that are semi-aquatic, fossorial, terrestrial, and arboreal and have filled niches more commonly seen in Laurasiatherians such as eulipotyphlans and rodents (Nowak 2018). For this study, all 30 species split between two families of the order were included. The sequence of genera follows Asher et al. 2010 with regard to the IUCN's Red List of Threatened Species 2023.

Family Potamogalidae

Micropotamogale lamottei	Nimba Otter-shrew
Micropotamogale ruwenzorii	Rwenzori Otter-shrew
Potamogale velow	Giant Otter-shrew

Family Tenrecidae

Echinops telfairi	Lesser Hedgehog Tenrec
Geogale aurita	Large-eared Tenrec
Hemicentetes nigriceps	Highland Streaked Tenrec
Hemicentetes semispinosus	Lowland Streaked Tenrec
Limnogale mergulus	Web-footed Tenrec

Microgale brevicaudata	Short-tailed Shrew Tenrec
Microgale cowani	Cowan's Shrew Tenrec
Microgale drouhardi	Drouhard's Shrew Tenrec
Microgale dryas	Dryad Shrew Tenrec
Microgale fotsifotsy	Pale Shrew Tenrec
Microgale gracilis	Gracile Shrew Tenrec
Microgale gymnorhyncha	Naked-nosed Shrew Tenrec
Microgale longicaudata	Lesser Long-tailed Shrew Tenrec
Microgale monticola	Montane Shrew Tenrec
Microgale nasoloi	Nasolo's Shrew Tenrec
Microgale parvula	Pygmy Shrew Tenrec
Microgale principula	Greater Long-tailed Shrew Tenrec
Microgale pusilla	Least Shrew Tenrec
Microgale soricoides	Shrew-toothed Shrew Tenrec
Microgale taiva	Taiva Shrew Tenrec
Microgale thomasi	Thomas's Shrew Tenrec
Nesogale dobsoni	Dobson's Shrew Tenrec
Nesogale talazaci	Talazac's Shrew Tenrec
Oryzorictes hova	Mole-like Rice Tenrec
Oryzorictes tetradactylus	Four-toed Rice Tenrec
Setifer setosus	Greater Hedgehog Tenrec
Tenrec ecaudatus	Tailless Tenrec

Order Macroscelida

Sengis are endemic to Africa. Most species are strictly insectivorous, although a few species will eat fruit and other plant material. Sengis are terrestrial and exceedingly swift-moving (Nowak 2018). For this study, 14 species were included. The sequence of genera follows ASM Mammal Diversity Database (2023) with regard to the IUCN’s Red List of Threatened Species 2023.

Family Macroscelidae

Elephantulus brachyrhynchus	Short-snouted Sengi
Elephantulus edwardii	Cape Rock Sengi
Elephantulus fuscipes	Dusky-footed Sengi
Elephantulus fuscus	Dusky Sengi
Elephantulus intufi	Bushveld Sengi
Elephantulus myurus	Eastern Rock Sengi
Elephantulus rupestris	Western Rock Sengi
Galegeeska rufescens	Rufous Sengi
Macroscelides proboscideus	Karoo Round-eared Sengi
Petrodromus tetradactylus	Four-toed Sengi
Petrosaltator rozeti	North African Sengi
Rhynchocyon chrysopygus	Golden-rumped Sengi
Rhynchocyon cirnei	Chequered Sengi
Rhynchocyon petersi	Black-and-rufous Sengi

Superorder Euarchontoglires

Order Scandentia

Banxrings or tree shrews are found throughout southeast Asia. Squirrel-like in appearance, they share many physical characteristics with Primates, including large braincases, morphologically similar arterial design, and sexual organs. Two families are recognized, with members of Tupaiidae having members that are scansorial, terrestrial, and arboreal. Diet is omnivorous consisting mostly of insects and fruit with occasional animal matter taken (Nowak 2018). For this study, 18 species in two families were included. The sequence of genera follows Nowak 2018 with regard to the IUCN’s Red List of Threatened Species 2023.

Family Ptilocercidae

Ptilcercus lowii	Pen-tailed Banxring

Family Tupaiidae

Anathana ellioti	Madras Banxring

Dendrogale melanura	Bornean Smooth-tailed Banxring
Dendrogale murina	Northern Smooth-tailed Banxring
Tupaia belangeri	Northern Banxring
Tupaia dorsalis	Striped Banxring
Tupaia glis	Common Banxring
Tupaia gracilis	Slender Banxring
Tupaia javanica	Horsefield's Banxring
Tupaia longipes	Long-footed Banxring
Tupaia minor	Lesser Banxring
Tupaia montana	Mountain Banxring
Tupaia nicobarica	Nicobar Banxring
Tupaia palawanensis	Palawan Banxring
Tupaia picta	Painted Banxring
Tupaia splendidula	Ruddy Banxring
Tupaia tana	Large Banxring

Order Primates

Primates are an ancient clade characterized by having nails instead of claws, pads at the tip of the fingers made up of deposits of fat and nerves to heighten sensitivity, binocular vision, and a high degree of depth perception (Feldhamer et al. 2015) Very few species of this incredibly large and diverse order meet the specifications required for this study. A total of 18 species in 4 families were ultimately selected. Genera and species names and arrangement follow ASM Mammal Diversity Database (2023) with regard to the IUCN’s Red List of Threatened Species 2023.

Family Galagidae

Galago gallarum	Somali Lesser Galago
Galago matschiei	Spectacled Lesser Galago
Galago moholi	Southern Lesser Galago
Galago senegalensis	Northern Lesser Galago

Galagoides demidoff	Demidoff's Dwarf Galago
Galagoides thomasi	Thomas's Dwarf Galago
Paragalago granti	Mozambique Dwarf Galago
Paragalago orinus	Mountain Dwarf Galago
Paragalago rondoensis	Rondo Dwarf Galago
Paragalago zanzibaricus	Tanzania Coast Dwarf Galago
Sciurocheirus (Galago) alleni	Bioko Squirrel Galago
Family Lorisidae	
Arctocebus aureus	Golden Angwantibo
Arctocebus calabarensis	Calabar Angwantibo
Carlito syrichta	Philippine Tarsier
Cephalopachus bancanus	Western Tarsier
Tarsius dentatus	Dian's Tarsier
Tarsius pumilus	Pygmy Tarsier
Family Cercopithecidae	
Miopithecus talapoin	Southern Talapoin Monkey

Order Rodentia

Rodents are the largest and most successful radiation of mammals and occur naturally on all continents except for Antarctica. Members of this order differ substantially in ecology, size, habitat and dietary preferences, and life history. One key unifying morphological characteristic includes a single pair of continuously growing incisors in each of the upper and lower jaws; a trait that has remained unchanged in the ordinal history of the group (Eisenberg 1981) Many species of this incredibly large and diverse order meet the specifications required for this study. A total of 269 species in 8 families were ultimately selected. Due to the enormity of this order, suborders (Wilson and Reeder 2005) are included as well to better organize the arrangement here. Genera and species names follow ASM Mammal Diversity Database (2023) with regard to the IUCN’s Red List of Threatened Species 2023.

Suborder Hystricomorpha

Family Echimyidae

Hoplomys gymnurus	Armored Rat

Suborder Sciuromorpha

Family Sciuridae

Rhinosciurus latiacaudatus	Shrew-faced Squirrel

Family Gliridae

Selevinia betpakdalaensis	Desert Dormouse

Suborder Myomorpha

Family Dipodidae

Orientallactaga (Allactaga) sibirica	Siberian Jerboa
Pygeretmus platyurus	Lesser Fat-tailed Jerboa
Pygeretmus pumilio	Dwarf Fat-tailed Jerboa
Pygeretmus zhitkovi	Greater Fat-tailed Jerboa
Salpingotus michaelis	Balochistan Pygmy Jerboa
Salpingotus crassicauda	Thick-tailed Pygmy Jerboa
Salpingotus heptneri	Heptner's Pygmy Jerboa
Salpingotus kozlovi	Kozlov's Pygmy Jerboa
Salpingotus pallidus	Pallid Pygmy Jerboa

Family Sminthidae

Sicista armenica	Armenian Birch Mouse
Sicista betulina	Northern Birch Mouse
Sicista caucasica	Caucasian Birch Mouse
Sicista caudata	Long-tailed Birch Mouse
Sicista concolor	Chinese Birch Mouse
Sicista kazbegica	Kazbeg Birch Mouse
Sicista kluchorica	Kluchor Birch Mouse
Sicista napaea	Altai Birch Mouse
Sicista pseudonapaea	Gray Birch Mouse
Sicista severtzovi	Severtzov's Birch Mouse

Sicista strandi	Strand's Birch Mouse
Sicista subtilis	Southern Birch Mouse
Sicista tianshanica	Tian Shan Birch Mouse
Family Nesomyidae	
Mystromys albicaudatus	African White-tailed Rat
Petromyscus barbouri	Barbour's Pygmy Rock Mouse
Petromyscus collinus	Common Pygmy Rock Mouse
Petromyscus monticularis	Short-eared Pygmy Rock Mouse
Petromyscus shortridgei	Shortridge's Pygmy Rock Mouse
Prionomys batesi	Bates's African Climbing Mouse
Steatomys bocagei	Bocage's Fat Mouse
Steatomys caurinus	North-western Fat Mouse
Steatomys cuppedius	Dainty Fat Mouse
Steatomys jacksoni	Jackson's Fat Mouse
Steatomys krebsii	Kreb's Fat Mouse
Steatomys opimus	Pousargues's Fat Mouse
Steatomys parvus	Tiny Fat Mouse
Steatomys pratensis	Common Fat Mouse
Family Cricetidae	
Akodon aerosus	Yungas Grass Mouse
Akodon affinis	Colombian Grass Mouse
Akodon mollis	Soft-furred Grass Mouse
Habromys chinanteco	Chinanteco Deermouse
Habromys delicatulus	Delicate Deermouse
Habromys ixtlani	Ixtlan Deermouse
Habromys lepturus	Zempoaltepec Deermouse
Habromys lophurus	Crested-tailed Deermouse
Habromys simulatus	Xico Deermouse
Isthmomys flavidus	Yellow Deermouse
Isthmomys pirrensis	Mount Pirre Deermouse
Necromys punctulatus	Ecuadorean Akodont

Necromys urichi	Northern Akodont
Neomicroxus (Akodon) bogotensis	Bogota Grass Mouse
Neomicroxus (Akodon) latebricola	Ecuadorean Grass Mouse
Neotomodon alstoni	Volcano Deermouse
Oligoryzomys arenalis	Sandy Pygmy Rice Rat
Oligoryzomys destructor	Tschudi's Pygmy Rice Rat
Oligoryzomys fulvescens	Fulvous Pygmy Rice Rat
Oligoryzomys griseolus	Grayish Pygmy Rice Rat
Oligoryzomys vegetus	Sprightly Pygmy Rice Rat
Onychomys arenicola	Chihuahuan Grasshopper Mouse
Onychomys leucogaster	Northern Grasshopper Mouse
Onychomys torridus	Southern Grasshopper Mouse
Osgoodomys banderanus	Osgood's Deermouse
Peromyscus attwateri	Texas Deermouse
Peromyscus aztecus	Aztec Deermouse
Peromyscus beatae	Orizaba Deermouse
Peromyscus boylii	Brush Deermouse
Peromyscus bullatus	Perote Deermouse
Peromyscus californicus	California Deermouse
Peromyscus crinitus	Canyon Deermouse
Peromyscus difficilis	Southern Rock Deermouse
Peromyscus eremicus	Cactus Deermouse
Peromyscus eva	Southern Baja Deermouse
Peromyscus fraterculus	Northern Baja Deermouse
Peromyscus furvus	Blackish Deermouse
Peromyscus gossypinus	Cotton Deermouse
Peromyscus grandis	Large Deermouse
Peromyscus gratus	Saxicoline Deermouse
Peromyscus guatemalensis	Guatemalan Deermouse
Peromyscus gymnotis	Naked-eared Deermouse
Peromyscus hooperi	Hooper's Deermouse

Peromyscus hylocetes	Transvolcanic Deermouse
Peromyscus keeni	North-western Deermouse
Peromyscus leucopus	White-footed Deermouse
Peromyscus levipes	Nimble-footed Deermouse
Peromyscus maniculatus	Eastern Deermouse
Peromyscus mayensis	Mayan Deermouse
Peromyscus megalops	Broad-faced Deermouse
Peromyscus mekisturus	Puebla Deermouse
Peromyscus melanocarpus	Black-wristed Deermouse
Peromyscus melanophrys	Plateau Deermouse
Peromyscus melanotis	Black-eared Deermouse
Peromyscus melanurus	Black-tailed Deermouse
Peromyscus merriami	Merriam's Deermouse
Peromyscus mexicanus	Mexican Deermouse
Peromyscus nasutus	Northern Rock Deermouse
Peromyscus ochraventer	El Carrizo Deermouse
Peromyscus pectoralis	Southern White-ankled Deermouse
Peromyscus perfulvus	Tawny Deermouse
Peromyscus polionotus	Oldfield Deermouse
Peromyscus polius	Chihuahuan Deermouse
Peromyscus sagax	Michoacan Deermouse
Peromyscus simulus	Sinaloan Deermouse
Peromyscus spicilegus	Gleaning Deermouse
Peromyscus stirtoni	Stirton's Deermouse
Peromyscus truei	Pinyon Deermouse
Peromyscus winkelmanni	Coalcoman Deermouse
Peromyscus yucatanicus	Yucatan Deermouse
Peromyscus zarhynchus	Chiapan Deermouse
Podomys floridanus	Florida Deermouse
Scolomys melanops	Gray South American Spiny Mouse
Scotinomys teguina	Short-tailed Singing Mouse

Scotinomys xerampelinus	Long-tailed Singing Mouse
Sigmodon alleni	Allen's Cotton Rat
Sigmodon alstoni	Groove-toothed Cotton Rat
Sigmodon arizonae	Arizona Cotton Rat
Sigmodon fulviventer	Tawny-bellied Cotton Rat
Sigmodon hirsutus	Burmeister's Cotton Rat
Sigmodon hispidus	Hispid Cotton Rat
Sigmodon inopinatus	Ecuadorean Cotton Rat
Sigmodon leucotis	White-eared Cotton Rat
Sigmodon mascotensis	West Mexican Cotton Rat
Sigmodon ochrognathus	Yellow-nosed Cotton Rat
Sigmodon peruanus	Peruvian Cotton Rat
Sigmodon toltecus	Toltec Cotton Rat
Family Muridae	
Apomys abrae	Luzon Cordillera Forest Mouse
Apomys datae	Northern Luzon Forest Mouse
Apomys gracilirostris	Large Mindoro Forest Mouse
Apomys hylocetes	Mindanao Mossy Forest Mouse
Apomys insignis	Mindanao Montane Forest Mouse
Apomys littoralis	Mindanao Lowland Forest Mouse
Apomys microdon	Small Luzon Forest Mouse
Apomys musculus	Least Philippine Forest Mouse
Apomys sacobianus	Long-nosed Luzon Forest Mouse
Archboldomys luzonensis	Isarog Shrew Mouse
Berylmys berdmorei	Berdmore's White-toothed Rat
Berylmys bowersi	Bowers's White-toothed Rat
Berylmys mackenziei	Mackenzie's White-toothed Rat
Berylmys manipulus	Manipur White-toothed Rat
Bunomys andrewsi	Andrews's Hill Rat
Bunomys chrysocomus	Common Hill Rat
Bunomys coelestis	Lompobatang Hill Rat

Bunomys penitus	Montane Hill Rat
Bunomys prolatus	Tambusisi Hill Rat
Chrotomys gonzalesi	Isarog Striped Shrew Rat
Chrotomys mindorensis	Lowland Striped Shrew Rat
Chrotomys silaceus	Blazed Luzon Striped Shrew Rat
Chrotomys whiteheadi	Montane Striped Shrew Rat
Colomys goslingi	East African Wading Rat
Congomys (Praomys) lukolelae	Lukolela Swamp Mouse
Congomys (Praomys) verschureni	Verschuren'ts Swamp Mouse
Deomys ferrugineus	Congo Forest Rat
Desmodillus auricularis	Cape Short-tailed Gerbil
Echiothrix centrosa	Central Sulawesi Spiny Rat
Echiothrix leucura	Northern Sulawesi Spiny Rat
Frateromys (Bunomys) fratrorum	Fraternal Hill Rat
Hybomys (badius) rufocanus	Cameroon Highland Striped Mouse
Hybomys basilii	Father Basilio's Striped Mouse
Hybomys lunaris	Moon Mountains Striped Mouse
Hybomys univittatus	Peters's Striped Mouse
Leopoldamys ciliatus	Sundaic Mountain Long-tailed Giant Rat
Leopoldamys edwardsi	Edwards's Long-tailed Giant Rat
Leopoldamys milleti	Millet's Long-tailed Giant Rat
Leopoldamys neilli	Neill's Long-tailed Giant Rat
Leopoldamys sabanus	Indomalayan Long-tailed Giant Rat
Lophuromys brevicaudus	Short-tailed Brush-furred Rat
Lophuromys chrysopus	Ethiopian Forest Brush-furred Rat
Lophuromys dieterleni	Mount Oku Brush-furred Rat
Lophuromys eisentrauti	Mount Lefo Brush-furred Rat
Lophuromys flavopunctatus	Buff-spotted Brush-furred Rat
Lophuromys huttereri	Hutterer's Brush-furred Rat
Lophuromys luteogaster	Buff-bellied Brush-furred Rat
Lophuromys medicaudatus	Western Rift Brush-furred Rat

Lophuromys melanonyx	Black-clawed Brush-furred Rat
Lophuromys nudicaudus	Naked-tailed Brush-furred Rat
Lophuromys rahmi	Rahm's Brush-furred Rat
Lophuromys roseveari	Mount Cameroon Brush-furred Rat
Lophuromys sikapusi	Western Brush-furred Rat
Lophuromys woosnami	Woosnam's Brush-furred Rat
Malacomys cansdalei	Cansdale's Swamp Rat
Malacomys edwardsi	Edwards's Swamp Rat
Malacomys longipes	Common Swamp Rat
Mastomys (Myomyscus) angolensis	Angolan Multimammate Mouse
Mastomys awashensis	Awash Multimammate Mouse
Mastomys coucha	Southern African Multimammate Mouse
Mastomys erythroleucus	Reddish-white Multimammate Mouse
Mastomys huberti	Hubert's Multimammate Mouse
Mastomys kollmannspergeri	Kollmannsperger's Multimammate Mouse
Mastomys natalensis	Natal Multimammate Mouse
Mastomys shortridgei	Shortridge's Multimammate Mouse
Melasmothrix naso	Diurnal Sulawesian Shrew Rat
Micromys minutus	Eurasian Harvest Mouse
Mus triton	Gray-bellied Mouse
Myomyscus verreauxii	Verreaux's Meadow Mouse
Ochromyscus (Myomyscus) brockmani	Brockman's White-bellied Rocky Mouse
Ochromyscus (Myomyscus) yemeni	Yemen White-bellied Rocky Mouse
Nesoromys ceramicus	Seram Island Mountain Rat
Pachyuromys duprasi	Fat-tailed Jird
Paulamys naso	Paula's Long-nosed Rat
Praomys daltoni	Dalton's Soft-furred Mouse
Praomys degraaffi	De Graaff's Soft-furred Mouse
Praomys derooi	Deroo's Mouse
Praomys obscurus	Gotel Mountain Soft-furred Mouse
Praomys petteri	Petter's Soft-furred Mouse

Rattus andamanensis	Indochinese Forest Rat
Rattus argentiventer	Ricefield Rat
Rattus baluensis	Kinabalu Rat
Rattus blangorum	Aceh Rat
Rattus bontanus	South-western Xanthurus Rat
Rattus burrus	Nicobar Archipelago Rat
Rattus everetti	Philippine Forest Rat
Rattus exulans	Pacific Rat
Rattus feliceus	Spiny Seram Island Rat
Rattus hainaldi	Hainald's Flores Island Rat
Rattus hoffmanni	Hoffmann's Sulawesi Rat
Rattus hoogerwerfi	Hoogerwerf's Sumatran Rat
Rattus korinchi	Sumatran Mountain Rat
Rattus leucopus	Cape York Rat
Rattus losea	Losea Rat
Rattus marmosurus	Marmoset Xanthurus Rat
Rattus mindorensis	Mindoro Mountain Rat
Rattus mollicomulus	Lampobatang Sulawesi Rat
Rattus montanus	Sri Lankan Mountain Rat
Rattus morotaiensis	Halmahara Rat
Rattus nitidus	White-footed Indochinese Rat
Rattus norvegicus	Brown Rat
Rattus osgoodi	Osgood's Vietnamese Rat
Rattus palmarum	Car Nicobar Rat
Rattus pyctoris	Himalayan Rat
Rattus ranjiniae	Ranjini's Rat
Rattus rattus	Roof Rat
Rattus salocco	South-eastern Xanthurus Rat
Rattus satarae	Sahyadris Forest Rat
Rattus tanezumi	Oriental House Rat
Rattus timorensis	Timor Forest Rat

Rattus tiomanicus	Malaysian Field Rat
Rattus xanthurus	North-eastern Xanthurus Rat
Rhynchomys isarogensis	Mount Isarog Shrew Rat
Rhynchomys soricoides	Mount Data Shrew Rat
Serengetimys (Mastomys) pernanus	Dwarf Serengeti Mouse
Stenocephalemys albipes	White-footed Ethiopian Rat
Stenocephalemys albocaudata	White-tailed Ethiopian Rat
Stenocephalemys griseicauda	Gray-tailed Ethiopian Rat
Stenocephalemys ruppi	Rupp's Ethiopian Rat
Sundamys (Rattus) annandalei	Annandale's Sundaic Rat
Taeromys arcuatus	Salokko Rat
Taeromys callitrichus	Lovely-haired Rat
Taeromys celebensis	Celebes Rat
Taeromys microbullatus	Small-eared Rat
Taeromys punicans	Sulawesi Forest Rat
Taeromys taerae	Tondano Rat
Tarsomys apoensis	Dusky Long-footed Rat
Tarsomys echinatus	Spiny Long-footed Rat
Tateomys macrocercus	Long-tailed Sulawesian Shrew Rat
Tateomys rhinogradoides	Tate's Sulawesian Shrew Rat
Taterillus arenarius	Robbins's Tateril
Taterillus congicus	Congo Tateril
Taterillus emini	Emin's Tateril
Taterillus gracilis	Gracile Tateril
Taterillus lacustris	Lake Chad Tateril
Taterillus petteri	Petter's Tateril
Taterillus pygargus	Senegal Tateril
Taterillus tranieri	Tranier's Tateril
Typomys (Hybomys) planifrons	Miller's Striped Mouse
Typomys (Hybomys) trivirgatus	Temminck's Striped Mouse
Uranomys ruddi	Rudd's Bristle-furred Rat

Zelotomys hildegardeae	Hildegarde's Broad-headed Mouse
Zelotomys woosnami	Woosnam's Broad-headed Mouse

Superorder Laurasiatheria

Order Eulipotyphla

Long considered a "wastebasket" group for small, morphologically conservative insectivorous mammals, this group is constantly fluctuating at practically every level of taxonomic nomenclature (including ordinal status) as continuing efforts involving molecular genetics, improved morphological studies and paleontology attempt to elucidate the relationship between different lineages. See Douady and Douzery (2009); Zack (2010); Springer et al. (2018); and Sato el al. (2019) for examples and summaries.

Some morphological features that unite this clade as currently understood include five clawed digits on each foot that are non-opposable, relatively small eyes and ears; separate radius and ulna bones, rooted teeth, small braincases that are little elevated over the facial line, reduced or absent zygomatic arches, orbits that generally open posteriorly, and cerebral hemispheres of the brain that are smooth, lack fissures, and do not extend backward over the cerebellum (Nowak 1999*b*). Besides Soricidae, a total of 62 species in 3 families were ultimately selected. Genera and species names follow ASM Mammal Diversity Database (2023) with regard to the IUCN's Red List of Threatened Species 2023.

Family Talpidae

Condylura cristata	Star-nosed Mole
Dymecodon pilirostris	True's Shrew Mole
Euroscaptor grandis	Greater Chinese Mole
Euroscaptor klossi	Kloss's Mole
Euroscaptor longirostris	Long-nosed Mole
Euroscaptor micrura	Himalayan Mole

Euroscaptor parvidens	Small-toothed Mole
Galemys pyrenaicus	Pyrenean Desman
Mogera imaizumii	Small Japanese Mole
Mogera insularis	Formosan Mole
Mogera tokudae	Sado Mole
Mogera uchidai	Senkaku Mole
Mogera wogura	Large Japanese Mole
Neurotrichus gibbsii	American Shrew Mole
Oreoscaptor (Euroscaptor) mizura	Japanese Mountain Mole
Parascalops breweri	Hairy-tailed Mole
Parascaptor leucurus	White-tailed Mole
Scalopus aquaticus	Eastern Mole
Scapanulus oweni	Gansu Mole
Scapanus latimanus	Northern Broad-footed Mole
Scapanus orarius	Coast Mole
Scapanus townsendii	Townsend's Mole
Scaptochirus moschatus	Short-faced Mole
Scaptonyx fusicaudus	Long-tailed Mole
Talpa altaica	Altai Mole
Talpa caeca	Blind Mole
Talpa caucasica	Caucasian Mole
Talpa davidiana	Pere David's Mole
Talpa europaea	European Mole
Talpa levantis	Levant Mole
Talpa occidentalis	Iberian Mole
Talpa romana	Roman Mole
Talpa stankovici	Balkan Mole
Uropsilus andersoni	Anderson's Shrew Mole
Uropsilus gracilis	Gracile Shrew Mole
Uropsilus investigator	Inquisitive Shrew Mole
Uropsilus soricipes	Chinese Shrew Mole

Urotrichus talpoides	Japanese Shrew Mole
Family Erinaceidae	
Atelerix albiventris	Four-toed Hedgehog
Atelerix algirus	North African Hedgehog
Atelerix frontalis	Southern African Hedgehog
Atelerix sclateri	Somali Hedgehog
Erinaceus amurensis	Amur Hedgehog
Erinaceus concolor	Southern White-breasted Hedgehog
Erinaceus europaeus	West European Hedgehog
Erinaceus roumanicus	Northern White-breasted Hedgehog
Hemiechinus auritus	Common Long-eared Hedgehog
Hemiechinus collaris	Indian Long-eared Hedgehog
Mesechinus dauuricus	Daurian Hedgehog
Mesechinus hughi	Hugh's Hedgehog
Paraechinus aethiopicus	Desert Hedgehog
Paraechinus hypomelas	Brandt's Hedgehog
Paraechinus micropus	Indian Hedgehog
Paraechinus nudiventris	Bare-bellied Hedgehog
Family Galericidae	
Echinosorex gymnura	Moonrat
Otohylomys megalotis	Long-eared Gymnure
Hylomys parvus	Dwarf Gymnure
Hylomys suillus	Short-tailed Gymnure
Neohylomys hainanensis	Hainan Gymnure
Neotetracus sinensis	Shrew Gymnure
Podogymnura aureospinula	Dinagat Gymnure
Podogymnura truei	Mount Apo Gymnure

Order Chiroptera

Bats are the only mammals capable of flight. Consequently, bats are found on most landmasses, including many islands that are otherwise unoccupied by other mammals. Bats are incredibly diverse and this is reflected in their diets and life histories (Eisenburg 1981). Selection reflects genera/species that glean prey off of surfaces or hunt on the ground (Aguirre et al. 2002, Holderied and Von Helversen 2003, Siemers and Schnitzler 2004, Delaval et al. 2005, Denzinger and Schnitzler 2013). A total of 154 species in 6 families were ultimately selected. Due to the enormity of this order, suborders (Eick et al. 2005, Hutcheon and Kirsch 2006) are included as well to better organize the arrangement here. Genera and species names follow ASM Mammal Diversity Database (2023) with regard to the IUCN's Red List of Threatened Species 2023.

Suborder Pteropodiformes

Family Hipposideridae	
Coelops frithii	East Asian Tailless Leaf-nosed Bat
Coelops robinsoni	Malayan Tailless Leaf-nosed Bat
Family Megadermatidae	
Cardioderma cor	Heart-nosed False-vampire
Lavia frons	Yellow-winged False-vampire
Family Rhinolophidae	
Rhinolophus acuminatus	Acuminate Horseshoe Bat
Rhinolophus adami	Adam's Horseshoe Bat
Rhinolophus affinis	Intermediate Horseshoe Bat
Rhinolophus alcyone	Halcyon Horseshoe Bat
Rhinolophus arcuatus	Arcuate Horseshoe Bat
Rhinolophus beddomei	Beddome's Woolly Horseshoe Bat
Rhinolophus blasii	Blasius's Horseshoe Bat
Rhinolophus bocharicus	Bokhara Horseshoe Bat
Rhinolophus borneensis	Bornean Horseshoe Bat
Rhinolophus canuti	Knud's Horseshoe Bat
Rhinolophus capensis	Cape Horseshoe Bat
Rhinolophus celebensis	Sulawesi Horseshoe Bat
Rhinolophus clivosus	Geoffroy's Horseshoe Bat

Rhinolophus coelophyllus	Croslet Horseshoe Bat
Rhinolophus cognatus	Andaman Horseshoe Bat
Rhinolophus convexus	Convex Horseshoe Bat
Rhinolophus creaghi	Creagh's Horseshoe Bat
Rhinolophus darlingi	Darling's Horseshoe Bat
Rhinolophus deckenii	Decken's Horseshoe Bat
Rhinolophus denti	Dent's Horseshoe Bat
Rhinolophus eloquens	Eloquent Horseshoe Bat
Rhinolophus euryale	Mediterranean Horseshoe Bat
Rhinolophus euryotis	New Guinea Broad-eared Horseshoe Bat
Rhinolophus ferrumequinum	Greater Horseshoe Bat
Rhinolophus formosae	Formosan Woolly Horseshoe Bat
Rhinolophus fumigatus	Abyssinian Horseshoe Bat
Rhinolophus guineensis	Guinean Horseshoe Bat
Rhinolophus hildebrandtii	Hildebrandt's Horseshoe Bat
Rhinolophus hilli	Hill's Horseshoe Bat
Rhinolophus hillorum	Upland Horseshoe Bat
Rhinolophus hipposideros	Lesser Horseshoe Bat
Rhinolophus inops	Philippine Forest Horseshoe Bat
Rhinolophus keyensis	Insular Horseshoe Bat
Rhinolophus landeri	Lander's Horseshoe Bat
Rhinolophus lepidus	Blyth's Horseshoe Bat
Rhinolophus luctus	Great Woolly Horseshoe Bat
Rhinolophus maclaudi	Maclaud's Horseshoe Bat
Rhinolophus macrotis	Big-eared Horseshoe Bat
Rhinolophus maendeleo	Maendeleo Horseshoe Bat
Rhinolophus malayanus	Malayan Horseshoe Bat
Rhinolophus marshalli	Marshall's Horseshoe Bat
Rhinolophus mehelyi	Mehely's Horseshoe Bat
Rhinolophus mitratus	Mitred Horseshoe Bat
Rhinolophus montanus	Timorese Horseshoe Bat

Rhinolophus osgoodi	Osgood's Horseshoe Bat
Rhinolophus paradoxolophus	Bourret's Horseshoe Bat
Rhinolophus pearsonii	Pearson's Horseshoe Bat
Rhinolophus philippinensis	Large-eared Horseshoe Bat
Rhinolophus pusillus	Least Horseshoe Bat
Rhinolophus rex	King Horseshoe Bat
Rhinolophus robinsoni	Robinson's Horseshoe Bat
Rhinolophus rouxii	Indian Rufous Horseshoe Bat
Rhinolophus rufus	Large Rufous Horseshoe Bat
Rhinolophus ruwenzorii	Ruwenzori Horseshoe Bat
Rhinolophus sakejiensis	Sakeji Horseshoe Bat
Rhinolophus sedulus	Lesser Woolly Horseshoe Bat
Rhinolophus shameli	Shamel's Horseshoe Bat
Rhinolophus shortridgei	Shortridge's Horseshoe Bat
Rhinolophus siamensis	Thai Horseshoe Bat
Rhinolophus silvestris	African Forest Horseshoe Bat
Rhinolophus simulator	Bushveld Horseshoe Bat
Rhinolophus sinicus	Chinese Rufous Horseshoe Bat
Rhinolophus stheno	Lesser Brown Horseshoe Bat
Rhinolophus subbadius	Little Nepalese Horseshoe Bat
Rhinolophus subrufus	Small Rufous Horseshoe Bat
Rhinolophus swinnyi	Swinny's Horseshoe Bat
Rhinolophus thomasi	Thomas's Horseshoe Bat
Rhinolophus trifoliatus	Trefoil Horseshoe Bat
Rhinolophus virgo	Yellow-faced Horseshoe Bat
Rhinolophus yunanensis	Dobson's Horseshoe Bat
Rhinolophus ziama	Ziama Horseshoe Bat

Suborder Vespertilioniformes

Family Nycteridae

Nycteris arge	Bates's Slit-faced Bat

Nycteris aurita	Andersen's Slit-faced Bat
Nycteris gambiensis	Gambian Slit-faced Bat
Nycteris hispida	Hairy Slit-faced Bat
Nycteris intermedia	Intermediate Slit-faced Bat
Nycteris javanica	Javan Slit-faced Bat
Nycteris macrotis	Large-eared Slit-faced Bat
Nycteris madagascariensis	Madagascar Slit-faced Bat
Nycteris major	Dja Slit-faced Bat
Nycteris nana	Dwarf Slit-faced Bat
Nycteris parisii	Parisi's Slit-faced Bat
Nycteris thebaica	Egyptian Slit-faced Bat
Nycteris tragata	Malayan Slit-faced Bat
Nycteris vinsoni	Vinson's Slit-faced Bat
Nycteris woodi	Wood's Slit-faced Bat
Family Phyllostomidae	
Gardnerycteris crenulata	Striped Spear-nosed Bat
Glyphonycteris sylvestris	Tricolored Big-eared Bat
Lampronycteris brachyotis	Orange-throated Bat
Lonchorhina aurita	Common Sword-nosed Bat
Lonchorhina orinocensis	Orinoco Sword-nosed Bat
Lophostoma brasiliense	Pygmy Round-eared Bat
Lophostoma carrikeri	Carriker's Round-eared Bat
Lophostoma evotis	Davis's Round-eared Bat
Lophostoma silvicola	White-throated Round-eared Bat
Macrotus californicus	Californian Leaf-nosed Bat
Macrotus waterhousii	Waterhouse's Leaf-nosed Bat
Micronycteris hirsuta	Hairy Big-eared Bat
Micronycteris megalotis	Little Big-eared Bat
Micronycteris microtis	Common Big-eared Bat
Micronycteris minuta	Tiny Big-eared Bat
Micronycteris schmidtorum	Schmidts' Big-eared Bat

Mimon cozumelae	Cozumelan Golden Bat
Phyllostomus discolor	Pale Spear-nosed Bat
Phyllostomus elongatus	Lesser Spear-nosed Bat
Tonatia saurophila	Jamaican Round-eared Bat
Trachops cirrhosus	Fringe-lipped Bat
Trinycteris nicefori	Niceforo's Big-eared Bat
Family Vespertiolionidae	
Antrozous pallidus	Pallid Bat
Corynorhinus mexicanus	Mexican Big-eared Bat
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat
Corynorhinus townsendii	Townsend's Big-eared Bat
Kerivoula africana	Tanzanian Woolly Bat
Kerivoula argentata	Damara Woolly Bat
Kerivoula cuprosa	Coppery Woolly Bat
Kerivoula eriophora	Ethiopian Woolly Bat
Kerivoula flora	Flores Woolly Bat
Kerivoula hardwickii	Hardwicke's Woolly Bat
Kerivoula intermedia	Small Woolly Bat
Kerivoula lanosa	Lesser Woolly Bat
Kerivoula lenis	Lenis Woolly Bat
Kerivoula minuta	Least Woolly Bat
Kerivoula myrella	Bismarck Woolly Bat
Kerivoula papillosa	Papillose Woolly Bat
Kerivoula pellucida	Clear-winged Woolly Bat
Kerivoula phalaena	Spurrell's Woolly Bat
Kerivoula smithii	Smith's Woolly Bat
Kerivoula whiteheadi	Whitehead's Woolly Bat
Myotis adversus	Gray Large-footed Myotis
Myotis auriculus	South-western Myotis
Myotis bechsteinii	Bechstein's Myotis
Myotis brandtii	Brandt's Myotis

Myotis emarginatus	Geoffroy's Myotis
Myotis evotis	Long-eared Myotis
Myotis myotis	Greater Myotis
Myotis mystacinus	Common Whiskered Myotis
Myotis nattereri	Natterer's Myotis
Myotis vivesi	Fish-eating Myotis
Nyctophilus heran	Sunda Long-eared Bat
Otonycteris hemprichii	Desert Long-eared Bat
Phoniscus atrox	Groove-toothed Trumpet-eared Bat
Phoniscus jagorii	Frosted Groove-toothed Bat
Plecotus (alpinus) macrobullaris	Alpine Long-eared Bat
Plecotus auritus	Brown Long-eared Bat
Plecotus austriacus	Gray Long-eared Bat
Plecotus balensis	Ethiopian Long-eared Bat
Plecotus kolombatovici	Mediterranean Long-eared Bat
Plecotus sardus	Sardinian Long-eared Bat
Plecotus taivanus	Taiwan Long-eared Bat
Plecotus teneriffae	Canary Long-eared Bat

Order Carnivora

As with the order Primates, Carnivora exhibits an extraordinarily broad range of mammals that encompass a wide variety of niches and dietary preferences across several orders of magnitude in size, from hyper-carnivorous terrestrial weasels (*Mustella*) weighing as little as 30 grams to piscivorous aquatic seals weighing as much as 5,000 kilograms. Modern carnivores are generally specialized for eating flesh, although trophic specializations have occurred, resulting in species that have diets exclusively or primarily herbivorous, insectivorous, etc. These specializations include the general retention of a simple digestive system and conservative dentition (Eisenberg 1981). 7 species in 2 families were tentatively selected. African species selection was influenced by Kingdon et al. (Kingdon et al. 2013). Genera and species names follow ASM Mammal Diversity Database (2023) with regard to the IUCN’s Red List of Threatened Species 2023.

Family Canidae	
Vulpes cana	Blanford's Fox
Family Herpestidae	
Crossarchus platycephalus	Flat-headed Cusimanse
Cynictis penicillata	Yellow Mongoose
Dologale dybowskii	Pousargues's Mongoose
Helogale hirtula	Ethiopian Dwarf Mongoose
Helogale parvula	Common Dwarf Mongoose
Suricata suricatta	Meerkat

APPENDIX REFEENCES

Abe, H. 1967. Classification and biology of Japanese Insectivora (Mammalia). Journal of Faculty of Agriculture, Hokkaido University, Sapporo 55:191–269.

Abe, H. 1977. Variation and taxonomy of some small mammals from Central Nepal. Journal of the Mammalogical Society of Japan 7:63–73.

Abramov, A., A. Bannikova, and V. Rozhnov. 2012. White-toothed shrews (Mammalia, Soricomorpha, *Crocidura*) of coastal islands of Vietnam. ZooKeys 207:37–47.

Abramov, A. V., P. D. Jenkins, V. V. Rozhnov, and A. A. Kalinin. 2008. Description of a new species of *Crocidura* (Soricomorpha: Soricidae) from the island of Phu Quoc, Vietnam. Mammalia 72:269–272.

Aguirre, L. F., A. Herrel, R. Van Damme, and E. Matthysen. 2002. Ecomorphological analysis of trophic niche partitioning in a tropical savannah bat community. Proceedings of the Royal Society of London. Series B: Biological Sciences 269:1271–1278.

Alexander, L. F. 1994. A morphometric analysis of geographic variation within *Sorex monticolus* (Insectivora:Soricidae). M.S. Thesis, Oregon State University, Corvalis, Oregon, USA.

Alfred, J. R. B., Ramakrishna, and M. S. Pradhan. 2006. Validation of threatened mammals of India. Zoological Survey of India, Kolkata, IND.

Alfred, R. B., and S. Chakraborty. 2002. Endemic mammals of India. Records of the Zoological Survey of India, Occasional Paper 201:1–37.

Allen, G. M. 1914. Notes on the birds and mammals of the Arctic Coast of East Siberia. Proceedings of the New England Zoological Club V:1–66.

Allen, G. M. 1923. New Chinese Insectivores. American Museum Novitates 100:1–11.

Allen, G. M. 1926. Central Asiatic expeditions of the American Museum of Natural History, under the leadership of Roy Chapman Andrews : preliminary contributions in geology, palaeontology, and zoology. American Museum of Natural History, New York, New York, USA.

Allen, G. M. 1938. The mammals of China and Mongolia. Part 1. Volume XI. Natural History of Central Asia, American Museum of Natural History, New York, New York, USA.

Allen, G. M., and A. Loveridge. 1933. No. 2- Reports on the scientific results of an expedition to the southwestern highlands of Tanganyika Territory. Bulletin of the Museum of Comparative Zoology 75:47–61.

Allen, J. A., H. Lang, and J. P. Chapin. 1917. The skeletal characters of *Scutisorex* Thomas. Bulletin of the American Museum of Natural History 37:769–784.

Alvarez-Castaneda, S. T., and J. L. Patton, editors. 1999. Mamiferos del noroeste de Mexico. Centro de Investigaciones Biologicas del Noroeste, S.C., La Paz, Baja California Sur, MEX.

Anderson, J. 1881. Catalogue of Mammalia in the Indian Museum, Calcutta: Part 1. The Indian Museum, Calcutta, IND.

Anthony, H. E. 1928. Field book of North American mammals descriptions of every mammal known north of the Rio Grande, together with brief accounts of habits, geographical ranges, etc. First. G.P. Putnam's Sons, New York, New York, USA.

Arai, S., T. Mori, H. Yoshida, and S. Shiraishi. 1985. A note on the Japanese water shrew, *Chimarrogale himalyica platycephala*, from Kyushu. Journal of the Mammalogy Society Japan 10:193–203.

Arnason, U., J. A. Adegoke, A. Gullberg, E. H. Harley, A. Janke, and M. Kullberg. 2008. Mitogenomic relationships of placental mammals and molecular estimates of their divergences. Gene 421:37–51.

Asher, R. J., and E. R. Seiffert. 2010. Systematics of endemic African mammals. Pages 903–920 *in* L. Werdelin and W. Sanders, editors. Cenozoic mammals of Africa. University of California Press, Berkeley, California, USA.

Atallah, S. I., and D. L. Harrison. 1967. New records of rodents, bats and insectivores from the Arabian Peninsula. Journal of Zoology 153:311–319.

Aulagnier, S. 2009. Mammals of Europe, North Africa and the Middle East. A. & C. Black, London, ENG.

Bailey, V. 1931. Mammals of New Mexico. North American Fauna 53:1–412.

Baker, R. H. 1956. Mammals of Coahuila, Mexico. University of Kansas Publications Museum of Natural History 9:125–335.

Bangs, O. 1902. Descriptions of two new, insular blarinas from eastern Massachusetts. Proceedings of the New England Zoological Club 3:75–78.

Bannikova, A. A., B. I. Sheftel, V. S. Lebedev, D. Yu. Aleksandrov, and M. Muehlenberg. 2009. *Crocidura shantungensis*, a new species for Mongolia and Buryatia. Doklady Biological Sciences 424:68–71.

Barrett-Hamilton, G. E. H. 1905. Article: LXV.—Notes on Subspecies of European Shrews (*Sorex* and *Neomys*). The Annals and Magazine of Natural History; Zoology, Botany, and Geology 15:506–508.

Bauer, K. 1960. Zur systematik, okologie und Bionomie der einzelnen Arten. Bonner Zoologische Beitrage 2:176–201.

Bee, J. W., and E. R. Hall. 1956. Mammals of northern Alaska on the Arctic Slope. University of Kansas Publications, Museum of Natural History 8:1–309.

Bego, F., E. Saçdanaku, M. Pacifici, and C. Rondinini. 2018. Small terrestrial mammals of Albania: Distribution and diversity (Mammalia, Eulipotyphla, Rodentia). ZooKeys 742:127–163.

Benda, P., and A. K. Nasher. 2006. First record of *Crocidura dhofarensis* Hutterer et Harrison, 1988 (Mammalia: Soricidae) in Yemen. Journal of the National Museum, Natural History Series 175:27–30.

Best, T. L., and J. L. Dusi. 2014. Mammals of Alabama. University of Alabama Press, Tuscaloosa, Alabama, USA.

Blanford, W. T., editor. 1888. The fauna of British India including Ceylon and Burma. Taylor & Francis, London, ENG.

von Bloeker, J. C., Jr. 1932. Three new mammals from salt marsh areas in southern California. Proceedings of the Biological Society of Washington 45:131–138.

von Bloeker, J. C., Jr. 1939. Two New Shrews From West-Central California. Biological Society of Washington 52:93–96.

von Bloeker, J. C., Jr. 1942. A new shrew from Santa Catalina Island, California. Bulletin of the Southern California Academy of Sciences 40 Part 3:163–165.

Blyth, E. 1856. Article: III.—Memoir on the Indian species of Shrews. With Notes by Robert F. Tomes, Esq. The Annals and Magazine of Natural History; Zoology, Botany, and Geology 17:11–28.

Bole, B. P., and P. N. Moulthrop. 1942. The Ohio recent mammal Collection in the Cleveland Museum of Natural History. Scientific Publications of the Cleveland Museum of Natural History 5:83–181.

Brünner, H., N. Lugon-Moulin, F. Balloux, L. Fumagalli, and J. Hausser. 2002. A taxonomical re-evaluation of the Valais chromosome race of the common shrew *Sorex araneus* (Insectivora: Soricidae). Acta Theriologica 47:245–275.

Buchalczyk, T., and J. Raczynski. 1961. Taksonomiczna wartość niektórych pomiarów czaszki krajowych przedstawicieli rodzaju *Sorex* Linnaeus 1758 i *Neomys* Kaup 1829; Taxonomischer Wert einiger Schädelmessungen inländischer Vertreter der Gattung *Sorex* Linnaeus 1758 und *Neomys* Kaup 1829. Acta Theriologica 5:115–124.

Buhler, P. 1996. *Neomys fodiens niethammeri* ssp. n., eine neue Wasserspitzmausform aus Nord-Spanien. Bonner Zoologische Beiträge 1–2:165–170.

Burt, W. H. 1938. A new water shrew (*Sorex palustris*) from Labrador. Occasional Papers of the Museum of Zoology, University of Michigan 383:1–2.

Burton, M. 1976. Magna illustrated guide to mammals of Britain and Europe. Wigston, Leicester : Magna Books.

Cabrera, A. 1907. Three new Spanish Insectivores. The Annals and Magazine of Natural History; Zoology, Botany, and Geology 20:115–120.

Cabrera, A. 1914. Fauna Iberica: Mamiferos. Volume 1. Museo Nacional de Ciencias Naturales, Madrid, ESP.

Camargo, I., and S. T. Álvarez-Castañeda. 2019. Rediscovery of the extinct Tule shrew (*Sorex ornatus juncencis*) in the San Quintin plains: a taxonomic reevaluation after 90 years without new records. Mammalia 83:193–197.

Camargo, I., and S. T. Álvarez-Castañeda. 2020. A new species and three subspecies of the desert shrew (*Notiosorex*) from the Baja California peninsula and California. Journal of Mammalogy 101:872–886.

Carraway, L. N. 1985. *Sorex pacificus*. Mammalian Species 231:1–5.

Carraway, L. N. 1990. A morphologic and morphometric analysis of the "*Sorex vagrans* species complex" in the Pacific Coast region. Texas Tech University Press, Lubbock, Texas, USA.

Carraway, L. N. 2007. Shrews (Eulypotyphla: Soricidae) of Mexico. Monographs of the Western North American Naturalist 3:1–91.

Carraway, L. N. 2010. Fossil history of *Notiosorex* (Soricomorpha: Soricidae) shrews with descriptions of new fossil species. Western North American Naturalist 70:144–163.

Carraway, L. N., and R. M. Timm. 2000. Revisions of the extant taxa of the genus *Notiosorex* (Mammalia: Insectivora: Soricidae). Proceedings of the Biological Society of Washington 113:302–318.

Carraway, L. N., and B. J. Verts. 2005. Assessment of variation in cranial and mandibular dimensions in geographic races of *Sorex trowbridgii*. Special Publication of the International Soceity of Shrew Biologists 1:139–153.

Carter, T. D. 1942. Three new mammals of the Genera *Crocidura*, *Callosciurus*, and *Pteromys* from Northern Burma. American Museum Novitates 1208:4.

Catzeflis, F., T. Maddalena, S. Hellwing, and P. Vogel. 1985. Unexpected findings on the taxonomic status of East Mediterranean *Crocidura russula* auct. (Mammalia, Insectivora). Zeitschrift fur Saugetierkunde 50:185–201.

Ceríaco, L. M. P., M. P. Marques, F. Jacquet, V. Nicolas, M. Colyn, C. Denys, P. C. Sardinha, and C. Bastos-Silveira. 2015. Description of a new endemic species of shrew (Mammalia, Soricomorpha) from Príncipe Island (Gulf of Guinea). Mammalia 79:325-341.

Chasen, F. N. 1940. The mammals of the Netherlands Indian Mt. Le User Expedition 1937 to North-Sumatra. Treubia Deel 17:479–502.

Chaworth-Musters, J. L. 1932. XX.— A contribution to our knowledge of the mammals of Macedonia and Thessaly. Annals and Magazine of Natural History 9:166–171.

Chen, S., Y. Liu, Z. Sun, F. Tu, C. Fu, Q. Wang, and S. Liu. 2014. Morphometric and pelage color variation of two sibling species of shrew (Mammalia: Soricomorpha). Acta Theriologica 59:407–413.

Chen, Z.-Z., K. He, C. Huang, T. Wan, L.-K. Lin, S.-Y. Liu, and X.-L. Jiang. 2017. Integrative systematic analyses of the genus Chodsigoa (Mammalia: Eulipotyphla: Soricidae), with descriptions of new species. Zoological Journal of the Linnean Society 180:694–713.

Churchfield, S. 1990. The natural history of shrews. Comstock Publishing Associates, Ithica, New York, USA.

Cockrum, E. L. 1952. Mammals of Kansas. University of Kansas Publications, Museum of Natural History 7:1–303.

Cornely, J. E., L. N. Carraway, and B. J. Verts. 1992. *Sorex preblei*. Mammalian Species 416:1–3.

Cory, C. B. 1912. The Mammals of Illinois and Wisconsin. Field Museum of Natural History Publication 153 (Zoological Series) 11:1–505.

Dalquest, W. W. 1948. Mammals of Washington. University of Kansas Publications, Museum of Natural History 2:1–444.

Dannelid, E. 1990. Principal component and PLS discriminant analyses applied on skulls of European shrews of the Genus *Sorex* (Mammalia, Soricidae). Bonner Zoologische Beiträge 41:141–156.

Das, I. 1999. A noteworthy collection of mammals from Mount Harriet, Andaman Islands, India. Journal of South Asian Natural History 4:181–185.

Davis, Jr., J. A. 1957. A new shrew (*Sorex*) from Florida. American Museum Novitates 1844:1-9.

Davis, W. B. 1941*a*. A new shrew (genus *Blarina*) from Texas. Journal of Mammalogy 22:317–318.

Davis, W. B. 1941*b*. The short-tailed shrews (*Cryptotis*) of Texas. Journal of Mammalogy 22:411–418.

De Balsac, H. H. 1959. Nouvelle contribution à l`Étude des insectivores Soricidae du Mont Cameroun (Ergebnisse der Reise Eisentrauts 1957/58). Bonner Zoologische Beiträge 3–4:198–217.

De Balsac, H. H. 1968. Contribution à l'etude des Soricidae de Fernando Po et du Cameroun. Bonner Zoologische Beiträge 1–2:15–42.

De Balsac, H. H. 1975. Article: Nouvelles données sur la faune soricidienne du Cameroun. Bonner Zoologische Beiträge 1–3:94–99.

De Balsac, H. H., and V. Aellen. 1958. Les Soricidae de basse Côte d'Ivoire. Revue Suisse Zoology 65:921–956.

De Balsac, H. H., and J. Barloy. 1966. Revision des Crocidures du groupe flavescens-occidentalis-manni. Mammalia 30:601–633.

De Balsac, H. H., and R. Hutterer. 1982. Les Soricidae des iles du Golfe de Guinea-faits nouveoux et problems biogeographiques. Bonner Zoologische Beiträge 33:133–150.

De Balsac, H. H., and P. Mein. 1971. Les musaraignes momifiees des hypogees de Thebes. Existence d'un metalophe chez les Crocidurinae (Sensu Repenning). Mammalia 35:220–244.

Delany, M. J., and M. J. R. Healy. 1966. Variation in the white-toothed shrews in the British Isles. Proceedings of the Royal Society of London B: Biological Sciences 164:63–74.

Delaval, M., M. Henry, and P. Charles-Dominique. 2005. Interspecific competition and niche partitioning: Example of a Neotropical rainforest bat community. Revue d'Ecologie, Terre et Vie 60:149–165.

Demos, T. C., A. S. Achmadi, H. Handika, Maharadatunkamsi, K. C. Rowe, and J. A. Esselstyn. 2016. A new species of shrew (Soricomorpha: *Crocidura*) from Java, Indonesia: possible character displacement despite interspecific gene flow. Journal of Mammalogy 20:1–11.

Denzinger, A., and H.-U. Schnitzler. 2013. Bat guilds, a concept to classify the highly diverse foraging and echolocation behaviors of microchiropteran bats. Frontiers in Physiology 4:164.

Diersing, V. E. 1980. Systematics and evolution of the pygmy shrews (subgenus *Microsorex*) of North America. Journal of Mammalogy 61:76–101.

Diersing, V. E. 2019. Taxonomic revision of the long-tailed shrew, *Sorex dispar* Batchelder, 1911, from the Appalachian Region of North America, with the description of a new subspecies. Journal of Mammalogy 100:1837–1846.

Diersing, V. E., and D. F. Hoffmeister. 1977. Revision of the shrews *Sorex merriami* and a description of a new species of the subgenus *Sorex*. Journal of Mammalogy 58:321–333.

Dippenaar, N. J. 1977. Variation in *Crocidura mariquensis* (A. Smith, 1844) in southern Africa, Part 1 (Mammalia: Soricidae). Annals of the Transvaal Museum 30:163–206.

Dippenaar, N. J. 1979. Variation in *Crocidura mariquensis* (A. Smith, 1844) in southern Africa, Part 2 (Mammaila: Soricidae). Annals of the Transvaal Museum 32:1–34.

Dippenaar, N. J. 1995. Geographic variation in *Myosorex longicaudatus* (Soricidae) in the southern Cape Province, South Africa. Journal of Mammalogy 76:1071–1087.

Dippenaar, N. J., and J. Meester. 1989. Revision of the *Luna-Fumosa* complex of Afrotropical *Crocidura* Wagler, 1832 (Mammalia: Soricidae). Annals of the Transvaal Museum 35:1–47.

Dokuchaev, N. E. 1997. A new species of shrew (Soricidae, Insectivora) from Alaska. Journal of Mammalogy 78:811–817.

Dokuchaev, N. E., S. Ohdachi, and H. Abe. 1999. Morphometric status of shrews of the *Sorex caecutiens*/*shinto* group in Japan. Mammal Study 24:67–78.

Dollman, G. L. 1915*a*. XIX.-On the African shrews belonging to the genus *Crocidura*.-IV. Journal of Natural History 16:124–146.

Dollman, G. L. 1915*b*. XLV.-On the African shrews belonging to the genus *Crocidura*.-I. Journal of Natural History 15:507-527.

Dollman, G. L. 1915*c*. XLV.-On the African shrews belonging to the genus *Crocidura*.-V. Journal of Natural History 16:357–380.

Dollman, G. L. 1915*d*. X.-On the African shrews belonging to the genus *Crocidura*.-III. Journal of Natural History 16:66–80.

Dollman, G. L. 1915*e*. L.-On the African shrews belonging to the genus *Crocidura*.-II. Journal of Natural History 15:562–575.

Dollman, G. L. 1916*a*. LXIII.-On the African shrews belonging to the genus *Crocidura*.-VI. Journal of Natural History 16:506–514.

Dollman, G. L. 1916*b*. XVII.-On the African shrews belonging to the genus *Crocidura*.-VII. Journal of Natural History 17:188–209.

Douady, C. J., and E. J. P. Douzery. 2009. Hedgehogs, shrews, moles, and solenodons (Eulipotyphla). Pages 495–498 *in* S. B. Hedges and S. Kumar, editors. The Timetree of Life. Oxford University Press, Oxford, ENG.

Dubey, S., N. Salamin, S. D. Ohdachi, P. Barriere, and P. Vogel. 2007. Molecular phylogenetics of shrews (Mammalia: Soricidae) reveal timing of transcontinental colonizations. Molecular Phylogenetics and Evolution 44:126–137.

Dubey, S., N. Salamin, M. Ruedi, P. Barrière, M. Colyn, and P. Vogel. 2008. Biogeographic origin and radiation of the Old World crocidurine shrews (Mammalia: Soricidae) inferred from mitochondrial and nuclear genes. Molecular Phylogenetics and Evolution 48:953–963.

Duncan, P., and R. W. Wrangham. 1971. On the ecology and distribution of subterranean insectivores in Kenya. Journal of Zoology 164:149–163.

Durrant, S. D. 1952. Mammals of Utah: Taxonomy and distribution. University of Kansas Publications, Museum of Natural History 6:1–549.

Earl of Cranbrook Hon FLS, and P. J. Piper. 2008. Post-Pleistocene evolution of Bornean shrews Crocidura foetida (Mammalia, Soricidae): Post-Pleistocene Evolution of *C. foetida*. Biological Journal of the Linnean Society 94:413–419.

Eick, G. N., D. S. Jacobs, and C. A. Matthee. 2005. A Nuclear DNA Phylogenetic Perspective on the Evolution of Echolocation and Historical Biogeography of Extant Bats (Chiroptera). Molecular Biology and Evolution 22:1869–1886.

Eisenberg, J. F. 1981. The mammalian radiations: An analysis of trends in evolution, adaptation, and behavior. The University of Chicago Press, Chicago, Illinois, USA.

Ellerman, J. R., and T. C. S. Morrison-Scott. 1966. Checklist of Palaearctic and Indian Mammals 1758 to 1946. 2nd edition. British Museum (Natural History).

Elliot, D. G. 1917. A Checklist of Mammals of the North American Continent the West Indies and the Neighboring Seas. J. A. Allen, editor. American Museum of Natural History.

Esselstyn, J. A., A. S. Achmadi, H. Handika, T. C. Giarla, and K. C. Rowe. 2019. A new climbing shrew from Sulawesi highlights the tangled taxonomy of an endemic radiation. Journal of Mammalogy 100:1713–1725.

Esselstyn, J. A., A. S. Achmadi, and Maharadatunkamsi. 2014. A new species of shrew (Soricomorpha: *Crocidura*) from West Java, Indonesia. Journal of Mammalogy 95:216–224.

Esselstyn, J. A., and S. M. Goodman. 2010. New species of shrew (Soricidae: Crocidura) from Sibuyan Island, Philippines. Journal of Mammalogy 91:1467–1472.

Esselstyn, J. A., S. P. Maher, and R. M. Brown. 2011. Species Interactions during Diversification and Community Assembly in an Island Radiation of Shrews. PLoS ONE 6:e21885.

Fang, Y., and L. Lee. 2002. Re-evaluation of the Taiwanese white-toothed shrew, *Crocidura tadae* Tokuda and Kano, 1936 (Insectivora: Soricidae) from Taiwan and two offshore islands. Journal of Zoology 257:145–154.

Fang, Y.-P., L.-L. Lee, F.-H. Yew, and H.-T. Yu. 1997. Systematics of white-toothed shrews (Crocidura) (Mammalia: Insectivora: Soricidae) of Taiwan: karyological and morphological studies. Journal of Zoology, London 242:151–166.

Feldhamer, G. A., L. C. Drickamer, S. H. Vessey, J. F. Merritt, and C. Krajewski. 2015. Mammalogy: Adaptation, Diversity, Ecology. 4th edition. Johns Hopkins University Press, Baltimore, Maryland, USA. <https://books.google.com/books?hl=en&lr=&id=mO_RDwAAQBAJ&oi=fnd&pg=PR8&ots=XYeboiF2T3&sig=GWlTLuWcQYnZ27pY9doQbG5ISOU>. Accessed 16 Jun 2024.

Findley, J. S. 1955. Speciation of the Wandering Shrew. University of Kansas Publications Museum of Natural History 9:1–18.

Fisher, B. L., editor. 2004. Monts Doudou, Gabon A Floral and Faunal Inventory With Reference to Elevational Distribution. Memoirs of the California Academy of Sciences 308.

French, T. W. 1980. Sorex longirostris. Mammalian Species 1–3.

García-Perea, R., J. Ventura, M. J. López-Fuster, and J. Gisbert. 1997. Sorex granarius. Mammalian Species 1–4.

Gardner, A. L. 2008. Mammals of South America, Volume 1: Marsupials, Xenarthrans, Shrews, and Bats. University of Chicago Press.

Genoways, H. H., and J. R. Choate. 1998. Natural History of the Southern Short-tailed Shrew, Blarina carolinensis. Occasional Papers of the Museum of Southwestern Biology 8:1–43.

George, S. B. 1989. Sorex trowbridgii. Mammalian Species 1–5.

George, S. B., and J. D. Smith. 1991. Inter- and intraspecific variation among coastal and island populations of <i>Sorex monticolus<i> and <i>Sorex vagrans<i> in the Pacific Northwest. Pages 75–91 *in* J. S. Findley and T. L. Yates, editors. The biology of the Soricidae. Volume 1. Special Publication: The Museum of Southwestern Biology.

Gillihan, S. W., and K. R. Foresman. 2004. Sorex vagrans. Mammalian Species 1–5.

Golley, F. B. 1962. Mammals of Georgia: a study of their distribution and functional role in the ecosystem. University of Georgia Press, Athens.

Goodwin, G. G. 1933. Mammals Collected in the Maritime Province of Siveria by the Morden-Graves North Asiatic Expedition, With the Description of a New Hare From the Amur River. American Museum Novitates 1–18.

Gottschang, J. L. 1965. Range Extension and Notes on the Shrew Sorex cinereus in Ohio. The Ohio Journal of Science 65:46–47.

Graf, J. D., J. Hausser, A. Farina, and P. Vogel. 1979. Confirmation du statut spécifique de Sorex samniticus Altobello, 1926 (Mammalia, Insectivora). Bonner Zoologische Beiträge 30:14–21.

Green, M. M. 1932. An Unrecognized shrew from New Jersey. University of California Publications in Zoology 38:386–388.

Grinnell, J. 1913. The Species of the Mammalian Genus Sorex of West-central California: With a Note on the Vertebrate Palustrine Faunas of the Region. University of California Publications in Zoology 10:179–195.

Grinnell, J. 1932. A Relic Shrew From Central California. University of California Publications in Zoology 38:389–390.

Guevara, L., V. Sánchez-Cordero, L. León-Paniagua, and N. Woodman. 2014. A new species of small-eared shrew (Mammalia, Eulipotyphla, *Cryptotis*) from the Lacandona rain forest, Mexico. Journal of Mammalogy 95:739–753.

Hafner, D. J., and D. W. Stahlecker. 2002. Distribution of Merriam's Shrew (Sorex merriami) and the Dwarf Shrew (Sorex nanus), and New Records for New Mexico. The Southwestern Naturalist 47:134–137.

Hai, B. T., L. N. Tu, V. T. Duong, and N. T. Son. 2017. Geographic Variation in Skull Size and Shape of Crocidura dracula (Mammalia: Soricidae) in Vietnam. Tieu Ban Da Ding Hoc Va Bao Ton 670–677.

Hall, E. R. 1938. Variation Among Insular Mammals of Georgia Strait, British Columbia. The American Naturalist 72:453–463.

Hall, E. R. 1946. Mammals of Nevada. University of California Press, Berkeley, California, USA.

Hall, E. R. 1981. The mammals of North America. New York : Wiley. <http://archive.org/details/mammalsofnortham0000hall>. Accessed 29 Apr 2024.

Hall, E. R., and W. W. Dalquest. 1960. The mammals of Veracruz. University of Kansas publications, Museum of Natural History 14:165--362.

Hall, E. R. (Eugene R. 1955. Handbook of mammals of Kansas. Lawrence, Kansas : Museum of Natural History, University of Kansas. <http://archive.org/details/handbookofmammal00hall>. Accessed 29 Apr 2024.

Hamilton, Jr., W. J. 1955. A new subspecies of Blarina brevicauda from Florida. Proceedings of the Biological Society of Washington 68:37–40.

Hamilton, W. J. 1944. The Biology of the Little Short-Tailed Shrew, Cryptotis parva. Journal of Mammalogy 25:1–7.

Han, S., S. D. Ohdachi, and H. Abe. 2000. New records of 2 Sorex species from South Korea. Mammal Study 25:141–144.

Harper, F. 1961. Land and fresh-water mammals of the Ungava Peninsula. Lawrence, University of Kansas. <http://archive.org/details/landfreshwaterma0000harp>. Accessed 29 Apr 2024.

Harrison, D. L. 1964. The mammals of Arabia. <https://portals.iucn.org/library/node/16636>. Accessed 29 Apr 2024.

Harrison, J. L. 1958. *Chimarrogale hantu* a new water shrew from the Malay Peninsula, with a note on the genera *Chimarrogale* and *Crossogale* (Insectivora, Soricidae). Annals and Magazine of Natural History 1:282–290.

Hassinger, J. D. 1970. Shrews of the Crocidura zarudnyi pergrisea Group with Descriptions of a New Subspecies. Fieldiana: Zoology, N.S. 58:1–8.

Hassinger, J. D. 1973. A survey of the mammals of Afghanistan resulting from the 1965 Street Expedition (excluding bats). Fieldiana: Zoology, N.S. 60.

He K., Deng K., and Jiang X.-L. 2013. First record of Van sung’s shrew (<I>Chodsigoa caovansunga</I>) in China: First record of Van sung’s shrew (<I>Chodsigoa caovansunga</I>) in China. Zoological Research 33:542–544.

He, K., N. Woodman, S. Boaglio, M. Roberts, S. Supekar, and J. E. Maldonado. 2015. Molecular Phylogeny Supports Repeated Adaptation to Burrowing within Small-Eared Shrews Genus of Cryptotis (Eulipotyphla, Soricidae). B.-S. Yue, editor. PLOS ONE 10:1–13.

Heaney, L. R., and R. M. Timm. 1983. Systematics and Distribution of Shrews of the Genus Crocidura (Mammalia: Insectivora) in Vietnam. Proceedings of the Biological Society of Washington 96:115–120.

Heller, E. 1910. New Species of Insectivores From British East Africa, Uganda, and the Sudan. Smithsonian Miscellaneous Collections 56:1–12.

Heller, E. 1912. New races of Insectivores, Bats, and Lemurs from British East Africa. Smithsonian miscellaneous collections. 60:1–13.

Henderson, J., and G. Forbes. 2012. Occurrence of the Maritime Shrew (Sorex maritimensis) in Black Spruce (Picea mariana) Forest Stands in Southeastern New Brunswick. The Canadian Field-Naturalist 126:1–7.

Hess, B. M. 2016. Distribution and Taxonomic Status of the Short-tailed Shrew (Genus Blarina) in North Carolina. M.S. Thesis, North Carolina State, Raleigh, North Carolina.

Hinckley, A., M. Camacho-Sanchez, M. Ruedi, M. T. R. Hawkins, M. Mullon, A. Cornellas, F. Tuh Yit Yuh, and J. A. Leonard. 2022. Evolutionary history of Sundaland shrews (Eulipotyphla: Soricidae: *Crocidura*) with a focus on Borneo. Zoological Journal of the Linnean Society 194:478–501.

Hoffmann, R. S. 1971. Relationships of Certain Holarctic Shrews, Genus Sorex. Zeitschrift fur Saugetierkunde 36:94–200.

Hoffmann, R. S. 1985*a*. A review of the genus Soriculus (Mammalia Insectivora). The Journal of the Bombay Natural History Society 82:459–481.

Hoffmann, R. S. 1985*b*. The correct name for the palearctic brown, or flat-skulled, shrew is Sorex roboratus. Proceedings of the Biological Society of Washington 98:17–28.

Hoffmann, R. S., and R. D. Fisher. 1978. Additional Distributional Records of Preble's Shrew (Sorex preblei). Journal of Mammalogy 59:883–884.

Hoffmann, R. S., and R. S. Peterson. 1967. Systematics and Zoogeography of Sorex in the Bering Strait Area. Systematic Zoology 16:127–136.

Hoffmeister, D. F. 1971. Mammals of Grand Canyon. University of Illinois Press.

Hoffmeister, D. F. 2002. Mammals of Illinois. University of Illinois Press.

Hoffmeister, D. F., and W. W. Goodpasters. 1954. The mammals of the Huachua Mountains, southeastern Arizona. Urbana, University of Illinois Press. <http://archive.org/details/mammalsofhuachu24hoff>. Accessed 29 Apr 2024.

Hofmann, J. E. 2013. Field manual of Illinois mammals. Illinois Natural History Survey, Champaign.

Holderied, M. W., and O. Von Helversen. 2003. Echolocation range and wingbeat period match in aerial-hawking bats. Proceedings of the Royal Society of London. Series B: Biological Sciences 270:2293–2299.

Hollister, N. 1913. Mammals Collected by the Smithsoniana-Harvard Expedition to the Altai Mountains, 1912. Volume 45, No. 1990. US Goverment Printing Office.

Hollister, N. 1916. Article XXXV.-Shrews Collected By the Congo Expedition of the American Museum. Bulletin of the American Museum of Natural History 35:663–680.

Hollister, N. 1918. East African mammals in the United States National Museum pt. 1: Insectivora, Chiroptera, and Carnivora. Volume 99. US Goverment Printing Office.

Hooper, E. T. 1942. The Water Shrew (Sorex palustris) of the Southern Allegheny Mountains. Occasional Papers of the Museum of Zoology University of Michigan 1–4.

Humiński, S., and I. Wójcik-Migała. 1967. Note on Crocidura suaveolens (Pallas, 1811) from Poland. Acta Theriologica 12:168–171.

Hutcheon, J. M., and J. A. Kirsch. 2006. A moveable face: deconstructing the Microchiroptera and a new classification of extant bats. Acta Chiropterologica 8:1–10.

Hutterer, R. 1979. Verbreitung und Systematik von Sorex minutus Linnaeus, 1766 (Insectivora; Soricinae) im Nepal-Himalaya und angrezenden Gebieten. Sonderdruck aus Z. F. Saugetierkunde 44:65–80.

Hutterer, R. 1980. Zur Systematik und Verbreitung der Soricidae Äthiopiens (Mammalia; Insectivora). Bonner Zoologische Beiträge 31:217–247.

Hutterer, R. 1981*a*. Crocidura manengubae n.sp. (Mammalia: Soricidae), eine neue Spitzmaus aus Kamerun. Bonner Zoologische Beiträge 32:241–248.

Hutterer, R. 1981*b*. Range extension of Crocidura smithii, with description of a new subspecies from Senegal. Mammalia 45:388–391.

Hutterer, R. 1983*a*. Crocidura grandiceps, eine neue Spitzmaus aus Westafrika. Revue Suisse Zoology 90:699–707.

Hutterer, R. 1983*b*. Taxonomy and distribution of Crocidura fuscomurina (Heuglin, 1865). Mammalia 47:221–227.

Hutterer, R. 1985. Anatomical adaptations of shrews. Mammal Review 15:43–55.

Hutterer, R. 1986*a*. The species of Crocidura (Soricidae) in Morocco. Mammalia 50:521–534.

Hutterer, R. 1986*b*. Diagnosen Neuer Spitzmause aus Tansania (Mammalia: Soricidae). Bonner Zoologische Beiträge 37:23–33.

Hutterer, R. 1986*c*. Synopsis der Gattung Paracrocidura (Mammalia: Soricidae), mit Beschreibung einer neuen Art. Bonner Zoologische Beitrage 37:73–90.

Hutterer, R. 1991. Variation and evolution of the Sicilian shrew- taxonomic conclusions and description of a possibly related species from the Pleistocene of Morocco. Bonner Zoologische Beiträge 42:241–251.

Hutterer, R. 2007. Records of shrews from Panay and Palawan, Philippines, with the description of two new species of Crocidura (Mammalia: Soricidae). Lynx (Praha) 5–20.

Hutterer, R., D. S. Balete, T. C. Giarla, L. R. Heaney, and J. A. Esselstyn. 2018. A new genus and species of shrew (Mammalia: Soricidae) from Palawan Island, Philippines. Journal of Mammalogy 99:518–536.

Hutterer, R., F. Dieterlen, and G. Nikolaus. 1992. Article: Small mammals from forest islands of eastern Nigeria and adjacent Cameroon, with systematical and biogeographical notes. Bonner Zoologische Beiträge 43:393–414.

Hutterer, R., and N. J. Dippenaar. 1987. A new species of Crocidura Wagler, 1832 (Soricidae) from Zambia. Bonner zoologische Beiträge 38:1–7.

Hutterer, R., and D. Happold. 1983. The Shrews of Nigeria (Mammalia: Soricidae). BONNER ZOOLOGISCHE MONOGRAPHIEN 18:81.

Hutterer, R., and D. L. Harrison. 1988. A new look at the shrews (Soricidae) of Arabia. Bonner zoologische Beiträge 39:59–72.

Hutterer, R., and P. D. Jenkins. 1980. A new species of Crocidura from Nigeria (Mammalia: Insectivora). Bulletin of the British Museum (Natural History) Zoology 39:305–310.

Hutterer, R., P. D. Jenkins, and W. N. Verheyen. 1991. A new forest shrew from southern Tanzania. Oryx 25:165–168.

Hutterer, R., and D. Kock. 2002. Recent and ancient records of shrews from Syria, with notes on Crocidura katinka Bate, 1937 (Mammalia: Soricidae). Bonner zoologische Beiträge 50:249–258.

Hutterer, R., and C. Montermann. 2009. A large new species of Sylvisorex (Mammalia: Soricidae) from Nigeria and the first record of Sylvisorex ollula from the country. Bonner zoologische Beiträge 56:201–208.

Hutterer, R., J. Riegert, and O. Sedlacek. 2009. A tiny new species of Sylvisorex from the Bamanda Highlands, Cameroon. Bonner Zoologische Beiträge 56:151–157.

Hutterer, R., and D. A. Schlitter. 1996. Shrews of Korup National Park, Cameroon, with the description of a new Sylvisores (Mammalia: Soricidae). Contributions in Mammalogy: A Memorial Volume Honoring Dr. J. Knox Jones, Jr. 57–66.

Ingles, L. G. 1954. Mammals of California and Its Coastal Waters. Stanford University Press.

IUCN. 2023. The IUCN Red List of Threatened Species. <https://www.iucnredlist.org>.

J. L. Paradiso. 1969. Mammals of Maryland, 1969, North American Fauna, Number 66: pages 1-193 pages. United States Department of the Interior, Bureau of Sport Fisheries and Wildlife. <http://archive.org/details/mammalsofmarylan0000jlpa>. Accessed 29 Apr 2024.

Jackson, H. H. T. 1919. An Unrecognized Shrew From Warren Island, Alaska. Proceedings of the Biological Society of Washington 32:23–24.

Jackson, H. H. T. 1922. New Species and Subspecies of Sorex From Western America. Journal of the Washington Academy of Sciences 12:262–264.

Jackson, H. H. T. 1925*a*. Preliminary Descriptions of Seven Shrews of the Genus Sorex. Proceedings of the Biological Society of Washington 38:127–130.

Jackson, H. H. T. 1925*b*. Two New Pigmy Shrews of the Genus Microsorex. Proceedings of the Biological Society of Washington 38:125–126.

Jackson, H. H. T. 1928. A Taxonomic Review of the American Long-tailed Shrews: (Genera Sorex and Microsorex). North American Fauna 51:1–238.

Jacquet, F., R. Hutterer, V. Nicolas, J. Decher, M. Colyn, A. Couloux, and C. Denys. 2013. New Status for Two African Giant Forest Shrews, *Crocidura goliath goliath* and *C. goliath nimbasilvanus* (Mammalia: Soricomorpha), Based on Molecular and Geometic Morphometric Analyses. African Zoology 48:13–29.

Jacquet, F., V. Nicolas, M. Colyn, B. Kadjo, R. Hutterer, J. Decher, B. Akpatou, C. Cruaud, and C. Denys. 2014. Forest refugia and riverine barriers promote diversification in the West African pygmy shrew (*Crocidura obscurior* complex, Soricomorpha). Zoologica Scripta 43:131–148.

Jameson, E. W., Jr., and G. S. Jones. 1977. The Soricidae of Taiwan. Proceedings of the Biological Society of Washington 90:459–482.

Jenkins, P. D. 1976. Variation in Eurasian shrews of the genus Crocidura (Insectivora: Sodicidae). Bulletin of the British Museum (Natural History). 30:271–309.

Jenkins, P. D. 1982. A discussion of Malayan and Indonesian shrews of the genus Crocidura. Zoologische Mededelingen 56:267–279.

Jenkins, P. D. 2013. An Account of the Himalayan Mountain Soricid Community, With the Description of a New Species of Crocidura (Mammalia: Soricomorpha: Soricidae). The Raffles Bulletin of Zoology Supplement No. 29:161–175.

Jenkins, P. D., A. V. Abramov, A. A. Bannikova, and V. V. Rozhnov. 2013. Bones and genes: resolution problems in three Vietnamese species of Crocidura (Mammalia, Soricomorpha, Soricidae) and the description of an additional new species. ZooKeys 61–79.

Jenkins, P. D., A. V. Abramov, V. V. Rozhnov, and A. Olsson. 2010. A new species of Crocidura (Soricomorpha: Soricidae) from southern Vietnam and north-eastern Cambodia. Zootaxa 2345:60–68.

Jenkins, P. D., D. P. Lunde, and C. B. Moncrieff. 2009. Chapter 10. Descriptions of New Species of Crocidura (Soricomorpha: Soricidae) from Mainland Southeast Asia, with Synopses of Previously Described Species and Remarks on Biogeography. Bulletin of the American Museum of Natural History 331:356–405.

Jenkins, P. D., and A. L. Smith. 1995. A new species of Crocidura recovered from owl pellets in Thailand. Bulletin Natural History Museum London (Zoology) 61:103–109.

Jenkins, P., M. Ruedi, and M. Catzeflis. 1998. A biochemical and morphological investigation of Suncus dayi (Dobson, 1888) and discussion of relationship in Suncus Hemprich & Ehrenberg, 1833, Crocidura Wagler, 1832, and Sylvisorex Thomas, 1904 (Insectivora: Soricidae. Bonner Zoologische Beitrage 47:257–276.

Jentink, F. A. 1888. Note XII. On the shrews from the Malayan Archipelago. Notes from the Leyden Museum X:161–167.

Jiang, X., and R. S. Hoffmann. 2001. A Revision of the white-toothed shrews (Corcidura) of southern China. Journal of Mammalogy 82:1059–1079.

Jo, Y.-S., J. T. Baccus, and J. L. Koprowski. 2018. Mammals of Korea: a review of their taxonomy, distribution and conservation status. Zootaxa 4522:001–216.

Johnson, D. H. 1951. The Water Shrews of the Labrador Peninsula. Proceedings of the Biological Society of Washington 64:109–116.

Jones, J., D. Armstrong, R. Hoffmann, and C. Jones. 1983. Mammals of the Northern Great Plains. University of Nebraska State Museum: Mammalogy Papers. <https://digitalcommons.unl.edu/museummammalogy/273>.

Jones, J. K., Jr. 1959. Comments on the Biology of the Quelpart Island Shrew, Crocidura dsinezumi quielpartis Kuroda. Journal of Mammalogy Society Japan 1.

Jones, J. K., Jr. 1964. Distribution and Taxonomy of Mammals of Nebraska. Nebraskiana Publications. <https://digitalcommons.unl.edu/nebraskianapubs/6>.

Jones, J. K., Jr., and D. H. Johnson. 1960. Review of the Insectivores of Korea. University of Kansas Publications Museum of Natural History 9:549–578.

Jones, M. C., T. R. Simpson, R. W. Manning, and M. R. Forstner. 2007. Texas shrews (Blarina hylophaga) lacking external eye openings. Southeastern Naturalist 6:752–754.

Judin, B. S. 1964. The geographical distribution and interspecific taxonomy of Sorex minutissimus Zimmermann, 1780 in West Siberia; Rozprzestrzenienie geograficzne i systematyka wewnątrzgatunkowa Sorex minutissimus Zimmermann, 1780 w Zachodniej Syberii. Acta Theriologica 8:167–179.

Junge, J. A., R. S. Hoffmann, and R. W. Debry. 1983. Relationships within the Holarctic Sorex arcticus - Sorex tundrensis species complex. Acta Theriologica 28:339–350.

Kamalakannan, M., C. Sivaperuman, S. Kundu, G. Gokulakrishnan, C. Venkatraman, and K. Chandra. 2021. Discovery of A New Mammal Species (Soricidae: Eulipotyphla) From Narcondam Volcanic Island, India. Scientific Reports 11:9416.

Kefelioğlu, H., and A. Y. Selçuk. 2016. Taxonomic status of Neomys species (Mammalia: Soricomorpha)and their distribution in Turkey. TURKISH JOURNAL OF ZOOLOGY 40:825–830.

Kerbis Peterhans, J. C., M. H. Huhndorf, A. J. Plumptre, R. Hutterer, P. Kaleme, and B. Ndara. 2013. Mammals, other than bats, from Misotshi-Kabogo highlands (eastern Democratic Republic of Congo), with the description of two new species (Mammalia: Soricidae). Bonner Zoologische Beitrage 62:203–219.

Kerbis Peterhans, J. C., R. Hutterer, P. Kaliba, and L. Mazibuko. 2008. First Record Of Myosorex (Mammalia: Soricidae) From Malawi With Description As A New Species, Myosorex gnoskei. Journal of East African Natural History 97:19–32.

Kerbis Peterhans, J., R. Hutterer, J. Mwanga, B. Ndara, L. Davenport, I. B. Karhagomba, and J. Udelhoven. 2010. African Shrews Endemic to the Albertine Rift: Two New Species of *Myosorex* (Mammalia: Soricidae) from Burundi and the Democratic Republic of Congo. Journal of East African Natural History 99:103–128.

Kerbis Peterhans, J., W. T. Stanley, R. Hutterer, T. C. Demos, and B. Agwanda. 2009. A new species of Surdisorex Thomas, 1906 (Mammalia, Soricidae) from western Kenya. Bonner zoologische Beiträge 56:175–183.

Kingdon, J., D. Happold, T. Butynski, M. Hoffmann, M. Happold, and J. Kalina, editors. 2013. Mammals of Africa. Bloomsbury Publishing, London.

Kirkland, G. L. 1981. Sorex dispar and Sorex gaspensis. Mammalian Species 1.

Kirkland, Jr., G. L., and D. F. Schmidt. 1996. Sorex arcticus. Mammalian Species 1–5.

Kock, D. 1974. Eine neue Suncus-Art von Flores, Kleine Sunda-Inseln (mammalia: Insectivora). Senckenbergiana biologica 55:197–203.

Koller, O. 1929. Die Soriciden Des Zoologischen Museums in Buitenzorg Auf Java. Treubia 11:313–324.

Konečný, A., R. Hutterer, Y. Meheretu, and J. Bryja. 2020. Two new species of Crocidura (Mammalia: Soricidae) from Ethiopia and updates on the Ethiopian shrew fauna. Journal of Vertebrate Biology 69:20064.

Kovaleva, V. Yu., Yu. N. Litvinov, and V. M. Efimov. 2014. Shrews (Soricidae, Eulipotyphla) from the Russian Far East and Siberia: Combination and search for congruence of molecular genetic and morphological data. Biology Bulletin 41:575–588.

Krystufek, B., V. Vohralik, and C. Kurtonur. 1998. A New Look at the Identity and Distribution of Water Shrews (Neomys spp.) in Turkey. Zeitschrift fur Saugetierkunde 63:129–136.

Kundu, S., M. Kamalakannan, A. R. Kim, V. D. Hegde, D. Banerjee, W.-K. Jung, Y.-M. Kim, and H.-W. Kim. 2023. Morphology and Mitochondrial Lineage Investigations Corroborate the Systematic Status and Pliocene Colonization of Suncus niger (Mammalia: Eulipotyphla) in the Western Ghats Biodiversity Hotspot of India. Genes 14:1493.

Kuroda, N. 1924. On new mammals from the Riu Kiu Islands and the vicinity. Tokyo 1–14.

Kuroda, N. 1928. The Mammal Fauna of Sakhalin. Journal of Mammalogy 9:222–229.

Lapini, L., M. G. Filippucci, and S. Filacorda. 2001. Genetic and morphometric comparison betweenSorex arunchi Lapini and Testone, 1998, and other shrews from Italy. Acta Theriologica 46:337–352.

Lavrenchenko, L. A., L. L. Voyta, and R. Hutterer. 2016. Diversity of shrews in Ethiopia, with the description of two new species of Crocidura (Mammalia: Lipotyphla: Soricidae). Zootaxa 4196:38.

Lay, D. M. 1967. A Study of the Mammals of Iran REsulting From the Street Expedition of 1962-1963. Fieldiana: Zoology, N.S. 54:285.

Lee, J. B. 2014. Taxonomic Notes and Data Matrix for Interactive Key of Erinaceomorpha, Soricomorpha, and Rodentia (Mammalia) in Korea. M.S. Thesis, Incheon National University, South Korea.

Lehmann, E. V. 1976. Neomys anomalus rhenanus ssp. nova, die Sumpfspitzmaus des Rheingebietes. Bonner Zoologische Beiträge 160–163.

Li, Yaoyao, H. Li, M. Motokawa, Y. Wu, M. Harada, H. Sun, X. Mo, J. Wang, and Yuchun Li. 2019. A revision of the geographical distributions of the shrews Crocidura tanakae and C. attenuata based on genetic species identification in the mainland of China. ZooKeys 869:147–160.

Lindsay, D. M. 1960. Mammals of Ripley and Jefferson Counties, Indiana. Journal of Mammalogy 41:253–262.

Lindsay, H. M. 1929. Scientific results from the mammal survey no. XLVIII Indian Shrews. The Journal of the Bombay Natural History Society 33:326–340.

Long, C. A. 1965. The Mammals of Wyoming. University of Kansas Publications Museum of Natural History 14:758.

Long, C. A. 1971. Taxonomic Revision of the Mammalian Genus Microsorex Coues. Transactions of the Kansas Academy of Science (1903-) 74:181–196.

Lowery, G. H. 1974. The mammals of Louisiana and its adjacent waters. [Baton Rouge] Published for the Louisiana Wild Life and Fisheries Commission by the Louisiana State University Press. <http://archive.org/details/mammalsoflouisia0000lowe>. Accessed 29 Apr 2024.

Lunde, D. P., G. G. Musser, and N. T. Son. 2003. A survey of small mammals from Mt. Tay Con Linh II, Vietnam, with the description of a new species of Chodsigoa (Insectivora: Soricidae). Mammal Study 28:31–46.

Lunde, D. P., G. G. Musser, and T. Ziegler. 2004. Description of a new species of Crocidura (Soricomorpha: Soricidae, Crocidurinae) from Ke Go Nature Reserve, Vietnam. Mammal Study 29:27–36.

Lyon, M. W., Jr. 1936. Mammals of Indiana. The American Midland Naturalist 17:1–373.

Maldonado, J. E., F. Hertel, and C. Vilà. 2004. Discordant Patterns of Morphological Variation in Genetically Divergent Populations of Ornate Shrews (Sorex ornatus). Journal of Mammalogy 85:886–896.

Margry, K. 2013. A New Record of Taiga Shrew (Sorex isodon Turov, 1924), From Sogn Og Fjordane, Norway. Lutra 56:137–141.

Martin, A., R. Hutterer, and G. B. Corbet. 1984. On the presence of shrews (Soricidae) in the Canary Islands. Bonner Zoologische Beiträge 35:5–14.

Matson, J. O., and N. Ordóñez-Garza. 2017. The taxonomic status of Long-tailed shrews (Mammalia: genus Sorex) from Nuclear Central America. Zootaxa 4236:461–483.

Matson, J. O., and N. Woodman. 2019. Shrews (Eulipotyphla, Soricidae) of Guatemala. Mussaranas (Eulipotyphla, Soricidae) de Guatemala". Perspectivas de investigacion sobre los mamiferos silvestres de Guatemala (Research Perspectives on the Wild Mammals of Guatemala) 19–29.

McCay, T. S. 2001. Blarina carolinensis. Mammalian Species 1–7.

McTaggart-Cowan, I., and C. J. Guiguet. 1956. The Mammals of British Columbia. British Columbia Provincial Museum, Department of Education with the co-operation of Department of Recreation and Conservation.

Medway, L. G. 1978. The wild mammals of Malaya (Peninsular Malaysia) and Singapore-2.

Meegaskumbura, S., M. Meegaskumbura, R. Pethiyagoda, K. Manamendra-Arachchi, and C. J. Schneider. 2007. Crocidura hikmiya, a new shrew (Mammalia: Soricomorpha: Soricidae) from Sri Lanka. Zootaxa 19–30.

Meegaskumbura, S., M. Meegaskumbura, and C. J. Schneider. 2010. Systematic relationships and taxonomy of Suncus montanus and S. murinus from Sri Lanka. Molecular Phylogenetics and Evolution 55:473–487.

Meegaskumbura, S., M. Meegaskumbura, and C. J. Schneider. 2012. Re-evaluation of the taxonomy of the Sri Lankan pigmy shrew Suncus fellowesgordoni (Soricidae: Crocidurinae) and its phylogenetic relationship with S. etruscus. Zootaxa 3187:57–68.

Meegaskumbura, S., and C. J. Schneider. 2009. A Taxonomic Evaluation of the Shrew *Suncus montanus* (Soricidae: Crocidurinae) of Sri Lanka and India. Ceylon Journal of Science (Biological Sciences) 37:129–136.

Meek, P. D. 2000. The decline and current status of the Christmas Island shrew Crocidura Attentuata Trichura on Christmas Island, Indian Ocean. Australian Mammalogy 22:43.

Meester, J. 1953. The Genera of African Shrews. Annals of the Transvaal Museum 22:205–214.

Meester, J. 1963. A Systematic Revision of the Shrew Genus Crocidura in Southern Africa. Memoir No. 13, Transvaal Museum, Pretoria, South Africa.

Meester, J., and A. V. W. Lambrechts. 1971. The Southern African Species of Suncus Ehrenberg (Mammaila: Soricidae). Annals of the Transvaal Museum 27:1–14.

Mehlum, F., and E. Potapov. 1995. Small mammals from the Koren Arctic Expedition to the Kolyma River, northeast Siberia 1914-1918. Polar Research 14:1–14.

Melander, Y. 1941. Sorex lapponicus, eine im nordlichsten Schweden gefundene neue Spitzmausart. Kungl. Fysiografiska sallskapet i Lund forhandlingar 11:2–11.

Merriam, C. H. 1895*a*. Revision of the shrews of the American genera Blarina and Notiosorex. North American Fauna 10:1–57.

Merriam, C. H. 1895*b*. Synopsis of the American Shrews of the Genus Sorex. North American Fauna 10:57–125.

Merriam, C. H. 1902. Two new Shrews of the Sorex tenellus Group From California. Proceedings of the Biological Society of Washington 15:75–76.

Merritt, J. F. 1987. Guide to the Mammals of Pennsylvania. University of Pittsburgh Pre.

Merritt, J. F., G. L. Kirkland, R. K. Rose, and International Colloquium on the Biology of the Soricidae, editors. 1994. Advances in the biology of shrews. Volume 18. Special publication, Carnegie Museum of Natural History, Pittsburgh. <https://www.biodiversitylibrary.org/bibliography/123995>. Accessed 9 Aug 2023.

Miller, G. S. 1902. The mammals of the Andaman and Nicobar Islands. Proceedings of the United States National Museum 24:751–795.

Miller, Jr., G. S. 1901. Five New Shrews From Europe. Proceedings of the Biological Society of Washington 14:41–45.

Miller, Jr., G. S. 1907. Some new European Insectivora and Carnivora. The Annals and Magazine of Natural History; Zoology, Botany, and Geology 7:389–398.

Miller, Jr., G. S. 1909. Article: LIV.—Twelve new European mammals. The Annals and Magazine of Natural History; Zoology, Botany, and Geology 8:415–421.

Miller, Jr., G. S. 1910. Descriptions of Two New Genera and Sixteen New Species of Mammals From the Philippine Islands. Proceedings of the United States National Museum 38:391–404.

Miller, Jr., G. S. 1911. Three new shrews of the genus Cryptotis. Proceedings of the Biological Society of Washington 24:221–224.

Miller, Jr., G. S. 1912. Catalogue of the mammals of Western Europe (Europe exclusive of Russia) in the collection of the British Museum. Trustees of the British Museum, London, England.

Mishta, A. V. 2007. Morphometric variation of the common shrew Sorex araneus in Ukraine, in relation to geoclimatic factors and karyotype. Russian Journal of Theriology 6:051–062.

Molina, O., and R. Hutterer. 1989. A Cryptic New Species of Crocidura from Gran Canaria and Tenerife, Canary Islands (Mammalia: Soricidae). Bonner Zoologische Beiträge 40:85–97.

Moreno Cárdenas, P. A., and L. Albuja V. 2014. Una nueva especie de Musaraña del género Cryptotis Pomel 1848 (Mammalia: Soricomorpha: Soricidae) de Ecuador y estatus taxonomico de Cryptotis equatoris Thomas (1912). Papéis Avulsos de Zoologia (São Paulo) 54:403–418.

Mori, E., M. Brambilla, F. Ramazzotti, L. Ancillotto, G. Mazza, D. Russo, G. Amori, and A. Galimberti. 2020. In or Out of the Checklist? DNA Barcoding and Distribution Modelling Unveil a New Species of Crocidura Shrew for Italy. Diversity 12:1–12.

Motokawa, M., M. Harada, L. Apin, S. Yasuma, S.-L. Yuan, and L.-K. Lin. 2006. Taxonomic study of the water shrewsChimarrogale himalayica andC. platycephala. Acta Theriologica 51:215–223.

Motokawa, M., M. Harada, K. Mekada, and K. C. Shrestha. 2008. Karyotypes of three shrew species (Soriculus nigrescens, Episoriculus caudatus and Episoriculus sacratus) from Nepal. Integrative Zoology 3:180–185.

Motokawa, M., and L.-K. Lin. 2002. Geographic variation in the mole-shrew Anourosorex squamipes. Mammal Study 27:113–120.

Motokawa, M., L.-K. Lin, M. Harada, and S. Hattori. 2003. Morphometric Geographic Variation in the Asian Lesser White-Toothed Shrew Crocidura shantungensis (Mammalia, Insectivora) in East Asia. Zoological Science 20:789–795.

Mukinzi, I., R. Hutterer, and P. Barriere. 2009. A new species of Sylvisorex (Mammalia: Soricidae) from lowland forests north of Kisangani, Democratic Republic of Congo. Mammalia 73:130–134.

Mumford, R. E., and J. O. Whitaker. 1982. Mammals of Indiana. Bloomington : Indiana University Press. <http://archive.org/details/mammalsofindiana00mumf>. Accessed 29 Apr 2024.

Musie, O. J. 1959. Fauna of the Aleutian Islands and Alaska Peninsula. North American Fauna 378.

Nagorsen, D. W., N. Panter, and A. G. Hope. 2017. Are the western water shrew (*Sorex navigator*) and American water shrew (*Sorex palustris*) morphologically distinct? Canadian Journal of Zoology 95:727–736.

Niethammer, J. 1956. Insektenfresser und Nayer Spaniens. Bonner Zoologische Beiträge 4:249–295.

Nowak, R. M. 1999. Walker's Mammals of the World. Volume 1. John Hopkins Univsersity Press, Baltimore.

Nowak, R. M. 2018. Walker's Mammals of the World. Monotremes, Marsupials, Afrotherians, Xenarthrans, and Sundatherians. John Hopkins Univsersity Press. <https://doi.org/10.1016/j.mambio.2018.09.009>. Accessed 16 Jun 2024.

Ochocińska, D., and J. R. Taylor. 2003. Bergmann's rule in shrews: geographical variation of body size in Palearctic Sorex species. Biological Journal of the Linnean Society 78:365–381.

Ognev, S. I. 1928. Mammals of Eastern Europe and Northern Asia: Insectivora and Chiroptera. Volume 1. Israel Program for Scientific Translations.

Ohdachi, S. D., H. Abe, H. S. Oh, and S. H. Han. 2005. Morphological relationships among populations in the Sorex caecutiens/shinto group (Eulipotyphla, Soricidae) in East Asia, with a description of a new subspecies from Cheju Island, Korea. Mammalian Biology 70:345–358.

Ohdachi, S. D., Y. Ishibashi, M. A. Iwasa, and T. Saitoh, editors. 2015. The Wild Mammals of Japan. 2nd edition. Volume 544. SHOUKADOH Book Sellers and the Mammalogical Society of Japan.

Okhotina, M. V. 1976. A new form of shrews from the Moneron Island. Zoologicheskiizhurnal 55:590–595.

Okhotina, M. V. 1977. Palaearctic shrews of the subgenus Otisorex: biotopic preference, population number, taxonomic revision and distribution history. Acta Theriologica 22:191–206.

Okhotina, M. V. 1993. Subspecific Taxonomic Revision of Far East Shrews With Description of New Subspecies. Trudy Zoologicheskogo instituta 243:58–70.

Osborn, D. J. 1965. Hedgehogs and Shrews of Turkey. Proceedings of the United States National Museum 117:553–566.

Osborn, D. J., and I. Helmy. 1980. The contemporary land mammals of Egypt including Sinai. Fieldiana: Zoology, N.S. 616.

Osgood, F. L. 1938*a*. The Mammals of Vermont. Journal of Mammalogy 19:435–441.

Osgood, F. L. 1938*b*. The Mammals of Vermont. Journal of Mammalogy 19:435–441.

Osgood, W. 1941. Mammals of Burma expedition-Osgood testimonial volume. Papers on Mammalogy 68–70.

Osgood, W. H. 1910. Further New Mammals from British East Africa. Publications of the Field Musuem of Natural History 10:15–21.

Osgood, W. H. 1936. New and imperfectly known small mammals from Africa. Zoological Series of Field Museum of Natural History 20:217–256.

Owen, J. G. 1984. Sorex fumeus. Mammalian Species 1–8.

Owen, J. G., and R. S. Hoffmann. 1983. Sorex ornatus. Mammalian Species 1–5.

Passarge, V. H. 1984. Sorex isodon marchicus ssp. nova in Mitteleuropa. Zeitschrift fur Saugetierkunde 49:278–284.

Pattie, D. 1973. Sorex bendirii. Mammalian Species 2.

Petter, F. 1963. Un Nouvel Insectivore du Nord de ;-Assam: Anourosorex squamipes schmidi nov absp. Mammalia 27:444–445.

Phillipps, Q. 2016. Phillipps' field guide to the mammals of Borneo : Sabah, Sarawak, Brunei, and Kalimantan. Princeton, New Jersey : Princeton University Press. <http://archive.org/details/phillippsfieldgu0000phil>. Accessed 29 Apr 2024.

Polyakov, A. V., S. S. Onischenko, V. B. Ilyashenko, J. B. Searle, and P. M. Borodin. 2002. Morphometric difference between the Novosibirsk and Tomsk chromosome races ofSorex araneus in a zone of parapatry. Acta Theriologica 47:381–387.

Querouil, S., R. Hutterer, P. Barriere, M. Colyn, J. C. Kerbis Peterhans, and E. Verheyen. 2001. Phylogeny and evolution of african shrews (Mammalia: Soricidae) inferred from 16s rRNA sequences. Molecular Phylogenetics and Evolution 20:185–195.

Quiroga-Carmona, M., and C. DoNascimiento. 2016. A new species of small-eared shrew of the genus Cryptotis Pomel, 1848 (Mammalia, Eulipotyphla, Soricidae) from the easternmost mountains of the Venezuelan Andes. Mammalian Biology - Zeitschrift für Säugetierkunde 81:494–505.

Quiroga-Carmona, M., and J. Molinari. 2012. Description of a new shrew of the genus Cryptotis (Mammalia: Soricomorpha: Soricidae) from the Sierra de Aroa, an isolated mountain range in northwestern Venezuela, with remarks on biogeography and conservation. Zootaxa 3441:1.

Quiroga-Carmona, M., and N. Woodman. 2015. A new species of *Cryptotis* (Mammalia, Eulipotyphla, Soricidae) from the Sierra de Perijá, Venezuelan-Colombian Andes. Journal of Mammalogy 96:800–809.

Ramírez-Pulido, J., A. Castillo-Morales, A. Salame-Méndez, and A. Castro-Campillo. 2004. CARACTERÍSTICAS MORFOLÓGICAS Y MORFOMÉTRICAS DE CINCO ESPECIES DE CRYPTOTIS (MAMMALIA: SORICOMORPHA). Acta Zoologica Mexicana 20:9–37.

Rangasamy, V., C. Raghunathan, and K. Chandra. 2019. Observation on the re-occurrence of Nicobar spiny shrew (Crocidura nicobarica Miller, 1902): A critically endangered mammal of Great Nicobar Island, India. Records of the Zoological Survey of India, Occasional Paper 119:49–54.

Ray, J. C., and R. Hutterer. 1995. Structure of a Shrew Community in the Central African Republic Based on the Analysis of Carnivore Scats, With the Description of a New Sylvisorex (Mammalia: Soricidae). Ecotropica 85–97.

Redding, R. W., and D. M. Lay. 1978. Article: Description of a new species of shrew of the genus Crocidura (Mammalia: Insectivora: Soricidae) from southwestern Iran. Zeitschrift fur Saugetierkunde 43:306–310.

Reid, F. 1997. A field guide to the mammals of Central America & southeast Mexico. New York : Oxford University Press. <http://archive.org/details/fieldguidetomamm0000reid_o3n6>. Accessed 29 Apr 2024.

Reid, F. 2006. A Field Guide to Mammals of North America, North of Mexico. Houghton Mifflin Harcourt.

Remm, J., O. Kalda, H. Valdmann, and E. Moks. 2015. Eesti Imetajad Liikide Tundmaoppimise teejuht. Tartu Ulikooli okoloogia-ja maateaduste instituut 157.

Rey, J. M. 1971. Contribucion al conocimiento de la msarana enanana, Sorex minutus en la Peninsula Iberica (Mammaila, Insectivora). Bol. R. Soc. Esp. Hist. Nat 153–160.

Richter, H. 1966. Eine Serie Crocidura gueldenstaedti von der griechischen Insel Samos. Beaufortia 13:109–115.

Roberts, A. 1924. Some additions to the list of South African mammals. Annals of the Transvaal Museum 10 Part 2:6–76.

Roberts, A. 1929. New forms of African mammals. Annals of the Transvaal Museum 13:82–121.

Roberts, A. 1932. Scientific Results of the Vernay-Lang Kalahari Expedition, March to September, 1930 Mammals. Annals of the Transvaal Museum 15:187–221.

Roberts, A. 1946. Descriptions of numerous new subspecies of mammals. Annals of the Transvaal Museum 20 Part 4:303–328.

Ruedi, M. 1995. Taxonomic revision of shrews of the genus Crocidura from the Sunda Shelf and Sulawesi with description of two new species (Mammalia: Soricidae). Zoological Journal of the Linnean Society 115:211–265.

Saito, H., B. T. Hai, L. N. Tu, N. T. Son, S. Kawada, and M. Motokawa. 2021. Shrews (Mammalia: Eulipotyphla: Soricidae) from Mt. Tay Con Linh, Ha Giang Province, northeast Vietnam. National Museum of Nature and Sciece. <https://doi.org/10.50826/bnmnszool.47.1_43>. Accessed 23 Apr 2024.

Sato, J. J., T. M. Bradford, K. N. Armstrong, S. C. Donnellan, L. M. Echenique-Diaz, G. Begué-Quiala, J. Gámez-Díez, N. Yamaguchi, S. T. Nguyen, and M. Kita. 2019. Post K-Pg diversification of the mammalian order Eulipotyphla as suggested by phylogenomic analyses of ultra-conserved elements. Molecular phylogenetics and evolution 141:106605.

Scheffer, V. B., and W. W. Dalquest. 1942. A New Shrew from Destruction Island, Washington. Journal of Mammalogy 23:333–335.

Schlater, M. A., editor. 1901. the Mammals of South Africa Volume II. Rodentia, Chiroptera, Insectivora, Cetacea and Edentata. Volume II. R.H. Porter.

Schlitter, D. A., and J. B. Bowles. 1967. Noteworthy Distributional Records of Some Mammals in Iowa. Transactions of the Kansas Academy of Science (1903-) 70:525–529.

Schwartz, A. 1956. A New Subspecies of the Longtail Shrew (Sorex dispar batchelder) From the Southern Appalachian Mountains. Journal of the Elisha Mitchell Scientific Society 72:24–30.

Schwartz, C. W., and E. R. Schwartz. 2001. The Wild Mammals of Missouri. University of Missouri Press.

Setzer, H. W. 1956. Mammals of the Anglo-Egyptian Sudan. Proceedings of the United States National Museum 106:447–587.

Shohfi, H. E., C. J. Conroy, A. R. Wilhelm, and J. L. Patton. 2006. New Records of Sorex preblei and S. tenellus in California. C. W. Edwards, editor. The Southwestern Naturalist 51:108–111.

Siemers, B. M., and H.-U. Schnitzler. 2004. Echolocation signals reflect niche differentiation in five sympatric congeneric bat species. Nature 429:657–661.

Skaren, U. 1964. Variation in Two Shrews, Sorex unguiculatus Dobson and S.a. araneus L. Annals Zoologici Fennici 1:94–124.

Smith, A. T., and Y. Xie. 2013. Mammals of China. Princeton University Press.

Sokolov, V. E., and A. K. Tembotov. 1989. Vertebrates of the Caucasus. Mammals. Insectivores. Moscow: Nauka.

Spitzenberger, von F. 1970*a*. Zur Verbreitung und Systematik türkischer Crocidurinae (Insectivora, Mammalia). Annalen des Naturhistorischen Museums in Wien 233–252.

Spitzenberger, von F. 1970*b*. First records of the eyelash shrew Suncus etruscus for crete and Asia Minor and the distribution of the species in the Southwest Asian region. Zeitschrift fur Saugetierkunde 35:107–113.

Spitzenberger, V. F. 1971. Eine neue, tiergeographisch bemerkenswerte Crocidura (Insectivora, Mammalia) aus der Türkei. Annalen des Naturhistorischen Museums in Wien, Serie A 75:539–552.

Springer, M. S., W. J. Murphy, and A. L. Roca. 2018. Appropriate fossil calibrations and tree constraints uphold the Mesozoic divergence of solenodons from other extant mammals. Molecular phylogenetics and evolution 121:158–165.

Stanley, W. T., and R. Hutterer. 2000. A new species of Myosorex from the Eastern Arc Mountains, Tanzania. Bonner Zoologische Beitrage 49:19–30.

Stanley, W. T., R. Hutterer, T. C. Giarla, and J. A. Esselstyn. 2015. Phylogeny, phylogeography and geographical variation in the *Crocidura monax* (Soricidae) species complex from the montane islands of Tanzania, with descriptions of three new species: Systematics of *Crocidura Monax*. Zoological Journal of the Linnean Society 174:185–215.

Stanley, W. T., L. W. Robbins, J. M. Malekani, S. G. Mbalitini, D. A. Migurimu, J. C. Mukinzi, J. Hulselmans, V. Prévot, E. Verheyen, R. Hutterer, J. B. Doty, B. P. Monroe, Y. J. Nakazawa, Z. Braden, D. Carroll, J. C. Kerbis Peterhans, J. M. Bates, and J. A. Esselstyn. 2013. A new hero emerges: another exceptional mammalian spine and its potential adaptive significance. Biology Letters 9:20130486.

Stanley, W. T., M. A. Rogers, and R. Hutterer. 2005. A new species of *Congosorex* from the Eastern Arc Mountains, Tanzania, with significant biogeographical implications. Journal of Zoology 265:269–280.

Stone, R. D. 1995. Eurasian insectivores and tree shrews: status survey and conservation action plan. Volume 26. IUCN.

Stroganov, S. U. 1941. Insectivorous mammals of fauna of Russia. Doklady Akademii Nauk SSSR 33:270–272.

Stroganov, S. U. 1949. Sorex minutissimus karelicus Stroganov, 1949. Ученые записки Томского государственного университета 12:191–192.

Stroganov, S. U. 1956*a*. New species of shrew from the Siberian fauna. Pages 1–14 *in*. Proceedings of the Institute of Biology, West Siberian Branch, Academy of Sciences of the USSR, Zoology. Volume 1.

Stroganov, S. U. 1956*b*. Materials on the systematics of Siberian mammals. Proceedings of the Biological Institute, West-Siberian Filial of USSR Academy Science 1:3–10.

Swarth, H. S. 1913. Report on a collection of birds and mammals from Vancouver Island. University of California Publications in Zoology 10:124.

Taborska, J. 2014. Diversity and phylogenetic relationships of Crocidura shrews in Ethiopia. Masarykianan Brunensis Universitas.

Tate, G. H. H. 1947. Mammals of Eastern Asia. Pacific World Series, The MacMillan Company, New York.

Taylor, P. J., T. C. Kearney, J. C. Kerbis Peterhans, R. M. Baxter, and S. Willows-Munro. 2013. Cryptic diversity in forest shrews of the genus *Myosorex* from southern Africa, with the description of a new species and comments on *Myosorex tenuis*: Cryptic Diversity in African Forest Shrews. Zoological Journal of the Linnean Society 169:881–902.

Tez, C. 1999. Taxonomy and Distribution of the White-Toothed Shrews (Crocidura) (Soricidae: Insectivora: Mammalia) of Turkey. Turkish Journal of Zoology 365–374.

Tez, C., and H. Kefelioglu. 2000. Does Crocidura pergrisea arispa Spitzenberger, 1971 occur in Turkey. Pakistan Journal of Biological Sciences 3:2197–2198.

The Earl of Cranbrook, and P. Crowcroft. 1958. The White-toothed Shrews of the Channel Islands. Annals and Magazine of Natural History 1:359–364.

Thomas, O. 1906. LVI.— *New insectivores and voles collected by Mr. A. Robert near Trebizond*. Annals and Magazine of Natural History 17:415–421.

Thomas, O. 1907. On mammals from Northern Persia, presented to the National Museum by Col. A.C. Bailward. The Annals and magazine of natural history; zoology, botany, and geology 196–207.

Thomas, O. 1913. LIII.— A New Shrew From the Andaman Islands. The Annals and Magazine of Natural History; Zoology, Botany, and Geology 11:468–469.

Thomas, O. 1914. LXV.- On Small Mammals From Djarkent, Central Asia. The Annals and Magazine of Natural History; Zoology, Botany, and Geology 73–78:563–573.

Thompson, C. W., J. R. Choate, H. H. Genoways, and E. J. Finck. 2011. Blarina hylophaga (Soricomorpha: Soricidae). Mammalian Species 43:94–103.

Thorn, E., and J. C. Kerbis Peterhans. 2009. Small Mammals of Uganda. Zoologisches Forschungsmuseum Alexander Koenig.

Trouessart, E. L. 1880. On a new very small shrew from Mayotte Crocidura coquerelii, Pollen and van Dam, MS. Notes from the Leyden Museum 2:85–89.

Trouessart, E. L. 1910. The Mammals of Europe. R. Friedlander & Sohn, Berlin, Germany.

Upham, N., C. Burgin, J. Widness, S. Liphardt, C. Parker, M. Becker, I. Rochon, and D. Huckaby. 2023. Mammal Diversity Database.

Van Peenen, P. F. D., P. F. Ryan, R. H. Light, and U. S. N. Museum. 1969. Preliminary identification manual for mammals of South Vietnam. United States National Museum, Smithsonian Institution Washington, DC.

Venkataraman, K., A. Chattopadhyay, and K. A. Subramanian, editors. 2013. Endemic animals of India (Vertebrates). Director, Zoological Survey of India, Kolkata.

Vereshchagin, N. K. 1967. The mammals of the Caucasus; a history of the evolution of the fauna.(Mlekopitayushchie Kavkaza; istoriya formirovaniya fauny).

Vesmanis, I. 1977. Article: Eine neue Crocidura-Art aus der Cyrenaica, Libyen: Crocidura aleksandrisi n. sp (Mammalia: Insectivora: Crocidura). Bonner Zoologische Beiträge 1–2:3–12.

Vesmanis, I. 1981. Uber die typusexemplare Corcidura russula pulchra Cabrera, 1907, und Crocidura russula cintrae Miller, 1907, von der Iberischen Halbinsel (Mammalia, Insectivora). Misc. Zool 7:165–170.

Vesmanis, I., and A. Vesmanis. 1979. Beltrag zur Kennopis der Crociduren-Fuauan Markkkos (Mammalia, Insectivora, Soricidae) I. Die Wimperspitzrnause aus den Sammlungen des Smithsoian Institution, Washington. Zoologische Abhandlungen 36:11–80.

Vivar, E., V. Pacheco, and M. Valqui. 1997. A New Species of Cryptotis (Insectivora: Soricidae) from Northern Peru. AMERICAN MUSEUM NOVITATES 1–15.

Vogel, P., T. Maddalena, and F. Catzeflis. 1986. A contribution to the taxonomy and ecology of shrews (Crocidura zimmermanni and C. suaveolens) from Crete and Turkey. Acta Theriologica 31:537–545.

Volpert, Y. L., and E. G. Shadrina. 2002. Small Mammals of the Northeast of Siberia. Nauka.

Webster, W. D., J. F. Parnell, and W. C. Biggs. 1985. Mammals of the Carolinas, Virginia, and Maryland. University of North Carolina Press.

Webster, Wm. D., N. D. Moncrief, J. R. Choate, and H. H. Genoways. 2011. Systematic revision of the Northern Short-tailed Shrew, *Blarina brevicauda* (Say). Memoir, Virginia Museum of Natural History, Martinsville, VA. <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1141&context=museummammalogy>. Accessed 27 Jun 2016.

Weigel, I. 1969. Systematic review of the insectivores and rodents of Nepal with remarks on animal geography. Khumbu Himal Ergebnisse des Forschungsunternehmens Nepal Himalaya. Hrsg. von Walter Hellmich 3:149–196.

Whitaker, J. O., Jr., and W. J. Hamilton Jr. 1998. Mammals of the Eastern United States. Comstock Publishing Associates.

Whitaker, Jr., J. O. 1974. Cryptotis parva. Mammalian Species 1–8.

Whitaker Jr, J. O. 2004. Sorex cinereus. Mammalian Species 1–9.

Wilson, D. E., and R. A. Mittermeier. 2018. Handbook of the mammals of the world: vol. 8: insectivores, sloths and colugos.

Wilson, D. E., and D. M. Reeder. 2005. Mammal species of the world: a taxonomic and geographic reference. Third edition. John Hopkins Univsersity Press, Baltimore.

Wilson, D. E., and S. Ruff. 1999. The Smithsonian Book of North American Mammals. University of British Columbia Press.

Witte, G. 1964. Zur Systematik der Insektenfresser des Monte-Gargano-Gebietes (Italien). Bonner Zoologische Beiträge 1/2:1–35.

Woodman, N. 2002. A new species of small-eared shrew from Colombia and Venezuela (Mammalia: Soricomorpha: Soricidae: Genus Cryptotis). PROCEEDINGS OF THE BIOLOGICAL SOCIETY OF WASHINGTON 115:249–272.

Woodman, N. 2003. A new species of small-eared shrew of the Cryptotis nigrescens-group from Colombia (Mammalia: Soricomorpha: Soricidae). Proceedings of the Biological Society of Washington 116:853–872.

Woodman, N. 2010. Two new species of shrews (Soricidae) from the western higlands of Guatemala. Journal of Mammalogy 91:566–579.

Woodman, N. 2012. Taxonomic Status and Relationships of Sorex obscurus parvidens Jackson, 1921, From California. Journal of Mammalogy 93:826–838.

Woodman, N. 2015. Morphological variation among broad-clawed shrews (Mammalia: Eulipotyphla: Soricidae: Cryptotis Pomel, 1848) from highlands of western Honduras, with descriptions of three new cryptic species. Annals of Carnegie Museum 83:95–119.

Woodman, N. 2018. Rediscovery of the type series of the Acadian Masked Shrew, *Sorex acadicus* (Mammalia: Soricidae), with the designation of a neotype and a reevaluation of its taxonomic status. Proceedings of the Biological Society of Washington 131:111–131.

Woodman, N. 2019. Three New Species of Small-eared Shrews, Genus Cryptotis, From El Salvador, Guatemlala, and Hounduras (Mammalia: Eulipotyphla: Soricidae). Special Publications Museum of Texas Tech University 52.

Woodman, N. 2023. Skeletal indicators of locomotor adaptations in shrews. Therya 14:15–37.

Woodman, N., and R. D. Fisher. 2016. Identification and distribution of the Olympic Shrew (Eulipotyphla: Soricidae), *Sorex rohweri* Rausch et al., 2007 in Oregon and Washington, based on USNM specimens. Proceedings of the Biological Society of Washington 129:84–102.

Woodman, N., J. O. Matson, T. J. McCarthy, R. P. Eckerlin, W. Bulmer, and N. Ordóñez-Garza. 2012. Distributional Records of Shrews (Mammalia, Soricomorpha, Soricidae) from Northern Central America with the First Record of Sorex from Honduras. Annals of Carnegie Museum 80:207–237.

Woodman, N., and F. A. Stabile. 2015. Functional skeletal morphology and its implications for locomotory behavior among three genera of myosoricine shrews (Mammalia: Eulipotyphla: Soricidae): Myosoricine Locomotory Adaptations. Journal of Morphology 276:550–563.

Woodman, N., and R. M. Timm. 1993. Intraspecific and Interspecific variation in the cryptotis nigrecens species complex of small-eared shrews with the description of a new species from Columbia. Fieldiana: Zoology, N.S. 74:1–30.

Woodman, N., and R. M. Timm. 1999. Geographic variation and evolutionary relationships among broad-clawed shrews of the Cryptotis goldmani–group (Mammalia: Insectivora: Soricidae). Fieldiana: Zoology, N.S. 91:1–35.

Woodman, N., and R. M. Timm. 2000. Taxonomy and evolutionary relationships of Phillips' small-eared shrew, Cryptotis phillipsii (Schaldach, 1966), from Oaxaca, Mexico (Mammalia: Insectivora: Soricidae). PROCEEDINGS OF THE BIOLOGICAL SOCIETY OF WASHINGTON 113:339–355.

Woodman, N., and R. M. Timm. 2017. A new species of small-eared shrew in the Cryptotis thomasi species group from Costa Rica (Mammalia: Eulipotyphla: Soricidae). Mammal Research 62:89–101.

Woodman, N., and A. T. Wilken. 2019. Comparative functional skeletal morphology among three genera of shrews: implications for the evolution of locomotor behavior in the Soricinae (Eulipotyphla: Soricidae). R. Powell, editor. Journal of Mammalogy 100:1750–1764.

Yalden, D. W., and M. J. Largen. 1992. The endemic mammals of Ethiopia. Mammal Review 22:115–150.

Yang, L., H. Zhang, C. Zhang, J. Wu, Z. Wang, C. Li, and B. Zhang. 2020. A new species of the Genus Crocidura from Mount Huang, China. Zoological Systematics 45:1–14.

Yoshiyuki, M. 1988. Taxonomic status of the least red-toothed shrew from Korea. Bullentin of the National Science Museum 14:151–158.

Youngman, P. M. 1975. Mammals of the Yukon Territory. National Museum of Natural Sciences Publications in Zoology 10.

Yudin, B. S. 1969. Taxonomy of Some Species of Shrews (Soricidae) From Palaearctic and Nearctic. Acta Theriologica 14:21–34.

Yudin, B. S. 1989. Insectivorous mammals of Siberia. Izdatelstvo Nauka, Sibirskoje Otdelenie, Novosibirsk.

Zack, S. P. 2010. The phylogeny of eutherian mammals: a new analysis emphasizing dental and postcranial morphology of Paleogene taxa. The Johns Hopkins University.

Zagorodniuk, I. 1996. Rare shrew species in the territory of Ukraine: legends, facts and diagnostics. Bulletin of Zoology 30:53–69.

Zeballos, H., K. Pino, C. E. Medina, A. Pari, D. Chavez, N. Tinoco, and G. Ceballos. 2018. A new species of small-eared shrew of the genus Cryptotis from the northernmost Peruvian Andes. Zootaxa 4377:51–73.

Zhang, H., G. Wu, Y. Wu, J. Yao, S. You, C. Wang, F. Cheng, J. Chen, M. Tang, C. Li, and B. Zhang. 2019. A new species of the genus Crocidura from China based on molecular and morphological data. Zoological Systematics 44:279–293.

van Zyll de Jong, C. G. 1982. Relationships of amphiberingian shrews of the *Sorex cinereus* group. Canadian Journal of Zoology 60:1580–1587.

van Zyll de Jong, C. G. 1983. Handbook of Canadian mammals. Ottawa, Canada : National Museum of Natural Sciences : National Museums of Canada. <http://archive.org/details/handbookofcanadi0001vanz_i0c8>. Accessed 29 Apr 2024.

van Zyll de Jong, C. G., and G. L. Kirkland, Jr. 1989. A Morphometric Analysis of the Sorex cinereus Group in Central and Eastern North America. Journal of Mammalogy 70:110–122.

VITA

Graduate School
Southern Illinois University Carbondale

Wesley B Holland
w.holland.phylogeny@gmail.com

Auburn University
Bachelor of Science, Zoology, May 2007

Special Honors and Awards:
Emma Smith Hough Library Scholarship, 2015
Florence and Charles Foote Outstanding Teaching Assistant in Zoology, 2017

Thesis Paper Title:
Ecological Drivers of Size and Predictors of Potential Competition in Soricidae

Major Professor: Dr. Justin Boyles

Publications:

Fox, Brian J., Wesley B. Holland, Frank L. Boyd, Bradley F. Blackwell, and James B. Armstrong. "Use of stormwater impoundments near airports by birds recognized as hazardous to aviation safety." *Landscape and Urban Planning* 119 (2013): 64-73.

Fox, Brian, J., Armstrong, James B., Blackwell, Bradley F., Grand, James B., and Holland, Wesley B., "Parameters affecting bird use of stormwater detention ponds in the southeastern United States: implications for bird-aircraft collisions." 2008 Bird Strike Committee USA/Canada, 10 Meeting, Orlando, Florida. Paper 1.