Associations between Afrotropical bats, parasites, and microbial symbionts

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ABSTRACT

Bats are among the most diverse animals on the planet and harbor numerous bacterial, viral, and eukaryotic symbionts. The interplay between bacterial community composition and parasitism in bats is not well understood and may have important implications for studies of similar systems. Here we present a comprehensive survey of dipteran and haemosporidian parasites, and characterize the gut, oral, and skin microbiota of Afrotropical bats. We identify significant correlations between bacterial community composition of the skin and dipteran ectoparasite prevalence across four major bat lineages, as well as links between the oral microbiome and malarial parasitism, suggesting a potential mechanism for host selection and vector-borne disease transmission in bats. Mirroring recent studies of host-microbiome co-speciation in mammals, we find a weak correlation between chiropteran phylogenetic distances and bacterial community dissimilarity across the three anatomical sites, suggesting that host environment is more important than shared ancestry in shaping the composition of associated bacterial communities.

Keywords: microbiome, malaria, vector-borne disease, Afrotropics, Chiroptera

SIGNIFICANCE

Animals rely on bacterial symbionts for numerous biological functions, such as digestion and immune system development. Increasing evidence suggests that host-associated microbes may play a role in mediating parasite burden. This study is the first to provide a comprehensive survey of bacterial symbionts from multiple anatomical sites across a broad taxonomic range of Afrotropical bats, demonstrating significant associations between the bat microbiome and parasite prevalence. This study provides a framework for future approaches to systems biology of host-symbiont interactions across broad taxonomic scales, which will allow for the recognition of the interdependence between microbial symbionts and vertebrate health in the study of wild organisms and their natural history.

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INTRODUCTION

Humans and other animals rely on bacterial symbionts for numerous biological functions, such as digestion and immune system development (1, 2). Many studies have found significant associations between host phylogeny (shared common ancestry) and bacterial community composition (3, 4), while others have identified spatiotemporal variables as significant drivers of host-microbe associations over the course of individual lifespans (5-7). The influence of microbes on their hosts may be context dependent, such that the presence of a particular microbe may be beneficial under one set of ecological conditions and harmful under another. Thus, patterns of association between vertebrates and bacterial symbionts provide a unique lens through which to explore evolutionary and ecological phenomena.

Recognition of the interdependence between microbial symbionts and vertebrate health has led to a growing paradigm shift in the study of wild organisms and their natural history. Vertebrate species not only exhibit inherent life history characteristics, but serve as hosts to myriad bacteria, archaea, viruses, fungi, and eukaryotic organisms that abound in their environments. Many relationships between eukaryotic parasites and hosts have ancient origins, and the same may be true for host-microbial associations. Indeed, it is possible that bacterial symbionts of vertebrate hosts interact with eukaryotic parasites, viruses, or fungal symbionts in ways that could ultimately shape host evolution (8). For example, evidence from human and anthropophilic mosquito interactions suggests that the skin microbiome can influence vector feeding preference, thereby affecting transmission patterns of mosquito-borne pathogens (such as WNV, yellow fever, dengue, malaria, etc.), and ultimately imposing selective pressures on human populations - indeed, positive selection of malaria-protective genes can be seen in the human genome (9). Despite the potential significance of such interactions between hosts, microbes, and pathogen-transmitting vectors, they have not been well studied in most wild vertebrate systems.

Bats (Mammalia: Chiroptera) are an important system for comparison of the relative contributions of evolutionary and ecological factors driving host-symbiont associations. In addition to being one of the most speciose orders of mammals (second only to the order Rodentia), bats frequently live in large colonies, are long-lived, and volant, granting them access to a wide geographic range relative to their non-volant mammalian counterparts. The associations of diverse eukaryotic parasites (e.g. dipteran insects, haemosporidia, helminths) within numerous bat lineages have been well-characterized (10-13). Furthermore, bats have received increasing attention due to their role as putative vectors of human pathogens (*e.g.* Ebola, Marburg, SARS (14, 15)). Indeed, numerous serological surveys have supported the role of Afrotropical bats as reservoirs for a number of viruses (16-18). Taken together, these features make bats an appealing and tractable model for studying the interaction of bacterial symbionts and non-bacterial parasites and pathogens.

In this study, we conduct the first broad-scale study of Afrotropical bat-associated microbes. We test associations between bacterial community composition in the gastrointestinal tract, skin, and oral cavities from nine families and nineteen genera of bats. We pair this information with host-parasite associations between bats and ectoparasites in the superfamily Hippoboscoidea (obligate hematophagous dipteran insects), and haemosporidian (malarial) parasites putatively vectored by these hippoboscoid insects. Using a combination of machine learning, network theory, and negative binomial distribution models, we test the hypothesis that host-associated bacterial communities predict prevalence of parasitism by obligate dipteran and malarial parasites.

RESULTS

1) Ectoparasite and malarial parasite prevalence among Afrotropical bats

Sampling was conducted across 20 sites in Kenya and Uganda from July-August of 2016. Sites ranged from sea level to ~2500m in elevation (Fig. 1; Table S1). We collected gut, oral, and skin samples for bacterial community characterization from a total of 495 individual bats, comprising 9 families, 19 genera, and 28 recognized species. Bat families with the greatest representation included Hipposideridae (*n* = 80), Miniopteridae (*n* = 116), Rhinolophidae (*n* = 88), and Pteropodidae (*n* = 106). All host and parasite vouchers are accessioned at the Field Museum of Natural History (Chicago, IL, USA) (Table S2). Miniopterid bats experienced the highest prevalence of both ectoparasitism (*M. minor*, 89%) and malarial parasitism (*M. minor*, 67%) (Table 1). Bats with similarly high ectoparasite prevalence at the host species level included *Rhinolophus eloquens* (79%

prevalence), *Stenonycteris lanosus* (62%), and *Triaenops afer* (60%). Unlike miniopterid bats, these bat species did not harbor any detectable malarial parasites (Table 1).

2) Bacterial richness of bat skin drastically exceeds that of gut or oral communities

Across all samples, 51,136 Exact Sequence Variants (ESVs) were identified using Deblur (19). Gut microbial communities exhibited the lowest overall diversity (9,804 ESVs), followed by oral (13,629 ESVs), and skin (46,904 ESVs), the latter being significantly greater than gut or oral ($p < 2.2e\text{-}16$, Kruskal-Wallis; Bonferroni corrected p-value $p < 1e\text{-}113$, Dunn's test) (Fig. 2A). Aggregate mean observed ESVs by host genus were 70, 93, and 531 for gut, oral, and skin samples, respectively (Table 2). As with observed ESV richness counts, the Shannon index of bat skin microbial communities was significantly greater than that of either gut or oral microbiota ($p < 2.2e\text{-}16$, Kruskal-Wallis; Bonferroni corrected p-value $p < 1e\text{-}119$, Dunn's Test) (Fig. 2B). Based on weighted UniFrac distances, measures of intraspecific beta dispersion revealed a continuum of dissimilarities across all host species (Fig. 3). Mean beta dispersion among anatomical sites differed significantly ($p < 1.2e\text{-}7$, Kruskal-Wallis; Bonferroni corrected p-value $p < 0.01$, Dunn's Test). Meausres of intraspecific beta dispersion among unweighted UniFrac and Bray-Curtis distances also showed a continuum of dissimilarities across host species, and exhibited significant differences in mean beta dispersion across anatomical sites (Fig. S1).

3) Microbial communities significantly correlate with geographic locality, anatomical site, and host taxonomy, but not host phylogeny

Permutational analysis of variance (PERMANOVA) identified geographic locality, host taxonomy, and anatomical sampling site (gut, oral, skin) as significant factors explaining variation in three independent measures of microbial beta diversity (Bray-Curtis, unweighted UniFrac, and weighted UniFrac) ($p < 0.001$, ADONIS) (Table 4). Secondary analysis of sites by elevation revealed that bats at higher elevations tended to host increased alpha diversity across gut, oral, and skin microbiomes ($p <$ 2e-16, linear regression) (Fig. S2). In general, gut microbiota were dominated by Proteobacteria (Enterobacteraceae) and Firmicutes (Bacillaceae). Oral microbiota were dominated by Proteobacteria (Neisseriaceae, Pasteurellaceae). The oral microbiota of several insect bat families (Miniopteridae, Nycteridae, Rhinolophidae) were enriched for Firmicutes in the Mycoplasmataceae family, while the oral microbiota of fruit bats (Pteropodidae) were enriched for Firmicutes in the Streptococaccea family. Similar to gut and oral microbiota, skin also showed a high relative abundance of Proteobacteria (Moraxellaceae, Enterobacteraceae) and Firmicutes (Bacillaceae), with a pronounced increase in relative abundance of Actinobacteria and Bacteroidetes (Fig. 4).

Linear regression analyses of host phylogenetic distances and microbial community dissimilarity (unweighted UniFrac (uf) and weighted UniFrac (wuf) distances) revealed weak correlations for gut (uf: $R^2 = 0.013$, $p < 0.05$; wuf: $R^2 = 0.002$, $p = 0.752$; $R^2 = 0.0007$, $p = 0.2643$; $R^2 = 0.0015$, $p = 0.522$), oral ($R^2 = 0.009$; $p < 0.05$), and skin ($R^2 = 0.024$; $p < 0.005$) microbiota and host evolutionary relatedness (Fig. S3).

4) The microbiome is associated with parasitism in African bats

To test for significant associations between bacterial communities and eukaryotic parasites (obligate ectoparasitic dipteran insects, and obligate endoparasitic malarial parasites), we employed a combination of machine learning techniques, network analyses, and negative binomial distribution models (see methods). PERMANOVA analysis identified ectoparasite status and malarial infection status as significant predictors of bacterial beta diversity dissimilarity among skin and oral microbiota, respectively ($p < 0.001$, ADONIS). Tests of three independent measures of beta diversity (weighted UniFrac, unweighted UniFrac, and Bray-Curtis) produced congruent results, with the exception of oral microbiome, which was not significantly predictive of malarial infection based on unweighted UniFrac analysis (Table 3).

Supervised machine learning analyses (random forests; see methods) produced models that could classify the anatomical source of microbial communities and the host genus of gut, oral, and skin microbial samples with reasonable accuracy (ratio of baseline to observed classification error ≥2; *i.e.* random forest models performed at least twice as well as random). Random forest models also performed well when classifying ectoparasite status based on skin bacterial community composition, but less well for classification of malarial status based on oral bacterial community composition (Table 5).

Following the application of statistical and machine learning approaches, we employed network analyses to characterize the co-occurrence topology of microbial communities (in terms of the relative abundance of co-occurring ESVs) across the skin microbiota of our four most well-sampled bat families (Hipposideridae (n = 80), Miniopteridae (n = 116), Rhinolophida (n = 88), and Pteropodidae (n = 106)). Network analyses produced strikingly consistent results, revealing a significant decrease in cluster size ($p < 0.05$, Mann-Whitney-Wilcoxon rank sum test) and median node degree ($p < 0.05$, t test), as well as reduced network connectivity for parasitized bats from three of the four bat families examined (Fig. 5; Fig. S4).

5) Bacterial taxa on skin correlated with presence or absence of obligate dipteran ectoparasites

Negative binomial distribution (*e.g.* DESeq) models applied to skin microbiota in four well-sampled bat families (Hipposideridae, Miniopteridae, Rhinolophidae, Pteropodidae) identified a number of ESVs that were significantly associated with either ectoparasitized or non-ectoparasitized bats (Fig. 6). Overall, we identified 89 and 24 ESVs significantly associated with parasitized and non-parasitized bats, respectively (Table S3). Bacterial classes with the greatest representation among significant results were Actinobacteria (16 families), Gammaproteobacteria (11 families), Bacilli (5 families), and Alphaproteobacteria (3 families). ESVs significantly enriched in parasitized bats from at least three out of four bat families included Mycobacteraceae (Actinobacteria), and Xanthomonadaceae (Gammaproteobacteria). ESVs significantly enriched in parasitized bats from at least two out of four bat families included Hyphomicrobiaceae (Alphaproteobacteria), Alcaligenaceae (Betaproteobacteria), Moraxellaceae (Gammaproteobacteria), Planococcaceae (Bacilli), Flavobacteraceae

(Flavobacteria), Halobacteraceae (Halobacteria), and Chitinophagaceae (Saprospirae) (Fig. 6).

DISCUSSION

The bacterial diversity we observed among gut, oral, and skin microbiota of bats fall within ranges similarly observed in other vertebrate groups (3, 20-23). Although few studies have simultaneously compared gut, oral, and skin microbiota from the same individuals, our data refelct an apparent trend in the literature of skin bacterial diversity among vertebrates significantly outnumbering gut or oral bacterial diversity (24-27). Our data corroborate the findings of Nishida and Ochman (3), revealing no relationship between chiropteran phylogeny and gut bacterial community dissimilarity. We found the same absence of phylogenetic signal among oral and skin microbial communities. As suggested in other studies of volant vertebrates (bats and birds), convergent adaptations driven by the evolution of flight may be influencing the nature and composition of microbial communities in both bats and birds (28-30).

Microbial community specificity can be assessed as a function of intraspecific variation in dissimilarity (beta dispersion), where low dispersion suggests a tight and perhaps co-evolutionary link between hosts and symbionts, whereas high dispersion suggests more random associations between hosts and symbionts (31). Measures of beta dispersion among bats revealed a continuum for all three anatomical sites, with oral bacterial commuities showing lower levels of beta dispersion (for weighted UniFrac distances) than gut or skin communities (Fig. 3). This continuum suggests a possible gradient of host-symbiont specificity across different bat species that may be influenced by evolutionary history or host ecology. Given that we found no association between bacterial community dissimilarity and host phylogenetic distance, variation in beta dispersion is more likely a reflection of host ecology than evolutionary history.

Similar to recent studies in North American bats (32), we found sampling locality to be a significant factor influencing skin, gut and oral microbial composition (Table 4). Furthermore, we observed an apparent trend in increasing Shannon diversity and observed ESV richness along an elevational gradient that was most pronounced for skin microbiota (Fig. S2). A positive correlation between bacterial richness and elevation has been observed in studies of amphibian skin (33) and montane soil, and this pattern may be the result of climatological and other abiotic factors (*e.g.* pH) found along elevational gradients (34, 35).

We found the general composition of gut microbiota in East African bats to be similar to that of Neotropical bats, with Proteobacteria being the dominant bacterial phylum present (36). Regardless of diet (insectivorous or frugivorous), the distal bat gut is dominated by bacteria in the family Enterobacteriaceae (Phylum: Proteobacteria), though fruit bats do have an increased relative abundance of bacteria in the family Clostridiaceae (Phylum: Firmicutes) relative to insectivorous bats. In their study of neotropical bats, Phillips et al. (37) noted an increased relative abundance of Lactobacillales in frugivorous bats, and we note a similar pattern among pteropodid fruit bats in this study, which exhibited a slightly higher proportion of Streptococcaceae (Order: Lactobacillales) relative to insectivorous bats. Overall, the domination of the chiropteran gut by

Proteobacteria differs markedly from other mammalian gut microbiomes, which are generally dominated by Firmicutes (21, 38, 39).

Among most bat families, the oral microbiome was dominated by Pasteurellaceae (Phylum: Proteobacteria), and in some cases a high relative abundance of bacteria in the families Mycoplasmataceae (in nycterids), Neisseriaceae (in vespertilionids and rhinonycterids), and Streptococcaceae (in pteropodids) was also observed. Although the oral microbiome has received less attention than that of the gut, several studies have found diverse Pasteurellaceae and Neiserria lineages present in the oral microbiota of animals, including domestic cats (20) and marine mammals (40). Pasteurellaceae lineages have also recently been documented in the oral microbiota of Tasmanian devils (23, 41). In humans, Pasteurallaceae (genera *Haemophilus* and *Aggregatibacter*) and Neisseriaceae (genera *Neisseria*, *Kingella*, and *Eikenella*) play an important role in the formation supragingival plaque (22). Though these bacterial groups are present in lower proportions in other animals relative to bats, their presence in a broad range of host taxa suggest a conserved evolutionary niche.

Our analysis identified links between ectoparasitism, malarial parasitism, and bacterial communities on the skin and in oral cavities, respectively. Network analyses identified consistent, stable, and species-rich clusters of bacteria on the skin of non-ectoparasitized bats, compared to relatively disconnected and apparently transient bacteria on the skin of bats harboring ectoparasites. This result mirrors that found in human-mosquito interactions, in which individuals with lower bacterial diversity on the skin are significantly more attractive to blood-seeking mosquitoes than individuals with higher diversity (42). In humans, skin bacteria play a known role in attracting mosquitoes via their production of volatile organic compounds (VOCs), and studies have shown that variation in skin microbial community composition can increase or decrease human attractiveness to blood-seeking mosquitoes (42-44). Similar mechanisms may be at play in the bat-ectoparasite system, particularly given the phylogenetic proximity of hippobscoid bat parasites to mosquitoes.

Several bacterial families exhibited significant associations with presence of ectoparasitism in bats based on DESeq analyses. Bacteria found across multiple host families included (but were not limited to) Alcaligenaceae, Chitinophagaceae, Flavobacteriaceae, Moraxellaceae, Mycobacteriaceae (*Mycobacterium* spp.), and Xanthomonadaceae. In many cases, these bacterial families were associated with parasitism in some bat families, and absence of parasitism in others, suggesting a potential mechanism by which ectoparasites might be distinguishing between “correct” and “incorrect” hosts. As suggested by human-mosquito interaction studies (42, 43, 45), bacteria positively associated with increased rates of blood-feeding dipteran host selection may be producing VOCs on which the insects rely to identify their hosts. Bacteria that are negatively associated with such insects may be consuming the products of the former, or may be producing VOCs of their own that mask those of the former (suggested by Verhulst et al. (42)). To better understand the mechanisms underlying these correlations in wild populations, future experiments should consider including sampling of VOCs *in vivo*.

PERMANOVA analyses identified associations between the oral microbiome and malarial parasite prevalence among bats in the family Miniopteridae, although these associations were less robust than those of the skin bacteria and ectoparasitism. Upon further exploration of this potential association, we identified a single bacterial ESV in the genus *Actinobacillus* (99% similar to *A. porcinus* based on NCBI blastn search) as significantly reduced in malaria-free bats (baseMean 7.61, -24.2 log2FoldChange, p = 1.7E-20). Network analyses indicated no significant differences in connectivity or node degree distribution (results not shown). Because no other bat groups experienced rates of malarial parasitism adequate for statistical analyses, we were unable to explore this relationship further. Future studies that incorporate greater sampling of malaria-positive species may reveal more robust microbial associations, as have been documented in numerous experiments with controlled rodent and human malaria infections (45-47).

Although we cannot ascertain causality of differences in the microbial composition of skin in this study, our results support the hypothesis that these differences may provide a mechanism by which ectoparasites can locate or distinguish hosts. Alternatively, observed differences in microbial composition could result from microbial transfer from parasites to hosts. Given the known effect of locality and apparent absence of host phylogenetic signal in microbial community composition of skin, one possible explanation is that local environmental variables play a greater role in determining host-bacteria associations in bats. Indeed, in North America, multiple bat species have been found to share many bacterial genera with soil and plant material (32). Thus, local conditions and bacterial composition of bat roosts are likely playing an important role in driving the composition of skin bacteria, and via mechanisms similar to the camouflage hypothesis, could subsequently influence which individuals become parasitized.

METHODS

1) Sampling

Sampling for this study was conducted from the eastern coast of Kenya to the northern border of Uganda during August-October 2016 (Fig. 1; Table S1, S2). Eight families and nineteen genera of bats (order: Chiroptera) were collected as part of bird and small mammal biodiversity inventories. All sampling was conducted in accordiance with the Field Museum of Natural History IACUC and voucher specimens are accessioned at the Field Museum of Natural History (Table S2). Blood samples were collected and screened for haemosporidia and haemosporidian taxonomy was assigned using previously described molecular methods (13). Following blood sampling, ectoparasites were removed with forceps and placed directly into 95% EtOH; ectoparasites taxonomy was assigned based on morphological features. For the purposes of analysis with microbiome data, ectoparasite and malarial status were each scored separately as 1 (present) or 0 (absent). Gut, skin, and oral samples were taken for each bat for microbial analyses. Gut samples consisted of fecal material collected directly from the distal end of the colon using sterilized tools, and preserved on Whatman® FTA® cards for microbiome analyses. For oral microbiome analyses, we preserved both buccal swabs in lN_2 and tongue biopsies in 95% ethanol (EtOH). Comparison of ESV diversity obtained from paired subsets of each sample type revealed greater diversity recovered from tongue biopsies (data not shown); tongues were therefore used for characterization of oral microbiomes in this study. Lastly, skin samples from five regions of the body (ear, wing membrane, tail membrane, chest, back) were collected and pooled in 95% EtOH using sterile Integra® Miltex® 5mm biopsy punches. The goal of sampling from five body regions was to maximize bacterial diversity recovered from the external skin surface of each individual. We based our storage media selections on the recent study by Song et al. (48). Host sequencing and phylogenetic methods are described in Fig. S2.

2) Microbiome sequencing, characterization, and parasite association

DNA extractions were performed on gut, tongue, and skin samples using the MoBio PowerSoil 96 Well Soil DNA Isolation Kit (Catalog No. 12955-4, MoBio, Carlsbad, CA, USA). We used the standard 515f and 806r primers (49-51) to amplify the V4 region of the 16S rRNA gene, using mitochondrial blockers to reduce amplification of host mitochondrial DNA. Sequencing was performed using paired-end 150 base reads on an Illumina HiSeq sequencing platform. Following standard demultiplexing and quality filtering using the Quantative Insights Into Microbial Ecology pipeline (QIIME2) (52) and vsearch8.1 (53), ESVs were identified using the Deblur method (19) and taxonomy was assigned using the Greengenes Database (May 2013 release; http://greengenes.lbl.gov). Libraries containing fewer than 1000 reads were removed from further analyses. Negative controls all contained fewer than 1000 reads and were filtered at this step. We did not rarefy the data, based on the recommendations of McMurdie and Holmes (54). Data were then subset for analyses according to sample type, host genus, and locality (or some combination thereof). Site-specific analyses were only performed for sites from which five or more individual bats were sampled. We calculated alpha diversity for each sample type (gut, oral, skin) using the Shannon index, and measured species richness based on actual observed diversity. Significance of differing mean values for each diversity calculation was determined using the Kruskal-Wallis rank sum test, followed by a post-hoc Dunn test with bonferroni corrected *p*-values. Three measures of beta diversity (unweighted UniFrac, weighted UniFrac, and Bray-Curtis) were calculated using relative abundances of each ESV (calculated as ESV read depth over total read depth per library). Significant drivers of community similarity were identified using the ADONIS test with Bonferroni correction for multiple comparisons using the R package Phyloseq (55). Complete code for microbiome analyses can be found at http://github.com/hollylutz/BatMP.

3) Machine learning and network analyses

A supervised machine learning approach was used to produce random forests (RF) for the classification of different variables. RFs were constructed using 500 decision trees and subsets of ESV data via the supervised_learning.py script implemented in QIIME (52). We tested the ability of RFs to accurately classify 1) anatomical site (using all data), 2) host genus (using gut, oral, or skin microbial data separately), 3) ecotparasite status (using skin microbial data), and 4) malarial status (using oral microbial data). RF performance was assessed by comparing the out-of-bag estimated error (OOB) with baseline (random) error. If the ratio of OOB to baseline error was less than or equal to two, the model was considered to perform reasonably well, as it performed at least twice as well as random (56). To reconstruct microbial networks for skin and oral bacterial communities within bat family groupings (which were further sub-divided into parasitized or non-parasitized), we utilized the R package Sparse Inverse Covariance Estimation for Ecological Association Inference (SPIEC-EASI) (57). All network datasets were filtered to contain only ESVs that appeared in at least three individuals within each respective dataset. Network results produced with SPIEC-EASI were summarized using the R packages CAVnet (58) and igraph (59). Network stability was assessed by sequentially removing network nodes (ordered by betweeness centrality and degree) and observing natural connectivity (*i.e.* eigenvalue of the graph adjacency matrix) as nodes are removed. To determine which, if any, bacterial ESVs were significantly associated with ectoparasite or malarial prevalence, we performed analyses based on the negative binomial distribution of ESVs relative abundance, utilizing the R package DESeq2 (60). False discovery rate (FDR) was calculated using the Benjamini-Hochberg method (default method in DESeq), and *p*-values were adjusted accordingly.

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AUTHOR CONTRIBUTIONS

H.L.L. designed the research and wrote the first draft; H.L.L., E.W.J., T.C.D. analyzed data; H.L.L., P.W.W., W.B.S., J.C.K. conducted field research; J.A.G., B.D.P. provided funding and research support; all authors interpreted results and contributed to writing.

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FIGURE LEGENDS

Figure 1. Sampling localities and elevation, grouped by district. Colors correspond to elevation, and white numbers and size of points correspond to number of bats collected.

Figure 2. Alpha diversity of Exact Sequence Variants (ESVs) by anatomical sites, including (A) Observed richness, (B) Shannon index of diversity, (C) ESVs shared between anatomical sites. Asterisks indicate significant differences between groups (Dunn's Test, Bonferroni corrected p-value $p < 0.0001$).

Figure 3. Intraspecific variation across anatomical sites measured as beta dispersion of weighted UniFrac distances. Dotted lines indicate mean dispersion for anatomical groupings; numbers in parentheses indicate sample size per bat species. White and gray boxes correspond to the chiropteran suborders Yangochiroptera (microbats) and Yinpterochiroptera (fruits bats and kin), respectively.

Figure 4. (A) Relative abundance of top 6 bacterial phyla grouped by anatomical site, with each bar corresponding to individual libraries. (B) Relative abundance of the most prevelant eight bacterial families across all anatomical sites, grouped by bat family. Phylogeny based on Teeling et al. (61).

Figure 5. (A) Distribution of skin microbial network clusters for parasitized and non-parasitized bats, grouped by bat family (* indicates signifiance at $p < 0.005$, Kruskal-

Wallis) (B) Visualization of skin bacterial networks (based on Fruchterman-Reingold algorithm); colored nodes correspond to unique clusters of co-occurring ESVs within each network.

Figure 6. Log2fold change in relative abundance of skin-associated ESVs from the four most-sampled bat families. ESVs shown were found to be significantly associated with ectoparasite status in bats based on analysis of negative binomial distributions of relative abundance (Banjamini-Hochberg FDR corrected p-value $p < 0.05$). Positive values correspond to ESVs found to be enriched on parasitized bats, and negative values correspond to ESVs found to be enriched on non-parasitized bats. Gray bars highlight ESVs in bacterial families that were enriched in parasitized bats for three out of four bat families.

Table 1. Bat sampling, ectoparasite prevalence (n_{ecto}), and malarial parasite prevalence (n_{haem}) and identification.

Bat family	Bat species	n_{bats}	n_{ecto} (%)	n_{haem} (%)
Emballonuridae	*Coleura afra*	11	2 (18)	0
Hipposideridae	*Hipposideros caffer*	47	18 (38)	0
	Hipposideros camerunensis	2	0	0
	Hipposideros ruber	21	16 (76)	0
	Macronycteris vittatus	10	0	0
Miniopteridae	*Miniopterus africanus*	22	13 (59)	11 (50)
	Miniopterus natalensis	54	16 (30)	13 (24)
	Miniopterus rufus	22	20 (61)	20 (91)
	Miniopterus minor	18	16 (89)	12 (67)
Molossidae	*Chaerephon bivittatus*	14	0	0
	Otomops harrisoni	33	1 (3)	0
Nycteridae	*Nycteris arge*	3	0	0
	Nycteris thebaica	7	1 (14)	0
	Nycteris sp.	6	0	0
Pteropodidae	*Epomophorus labiatus*	2	0	0
	Epomophorus wahlbergi	11	0	3 (27)
	Micropteropus pusillus	4	0	0
	Myonycteris angolensis	4	0	0
	Rousettus aegyptiacus	48	24 (50)	0
	Stenonycteris lanosus	37	23 (62)	0
Rhinolophidae	*Rhinolophus clivosus*	43	8 (19)	0
	Rhinolophus eloquens	24	19 (79)	0
	Rhinolophus hildebrandti	4	1 (25)	0
	Rhinolophus landeri	14	0	3 (21)
	Rhinolophus sp.	3	0	
Rhinonycteridae	*Triaenops afer*	10	6 (60)	0
Vespertilionidae	*Myotis tricolor*	9	8 (89)	3 (33)
	Neoromicia nana	1	0	0
	Neoromicia sp.	3	0	
	Pipistrellus sp.	1	0	0
	Scotoecus hindei	4	1 (25)	0
	Scotophilus dingani	3	0	0
Total		495	193	65

Table 2. Alpha diversity of microbial communities across anatomical sites within each host genus, measured by Shannon Index of diversity (S-I) and observed sOTU richness (obs); n corresponds to number of libraries included in each calculation (following quality filtering).

			Fecal			Oral			Skin	
Host Family	Host Genus	S-I	obs	n_{fecal}	S-I	obs	n_{oral}	S-I	obs	n_{skin}
Emballonuridae	*Chaerephon*	1.16	52	12	1.39	57	14	3.57	547	14
Hipposideridae	*Hipposideros*	1.70	79	65	2.01	155	52	4.95	439	74
	Macronycteris	1.82	74	9	2.12	110	9	4.94	883	7
Miniopteridae	*Miniopterus*	1.41	70	92	1.55	87	74	4.12	403	114
Molossidae	*Coleura*	1.59	52	11	0.38	41	11	4.01	566	11
	Otomops	0.88	53	26	0.35	22	26	3.88	288	33
Nycteridae	*Nycteris*	1.60	80	10	1.62	78	14	4.48	807	14
Pteropodidae	*Epomophorus*	1.44	49	11	1.42	46	11	3.78	566	13
	Micropteropus	1.90	39	3	2.21	39	4	2.30	84	3
	Myonycteris	1.14	117	4	1.29	195	5	5.21	1246	4
	Rousettus	1.62	93	32	1.95	84	34	4.90	1207	34
	Stenonycteris	1.55	61	41	1.72	97	38	4.59	855	33
Rhinolophidae	*Rhinolophus*	1.34	62	58	1.95	81	59	4.71	543	79
Rhinonycteridae	*Triaenops*	1.69	82	9	1.28	414	9	4.03	508	10
Vespertilionidae	*Myotis*	1.62	54	1	1.33	72	6	5.41	771	3
	Neoromicia	2.13	65	4	1.47	37	4	3.76	267	4
	Pipistrellus	1.05	NA	1	NA	NA	0	4.80	360	2
	Scotoecus	1.86	92	4	1.97	17	3	4.20	360	4
	Scotophilus	1.23	64	3	0.38	96	1	4.08	459	2
				n_{fecal}			n_{orall}			n_{skin}
Mean		1.51	69	396	1.47	96	375	4.30	587	458

Table 3. Nonparametric permutational multivariate analysis of variance using distance matrices (via ADONIS), with distance matrices among sources of variation partitioned by host taxonomy (species nested within genus), ectoparasite status, malarial infection status, and locality included as strata to constrain permutation across this variable; * indicates p-value < 0.05.

		Weighted UniFrac			Unweighted UniFrac			Bray-Curtis		
Site	Partition Variable	F	R2	Pr(>F)	F	R2	Pr(>F)	F	R2	Pr(>F)
Fecal	(Host genus (species))	4.27	0.162	0.001*	3.15	0.120	0.001*	2.89	0.110	0.001*
	Ectoparasite status	0.47	0.001	0.912	1.42	0.004	0.048*	1.40	0.004	0.097
	Malarial status	1.34	0.004	0.21	1.33	0.004	0.077	1.98	0.005	0.011*
Oral	(Host genus (species))	6.82	0.279	0.001*	3.50	0.143	0.001*	6.69	0.274	0.001*
	Ectoparasite status	0.51	0.001	0.836	1.41	0.004	0.057	1.00	0.003	0.447
	Malarial status	2.78	0.008	0.015*	1.17	0.003	0.2	1.98	0.006	0.019*
Skin	(Host genus (species))	7.68	0.329	0.001*	3.98	0.170	0.001*	5.60	0.240	0.001*
	Ectoparasite status	2.42	0.006	0.01*	1.54	0.004	0.02*	2.07	0.005	0.001*
	Malarial status	0.92	0.002	0.513	1.02	0.002	0.363	1.06	0.003	0.32

Table 4. Permutational multivariate analysis of variance using distance matrices, with distance matrices among sources of variation partitioned by host taxonomy (species nested within genus), locality, and anatomical site.

	Weighted UniFrac			Unweighted UniFrac			Bray-Curtis		
Partition Variable	SumSq	F	Pr(>F)	SumSq	F	Pr(>F)	SumSq	F	Pr(>F)
Anatomical site	10.67	198.01	0.001*	56.52	82.90	0.001*	38.2	36.97	0.001*
Host Genus	3.77	13.09	0.001*	25.54	7.02	0.001*	85.30	15.06	0.001*
Locality	1.56	11.00	0.001*	20.62	11.34	0.001*	23.85	8.42	0.001*
Host Genus:species	1.39	4.08	0.001*	11.20	2.59	0.001*	25.25	1.33	0.001*

Table 5. Supervised machine learning results, showing random forest model performance with respect to different classification variables and input data sets (fecal, oral, skin microbiome). Model performance is assessed by measuring the ratio of Out-of-bag estimated error (OOB) to baseline error.

Classification variable	Input Data	Baseline error	OOB error	Baseline:OOB
Anatomical site	All data	0.68	0.14	4.8
Host Genus	Skin	0.75	0.17	4.3
Host Genus	Oral	0.78	0.24	3.2
Host Genus	Gut	0.77	0.35	2.2
Ectoparasite Status	Skin	0.53	0.27	2.0
Malarial Status (Miniopteridae only)	Oral	0.46	0.38	1.2

FIGURE 1

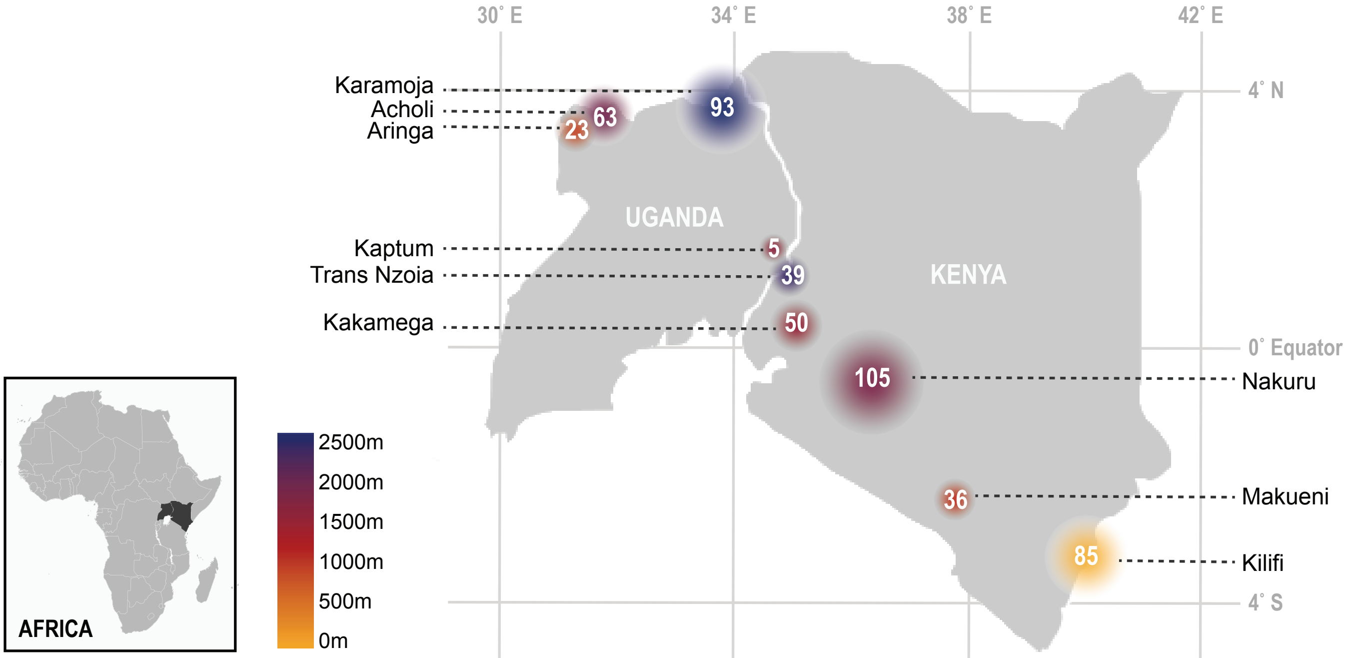
30° E
34° E
38° E
42° E
4° N
0° Equator
4° S
Karamoja
Acholi
Aringa
Kaptum
Trans Nzoia
Kakamega
Nakuru
Makueni
Kilifi
93
63
23
5
39
50
105
36
85
UGANDA
KENYA
AFRICA
2500m
2000m
1500m
1000m
500m
0m

FIGURE 2

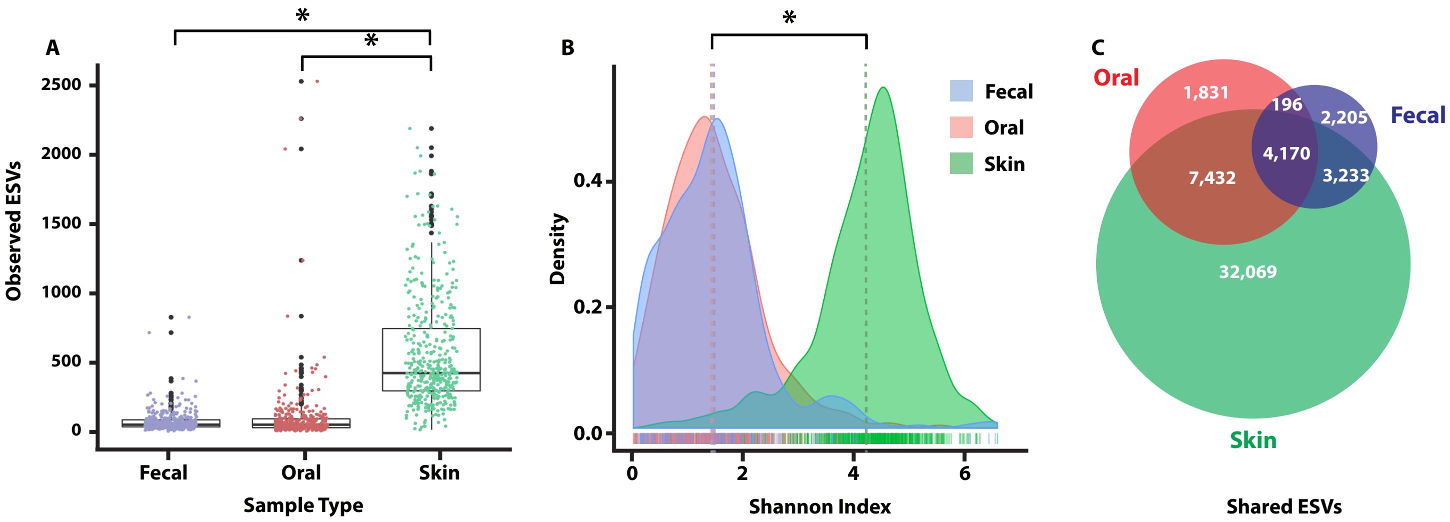
A
*
*
Observed ESVs
2500
2000
1500
1000
500
0
Fecal
Oral
Skin
Sample Type
B
*
Density
0.4
0.2
0.0
0
2
4
6
Shannon Index
Fecal
Oral
Skin
C
Oral
Fecal
Skin
1,831
196
2,205
4,170
7,432
3,233
32,069
Shared ESVs

FIGURE 3

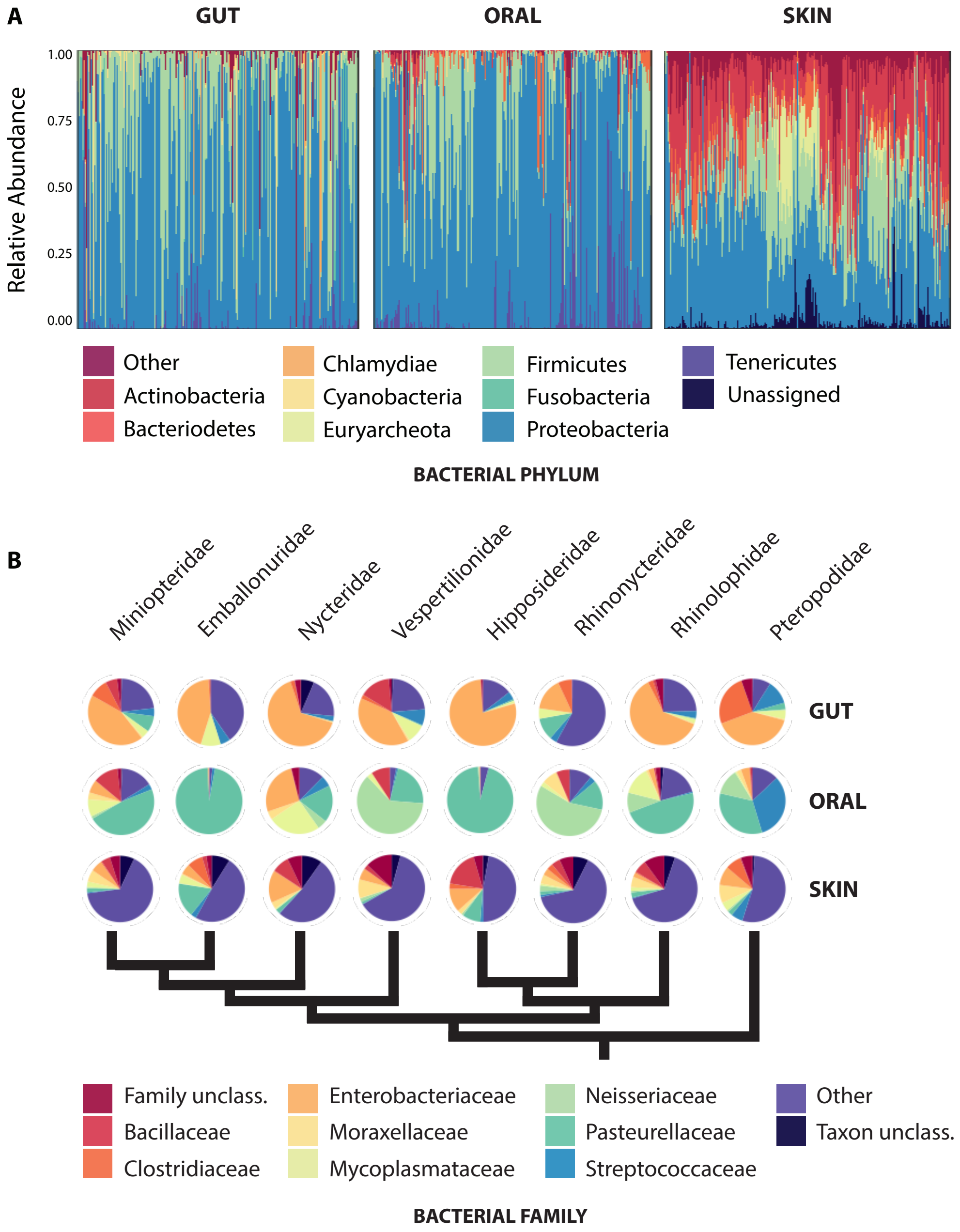
A
GUT
ORAL
SKIN
Relative Abundance
1.00
0.75
0.50
0.25
0.00
Other
Actinobacteria
Bacteriodetes
Chlamydiae
Cyanobacteria
Euryarcheota
Firmicutes
Fusobacteria
Proteobacteria
Tenericutes
Unassigned
BACTERIAL PHYLUM
B
Miniopteridae
Emballonuridae
Nycteridae
Vespertilionidae
Hipposideridae
Rhinonycteridae
Rhinolophidae
Pteropodidae
GUT
ORAL
SKIN
Family unclass.
Bacillaceae
Clostridiaceae
Enterobacteriaceae
Moraxellaceae
Mycoplasmataceae
Neisseriaceae
Pasteurellaceae
Streptococcaceae
Other
Taxon unclass.
BACTERIAL FAMILY

FIGURE 4

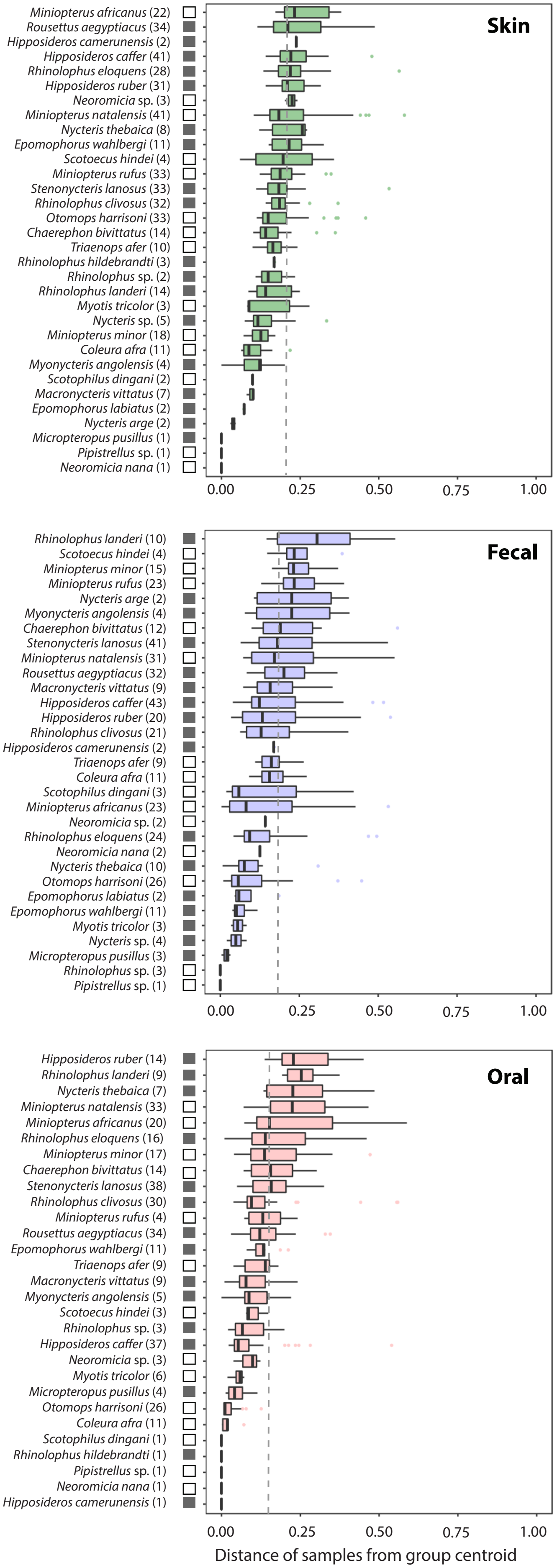
Skin
Miniopterus africanus (22)
Rousettus aegyptiacus (34)
Hipposideros camerunensis (2)
Hipposideros caffer (41)
Rhinolophus eloquens (28)
Hipposideros ruber (31)
Neoromicia sp. (3)
Miniopterus natalensis (41)
Nycteris thebaica (8)
Epomophorus wahlbergi (11)
Scotoecus hindei (4)
Miniopterus rufus (33)
Stenonycteris lanosus (33)
Rhinolophus clivosus (32)
Otomops harrisoni (33)
Chaerephon bivittatus (14)
Triaenops afer (10)
Rhinolophus hildebrandti (3)
Rhinolophus sp. (2)
Rhinolophus landeri (14)
Myotis tricolor (3)
Nycteris sp. (5)
Miniopterus minor (18)
Coleura afra (11)
Myonycteris angolensis (4)
Scotophilus dingani (2)
Macronycteris vittatus (7)
Epomophorus labiatus (2)
Nycteris arge (2)
Micropteropus pusillus (1)
Pipistrellus sp. (1)
Neoromicia nana (1)
0.00
0.25
0.50
0.75
1.00
Fecal
Rhinolophus landeri (10)
Scotoecus hindei (4)
Miniopterus minor (15)
Miniopterus rufus (23)
Nycteris arge (2)
Myonycteris angolensis (4)
Chaerephon bivittatus (12)
Stenonycteris lanosus (41)
Miniopterus natalensis (31)
Rousettus aegyptiacus (32)
Macronycteris vittatus (9)
Hipposideros caffer (43)
Hipposideros ruber (20)
Rhinolophus clivosus (21)
Hipposideros camerunensis (2)
Triaenops afer (9)
Coleura afra (11)
Scotophilus dingani (3)
Miniopterus africanus (23)
Neoromicia sp. (2)
Rhinolophus eloquens (24)
Neoromicia nana (2)
Nycteris thebaica (10)
Otomops harrisoni (26)
Epomophorus labiatus (2)
Epomophorus wahlbergi (11)
Myotis tricolor (3)
Nycteris sp. (4)
Micropteropus pusillus (3)
Rhinolophus sp. (3)
Pipistrellus sp. (1)
0.00
0.25
0.50
0.75
1.00
Oral
Hipposideros ruber (14)
Rhinolophus landeri (9)
Nycteris thebaica (7)
Miniopterus natalensis (33)
Miniopterus africanus (20)
Rhinolophus eloquens (16)
Miniopterus minor (17)
Chaerephon bivittatus (14)
Stenonycteris lanosus (38)
Rhinolophus clivosus (30)
Miniopterus rufus (4)
Rousettus aegyptiacus (34)
Epomophorus wahlbergi (11)
Triaenops afer (9)
Macronycteris vittatus (9)
Myonycteris angolensis (5)
Scotoecus hindei (3)
Rhinolophus sp. (3)
Hipposideros caffer (37)
Neoromicia sp. (3)
Myotis tricolor (6)
Micropteropus pusillus (4)
Otomops harrisoni (26)
Coleura afra (11)
Scotophilus dingani (1)
Rhinolophus hildebrandti (1)
Pipistrellus sp. (1)
Neoromicia nana (1)
Hipposideros camerunensis (1)
0.00
0.25
0.50
0.75
1.00
Distance of samples from group centroid

FIGURE 5

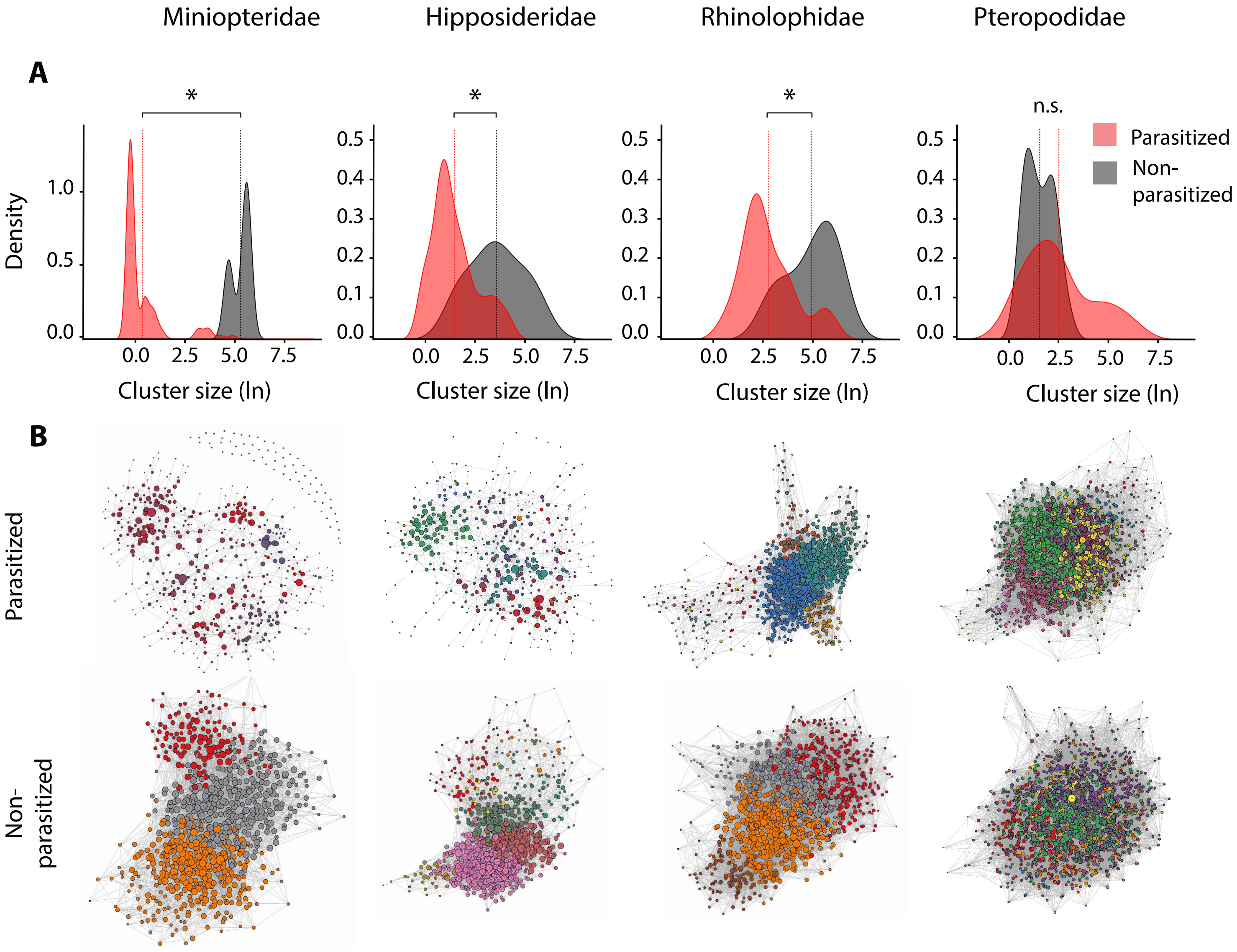
Miniopteridae
Hipposideridae
Rhinolophidae
Pteropodidae
A
*
*
*
n.s.
Density
0.0
0.5
1.0
0.1
0.2
0.3
0.4
0.5
0.0
2.5
5.0
7.5
Cluster size (ln)
Parasitized
Non-parasitized
B
Parasitized
Non-parasitized

FIGURE 6

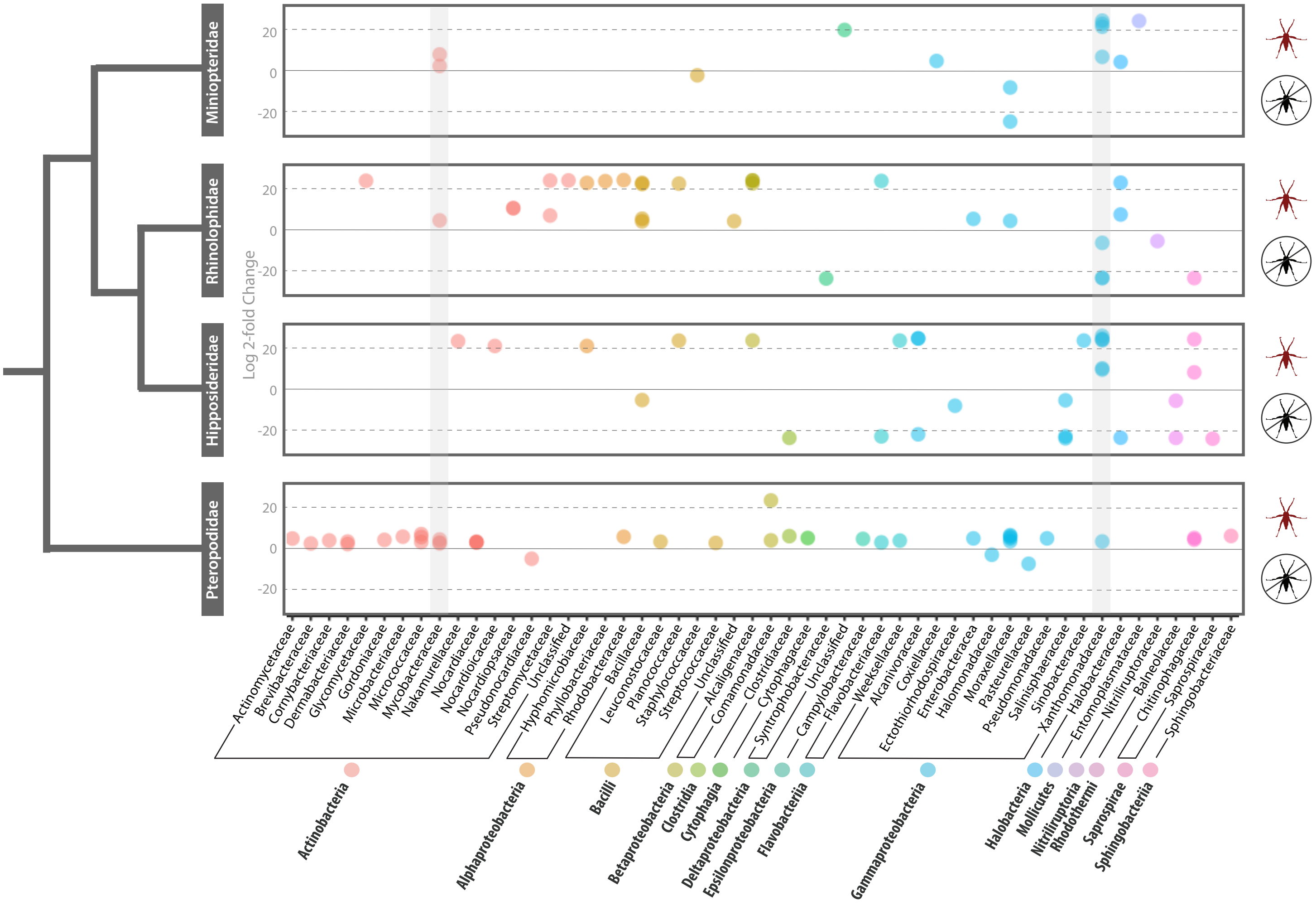
Miniopteridae
Rhinolophidae
Hipposideridae
Pteropodidae
Log 2-fold Change
20
0
-20
Actinomycetaceae
Brevibacteriaceae
Cornybacteriaceae
Dermabacteriaceae
Glycomycetaceae
Gordoniaceae
Microbacteriaceae
Micrococcaceae
Mycobacteriaceae
Nakamurellaceae
Nocardiaceae
Nocardioidaceae
Nocardiopsaceae
Pseudonocardiaceae
Streptomycetaceae
Unclassified
Hyphomicrobiaceae
Phyllobacteriaceae
Rhodobacteraceae
Bacillaceae
Leuconostocaceae
Planococcaceae
Staphylococcaceae
Streptococcaceae
Unclassified
Alcaligenaceae
Comamonadaceae
Clostridiaceae
Cytophagaceae
Syntrophobacteraceae
Unclassified
Campylobacteraceae
Flavobacteriaceae
Weeksellaceae
Alcanivoraceae
Coxiellaceae
Ectothiorhodospiraceae
Enterobacteracea
Halomonadaceae
Moraxellaceae
Pasteurellaceae
Pseudomonadaceae
Salinisphaeraceae
Sinobacteraceae
Xanthomonadaceae
Halobacteraceae
Entomoplasmataceae
Nitriliruptoraceae
Balneolaceae
Chitinophagaceae
Saprospiraceae
Sphingobacteriaceae
Actinobacteria
Alphaproteobacteria
Bacilli
Betaproteobacteria
Clostridia
Cytophagia
Deltaproteobacteria
Epsilonproteobacteria
Flavobacteriia
Gammaproteobacteria
Halobacteria
Mollicutes
Nitriliruptoria
Rhodothermi
Saprospirae
Sphingobacteriia

Figure S1. Meausres of intraspecific beta dispersion among (A) unweighted UniFrac and (B) Bray-Curtis distances. Dotted gray line indicates mean beta dispersion for each anatomical group and dissimilarity measure.

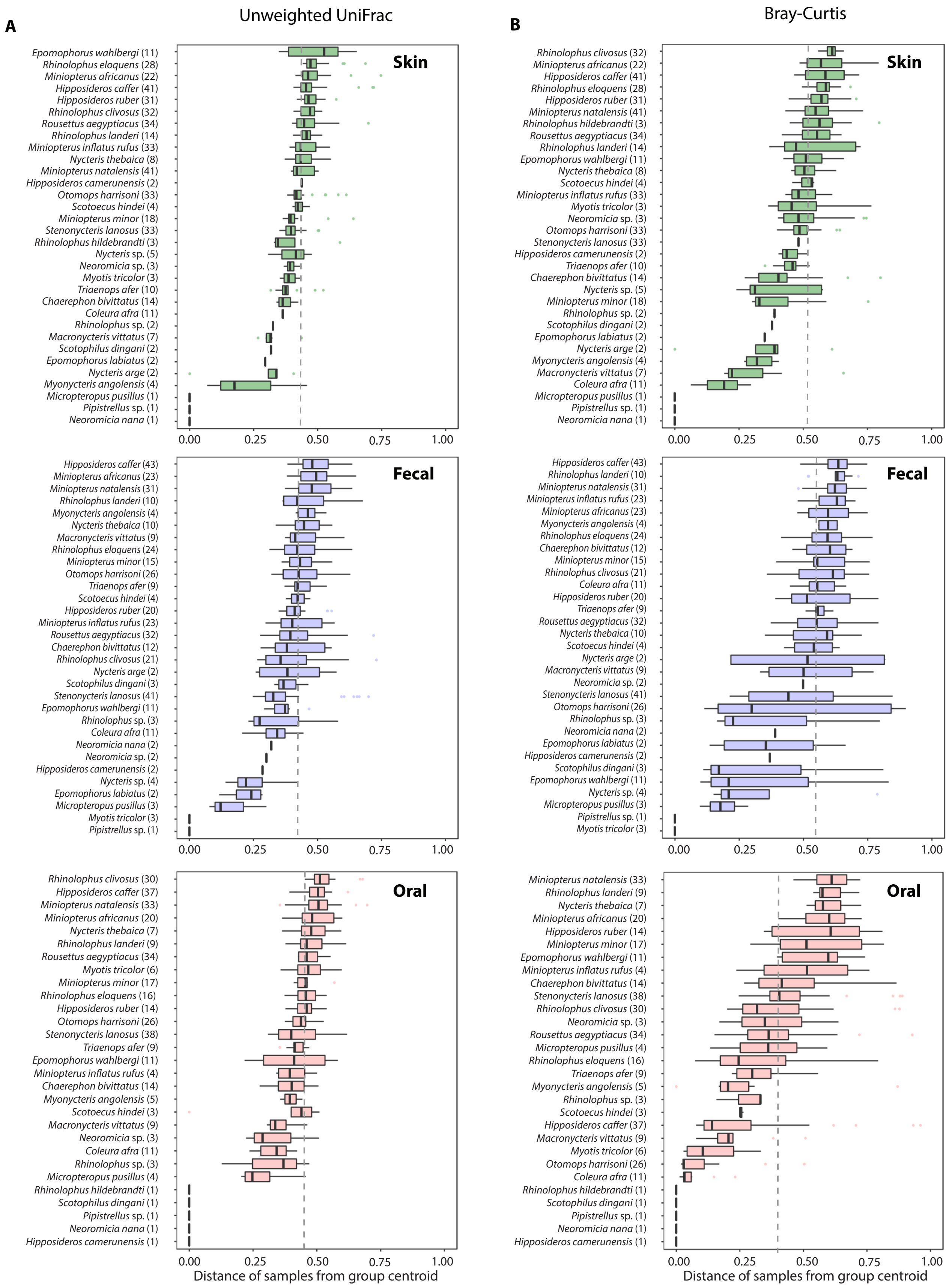

Figure S2. Linear regression of (A) Shannon diveristy and (B) observed ESV richness of gut, oral, and skin microbiomes against elevation from which host was sampled (~0 - 2500 meters above sea level). R^2 and significance values are provided within each plot.

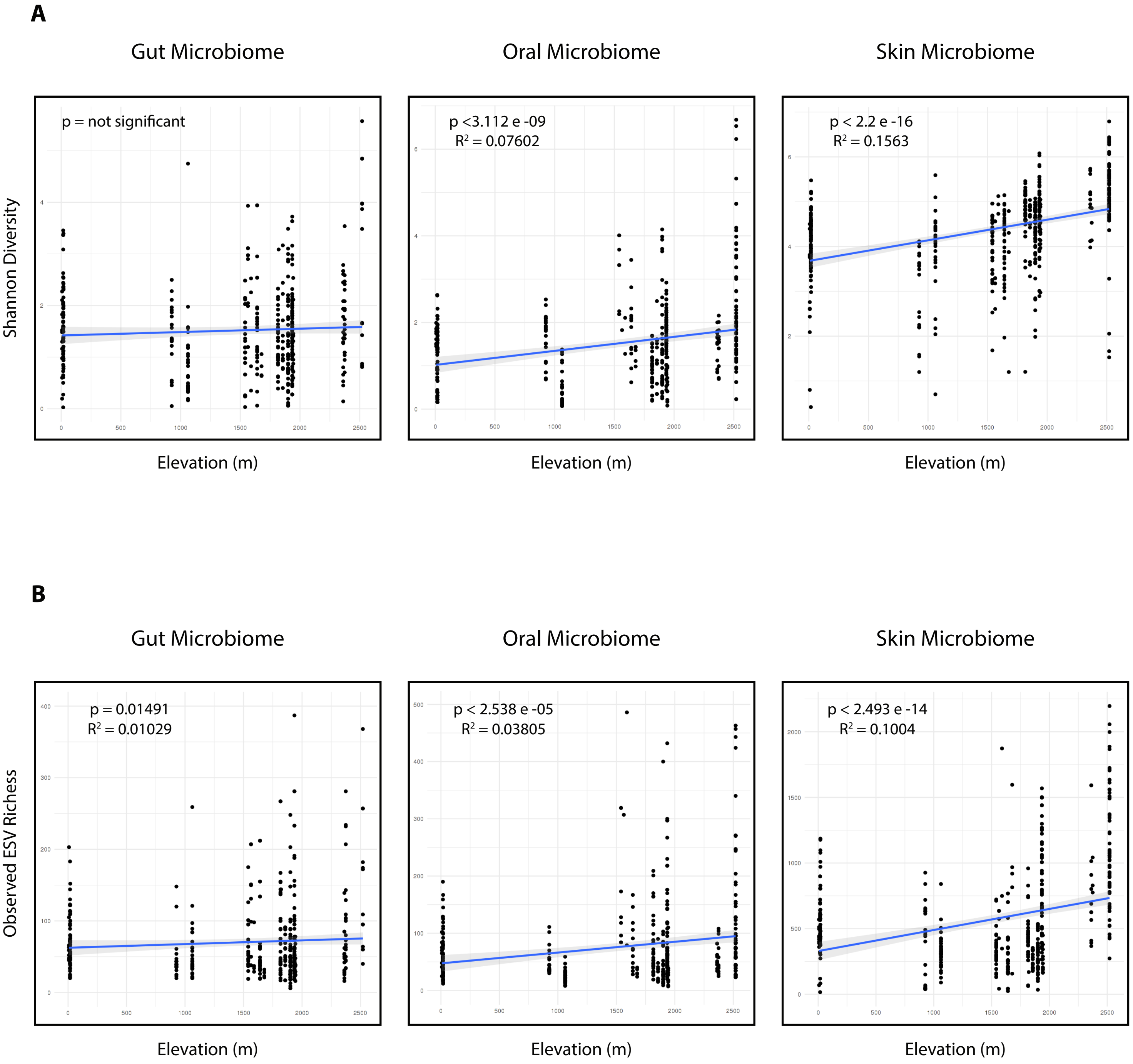

Figure S3.A Linear regression of patristic distances between microbial community dissimilarity (unweighted and weighted UniFrac) and phylogenetic distances between individual bat species sampled in this study.

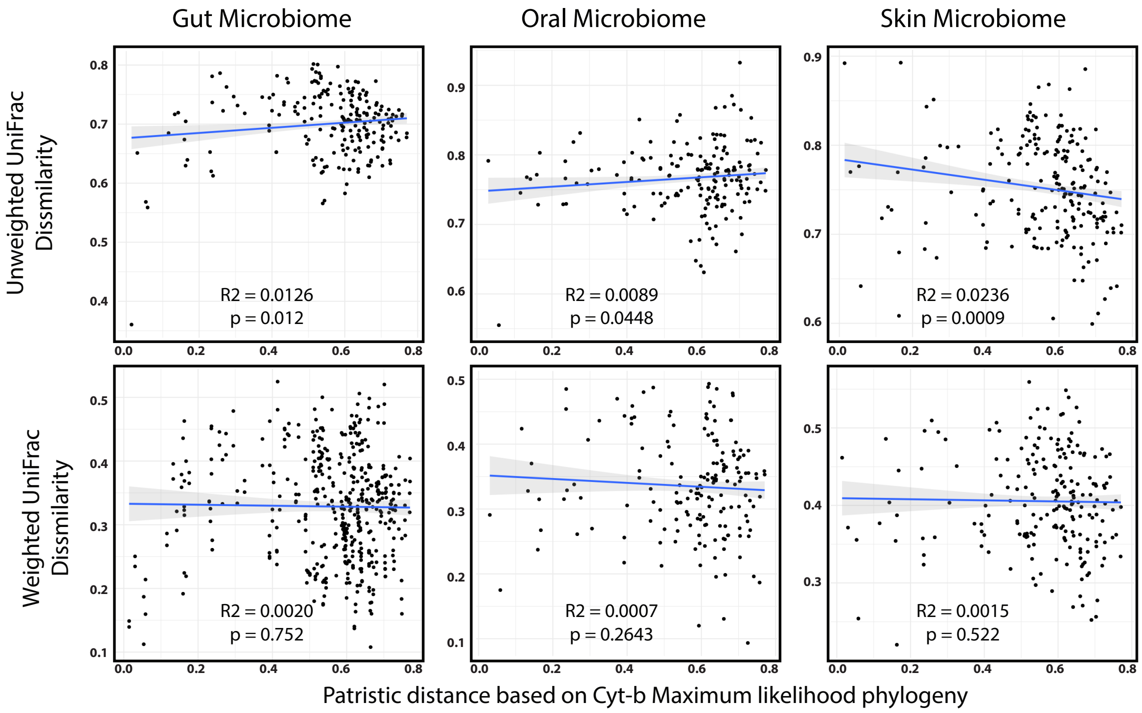

Figure S3.B Maximum likelihood phylogeny of bat species. Phylogenetic distances were calculated as patristic distances based on maximum likelihood reconstruction of bat species-level phylogeny with 1000 bootstrap (bs) replicates. Closed circles > 95% bs support, open black circles > 90% bs support, open gray circles >75% bs support.

Methods: DNA was extracted from pectoral muscle tissue of bat specimens, and sequenced for mitochondrial Cytochrome-b (cyt-b) using the primer pair LGL 765F and LGL 766R to amplify the entire cyt-b gene (1, 2). PCR amplification and sequencing were carried out as in Demos et al. (3).The best-supported model of nucleotide substitution for cyt-b was determined using the BIC on the maximum-likelihood topology estimated independently for each model in jMODELTEST2 (4) on CIPRES Science Gateway v.3.1 (5). Maximum-likelihood estimates of cyt-b gene trees and concatenated gene trees were made using the program RAxML-HPC v.8 (6) on the CIPRES portal. We conducted analyses using the rapid bootstrapping algorithm and searched for best-scoring ML tree algorithm under the GTRGAMMA model with 1000 bootstrap replicates (references listed on next page).

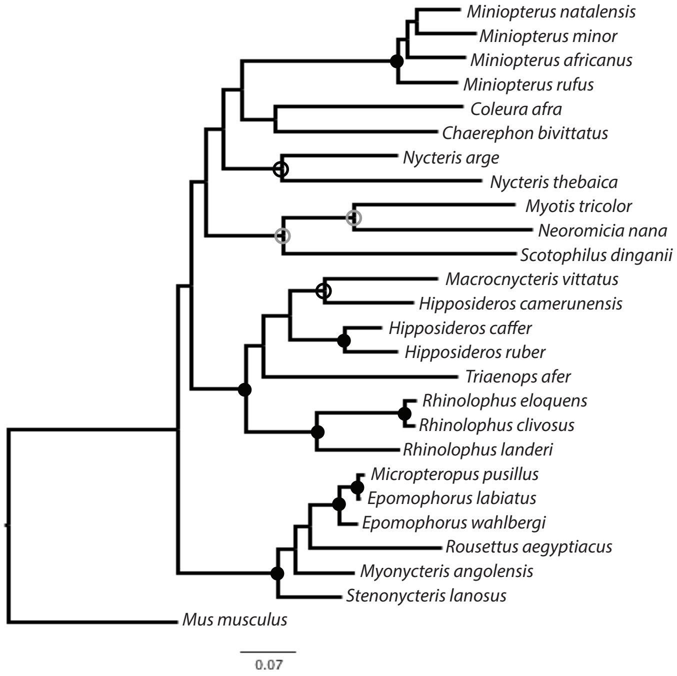

Figure S4. Network Analyses - (A) Node degree dsitribution of parasitized and non-parasitized bats, grouped by family. (B) Network fragility plots, showing natural network connectivity with sequential removal of nodes ordered by betweenness and degree.

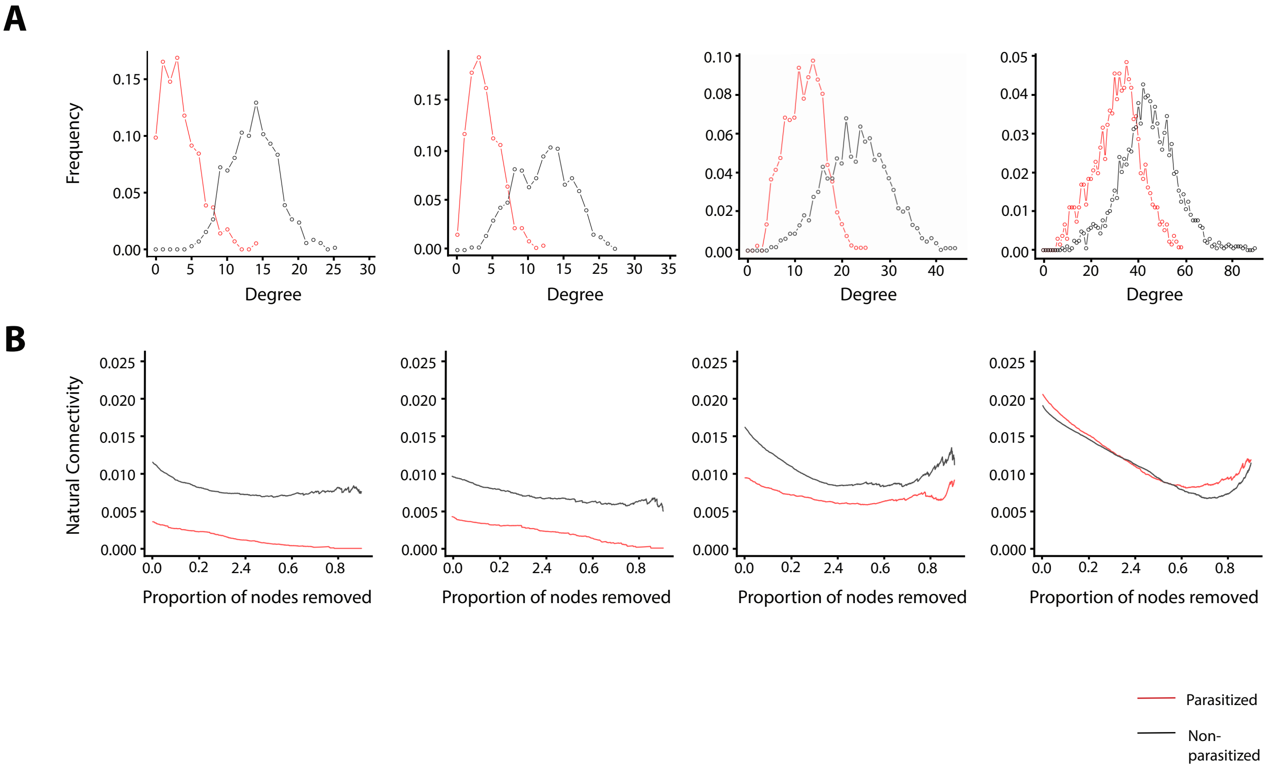

Table S1. Full sampling locality data. Loc_name corresponds to map labels in main text, Figure 1.

Loc_name	Country	County	Specific locality	GPS Coordinates	Elevation (m)
Acholi	Uganda	Acholi	Agoro-Agu Forest Reserve	N 3.81039 E32.92264	1935
Aringa	Uganda	Aringa	Aringa Bridge	N 3.71665 E 32.89481	926
Chyulu	Kenya	Makueni	Guano cave 3, Chyulu Hills National Park	S 02.33952 E 037.70911	1062
Lirhanda	Kenya	Kakamega	Lirhanda cave, Kakamega Forest	N 00.21176 E 034.89856	1540
Buzambuli	Kenya	Kakamega	Buzambuli Trail 3, Kakamega Forest National Reserve	N 00.34375 E 034.85660	1564
Ikhondo	Kenya	Kakamega	Ikhondo Junction, Kakamega Forest National Reserve	N 00.35293 E 034.86720	1590
Buyangu	Kenya	Kakamega	Buyangu KWS HQ, Kakamega Forest National Reserve	N 00.35500 E 034.86567	1618
Mahiakalo	Kenya	Kakamega	Mahiakalo cave, Kakamega Forest	N 00.24454 E 034.90688	1641
Kaptum	Uganda	Kaptum	Kaptum Cave	N 1.4474 E 34.5769	1678
Karamoja	Uganda	Karamoja	Mount Morungole	N 03.81083 E 34.02931	2520
Watamu	Kenya	Kilifi	Watamu cave, Gede	S 03.35109 E 040.01544	8
Makuruhu	Kenya	Kilifi	Makuruhu cave, Gede	S 03.32319 E 040.04153	17
Kaboga	Kenya	Kilifi	Kaboga cave, Gede	S 03.33452 E 040.03074	19
Kitum	Kenya	Trans Nzoia	Kitum cave, Mount Elgon National Park	N 01.02937 E 034.75580	2362
Makingeny	Kenya	Trans Nzoia	Makingeny cave, Mount Elgon National Park	N 01.03553 E 034.75305	2374
Lionhill	Kenya	Nakuru	Lion Hill cave, Lake Nakuru National Park	S 00.34589 E 036.11918	1816
Soysambu	Kenya	Nakuru	Monkey Bridge campsite, Soysambu Conservancy	S 00.39227 E 036.21117	1821
Kariandusi	Kenya	Nakuru	Kariandusi mines, Gilgil	S 00.45143 E 036.28194	1856
Diatomite	Kenya	Nakuru	Diatomite cave, Gilgil	S 00.43010 E 036.17368	1900
Pipeline	Kenya	Nakuru	Pipeline cave, Gilgil	S 00.53911 E036.29431	1943

Table S2. Host voucher information, biological and locality data, and ectoparasite and haemosporidian associations

FMNH_CatalogID	FieldID	Order	Family	Genus	Species	Sex	Loc_name	Country	Specific_Locality	Elevation	Day	Month	Year	Haemosporidia_status	Haemosporidia_ID	Ecto_status	Ecto_family	Ecto_ID
FMNH234186	PWW.3427	Chiroptera	Emballonuridae	Coleura	afra	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234181	PWW.3410	Chiroptera	Emballonuridae	Coleura	afra	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH234182	PWW.3411	Chiroptera	Emballonuridae	Coleura	afra	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH234177	PWW.3405	Chiroptera	Emballonuridae	Coleura	afra	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Polyctenidae	Polyctenidae
FMNH234183	PWW.3412	Chiroptera	Emballonuridae	Coleura	afra	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Polyctenidae	Polyctenidae
FMNH234178	PWW.3407	Chiroptera	Emballonuridae	Coleura	afra	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH234180	PWW.3409	Chiroptera	Emballonuridae	Coleura	afra	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH234184	PWW.3413	Chiroptera	Emballonuridae	Coleura	afra	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH234185	PWW.3414	Chiroptera	Emballonuridae	Coleura	afra	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH234187	PWW.3406	Chiroptera	Emballonuridae	Coleura	afra	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Macronyssidae	Macronyssidae
FMNH234179	PWW.3408	Chiroptera	Emballonuridae	Coleura	afra	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Polyctenidae	Eoctenes nycteridis
FMNH232108	JCK.9910	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Karamoja	Uganda	Mount Morungole	2520	24	7	2016	0	0	0	0	0
FMNH233998	PWW.3519	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH233999	PWW.3520	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234006	PWW.3527	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234007	PWW.3528	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234008	PWW.3529	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234011	PWW.3532	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234000	PWW.3521	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Nycteribiidae	Penicillidia pachymela
FMNH234002	PWW.3523	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Nycteribiidae	Penicillidia pachymela
FMNH234003	PWW.3524	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Nycteribiidae	Penicillidia pachymela
FMNH234005	PWW.3526	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Nycteribiidae	Penicillidia pachymela
FMNH234009	PWW.3530	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Nycteribiidae	Penicillidia pachymela
FMNH234010	PWW.3531	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234001	PWW.3522	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234004	PWW.3525	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Nycteribiidae	Penicillidia pachymela
FMNH234013	PWW.3604	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	0	0	0
FMNH234012	PWW.3603	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234015	PWW.3606	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234016	PWW.3608	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234017	PWW.3609	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234018	PWW.3610	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234019	PWW.3611	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234014	PWW.3605	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234020	PWW.3612	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234021	PWW.3613	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH233976	PWW.3396	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH233977	PWW.3397	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH233978	PWW.3398	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH233979	PWW.3399	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH233982	PWW.3402	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH233983	PWW.3403	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH233984	PWW.3404	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH233975	PWW.3395	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. 9	0	0	0
FMNH233980	PWW.3400	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH233981	PWW.3401	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH233989	PWW.3509	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233991	PWW.3511	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233993	PWW.3513	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233996	PWW.3516	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233997	PWW.3517	Chiroptera	Hipposideridae	Hipposideros	caffer	F	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233986	PWW.3506	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233987	PWW.3507	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233990	PWW.3510	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233992	PWW.3512	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233995	PWW.3515	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	0	0	0
FMNH233988	PWW.3508	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	1	Argasidae	Argasidae
FMNH233994	PWW.3514	Chiroptera	Hipposideridae	Hipposideros	caffer	M	Nakuru	Kenya	Pipeline cave Gilgil	1943	26	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234025	PWW.3599	Chiroptera	Hipposideridae	Hipposideros	camerunensis	M	Kakamega	Kenya	Buzambuli Trail 3 Kakamega Forest National Reserve	1564	31	10	2016	0	0	0	0	0
FMNH234026	PWW.3614	Chiroptera	Hipposideridae	Hipposideros	camerunensis	F	Kakamega	Kenya	Buzambuli Trail 3 Kakamega Forest National Reserve	1564	31	10	2016	0	0	0	0	0
FMNH234058	PWW.3584	Chiroptera	Hipposideridae	Hipposideros	ruber	F	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234052	PWW.3578	Chiroptera	Hipposideridae	Hipposideros	ruber	F	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Trombiculidae	chigger
FMNH234056	PWW.3582	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Macronyssidae	Macronyssidae
FMNH234054	PWW.3580	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234055	PWW.3581	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234057	PWW.3583	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234059	PWW.3585	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234060	PWW.3586	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234061	PWW.3587	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234053	PWW.3579	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Trombiculidae	chigger
FMNH234044	PWW.3553	Chiroptera	Hipposideridae	Hipposideros	ruber	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	0	0	0
FMNH234041	PWW.3550	Chiroptera	Hipposideridae	Hipposideros	ruber	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234047	PWW.3556	Chiroptera	Hipposideridae	Hipposideros	ruber	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234048	PWW.3557	Chiroptera	Hipposideridae	Hipposideros	ruber	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	1	Streblidae	Raymondia sp.

FMNH234049	PWW.3558	Chiroptera	Hipposideridae	Hipposideros	ruber	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234050	PWW.3559	Chiroptera	Hipposideridae	Hipposideros	ruber	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234051	PWW.3560	Chiroptera	Hipposideridae	Hipposideros	ruber	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234042	PWW.3551	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	0	0	0
FMNH234046	PWW.3555	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	0	0	0
FMNH234043	PWW.3552	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234045	PWW.3554	Chiroptera	Hipposideridae	Hipposideros	ruber	M	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234064	PWW.3417	Chiroptera	Hipposideridae	Macronycteris	vittatus	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234062	PWW.3415	Chiroptera	Hipposideridae	Macronycteris	vittatus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234063	PWW.3416	Chiroptera	Hipposideridae	Macronycteris	vittatus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234065	PWW.3418	Chiroptera	Hipposideridae	Macronycteris	vittatus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234066	PWW.3419	Chiroptera	Hipposideridae	Macronycteris	vittatus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234067	PWW.3420	Chiroptera	Hipposideridae	Macronycteris	vittatus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234068	PWW.3421	Chiroptera	Hipposideridae	Macronycteris	vittatus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234069	PWW.3422	Chiroptera	Hipposideridae	Macronycteris	vittatus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234070	PWW.3423	Chiroptera	Hipposideridae	Macronycteris	vittatus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234071	PWW.3424	Chiroptera	Hipposideridae	Macronycteris	vittatus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234788	PWW.3492	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH234790	PWW.3494	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH234791	PWW.3495	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	0	0	0
FMNH234792	PWW.3497	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH234795	PWW.3500	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH234787	PWW.3491	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234793	PWW.3498	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH234794	PWW.3499	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Penicillidia fulvida
FMNH234785	PWW.3481	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	0	0	0
FMNH234797	PWW.3502	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	0	0	0
FMNH234789	PWW.3493	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. 9	1	flea	flea
FMNH234786	PWW.3487	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234796	PWW.3501	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Nycteribiidae	Penicillidia fulvida
FMNH234780	PWW.3431	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234778	PWW.3428	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	1	Polychromophilus sp. 9	0	Nycteribiidae	Nycteribia schmidlii
FMNH234779	PWW.3429	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234777	PWW.3426	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH234781	PWW.3437	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	1	Polychromophilus sp. P	0	Nycteribiidae	Nycteribia schmidlii
FMNH234782	PWW.3438	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	1	Polychromophilus sp. 9	0	Nycteribiidae	Nycteribia schmidlii
FMNH234783	PWW.3444	Chiroptera	Miniopteridae	Miniopterus	africanus	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH234784	PWW.3448	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234776	PWW.3386	Chiroptera	Miniopteridae	Miniopterus	africanus	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	Nycteribiidae	Nycteribia schmidlii
FMNH234898	PWW.3486	Chiroptera	Miniopteridae	Miniopterus	natalensis	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH234899	PWW.3488	Chiroptera	Miniopteridae	Miniopterus	natalensis	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH234901	PWW.3496	Chiroptera	Miniopteridae	Miniopterus	natalensis	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	0	0	0
FMNH234902	PWW.3503	Chiroptera	Miniopteridae	Miniopterus	natalensis	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234893	PWW.3480	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	0	0	0
FMNH234894	PWW.3482	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	0	0	0
FMNH234900	PWW.3489	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	0	0	0
FMNH234896	PWW.3484	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	flea	flea
FMNH234895	PWW.3483	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234897	PWW.3485	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH234903	PWW.3504	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	26	10	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH234904	PWW.3505	Chiroptera	Miniopteridae	Miniopterus	natalensis	NA	Nakuru	Kenya	Diatomite cave Gilgil	1900	26	10	2016	1	Polychromophilus sp. P	1	Argasidae	Argasidae
FMNH234889	PWW.3455	Chiroptera	Miniopteridae	Miniopterus	natalensis	F	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	0	0	0	0	0
FMNH234891	PWW.3457	Chiroptera	Miniopteridae	Miniopterus	natalensis	F	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	0	0	0	0	0
FMNH234883	PWW.3449	Chiroptera	Miniopteridae	Miniopterus	natalensis	F	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234888	PWW.3454	Chiroptera	Miniopteridae	Miniopterus	natalensis	F	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234890	PWW.3456	Chiroptera	Miniopteridae	Miniopterus	natalensis	F	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH234885	PWW.3451	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	1	Polychromophilus sp. P	0	0	0
FMNH234884	PWW.3450	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234886	PWW.3452	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234887	PWW.3453	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Penicillidia fulvida
FMNH234892	PWW.3458	Chiroptera	Miniopteridae	Miniopterus	natalensis	M	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH234812	PWW.3589	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	0	0	0
FMNH234813	PWW.3590	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	1	Polychromophilus sp. P	1	Macronyssidae	Macronyssidae
FMNH234820	PWW.3597	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234816	PWW.3593	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	1	Polychromophilus sp. P	1	0	0
FMNH234819	PWW.3596	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	1	Polycrhomophilus mel.	1	Argasidae	Argasidae
FMNH234818	PWW.3595	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	0	0	1	Ixodidae	Ixodidae
FMNH234811	PWW.3588	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234814	PWW.3591	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234815	PWW.3592	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234817	PWW.3594	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Lirhanda cave Kakamega Forest	1540	30	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234800	PWW.3562	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. P	0	0	0
FMNH234799	PWW.3561	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234801	PWW.3563	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234804	PWW.3566	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234805	PWW.3567	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234807	PWW.3569	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii

FMNH234808	PWW.3570	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polycrhomophilus mel.	1	Nycteribiidae	Nycteribia schmidlii
FMNH234809	PWW.3571	Chiroptera	Miniopteridae	Miniopterus	rufus	F	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234802	PWW.3564	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polycrhomophilus mel.	1	Nycteribiidae	Nycteribia schmidlii
FMNH234803	PWW.3565	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234806	PWW.3568	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234810	PWW.3572	Chiroptera	Miniopteridae	Miniopterus	rufus	M	Kakamega	Kenya	Mahiakalo cave Kakamega Forest	1641	29	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234837	PWW.3425	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	1	Polychromophilus sp. 9	0	0	0
FMNH234839	PWW.3433	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH234838	PWW.3432	Chiroptera	Miniopteridae	Miniopterus	minor	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	1	Polychromophilus sp. 9	0	Nycteribiidae	Nycteribia schmidlii
FMNH234822	PWW.3379	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234823	PWW.3380	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Penicillidia fulvida
FMNH234824	PWW.3381	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH234825	PWW.3382	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234828	PWW.3385	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	Nycteribiidae	Nycteribia schmidlii
FMNH234830	PWW.3388	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	Nycteribiidae	Nycteribia schmidlii
FMNH234832	PWW.3390	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234833	PWW.3391	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	Nycteribiidae	Nycteribia schmidlii
FMNH234834	PWW.3392	Chiroptera	Miniopteridae	Miniopterus	minor	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234831	PWW.3389	Chiroptera	Miniopteridae	Miniopterus	minor	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH234826	PWW.3383	Chiroptera	Miniopteridae	Miniopterus	minor	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234827	PWW.3384	Chiroptera	Miniopteridae	Miniopterus	minor	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. 9	0	Nycteribiidae	Nycteribia schmidlii
FMNH234829	PWW.3387	Chiroptera	Miniopteridae	Miniopterus	minor	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	Nycteribiidae	Nycteribia schmidlii
FMNH234835	PWW.3393	Chiroptera	Miniopteridae	Miniopterus	minor	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH234836	PWW.3394	Chiroptera	Miniopteridae	Miniopterus	minor	NA	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	Polychromophilus sp. 9	1	Nycteribiidae	Nycteribia schmidlii
FMNH232120	JCK.9906	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	23	7	2016	0	0	0	0	0
FMNH232123	JCK.10024	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	25	7	2016	0	0	0	0	0
FMNH232131	JCK.10134	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	28	7	2016	0	0	0	0	0
FMNH232132	JCK.10135	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	28	7	2016	0	0	0	0	0
FMNH232134	JCK.10137	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	28	7	2016	1	Polychromophilus sp. P	0	0	0
FMNH232141	JCK.10184	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	0	0
FMNH232142	JCK.10185	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	0	0
FMNH232146	JCK.10261	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	1	Polychromophilus sp. P	0	0	0
FMNH232148	JCK.10263	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	1	Polychromophilus sp. P	0	0	0
FMNH232124	JCK.10069	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	1	Polychromophilus sp. P	1	Hippoboscidae	Ascodipteron sp.
FMNH232139	JCK.10182	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	Hippoboscidae	Ascodipteron sp.
FMNH232122	JCK.10021	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	25	7	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH232135	JCK.10148	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH232140	JCK.10183	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	Nycteribiidae	Nycteribia schmidlii
FMNH232144	JCK.10254	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	0	0	0	Nycteribiidae	Nycteribia schmidlii
FMNH232145	JCK.10260	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH232151	JCK.10277	Chiroptera	Miniopteridae	Miniopterus	natalensis are	F	Karamoja	Uganda	Mount Morungole	2520	2	8	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH232126	JCK.10075	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	1	Polychromophilus sp. P	0	0	0
FMNH232129	JCK.10111	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	0	0
FMNH232130	JCK.10133	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	28	7	2016	0	0	0	0	0
FMNH232133	JCK.10136	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	28	7	2016	0	0	0	0	0
FMNH232138	JCK.10181	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	0	0
FMNH232147	JCK.10262	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	0	0	0	0	0
FMNH232150	JCK.10265	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	1	Polychromophilus sp. P	0	0	0
FMNH232125	JCK.10073	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	1	Polychromophilus sp. P	1	Argasidae	Argasidae
FMNH232121	JCK.9907	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	23	7	2016	0	0	0	Nycteribiidae	Penicillidia fulvida
FMNH232127	JCK.10109	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	1	Polychromophilus sp. P	0	Nycteribiidae	Nycteribia schmidlii
FMNH232128	JCK.10110	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	Nycteribiidae	Nycteribia schmidlii
FMNH232136	JCK.10149	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	1	Polychromophilus sp. P	1	Nycteribiidae	Nycteribia schmidlii
FMNH232137	JCK.10152	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	Nycteribiidae	Nycteribia schmidlii
FMNH232143	JCK.10228	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	31	7	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH232149	JCK.10264	Chiroptera	Miniopteridae	Miniopterus	natalensis are	M	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
No Voucher	BN.593X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	NA	Aringa Bridge	926	NA	NA	NA	NA	NA	NA	NA	NA
No Voucher	BN.594X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.595X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.596X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.597X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.598X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.599X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.600X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.601X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.602X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.603X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.604X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.605X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.606X	Chiroptera	Molossidae	Chaerephon	bivitattus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
FMNH234377	PWW.3326	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234378	PWW.3327	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234382	PWW.3331	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234383	PWW.3332	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234384	PWW.3333	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234385	PWW.3334	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234386	PWW.3335	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0

FMNH234388	PWW.3337	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234389	PWW.3338	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234390	PWW.3339	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234391	PWW.3340	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234392	PWW.3341	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234393	PWW.3342	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234394	PWW.3343	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234396	PWW.3345	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234397	PWW.3346	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234402	PWW.3351	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234376	PWW.3325	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	1	Argasidae	Argasidae
FMNH234374	PWW.3323	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	1	flea	flea
FMNH234380	PWW.3329	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	1	flea	flea
FMNH234379	PWW.3328	Chiroptera	Molossidae	Otomops	harrisoni	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	1	Polyctenidae	Hypoctenes cf. clarus
FMNH234375	PWW.3324	Chiroptera	Molossidae	Otomops	harrisoni	M	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234381	PWW.3330	Chiroptera	Molossidae	Otomops	harrisoni	M	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234395	PWW.3344	Chiroptera	Molossidae	Otomops	harrisoni	M	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234398	PWW.3347	Chiroptera	Molossidae	Otomops	harrisoni	M	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234404	PWW.3353	Chiroptera	Molossidae	Otomops	harrisoni	M	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234387	PWW.3336	Chiroptera	Molossidae	Otomops	harrisoni	M	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	1	Argasidae	Argasidae
FMNH234399	PWW.3348	Chiroptera	Molossidae	Otomops	harrisoni	M	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	1	Streblidae	Brachytarsina sp.
NA	PWW.3573	Chiroptera	Molossidae	Otomops	harrisoni	NA	Makueni	NA	Guano cave 3 Chyulu Hills National Park	1062	NA	NA	NA	0	0	0	0	0
NA	PWW.3574	Chiroptera	Molossidae	Otomops	harrisoni	NA	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
NA	PWW.3575	Chiroptera	Molossidae	Otomops	harrisoni	NA	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
NA	PWW.3576	Chiroptera	Molossidae	Otomops	harrisoni	NA	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
NA	PWW.3577	Chiroptera	Molossidae	Otomops	harrisoni	NA	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH232429	JCK.10290	Chiroptera	Nycteridae	Nycteris	arge	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	7	8	2016	0	0	0	0	0
FMNH232430	JCK.10328	Chiroptera	Nycteridae	Nycteris	arge	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	0	0
FMNH234191	PWW.3601	Chiroptera	Nycteridae	Nycteris	arge	F	Kakamega	Kenya	Buzambuli Trail 3 Kakamega Forest National Reserve	1564	31	10	2016	0	0	1	Polyctenidae	Eoctenes sp.
FMNH232109	JCK.10138	Chiroptera	Nycteridae	Nycteris	thebaica	M	Karamoja	Uganda	Mount Morungole	2520	28	7	2016	0	0	0	0	0
No Voucher	BN.616X	Chiroptera	Nycteridae	Nycteris	sp.	NA	Kaptum	Uganda	Kaptum Cave	1678	NA	NA	2016	0	0	0	0	0
No Voucher	BN.617X	Chiroptera	Nycteridae	Nycteris	sp.	NA	Kaptum	Uganda	Kaptum Cave	1678	NA	NA	2016	0	0	0	0	0
No Voucher	BN.618X	Chiroptera	Nycteridae	Nycteris	sp.	NA	Kaptum	Uganda	Kaptum Cave	1678	NA	NA	2016	0	0	0	0	0
No Voucher	BN.619X	Chiroptera	Nycteridae	Nycteris	sp.	NA	Kaptum	Uganda	Kaptum Cave	1678	NA	NA	2016	0	0	0	0	0
No Voucher	BN.620X	Chiroptera	Nycteridae	Nycteris	sp.	NA	Kaptum	Uganda	Kaptum Cave	1678	NA	NA	2016	0	0	0	0	0
FMNH232431	JCK.10335	Chiroptera	Nycteridae	Nycteris	sp.	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234210	PWW.3646	Chiroptera	Nycteridae	Nycteris	thebaica	M	Kakamega	Kenya	Buyangu KWS HQ Kakamega Forest National Reserve	1618	1	11	2016	0	0	0	0	0
FMNH234205	PWW.3533	Chiroptera	Nycteridae	Nycteris	thebaica	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234207	PWW.3535	Chiroptera	Nycteridae	Nycteris	thebaica	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234208	PWW.3536	Chiroptera	Nycteridae	Nycteris	thebaica	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234209	PWW.3537	Chiroptera	Nycteridae	Nycteris	thebaica	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH234206	PWW.3534	Chiroptera	Nycteridae	Nycteris	thebaica	M	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	0	0	0
FMNH232079	JCK.10032	Chiroptera	Pteropodidae	Epomophorus	labiatus	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	1	Hepatocystisi sp. HEP_	0	0	0
FMNH232080	JCK.10178	Chiroptera	Pteropodidae	Epomophorus	labiatus	NA	Karamoja	Uganda	Mount Morungole	2520	30	7	2016	0	0	0	0	0
No Voucher	BN.607X	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.608X	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.611X	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.613X	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.614X	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
FMNH232394	JCK.10329	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	1	Failed Seq	0	0	0
FMNH232395	JCK.10360	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	1	Hepatocystisi sp. HEP_	0	0	0
FMNH232396	JCK.10363	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	1	Hepatocystisi sp. HEP_	0	0	0
FMNH232398	JCK.10286	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	6	8	2016	0	0	0	0	0
FMNH232397	JCK.10382	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	0	0	0
FMNH233597	PWW.3442	Chiroptera	Pteropodidae	Epomophorus	wahlbergi	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
No Voucher	BN.609X	Chiroptera	Pteropodidae	Micropteropus	pusillus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.610X	Chiroptera	Pteropodidae	Micropteropus	pusillus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.612X	Chiroptera	Pteropodidae	Micropteropus	pusillus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
No Voucher	BN.615X	Chiroptera	Pteropodidae	Micropteropus	pusillus	NA	Aringa	Uganda	Aringa Bridge	926	NA	NA	2016	0	0	0	0	0
FMNH232427	JCK.10301	Chiroptera	Pteropodidae	Myonycteris	angolensis	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	0	0
FMNH232428	JCK.10302	Chiroptera	Pteropodidae	Myonycteris	angolensis	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	0	0
FMNH232426	JCK.10299	Chiroptera	Pteropodidae	Myonycteris	angolensis	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	Hippoboscidae	Dipseliopoda biannulata
FMNH233612	PWW.3615	Chiroptera	Pteropodidae	Myonycteris	angolensis	F	Kakamega	Kenya	Ikhondo Junction Kakamega Forest National Reserve	1590	1	11	2016	0	0	0	0	0
FMNH233625	PWW.3600	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Kakamega	Kenya	Buzambuli Trail 3 Kakamega Forest National Reserve	1564	31	10	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH233624	PWW.3430	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	1	Polychromophilus sp. 9	0	Nycteribiidae	Nycteribia schmidlii
FMNH232060	JCK.9911	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Karamoja	Uganda	Mount Morungole	2520	24	7	2016	0	0	0	0	0
FMNH232078	JCK.10258	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	0	0	1	flea	flea
FMNH232077	JCK.10257	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	0	0	0	Hippoboscidae	Ascodipteron sp. ?
FMNH232064	JCK.10034	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH232065	JCK.10035	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH232066	JCK.10036	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH232070	JCK.10087	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	Nycteribiidae	Eucampsipoda africana
FMNH232071	JCK.10140	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	Nycteribiidae	Eucampsipoda africana
FMNH232062	JCK.10023	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	0	0	0
FMNH232072	JCK.10141	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	0	0
FMNH232074	JCK.10176	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Karamoja	Uganda	Mount Morungole	2520	30	7	2016	0	0	0	0	0
FMNH232063	JCK.10033	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	flea	flea

FMNH232061	JCK.10020	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH232068	JCK.10070	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH232069	JCK.10086	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	Nycteribiidae	Eucampsipoda africana
FMNH232073	JCK.10175	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Karamoja	Uganda	Mount Morungole	2520	30	7	2016	0	0	0	Nycteribiidae	Eucampsipoda africana
FMNH232076	JCK.10256	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	0	0	0	Nycteribiidae	Eucampsipoda africana
FMNH232075	JCK.10177	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	NA	Karamoja	Uganda	Mount Morungole	2520	30	7	2016	0	0	0	0	0
FMNH232067	JCK.10037	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	NA	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233627	PWW.3628	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	flea	flea
FMNH233628	PWW.3629	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233626	PWW.3627	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	flea	flea
FMNH233629	PWW.3630	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	flea	flea
FMNH233630	PWW.3631	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233631	PWW.3632	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233638	PWW.3639	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	0	0	0
FMNH233639	PWW.3640	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	0	0	0
FMNH233632	PWW.3633	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233633	PWW.3634	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233634	PWW.3635	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233635	PWW.3636	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233636	PWW.3637	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233637	PWW.3638	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233640	PWW.3641	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233641	PWW.3642	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Trans Nzoia	Kenya	Makingeny cave Mount Elgon National Park	2374	31	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233616	PWW.3361	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	0	0
FMNH233617	PWW.3362	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	0	0
FMNH233620	PWW.3365	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	0	0
FMNH233621	PWW.3366	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	0	0
FMNH233614	PWW.3359	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233622	PWW.3367	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233623	PWW.3368	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	F	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH233613	PWW.3358	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	0	0
FMNH233615	PWW.3360	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	0	0
FMNH233619	PWW.3364	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	0	0
FMNH233618	PWW.3363	Chiroptera	Pteropodidae	Rousettus	aegyptiacus	M	Kilifi	Kenya	Watamu cave Gede	8	21	10	2016	0	0	1	Nycteribiidae	Eucampsipoda africana
FMNH232059	JCK.9909	Chiroptera	Pteropodidae	Rousettus	angolensis	M	Karamoja	Uganda	Mount Morungole	2520	23	7	2016	0	0	0	Nycteribiidae	Eucampsipoda africana
FMNH232481	JCK.10305	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	0	0
FMNH232487	JCK.10338	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	0	0	0
FMNH232488	JCK.10339	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	0	0	0
FMNH232511	JCK.10408	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	12	8	2016	0	0	1	0	0
FMNH232512	JCK.10409	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	NA	NA	2016	0	0	1	0	0
FMNH232476	JCK.10291	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	7	8	2016	0	0	0	flea	flea
FMNH232486	JCK.10337	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	1	0	1	flea	flea
FMNH232495	JCK.10368	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	0	0	1	flea	flea
FMNH232502	JCK.10383	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	flea	flea
FMNH232510	JCK.10407	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	12	8	2016	0	0	1	flea	flea
FMNH232477	JCK.10298	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	Hippoboscidae	Dipseliopoda setosa
FMNH232478	JCK.10300	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	Hippoboscidae	Dipseliopoda biannulata
FMNH232480	JCK.10304	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	Hippoboscidae	Dipseliopoda setosa
FMNH232485	JCK.10336	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232490	JCK.10362	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232492	JCK.10365	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232493	JCK.10366	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232496	JCK.10369	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232498	JCK.10378	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	Hippoboscidae	Megastrebla bequaerti
FMNH232503	JCK.10384	Chiroptera	Pteropodidae	Stenonycteris	lanosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232482	JCK.10332	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	0	0	0
FMNH232489	JCK.10361	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	0	0	0	0	0
FMNH232505	JCK.10386	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	0	0
FMNH232491	JCK.10364	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	0	0	1	flea	flea
FMNH232500	JCK.10380	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	flea	flea
FMNH232501	JCK.10381	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	flea	flea
FMNH232506	JCK.10403	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	12	8	2016	0	0	1	flea	flea
FMNH232507	JCK.10404	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	12	8	2016	0	0	1	flea	flea
FMNH232479	JCK.10303	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	Hippoboscidae	Dipseliopoda setosa
FMNH232483	JCK.10333	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	0	Hippoboscidae	Megastrebla bequaerti
FMNH232484	JCK.10334	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	0	Hippoboscidae	Dipseliopoda setosa
FMNH232494	JCK.10367	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	10	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232497	JCK.10377	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232499	JCK.10379	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232504	JCK.10385	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232508	JCK.10405	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	12	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232509	JCK.10406	Chiroptera	Pteropodidae	Stenonycteris	lanosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	12	8	2016	0	0	1	Hippoboscidae	Dipseliopoda setosa
FMNH232467	JCK.10331	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	0	0	0
FMNH232474	JCK.10401	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	0	0
FMNH232475	JCK.10402	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	0	0	0
FMNH232466	JCK.10330	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	8	8	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH232470	JCK.10358	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	0	Hippoboscidae	Phthiridium tecta

FMNH232469	JCK.10357	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	0	0	0
FMNH232472	JCK.10399	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	0	0	0
FMNH232473	JCK.10400	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	1	0	0
FMNH232468	JCK.10355	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH232471	JCK.10359	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	0	Hippoboscidae	Phthiridium tecta
FMNH232083	JCK.10102	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	0	0
FMNH232086	JCK.10105	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	0	0
FMNH232087	JCK.10106	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	0	0
FMNH232088	JCK.10107	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	0	0
FMNH232100	JCK.10191	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	30	7	2016	0	0	0	0	0
FMNH232101	JCK.10229	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	31	7	2016	0	0	0	0	0
FMNH232097	JCK.10158	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	1	flea	flea
FMNH232081	JCK.10022	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	25	7	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH232085	JCK.10104	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	Hippoboscidae	Phthiridium tecta
FMNH232091	JCK.10151	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	Hippoboscidae	Phthiridium tecta
FMNH232096	JCK.10157	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH232099	JCK.10160	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	1	Failed Seq	1	Hippoboscidae	Phthiridium tecta
FMNH232082	JCK.10101	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	Streblidae	Brachytarsina sp.
FMNH232089	JCK.10108	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	Streblidae	Brachytarsina sp.
FMNH232093	JCK.10154	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	1	Streblidae	Brachytarsina sp.
FMNH232095	JCK.10156	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	0	0
FMNH232098	JCK.10159	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	0	0	0
FMNH232102	JCK.10233	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Karamoja	Uganda	Mount Morungole	2520	31	7	2016	0	0	0	0	0
FMNH232103	JCK.10255	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	0	0	0	0	0
FMNH232090	JCK.10150	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH232092	JCK.10153	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH232084	JCK.10103	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Karamoja	Uganda	Mount Morungole	2520	27	7	2016	0	0	0	Streblidae	Brachytarsina sp.
FMNH232094	JCK.10155	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Karamoja	Uganda	Mount Morungole	2520	29	7	2016	0	0	1	Streblidae	Brachytarsina sp.
FMNH233654	PWW.3607	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	0	0
FMNH233660	PWW.3624	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	1	Nycteria sp. 98 NYC_UG	0	0	0
FMNH233661	PWW.3625	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	0	0	0
FMNH233673	PWW.3623	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	0	0	0
FMNH233657	PWW.3620	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH233658	PWW.3621	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH233659	PWW.3622	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH233662	PWW.3626	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	F	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	1	Nycteria sp. 98 NYC_UG	1	Hippoboscidae	Phthiridium tecta
FMNH233655	PWW.3618	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	0	0	0
FMNH233656	PWW.3619	Chiroptera	Rhinolophidae	Rhinolophus	clivosus	M	Nakuru	Kenya	Kitum cave Mount Elgon National Park	2362	31	10	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH233798	PWW.3460	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233802	PWW.3465	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH233797	PWW.3459	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233803	PWW.3476	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233805	PWW.3478	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233799	PWW.3461	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	flea	flea
FMNH233801	PWW.3463	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233804	PWW.3477	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233806	PWW.3479	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233807	PWW.3490	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233800	PWW.3462	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH233700	PWW.3543	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233702	PWW.3545	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233705	PWW.3548	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233706	PWW.3549	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233809	PWW.3538	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233810	PWW.3539	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233812	PWW.3541	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233813	PWW.3542	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233703	PWW.3546	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	F	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Streblidae	Brachytarsina sp.
FMNH233701	PWW.3544	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233704	PWW.3547	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233811	PWW.3540	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Lion Hill cave Lake Nakuru National Park	1816	27	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233808	PWW.3518	Chiroptera	Rhinolophidae	Rhinolophus	eloquens	M	Nakuru	Kenya	Monkey Bridge campsite Soysambu Conservancy	1821	26	10	2016	0	0	0	0	0
FMNH232104	JCK.9905	Chiroptera	Rhinolophidae	Rhinolophus	hildebrandti	M	Karamoja	Uganda	Mount Morungole	2520	23	7	2016	0	0	0	0	0
FMNH232106	JCK.10068	Chiroptera	Rhinolophidae	Rhinolophus	hildebrandti	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Hippoboscidae	Ascodipteron sp.
FMNH232107	JCK.10074	Chiroptera	Rhinolophidae	Rhinolophus	hildebrandti	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Hippoboscidae	Phthiridium tecta
FMNH232105	JCK.9908	Chiroptera	Rhinolophidae	Rhinolophus	hildebrandti	M	Karamoja	Uganda	Mount Morungole	2520	23	7	2016	0	0	1	Trombiculidae	chigger
FMNH233887	PWW.3469	Chiroptera	Rhinolophidae	Rhinolophus	landeri	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233889	PWW.3471	Chiroptera	Rhinolophidae	Rhinolophus	landeri	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233893	PWW.3475	Chiroptera	Rhinolophidae	Rhinolophus	landeri	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233886	PWW.3468	Chiroptera	Rhinolophidae	Rhinolophus	landeri	F	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	1	Trombiculidae	chigger?
FMNH233883	PWW.3464	Chiroptera	Rhinolophidae	Rhinolophus	landeri	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233884	PWW.3466	Chiroptera	Rhinolophidae	Rhinolophus	landeri	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233885	PWW.3467	Chiroptera	Rhinolophidae	Rhinolophus	landeri	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233888	PWW.3470	Chiroptera	Rhinolophidae	Rhinolophus	landeri	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233890	PWW.3472	Chiroptera	Rhinolophidae	Rhinolophus	landeri	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233891	PWW.3473	Chiroptera	Rhinolophidae	Rhinolophus	landeri	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0
FMNH233892	PWW.3474	Chiroptera	Rhinolophidae	Rhinolophus	landeri	M	Nakuru	Kenya	Diatomite cave Gilgil	1900	25	10	2016	0	0	0	0	0

FMNH233880	PWW.3445	Chiroptera	Rhinolophidae	Rhinolophus	landeri	F	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	0	0	0	0	0
FMNH233881	PWW.3446	Chiroptera	Rhinolophidae	Rhinolophus	landeri	F	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	0	0	0	0	0
FMNH233882	PWW.3447	Chiroptera	Rhinolophidae	Rhinolophus	landeri	F	Nakuru	Kenya	Kariandusi mines Gilgil	1856	25	10	2016	0	0	0	0	0
FMNH233824	PWW.3355	Chiroptera	Rhinolophidae	Rhinolophus	sp.	F	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	1	Hippoboscidae	Phthiridium hoogstraali
FMNH233823	PWW.3354	Chiroptera	Rhinolophidae	Rhinolophus	sp.	M	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH233825	PWW.3357	Chiroptera	Rhinolophidae	Rhinolophus	sp.	M	Makueni	Kenya	Guano cave 3 Chyulu Hills National Park	1062	20	10	2016	0	0	0	0	0
FMNH234082	PWW.3369	Chiroptera	Rhinonycteridae	Triaenops	afer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH234086	PWW.3373	Chiroptera	Rhinonycteridae	Triaenops	afer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234088	PWW.3375	Chiroptera	Rhinonycteridae	Triaenops	afer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234090	PWW.3377	Chiroptera	Rhinonycteridae	Triaenops	afer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234091	PWW.3378	Chiroptera	Rhinonycteridae	Triaenops	afer	F	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	1	0	1	Streblidae	Raymondia sp.
FMNH234083	PWW.3370	Chiroptera	Rhinonycteridae	Triaenops	afer	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	0	0	0
FMNH234085	PWW.3372	Chiroptera	Rhinonycteridae	Triaenops	afer	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	0	0
FMNH234089	PWW.3376	Chiroptera	Rhinonycteridae	Triaenops	afer	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Macronyssidae	Macronyssidae
FMNH234084	PWW.3371	Chiroptera	Rhinonycteridae	Triaenops	afer	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH234087	PWW.3374	Chiroptera	Rhinonycteridae	Triaenops	afer	M	Kilifi	Kenya	Makuruhu cave Gede	17	21	10	2016	0	0	1	Streblidae	Raymondia sp.
FMNH232112	JCK.10026	Chiroptera	Vespertilionidae	Myotis	tricolor	F	Karamoja	Uganda	Mount Morungole	2520	25	7	2016	0	0	1	Nycteribiidae	Nycteribia latiterga
FMNH232118	JCK.10139	Chiroptera	Vespertilionidae	Myotis	tricolor	F	Karamoja	Uganda	Mount Morungole	2520	28	7	2016	1	Polychromophilus muri	1	Nycteribiidae	Nycteribia latiterga
FMNH232117	JCK.10072	Chiroptera	Vespertilionidae	Myotis	tricolor	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	0	0
FMNH232119	JCK.10259	Chiroptera	Vespertilionidae	Myotis	tricolor	M	Karamoja	Uganda	Mount Morungole	2520	1	8	2016	0	0	1	Ixodidae	Ixodidae
FMNH232111	JCK.10025	Chiroptera	Vespertilionidae	Myotis	tricolor	M	Karamoja	Uganda	Mount Morungole	2520	25	7	2016	1	Polychromophilus muri	1	Nycteribiidae	Nycteribia latiterga
FMNH232113	JCK.10028	Chiroptera	Vespertilionidae	Myotis	tricolor	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	1	Polychromophilus muri	1	Nycteribiidae	Nycteribia latiterga
FMNH232114	JCK.10029	Chiroptera	Vespertilionidae	Myotis	tricolor	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Nycteribiidae	Nycteribia latiterga
FMNH232115	JCK.10030	Chiroptera	Vespertilionidae	Myotis	tricolor	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Nycteribiidae	Nycteribia latiterga
FMNH232116	JCK.10031	Chiroptera	Vespertilionidae	Myotis	tricolor	M	Karamoja	Uganda	Mount Morungole	2520	26	7	2016	0	0	1	Nycteribiidae	Nycteribia latiterga
FMNH234713	PWW.3617	Chiroptera	Vespertilionidae	Neoromicia	nana	M	Kakamega	Kenya	Ikhondo Junction Kakamega Forest National Reserve	1590	1	11	2016	0	0	0	0	0
FMNH234596	PWW.3439	Chiroptera	Vespertilionidae	Neoromicia	sp.	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234597	PWW.3440	Chiroptera	Vespertilionidae	Neoromicia	sp.	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH234598	PWW.3443	Chiroptera	Vespertilionidae	Neoromicia	sp.	M	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	0	0	0
FMNH232432	JCK.10376	Chiroptera	Vespertilionidae	Pipistrellus	sp.	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	1	0	0
FMNH232514	JCK.10396	Chiroptera	Vespertilionidae	Scotoecus	hindei	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	0	0	0
FMNH232516	JCK.10398	Chiroptera	Vespertilionidae	Scotoecus	hindei	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	0	0	0
FMNH232513	JCK.10356	Chiroptera	Vespertilionidae	Scotoecus	hindei	F	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	9	8	2016	0	0	1	Hippoboscidae	Basilia ansifera
FMNH232515	JCK.10397	Chiroptera	Vespertilionidae	Scotoecus	hindei	M	Acholi	Uganda	Agoro-Agu Forest Reserve	1935	11	8	2016	0	0	0	0	0
FMNH234475	PWW.3602	Chiroptera	Vespertilionidae	Scotophilus	dingani	F	Kakamega	Kenya	Buzambuli Trail 3 Kakamega Forest National Reserve	1564	31	10	2016	0	0	0	0	0
FMNH234476	PWW.3616	Chiroptera	Vespertilionidae	Scotophilus	dingani	M	Kakamega	Kenya	Ikhondo Junction Kakamega Forest National Reserve	1590	1	11	2016	0	0	0	0	0
FMNH234474	PWW.3441	Chiroptera	Vespertilionidae	Scotophilus	dingani	F	Kilifi	Kenya	Kaboga cave Gede	19	22	10	2016	0	0	1	Nycteribiidae	Nycteribia schmidlii
FMNH232110	JCK.10180	Chiroptera	Vespertilionidae	Vespertilionid	sp.	M	Karamoja	Uganda	Mount Morungole	2520	30	7	2016	0	0	0	Spinturnicidae	Spinturnicidae

Table S3. DESeq results: ESVs from the skin that were identified as significantly enriched in either non-ectoparasitized (positive log2FoldChange values; black or ectoparasitized (negative log2FoldChange values; red) bats.

Host_family	baseMean	log2FoldChange	lfcSE	stat	pvalue	padj	Rank1	Rank2	Rank3	Rank4	Rank5	Rank6	Rank7
Hipposideridae	33.3360233	-25.65717963	2.84165626	-9.0289526	1.73E-19	4.77E-17	Bacteria	Bacteroidetes	[Saprospirae]	[Saprospirales]	Saprospiraceae	Unclassified	Unclassified
Hipposideridae	24.9053051	-25.44743324	2.961084869	-8.5939561	8.40E-18	1.54E-15	Bacteria	Proteobacteria	Gammaproteobacteria	Salinisphaerales	Salinisphaeraceae	Salinisphaera	Unclassified
Hipposideridae	21.6441823	-25.2429634	2.961117027	-8.5248111	1.53E-17	2.68E-15	Bacteria	Bacteroidetes	[Rhodothermi]	[Rhodothermales]	[Balneolaceae]	KSA1	Unclassified
Hipposideridae	35.4879494	-25.2388568	2.420732479	-10.426124	1.88E-25	3.63E-22	Bacteria	Firmicutes	Clostridia	Clostridiales	Clostridiaceae	Unclassified	Unclassified
Hipposideridae	20.5283726	-25.17048193	2.799904489	-8.9897645	2.48E-19	6.36E-17	Archaea	Euryarchaeota	Halobacteria	Halobacteriales	Halobacteriaceae	Natronomonas	Unclassified
Hipposideridae	33.6261871	-24.50404309	2.849792516	-8.5985358	8.07E-18	1.54E-15	Bacteria	Bacteroidetes	Flavobacteriia	Flavobacteriales	Flavobacteriaceae	Unclassified	Unclassified
Hipposideridae	11.6313092	-24.40177521	2.306373551	-10.580149	3.68E-26	1.42E-22	Bacteria	Proteobacteria	Gammaproteobacteria	Salinisphaerales	Salinisphaeraceae	Salinisphaera	Unclassified
Hipposideridae	5.78175293	-23.45826935	2.497594017	-9.3923469	5.87E-21	3.23E-18	Bacteria	Proteobacteria	Gammaproteobacteria	Oceanospirillales	Alcanivoracaceae	Alcanivorax	Unclassified
Hipposideridae	44.391983	-9.110914131	2.339431242	-3.8944996	9.84E-05	0.01148019	Bacteria	Proteobacteria	Gammaproteobacteria	Chromatiales	Ectothiorhodospiraceae	Unclassified	Unclassified
Hipposideridae	277.237854	-6.60493886	1.518580924	-4.3494151	1.37E-05	0.00175176	Bacteria	Bacteroidetes	[Rhodothermi]	[Rhodothermales]	[Balneolaceae]	KSA1	Unclassified
Hipposideridae	70.8563568	-6.389388446	1.413078047	-4.5216104	6.14E-06	0.00081475	Bacteria	Proteobacteria	Gammaproteobacteria	Salinisphaerales	Salinisphaeraceae	Salinisphaera	Unclassified
Hipposideridae	403.611788	-6.270630576	1.107148163	-5.6637682	1.48E-08	2.28E-06	Bacteria	Firmicutes	Bacilli	Bacillales	Bacillaceae	Unclassified	Unclassified
Hipposideridae	44.8861438	7.644821161	1.885374384	4.05480271	5.02E-05	0.00615871	Bacteria	Bacteroidetes	[Saprospirae]	[Saprospirales]	Chitinophagaceae	Unclassified	Unclassified
Hipposideridae	15.8097063	9.002077621	2.222664025	4.05012972	5.12E-05	0.00615871	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Luteibacter	rhizovicinus
Hipposideridae	36.9729559	9.667104592	2.044794813	4.72766486	2.27E-06	0.00032385	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Hipposideridae	0.89485376	20.86870844	2.959888545	7.05050482	1.78E-12	2.86E-10	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Nocardioidaceae	Unclassified	Unclassified
Hipposideridae	0.89485376	20.86870883	2.959888544	7.05050495	1.78E-12	2.86E-10	Bacteria	Proteobacteria	Alphaproteobacteria	Rhizobiales	Hyphomicrobiaceae	Devosia	Unclassified
Hipposideridae	4.93611809	23.27919885	2.527845745	9.20910578	3.29E-20	1.06E-17	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Nakamurellaceae	Unclassified	Unclassified
Hipposideridae	6.0392616	23.56015701	2.546061692	9.25356879	2.17E-20	8.36E-18	Bacteria	Firmicutes	Bacilli	Bacillales	Planococcaceae	Unclassified	Unclassified
Hipposideridae	6.15431009	23.58277186	2.72388647	8.65776607	4.81E-18	9.75E-16	Bacteria	Bacteroidetes	Flavobacteriia	Flavobacteriales	[Weeksellaceae]	Unclassified	Unclassified
Hipposideridae	6.20940611	23.59952012	2.545088156	9.27257473	1.82E-20	7.77E-18	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Sinobacteraceae	Unclassified	Unclassified
Hipposideridae	7.48028504	23.62760844	2.562780411	9.21952124	2.98E-20	1.04E-17	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Alcaligenaceae	Unclassified	Unclassified
Hipposideridae	6.8718056	23.73606007	2.731340242	8.69026118	3.62E-18	7.73E-16	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Hipposideridae	8.66930761	24.05903572	2.574969728	9.34342468	9.33E-21	4.49E-18	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Hipposideridae	10.1050997	24.23263237	2.758293021	8.78537276	1.56E-18	3.53E-16	Bacteria	Bacteroidetes	[Saprospirae]	[Saprospirales]	Chitinophagaceae	Unclassified	Unclassified
Hipposideridae	11.7961065	24.49313991	2.767890018	8.84902931	8.83E-19	2.12E-16	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Hipposideridae	13.3303502	24.62715736	2.597856709	9.4797982	2.55E-21	1.63E-18	Bacteria	Proteobacteria	Gammaproteobacteria	Oceanospirillales	Alcanivoracaceae	Alcanivorax	Unclassified
Hipposideridae	15.0738992	24.73109623	2.44240381	10.1257196	4.25E-24	4.09E-21	Bacteria	Proteobacteria	Gammaproteobacteria	Oceanospirillales	Alcanivoracaceae	Alcanivorax	Unclassified
Hipposideridae	33.8904008	25.96995682	2.521288461	10.300272	7.03E-25	9.02E-22	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Miniopterus	9.91594853	-25.58567541	2.017479186	-12.682002	7.44E-37	1.13E-33	Bacteria	Proteobacteria	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	Alkanindiges	Unclassified
Miniopterus	9.86344729	-8.50285269	2.025199058	-4.1985269	2.69E-05	0.00870641	Bacteria	Proteobacteria	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	Acinetobacter	Unclassified
Miniopterus	606.594629	-2.376277139	0.559035525	-4.2506729	2.13E-05	0.00743821	Bacteria	Firmicutes	Bacilli	Bacillales	Staphylococcaceae	Staphylococcus	Unclassified
Miniopterus	475.832275	2.315050715	0.485464246	4.76873577	1.85E-06	0.00076463	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Mycobacteriaceae	Mycobacterium	Unclassified
Miniopterus	92.5081738	4.319454662	1.138716109	3.79326737	0.00014868	0.04497011	Archaea	Euryarchaeota	Halobacteria	Halobacteriales	Halobacteriaceae	Halococcus	Unclassified
Miniopterus	96.4689286	4.819654198	1.073981799	4.4876498	7.20E-06	0.0027227	Bacteria	Proteobacteria	Gammaproteobacteria	Legionellales	Coxiellaceae	Rickettsiella	Unclassified
Miniopterus	16.2221811	6.873850559	1.233974991	5.57049422	2.54E-08	1.15E-05	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Miniopterus	59.749205	8.111218933	1.329825481	6.09946121	1.06E-09	5.37E-07	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Mycobacteriaceae	Mycobacterium	Unclassified
Miniopterus	0.98024775	20.38460648	2.931930405	6.9526229	3.59E-12	2.03E-09	Bacteria	Proteobacteria	Deltaproteobacteria	Myxococcales	unclassified	Unclassified	Unclassified
Miniopterus	15.314646	21.98481035	1.96908994	11.16496	6.05E-29	5.49E-26	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Miniopterus	46.8275783	23.45661248	1.763147258	13.3038306	2.20E-40	4.99E-37	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Miniopterus	10.2817702	23.72426544	2.024424912	11.7190148	1.02E-31	1.16E-28	Bacteria	Cyanobacteria	Chloroplast	Stramenopiles	unclassified	Unclassified	Unclassified
Miniopterus	29.1518671	24.8954245	2.440446386	10.2011766	1.96E-24	1.27E-21	Bacteria	Tenericutes	Mollicutes	Entomoplasmatales	Entomoplasmataceae	Entomoplasma	Unclassified
Miniopterus	26.8833469	25.05865373	1.665395292	15.0466702	3.63E-51	1.65E-47	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Pteropodidae	197.918879	-7.705987738	1.445731453	-5.3301654	9.81E-08	4.38E-05	Bacteria	Proteobacteria	Gammaproteobacteria	Pasteurellales	Pasteurellaceae	Avibacterium	Unclassified
Pteropodidae	11.6562082	-5.19327303	1.577955943	-3.2911394	0.00099782	0.0306917	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Pseudonocardiaceae	Actinomycetospora	Unclassified
Pteropodidae	46.3280145	-3.177959536	0.941405521	-3.3757605	0.00073612	0.02626475	Bacteria	Proteobacteria	Gammaproteobacteria	Oceanospirillales	Halomonadaceae	Candidatus Portiera	Unclassified
Pteropodidae	222.317519	2.145584572	0.618996233	3.46623203	0.00052781	0.02264072	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Dermabacteraceae	Brachybacterium	Unclassified
Pteropodidae	726.212554	2.457775804	0.700785138	3.50717455	0.00045289	0.02244331	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Brevibacteriaceae	Brevibacterium	aureum
Pteropodidae	13.2685055	2.509635649	0.824569764	3.04356982	0.00233789	0.04739544	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Mycobacteriaceae	Mycobacterium	Unclassified

Pteropodidae	372.152047	2.716938071	0.870978721	3.1194081	0.00181215	0.0413651	Bacteria	Firmicutes	Bacilli	Lactobacillales	Streptococcaceae	Lactococcus	garvieae
Pteropodidae	151.569379	2.914848464	0.882657155	3.30235635	0.00095876	0.03054341	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Mycobacteriaceae	Mycobacterium	Unclassified
Pteropodidae	169.414871	2.947354562	0.768660819	3.83440197	0.00012587	0.01122762	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Nocardiaceae	Rhodococcus	Unclassified
Pteropodidae	26.3950706	2.995492927	0.915443259	3.2721776	0.00106723	0.03107064	Bacteria	Bacteroidetes	Flavobacteriia	Flavobacteriales	Flavobacteriaceae	Unclassified	Unclassified
Pteropodidae	41.0912537	3.061484864	0.845280699	3.62185588	0.0002925	0.01922586	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Nocardiaceae	Rhodococcus	fascians
Pteropodidae	59.1688549	3.074215379	0.962941686	3.19252497	0.00141035	0.03787161	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Nocardiaceae	Rhodococcus	Unclassified
Pteropodidae	16.0799288	3.184695056	0.974251879	3.26886211	0.00107981	0.03107064	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Micrococcaceae	Arthrobacter	Unclassified
Pteropodidae	9.96279949	3.352163162	1.00234675	3.34431489	0.00082486	0.02829906	Bacteria	Firmicutes	Bacilli	Lactobacillales	Leuconostocaceae	Unclassified	Unclassified
Pteropodidae	32.229834	3.388681904	0.985558957	3.43833505	0.0005853	0.0233889	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Nocardiaceae	Nocardia	Unclassified
Pteropodidae	98.8625562	3.419943337	1.062502587	3.21876236	0.00128745	0.03588771	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Dermabacteraceae	Unclassified	Unclassified
Pteropodidae	14.4704316	3.468398712	1.001388823	3.4635884	0.00053302	0.02264072	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Rhodanobacter	Unclassified
Pteropodidae	30.8523866	3.610840904	1.090269038	3.31188063	0.00092671	0.03054341	Bacteria	Proteobacteria	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	Alkanindiges	Unclassified
Pteropodidae	219.403137	3.882183276	1.095733525	3.54299945	0.0003956	0.02075755	Bacteria	Bacteroidetes	Flavobacteriia	Flavobacteriales	[Weeksellaceae]	Chryseobacterium	Unclassified
Pteropodidae	837.095064	3.968944289	1.296094202	3.06223443	0.00219691	0.04557318	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Corynebacteriaceae	Corynebacterium	Unclassified
Pteropodidae	14.0749496	4.010380328	1.304276362	3.07479339	0.00210648	0.04473771	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Comamonadaceae	Unclassified	Unclassified
Pteropodidae	56.4996028	4.25907289	1.336892154	3.1858014	0.00144354	0.03787161	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Gordoniaceae	Gordonia	Unclassified
Pteropodidae	15.8728715	4.356749352	1.20558942	3.61379196	0.00030175	0.01922586	Bacteria	Bacteroidetes	[Saprospirae]	[Saprospirales]	Chitinophagaceae	Unclassified	Unclassified
Pteropodidae	178.794782	4.452743212	1.409556552	3.15896741	0.00158329	0.03817017	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Mycobacteriaceae	Mycobacterium	Unclassified
Pteropodidae	6.21886086	4.663028428	1.469938289	3.17226136	0.00151257	0.03811324	Bacteria	Bacteroidetes	[Saprospirae]	[Saprospirales]	Unclassified	Unclassified	Unclassified
Pteropodidae	5.96221438	4.749096228	1.363012276	3.48426519	0.00049349	0.02264072	Bacteria	Proteobacteria	Epsilonproteobacteria	Campylobacterales	Campylobacteraceae	Arcobacter	Unclassified
Pteropodidae	20.9436783	4.932987454	1.557435665	3.167378	0.0015382	0.03811324	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Actinomycetaceae	Unclassified	Unclassified
Pteropodidae	29.9474311	5.001377895	1.606855019	3.11252592	0.00185494	0.0413651	Bacteria	Proteobacteria	Gammaproteobacteria	Enterobacteriales	Enterobacteriaceae	Unclassified	Unclassified
Pteropodidae	10.2541137	5.014078622	1.385069977	3.62009047	0.0002945	0.01922586	Bacteria	Proteobacteria	Gammaproteobacteria	Pseudomonadales	Pseudomonadaceae	Pseudomonas	Unclassified
Pteropodidae	3.24100976	5.123619144	1.650426241	3.10442177	0.00190651	0.04147829	Bacteria	Proteobacteria	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	Perlucidibaca	Unclassified
Pteropodidae	3.37516681	5.18178447	1.510624461	3.43022677	0.00060308	0.0233889	Bacteria	Bacteroidetes	Cytophagia	Cytophagales	Cytophagaceae	Spirosoma	Unclassified
Pteropodidae	4.95612079	5.221601557	1.159942147	4.50160516	6.74E-06	0.00104039	Bacteria	Bacteroidetes	[Saprospirae]	[Saprospirales]	Chitinophagaceae	Chitinophaga	Unclassified
Pteropodidae	36.3126387	5.658834091	1.377583532	4.10779743	3.99E-05	0.00476996	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Micrococcaceae	Unclassified	Unclassified
Pteropodidae	4.87593266	5.711005131	1.671272559	3.41715964	0.00063278	0.02351838	Bacteria	SR1	Unclassified	Unclassified	Unclassified	Unclassified	Unclassified
Pteropodidae	36.6191086	5.804559353	1.291697739	4.4937443	7.00E-06	0.00104039	Bacteria	Proteobacteria	Alphaproteobacteria	Rhodobacterales	Rhodobacteraceae	Paracoccus	aminovorans
Pteropodidae	15.5814282	5.859034147	1.441500053	4.06453967	4.81E-05	0.00476996	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Microbacteriaceae	Unclassified	Unclassified
Pteropodidae	46.66724	6.009936763	1.620417793	3.708881	0.00020818	0.01688128	Bacteria	Proteobacteria	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	Unclassified	Unclassified
Pteropodidae	6.52515097	6.131913909	1.715182193	3.57508021	0.00035012	0.02075755	Bacteria	Firmicutes	Clostridia	Clostridiales	Clostridiaceae	Clostridium	Unclassified
Pteropodidae	6.99054863	6.230715904	1.991565377	3.12855203	0.0017567	0.0412362	Bacteria	Bacteroidetes	Sphingobacteriia	Sphingobacteriales	Sphingobacteriaceae	Unclassified	Unclassified
Pteropodidae	12.8455406	6.606968105	1.445297111	4.57135634	4.85E-06	0.00104039	Bacteria	Proteobacteria	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	Alkanindiges	Unclassified
Pteropodidae	139.44463	7.14102869	1.506630904	4.73973332	2.14E-06	0.00063629	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Micrococcaceae	Micrococcus	luteus
Pteropodidae	11.7853444	23.96508235	1.691972713	14.1639887	1.53E-45	1.37E-42	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Comamonadaceae	Rhodoferax	Unclassified
Rhinolophidae	6.21690977	-23.8707008	2.717367908	-8.7844935	1.57E-18	1.61E-16	Bacteria	Proteobacteria	Deltaproteobacteria	Syntrophobacterales	Syntrophobacteraceae	Unclassified	Unclassified
Rhinolophidae	5.44483902	-23.68996395	2.90593782	-8.1522611	3.57E-16	1.83E-14	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Dokdonella	Unclassified
Rhinolophidae	5.33513131	-23.65059387	2.705098902	-8.7429683	2.27E-18	2.09E-16	Bacteria	Bacteroidetes	[Saprospirae]	[Saprospirales]	Chitinophagaceae	Unclassified	Unclassified
Rhinolophidae	4.69629323	-23.4884648	2.695621731	-8.7135612	2.94E-18	2.46E-16	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Lysobacter	Unclassified
Rhinolophidae	6.34244731	-6.063086547	1.884632095	-3.2171194	0.00129485	0.04075613	Bacteria	Proteobacteria	Gammaproteobacteria	Xanthomonadales	Xanthomonadaceae	Unclassified	Unclassified
Rhinolophidae	10.1070747	-5.160488069	1.60780803	-3.2096419	0.001329	0.04075613	Bacteria	Actinobacteria	Nitriliruptoria	Nitriliruptorales	Nitriliruptoraceae	Unclassified	Unclassified
Rhinolophidae	52.5912353	4.708233337	1.396062002	3.3725102	0.00074486	0.0263567	Bacteria	Firmicutes	Bacilli	Bacillales	Bacillaceae	Lentibacillus	Unclassified
Rhinolophidae	286.783152	4.793488406	1.121747608	4.27323256	1.93E-05	0.00088623	Bacteria	Firmicutes	Bacilli	Bacillales	Unclassified	Unclassified	Unclassified
Rhinolophidae	29.0374515	4.948438459	1.493176523	3.31403446	0.0009196	0.03021549	Bacteria	Proteobacteria	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	Acinetobacter	Unclassified
Rhinolophidae	74.9680408	5.175528257	1.379008178	3.75308018	0.00017468	0.00669587	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Mycobacteriaceae	Mycobacterium	Unclassified
Rhinolophidae	7.84537579	5.932305883	1.610067389	3.68450782	0.00022915	0.00843254	Bacteria	Proteobacteria	Gammaproteobacteria	Enterobacteriales	Enterobacteriaceae	Unclassified	Unclassified
Rhinolophidae	30.9715879	6.023183129	1.795897484	3.35385688	0.00079694	0.02715485	Bacteria	Firmicutes	Bacilli	Bacillales	Bacillaceae	Unclassified	Unclassified
Rhinolophidae	20.7504911	7.6085716	1.87930866	4.04860136	5.15E-05	0.00215467	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Streptomycetaceae	Streptomyces	Unclassified
Rhinolophidae	128.396363	8.116688524	1.731467878	4.68774999	2.76E-06	0.00013375	Archaea	Euryarchaeota	Halobacteria	Halobacteriales	Halobacteriaceae	Halococcus	Unclassified
Rhinolophidae	226.682754	11.28161549	2.703490864	4.17298081	3.01E-05	0.00131709	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Nocardiopsaceae	Unclassified	Unclassified
Rhinolophidae	384.620387	11.30748268	2.903543181	3.89437387	9.85E-05	0.00393811	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Nocardiopsaceae	Nocardiopsis	exhalans

Rhinolophidae	13.121515	23.36634892	1.952101243	11.9698448	5.11E-33	4.70E-30	Bacteria	Firmicutes	Bacilli	Bacillales	Bacillaceae	Unclassified	Unclassified
Rhinolophidae	7.95472357	23.56150973	2.263836033	10.407781	2.28E-25	5.26E-23	Bacteria	Firmicutes	Bacilli	Bacillales	Planococcaceae	Sporosarcina	Unclassified
Rhinolophidae	25.9764381	23.68310583	2.905014398	8.15249172	3.57E-16	1.83E-14	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Alcaligenaceae	Pigmentiphaga	Unclassified
Rhinolophidae	30.0313576	23.92603537	2.691733283	8.88870956	6.18E-19	7.11E-17	Bacteria	Proteobacteria	Alphaproteobacteria	Rhizobiales	Hyphomicrobiaceae	Devosia	Unclassified
Rhinolophidae	10.4559986	23.94359103	2.596320604	9.22212418	2.91E-20	3.83E-18	Bacteria	Firmicutes	Bacilli	Bacillales	Bacillaceae	Lentibacillus	Unclassified
Rhinolophidae	11.1543769	24.03396481	2.050336281	11.7219624	9.84E-32	4.52E-29	Archaea	Euryarchaeota	Halobacteria	Halobacteriales	Halobacteriaceae	Halococcus	Unclassified
Rhinolophidae	19.2709528	24.79580547	2.876512782	8.62009223	6.69E-18	3.85E-16	Bacteria	Proteobacteria	Alphaproteobacteria	Rhizobiales	Phyllobacteriaceae	Mesorhizobium	Unclassified
Rhinolophidae	20.7016756	24.89752797	2.664359714	9.34465712	9.22E-21	1.41E-18	Bacteria	Bacteroidetes	Flavobacteriia	Flavobacteriales	Flavobacteriaceae	Unclassified	Unclassified
Rhinolophidae	22.0885461	24.99090392	2.888308394	8.65243614	5.04E-18	3.37E-16	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Glycomycetaceae	Glycomyces	Unclassified
Rhinolophidae	23.5924593	25.07911141	2.905037058	8.6329747	5.98E-18	3.67E-16	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Streptomycetaceae	Streptomyces	Unclassified
Rhinolophidae	24.5114842	25.12952762	2.905027754	8.65035715	5.13E-18	3.37E-16	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Alcaligenaceae	Unclassified	Unclassified
Rhinolophidae	69.9247038	25.15739443	2.904873199	8.66041053	4.70E-18	3.37E-16	Bacteria	Actinobacteria	Actinobacteria	Actinomycetales	Unclassified	Unclassified	Unclassified
Rhinolophidae	26.6336435	25.18897948	2.687384143	9.3730476	7.05E-21	1.30E-18	Bacteria	Proteobacteria	Betaproteobacteria	Burkholderiales	Alcaligenaceae	Unclassified	Unclassified
Rhinolophidae	27.999455	25.32174644	2.382913512	10.6263808	2.25E-26	6.89E-24	Bacteria	Proteobacteria	Alphaproteobacteria	Rhodobacterales	Rhodobacteraceae	Unclassified	Unclassified