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Prevalence and Diversity of the Haemosporidian Blood Parasite Leucocytozoon in Sub-Saharan African Birds

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LOYOLA UNIVERSITY CHICAGO

PREVALENCE AND DIVERSITY OF THE HAEMOSPORIDIAN BLOOD PARASITE
LEUCOCYTOZOOM IN SUB-SAHARAN AFRICAN BIRDS

A THESIS SUBMITTED TO
THE FACULTY OF THE GRADUATE SCHOOL
IN CANDIDACY FOR THE DEGREE OF
MASTER OF SCIENCE
PROGRAM IN BIOLOGY

BY

HEATHER R. SKEEN

CHICAGO, IL

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ABSTRACT

Our knowledge of avian Haemosporidian parasites has increased dramatically with the advent and increased use of molecular technologies. Yet *Leucocytozoon*, a common avian parasite, remains relatively understudied. Haemosporidian parasite diversity and prevalence has been shown to be dependent on several factors, including host family and habitat, on a microecological scale. In this study I screened 3,375 birds from sub-Saharan Africa for the presence of *Leucocytozoon* and demonstrate that the patterns of prevalence and diversity continue at a macroecological scale. Using molecular data, I found that the prevalence of *Leucocytozoon* varied between sampling areas from 3.9% to 62.64% and the diversity between parasite lineages varied from 0.1% to 16.6%. The high variation in prevalence between sampling areas indicated that there are significant factors affecting this parasite's ability to transmit between hosts. Through statistical tests, I determined that host family, geographic region, and habitat all influence the prevalence of *Leucocytozoon*. Additionally, by analyzing the distribution of parasite lineages I demonstrate that the 326 unique lineages recovered in this study are a small fraction of the overall number of parasites that may be present within the host populations. The results of this study provide insight into the true diversity of this parasite and the differences in prevalence across sampling areas.

CHAPTER ONE

INTRODUCTION

Importance and diversification of parasites

In most systems little is known about parasite diversification, including which hosts the parasite infects, which environments they inhabit and how many different parasite lineages are present. Parasites represent a substantial portion of the overall diversity on this earth, by some estimates constituting 40-50% of all living species (Price, 1977; Dobson et al., 2008; Freeland, 1983). These organisms can influence community structure (Thompson et al., 2005; Atkinson et al., 2000), affect phenotypic variation of their hosts (Poulin, 1995), and have been theorized as a driver of diversification of their hosts (Wegner et al., 2003; Spurgin and Richardson, 2010). The influence parasites hold over their hosts can be substantial.

As technology has advanced over the past several decades, specifically relating to molecular techniques, our awareness of the importance of parasites in the life of most host organisms has also increased. Yet our understanding of how parasites diversify to fill all of the unique niches has in many cases become more convoluted (Rigaud et al., 2010). The traditional thought of strict co-evolution between a parasite and its host does not always hold true. Co-evolution may occur at the host genus or familial levels or there may be no evidence of co-evolution present (Galen and Witt, 2014; Jenkins et al., 2012; Lauron et al., 2015; Wilson et al.,

2003). If the host is not the main influence in the evolution of parasite lineages, then other factors may potentially influence the diversification of parasites. Often these mechanisms are poorly understood and this is becoming increasingly apparent in certain blood parasites (Jenkins et al., 2012; Morand, 2015).

Blood parasites

Blood parasites, specifically those that directly infect the hosts' blood cells, have the potential to greatly contribute to our understanding of the ecology and evolution of disease in wild populations through the study of their life history, their ability to spread across great distances, and how substantial a presence they may or may not have in a given community. These pathogens often have a complicated life history influenced by their vertebrate host, arthropod vector and the external environments those both live in. The ability to identify the factors affecting the diversification of the blood parasite can potentially yield insight into how the parasite spreads across populations and communities.

Avian Haemosporidian parasites

Avian blood parasites in the Order Haemospororida are of special interest as they include the causative agents of malaria and other wildlife diseases. In most systems little is known about Haemosporidian parasite prevalence among and within various communities of birds. The three main genera of importance, in terms of abundance and overall impact on their hosts, are *Plasmodium*, *Haemoproteus*, and *Leucocytozoon*. These three closely related protozoa share several ecological traits, including a near worldwide distribution (Howe et al., 2012; Beadell et al., 2006), use

of arthropod vectors (Valkiunas, 2005) and exhibit frequent host switching (Martinsen et al., 2008). However, one notable difference is that while *Haemoproteus* and *Plasmodium* can be found to infect nearly all terrestrial vertebrates, *Leucocytozoon* is so far known only from birds. Compared to *Haemoproteus* and *Plasmodium*, there have been few comprehensive studies of ecological correlates relating to incidences of host infection and the implications this can have to the spread of *Leucocytozoon*.

Leucocytozoon

Leucocytozoon is an obligate intracellular protozoan parasite that infects blood cells of birds. Though mainly studied as a veterinary issue regarding disease in poultry animals, it is becoming increasingly apparent that *Leucocytozoon* can have a large impact on wild populations of birds. *Leucocytozoon* holds significance as a major cause of reduced fitness and death in birds, both captive and wild (Knowles et al., 2010; Stjerma et al., 2008). While most birds harboring this parasite show little to no signs of the disease, those that are visibly affected may show varying symptoms of anemia, emaciation, ataxia, enlargement of the liver or spleen, and gross lesions across several internal organs (Atkinson et al., 2009). The closely related genus *Plasmodium* has been shown to shorten telomeres in birds (Ashgar et al., 2015), decrease reproductive success (Marzal et al., 2005), and may even lead to the decline and extinction of species (Samuel et al., 2015). It is possible that *Leucocytozoon* is also capable of eliciting similar effects in birds (Atkinson, 1991; Marzal et al., 2005; Bennett et al., 1991).

Leucocytozoon spreads from host to host by utilizing Simuliid flies (Black flies) as a vector. Simuliid flies are the definitive host where sexual reproduction occurs and birds are the intermediate host where asexual reproduction occurs. Black flies have a near worldwide distribution (Adler et al., 2004) and are most often found near running water (Malmqvist et al., 1999). The concurrent near worldwide distribution that black flies have with birds is one of the key factors in the ability of *Leucocytozoon* to spread globally. The one known exception to the use of Simuliid flies as a vector occurs with the subgenus *Akiba*, which uses members of the genus *Culicoides*, a type of biting midge, as a vector. There is only one described species of this subgenus, *Akiba caulleryi* (Valkiunas, 2005).

Within the genus *Leucocytozoon* there is no clear consensus on what constitutes a species. One approach to describing species is to do so using the host family specificity approach, which currently recognizes about 143 different species (Atkinson, 2009). Another technique to defining species is through morphological analysis of the blood stages of this parasite. According to morphometric data there are approximately 107 currently known species (Valkiunas, 2005). Combining both of these methods the number decreases to only 36 valid species (Atkinson, 2009). However, using either or both the family specificity and morphospecies approach can lead to ambiguous results of species descriptions. For example, *Leucocytozoon toddi* was previously described as the only leucocytozoid species that parasitizes falconiform birds, based on morphological and host familial taxonomy. Sehgal (2006) found sequence divergences of over 10% in cytochrome b haplotypes

recovered from Californian raptors. The discovery of these genetically distinct haplotypes in morphologically similar *Leucocytozoon* is indicative of cryptic speciation of this parasite. Further investigation into *L. toddi* revealed distinct haplotypes corresponding with minute morphological differences that were previously undetected. *L. toddi* was redefined as a species group, which included *Leucocytozoon mathisi* and *Leucocytozoon buteonis* as part of it (Valkiunas et al., 2010).

The increase in the use of molecular data has provided an incredible amount of novel insight into the underlying biology of *Leucocytozoon* and other Haemosporidian parasites. In conjunction with morphological descriptions, biogeographic distribution and host affiliations, the addition of molecular data can further contribute to our understanding of the factors that govern parasite diversification by potentially bridging gaps in the knowledge of understanding the processes which allow the parasite to spread throughout host populations.

MalAvi: Collaborative advances for avian Haemosporidian parasites

One major collaborative advance in understanding the true diversity of Haemosporidian parasites is through an initiative at Lund University, Sweden which has created a database of avian Haemosporidian parasites in which all known cytochrome b lineages of *Plasmodium*, *Haemoproteus* and *Leucocytozoon* are deposited, vetted and curated. This database, known as MalAvi, seeks to increase the knowledge and accessibility of avian Haemosporidian parasites. As of August, 2015 there are over 2,000 unique lineages. This constitutes 1/5 of the estimated

10,000 unique Haemosporidian lineages hypothesized by Bensch et al. (2004). Per MalAvi guidelines, a lineage or haplotype is defined as being a 100% unique sequence. At this time, species delimitation of Haemosporidian parasites using genetic data is in the beginning stages. These unique haplotypes are used as a barcoding system for parasite identification. (Bensch et al., 2009).

Molecular techniques for parasite detection

As techniques for molecular detection of Haemosporidian parasites have increased in efficiency and sensitivity over the past two decades there has been debate over whether PCR is more sensitive at identifying infection over the traditional method of visually screening blood smears, especially at low levels of parasitemia, the quantifiable presence of a parasite in blood. The general consensus is that screening for the presence of parasites through PCR is equivalent to (Valkiunas et al., 2008) or better than (Bejon et al., 2006; Wang, 2014; Johnston et al., 2006; Ndao et al., 2004; Lutz et al., 2015) visual detection from blood films. Though there are many benefits to visually screening blood smears, due to the volume of samples included in this study as well as the goals of the research, I screened all samples via molecular methods only.

Parasite fidelity to host and biogeographic region

Previous studies have shown evidence for varying degrees of avian Haemosporidian host fidelity. The early consensus was that these parasites exhibit a high degree of host specificity (Bensch et al., 2000; Waldenstrom et al., 2002; Ricklefs and Fallon, 2002). *L. smithi* and *L. caulleryi* are examples of species specific

parasites to chickens and turkeys respectively. Additionally, it was posed that individual species of *Leucocytozoon* would be unable to parasitize birds of different orders (Valkiunas, 2005). The idea of strict host-specificity has lessened with the increase in the utilization of molecular methods to detect and identify Haemosporidian lineages found in wild birds. Recent studies have shown that *Leucocytozoon* generally shows specificity at the host familial level (Silva-Iturriza et al., 2012).

Similar to host specificity, geographic fidelity of a parasite may have a trade off between the ability to survive in an increased geographic range or increased fitness within a specific range. It has been hypothesized that lower host and geographic fidelity increases the parasite's ability to more successfully spread, facilitating increased prevalence across populations and greater geographic distribution of lineages. However, this decreased fidelity may come at the cost of decreased reproductive abilities (Marzal et al., 2008).

Prevalence and diversity of *Leucocytozoon*

There have been several studies asking similar questions about the prevalence and diversity of *Leucocytozoon* (Galen and Witt, 2014; Chasar et al., 2009; Ishtiaq et al., 2007; Szymanski and Lovette, 2005). However, this study is a major advance in that it utilizes avian blood samples collected on a continental-scale sub-Saharan Africa. The wide range of sampling sites and host taxa will allow for broader conclusions regarding the factors affecting the prevalence and diversity of *Leucocytozoon* to be drawn than seen in previous studies. Parasite diversification in

wild populations is poorly understood. This problem is heightened by little and unequal sampling of hosts populations throughout the world, it can be very difficult to obtain comparable sampling using within and among various geographic regions. This project is unique in that it utilizes samples collected and processed using consistent methodologies. This consistency allows for greater confidence in the conclusions than would be possible with studies using multiple techniques and hindered by limited and unequal sampling (Clark et al., 2014).

In order to fully understand how a parasite is able to successfully spread throughout populations, knowledge of factors limiting or compelling its diversification is essential. This study aims to investigate how the diversity and prevalence of *Leucocytozoon* varies among different groups of birds and ecological constraints. Utilizing a large set of avian blood samples collected across five countries of sub-Saharan Africa, I thoroughly screened each sample for the presence of *Leucocytozoon*. Once all birds are identified as being positive or not positive for the presence of the parasite I will conduct tests to analyze various factors that may influence how often *Leucocytozoon* is found within a population and how genetically diverse the *Leucocytozoon* are. It is important to note that no host will be designated as negative for the presence of *Leucocytozoon*. Hosts will be marked as positive or not positive for *Leucocytozoon* since it is possible that some hosts are infected with the parasite but show no indication through the molecular methods utilized in this study. Samples with very low quantities of the parasite in the blood

are difficult to detect and may go undetected. Therefore, it is important that no host is marked negative for the parasite as that could potentially be incorrect.

Specific Aims

The specific aim of this study is to identify factors affecting the prevalence and diversity of *Leucocytozoon* across a wide range of hosts and geographic areas. I will do this by answering the following questions:

What is the overall prevalence of Leucocytozoon within the scope of this study?

Few studies, if any, have compared *Leucocytozoon* prevalence across as many sampling areas and host species as this one. By calculating the overall prevalence of *Leucocytozoon* across a continental scale, I can define a baseline data point from which to make comparisons across several biotic and abiotic categorizations. Through the identification of significantly different levels of prevalence it may be possible to identify factors influencing those differences.

What is the prevalence of Leucocytozoon at specific sampling areas, geographic regions, various habitats and host families? Does prevalence differ significantly within these categories?

Estimating the prevalence within sampling areas, geographic regions, habitats, and host families allow for comparisons within each category. If the prevalences do prove to be statistically different, then it may be possible to implicate biotic or abiotic variables that increase or decrease the number of occurrences of *Leucocytozoon*. Variations in habitat and geographic characteristics such as rainfall, elevation, or proximity to running water may all influence the

prevalence of this parasite. Similarly, host characteristics such as sociality, nesting habits, or diet may also impact the prevalence. By determining if there is or is not a significant difference in prevalence within sampling areas, geographic regions, habitats, and host families then further research can be done as to why or why not there are differences.

Is there a sampling effect influencing the estimation of prevalence rate?

Is it possible to identify a point in which enough birds have been sampled to accurately estimate the prevalence in the overall population or does the prevalence and diversity of *Leucocytozoon* continually increase incrementally with the amount of birds sampled? For each refined geographic region I calculated a species accumulation curve using number of birds sampled as effort and number of *Leucocytozoon* lineages identified as the estimator of diversity. Using the species accumulation curves I aim to identify a point at which a sufficient number of birds have been sampled to accurately represent the presence of *Leucocytozoon* within that population. If all sampling areas have a sufficient number of hosts screened, then comparisons between the sites will be statistically supported.

How many unique lineages are found? Do lineages exhibit host or geographic specificity?

Another estimator of *Leucocytozoon* diversity is through the identification of the number of unique lineages present. Lineages can be examined for both host and geographic specificity. The degree to which *Leucocytozoon* lineages exhibit host specificity varies, though generally it occurs at the host family level. The amount of

geographic specificity of the parasite lineages is largely unknown, though through analysis of GenBank and MalAvi data it is possible for lineages to be very area specific or have lineages found on multiple continents.

What is the nucleotide diversity at various geographic regions and habitats? How genetically different are the lineages in this study?

Haemosporidian parasites are a highly diverse group of parasites. One measure of this diversity can be estimated through the amount of nucleotide differences between lineages. By calculating the overall nucleotide diversity and range of base pair mismatches in the whole study we can create baseline data points from which comparisons can be made. Nucleotide diversity will also be calculated for each geographic region and habitat. Comparisons of nucleotide diversity will show if *Leucocytozoon* diversification is influenced by habitat or region.

Experimental design: Does Taq affect the ability to detect infections?

Failure to positively identify low intensity infections can lead to underestimation of the true prevalence of a parasite within a population (Valkiunas, 2005). Molecular methodologies modified to enhance the probability of picking up low-level infections will allow for more accurate conclusions based on prevalence. Taq polymerase may have varying success in successfully replicating the targeted DNA sequence. By screening each blood sample multiple times using two different types of Taq, I tested if there is difference in the amplification rate between Roche Taq and Platinum Taq.

Since many *Leucocytozoon* lineages differ by as little as a one base pair, it is crucial to identify if there are a significant number of errors from mismatches in PCR replication or sequencing. These errors could lead to an incorrectly inflated amount of lineages that differ by one base pair. To test for this, I will quantify the number of mismatches between sequences in a pairwise distance matrix and examine if there is an abnormally large amount of low quantity mismatches, indicating the possibility of Taq error.

CHAPTER TWO

METHODS

Sampling Sites

Samples utilized in this research were collected from five different countries in sub-Saharan Africa: the Democratic Republic of the Congo (DRC), Kenya, MLW (MLW), MOZ (MOZ) and UGA (UGA) from 2009-2013. Table 1 and Figure 1 shows the breakdown of sampling areas, including dates, elevation and locality coordinates. Most sampling areas are comprised of multiple sampling sites. Birds collected in the Democratic Republic of the Congo, MLW, MOZ and UGA were captured using mist nets or were opportunistically collected. Blood was primarily collected via brachial venipuncture from live birds and stored on Whatman FTA Cards (GE Healthcare, Piscataway, NJ).

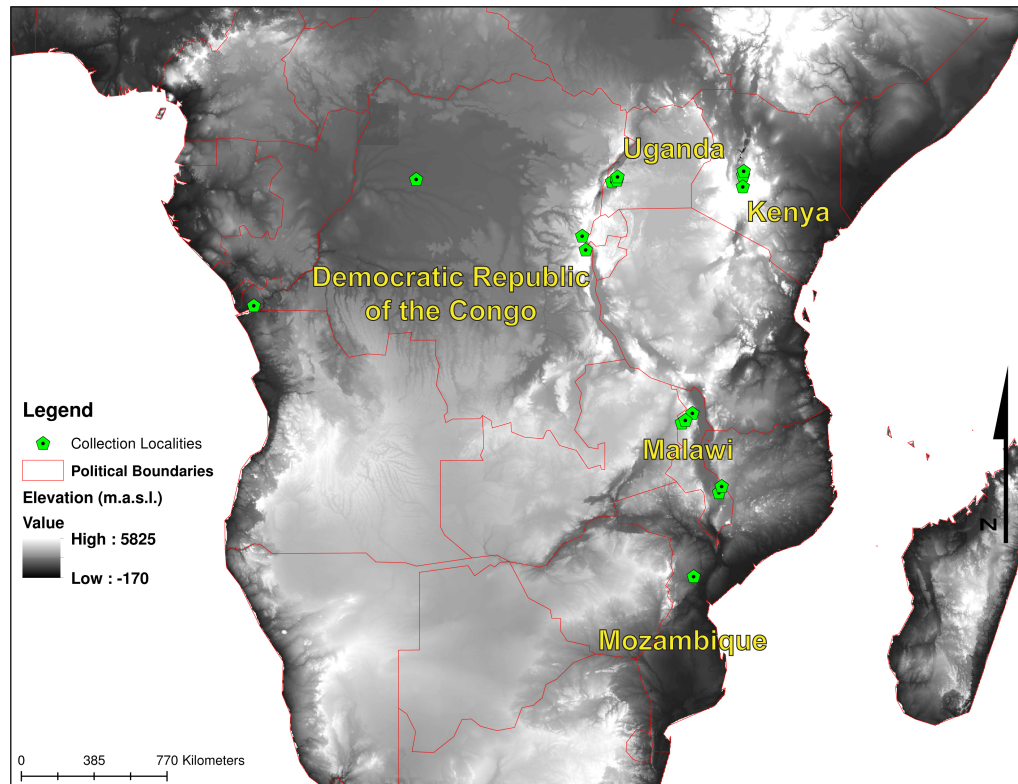


Figure 1: Map of sampling areas.

	Country	Location	Elevation (meters)	Latitude	Longitude	Date	Broad Region	Refined Region	Habitat ¹
1	DRC	Luki Biosphere Reserve	280	5°37' S	13°07' E	Jul, 2013	3	6	LF
2	DRC	Boende	350	0°23' S	20°50' E	Jun-Jul, 2013	3	6	LF
3	DRC	Kahuzi-Biega National Park	2392	2°19' S	28°44' E	Apr, 2012	1	1	MF
4	DRC	Kangala Forest	2245-2770	2°58' S	28°54' E	Apr, 2012	1	1	MF
5	Kenya	Laikipia County	1804-2343	0°34' N	36°23' E	Mar, 2012; Oct-Dec, 2012; Apr-Jul, 2013;	1	2	O
6	Kenya	Nakuru County	1809-2073	0°46' S	36°25' E	Sep-Dec, 2012; May, 2014	1	2	O
7	Kenya	Nyandarua County	1857-2672	0°02' N	36°22' E	Sep-Dec, 2012	1	2	O
8	MLW	Namizimu Forest Reserve	1029-1295	14°12' S	35°22' E	Feb, 2011	2	4	M
9	MLW	Vwaza Wildlife Reserve	1071-1775	11°04' S	33°38' E	Oct-Nov, 2009	1	3	M
10	MLW	Nyika National Park	1578-2434	10°44' S	33°58' E	Oct-Nov, 2009	1	3	O/MF
11	MLW	Mangochi Forest Reserve	470-1240	14°30' S	35°14' E	Feb-Mar, 2011	2	4	M
12	MOZ	Gorongosa Mountain	940-1220	18°29' S	34°02' E	Aug, 2011	2	5	M/MF
13	UGA	Kibale National Park, Mainaro	1200	0°21' N	30°23' E	Mar, 2013	1	1	LF
14	UGA	Kasyoha-Kitomi Forest Reserve	1322	0°16' S	30°09' E	Apr, 2013	1	1	LF
15	UGA	Kibale National Park, Ngogo Research Camp	1430	0°30' N	30°25' E	Mar, 2013	1	1	LF

Table 1: Geographic information of sampling areas with associated categorical designations for prevalence analyses.

¹Habitat: Lowland Forest (LF), Montane Forest(MF), Miombo Woodland(M), Open(O)

Sampling Areas: Broad and Refined Biogeographic Regions

Each sampling area was assigned a designation in several different categories to be used for parasite prevalence analyses. The first category, **Broad Geographic Region**, refers to sites in the Eastern Africa (1), Southern Africa (2) or Congo Basin (3) of our overall sampling area. The second category, **Refined Geographic Region**, separates sampling sites out into more specific geographic areas (pers. comm. J. Bates). Region 1 is the Albertine Rift area and includes sampling sites in eastern DRC and all of UGA. This region is characterized by mid to high elevations as well as numerous large rivers and lakes. Sampled habitats from the Albertine Rift region are montane and lowland forests. Deforestation is prominent, resulting in numerous fragmented forests. Region 2 is the Kenyan Highlands which is predominantly an arid, open environment. The sampling sites in Region 2 were primarily at private farms or protected conservation areas. Region 3, North MLW, is comprised of Vwaza Wildlife Reserve and Nyika National Park sampling areas. North MLW has the most habitats, with open, miombo woodlands, and montane forest all being found there. Region 4 is South MLW and includes the Namizimu and Mangochi Forest Reserves. There is a wide range of elevation in this sampling area, from 470-1295 meters and consists mainly of the miombo woodland habitat. Region 5 is Gorongosa Mountain in MOZ which is the southernmost sampling area of this study. Sampling at Gorongosa Mountain primarily occurred at two separate elevation of the same mountain, one sampling site at 940 meters and the second site at 1240 meters.

The final Refined Geographic Region is the Congo Basin. Two areas were sampled here, Luki Biosphere Reserve and Boende. The Congo Basin has the lowest elevation sampling sites at 280-350 and is comprised of the lowland forest habitat.

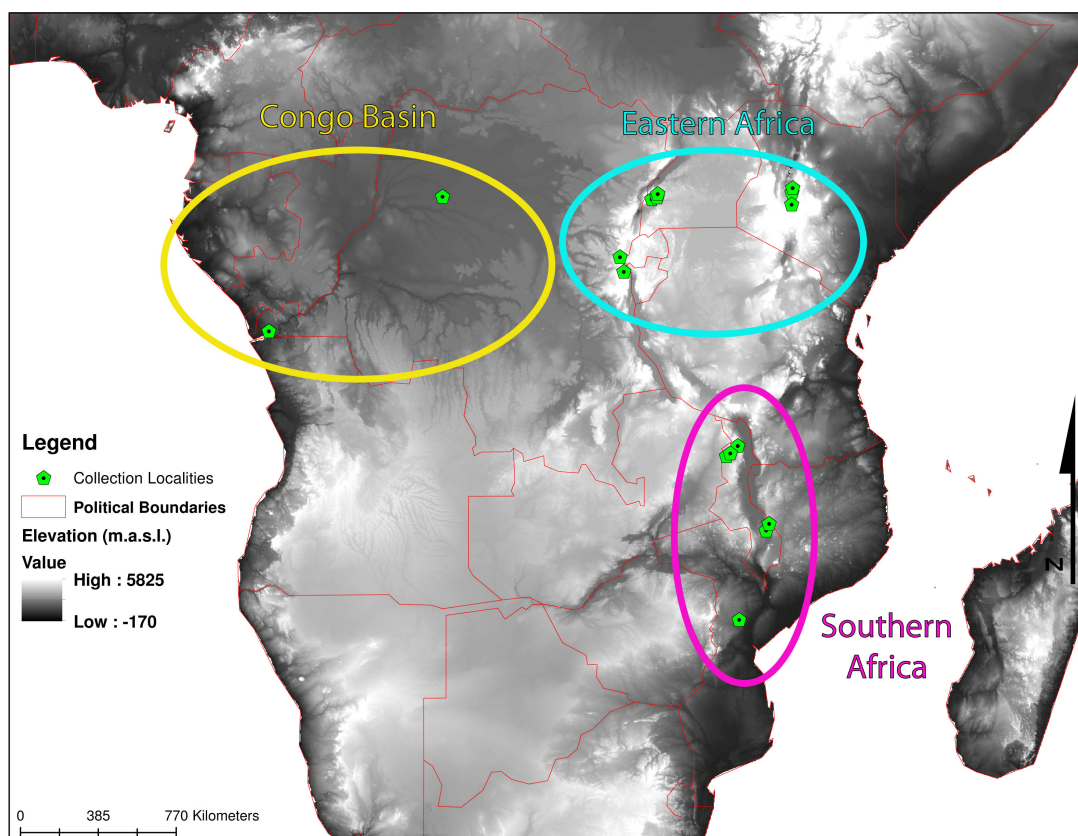


Figure 2: Distribution of Broad Geographic Regions.

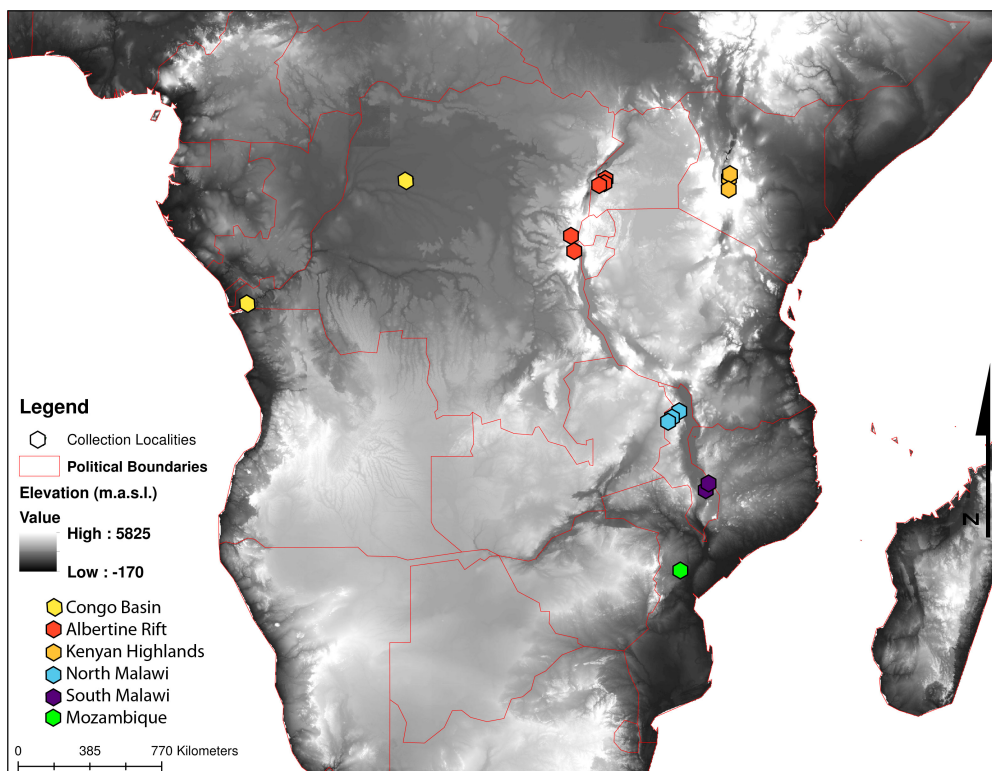


Figure 3: Distribution of Refined Geographic Regions.

Habitats

The final category is **Habitat** type. Lowland Forest (LF), also known as equatorial evergreen forests, are characterized by very little seasonal variation and high annual rainfall (1400-2000mm). It is estimated that species richness is high in this habitat type though endemism is not (Beresford and Cracraft, 1999; Mittermeier et al., 1998). Montane Forest (MF) is found in mid to high elevations throughout several countries in Africa, including parts of MLW and MOZ. Seasonality is pronounced in this habitat and rainfall varies between 1200-2000mm per year. This habitat shows fairly high levels of avian species

richness and moderate levels of avian endemism (Fjeldså and Lovett, 1997). Miombo woodlands (M) are found in parts of MLW and MOZ. These woodlands are generally found in lower elevations of the Eastern African Plateau and are characterized by a pronounced seasonality with both a wet (Summer-November-March) and dry/winter drought season. Bird diversity in this habitat has been described as prolific, with over 450 species of birds recorded, though there is little to no evidence of endemism in these species (Olsen et al., 2001). The final habitat category is Open (O), most similar to a savanna habitat. The open habitat is characterized by widely spaced trees with an open canopy. Average rainfall is generally lower than in the other habitats of this study, with an average of 90-150 centimeters per year (Dean et al., 1999).

Overall, I screened blood samples from 3,375 birds comprising 18 Orders, 67 families, 181 genera and 402 species for the presence of *Leucocytozoon*. Avian species designations follow the Clements list version 6.8 (Clements et al., 2013). Table 3 shows how many individuals per host family were screened. Avian sampling in this study is biased but not limited to birds commonly caught in mist nets.

Molecular Methods

I extracted genomic DNA from blood stored on Whatman FTA Cards using Qiagen DNeasy kits following a modified manufacturer's protocol for dried blood spots (Qiagen, Valencia, CA, USA). In total, 200 microliters of DNA elution was generated from each sample to be used in subsequent PCR runs.

False negatives are a common occurrence when screening for the presence of blood parasites (Richard et al., 2002; Freed and Caan, 2006). Therefore, I screened each blood sample three times to minimize the occurrence of false negatives. *Leucocytozoon* parasites were targeted through a nested PCR methods based on Bensch, 2008 (DW2/DW4, outer) and Sehgal, 2006 (LeucoF/LEucoR, inner). This method amplifies the mitochondrial cytochrome b gene (cytb). I conducted each of the three PCR screens independently of the others and ran them using identical conditions, with the exception of the Taq used. As part of an experimental process, I looked to optimize the ability to detect infections of low parasitaemia. In order to test the effect of Taq quality on the ability to detect infections, I ran two independent PCR runs using Roche Taq (Roche Diagnostics, GmbH, Mannheim, Germany) while the third run was conducted using Platinum Taq (Invitrogen, Carlsbad, CA). I quantified the number of times Roche Taq and Platinum Taq positively amplified *Leucocytozoon* and compared the results using a paired t-test to see if there is a significant difference in the abilities of the Taq to amplify parasite DNA.

I included negative controls in each extraction and all PCR runs to test for any contamination or false positives throughout these steps. I visualized PCR products on a 1.25% agarose gel. All visual positives were then purified for sequencing using exoSAP-IT (USB, Cleveland, Ohio). Following purification, I then utilized Sanger sequencing on an ABI 3730 Automated DNA sequencer (Applied Biosystems, Foster City, CA) using both the forward and reverse

primers LeucoF and LeucoR which produced an 818 base pair fragment of *cytb*. All sequence data were edited using Geneious version 7.1 and later (Biomatters).

Co-Infections

Co-infections are a common occurrence with avian Haemosporidian parasites and occur when two or more different haplotypes of these pathogens are found within the same host. In this study, I determined instances of multiple infections of *Leucocytozoon* through analysis of the chromatograms. Multiple peaks at a single nucleotide site indicate the presence of more than one *Leucocytozoon* haplotype. When applicable, I used visual phasing to parse apart the different lineages. If visual identification of the different lineages was not possible, I marked the host as positive for *Leucocytozoon*. These samples were included in prevalence analyses but were not in phylogenetic analysis or nucleotide diversity tests.

Lineage Identification

Edited sequence data were subjected to a BLAST search to genetically confirm their identity as *Leucocytozoon*. Following positive identification, all sequences were collapsed down into haplotypes that shared 100% pairwise identity. These unique haplotypes were then compared across the MalAvi database to distinguish lineages as previously identified or novel. Lineages were then assigned a name AfrLeu (Afrotropical *Leucocytozoon*) and identifying number from 001-326. Lineages from this study will be deposited and made available on both GenBank and the MalAvi database.

Haplotype and Nucleotide Diversity

Leucocytozoon haplotype diversity was estimated using the number of cytochrome b sequences present in this study as a whole and also in the separate categories associated with Geographic Regions and Habitats. Nucleotide diversity is used to measure the amount of polymorphisms per site within the sequences used in this study. Nucleotide diversity was calculated for all sequences used in this study and also in the separate categories associated with Geographic Regions and Habitats. Haplotype and Nucleotide diversity was calculated using DnaSP (Rozas et al, 2003). I then constructed a pairwise distance matrix of all sequences in PAUP (Swofford, 2003) and analyzed the matrix in R (Team, 2014).

I calculated species accumulation curves in R using the package *vegan* (Oksanen et al., 2007) for the Refined Geographic Regions. The species accumulation method I used was “random” and the “chao1” species richness estimator was used for the total number of expected species through the function *specpool*. The random method unsystematically adds in birds to the species accumulation curve instead of the order they were sampled. The purpose of these curves in this study is to determine if, as opposed to when, *Leucocytozoon* lineage diversity has been thoroughly sampled. To calculate *Leucocytozoon* lineage diversity within refined geographic areas, I constructed species accumulation curves using number of birds caught as the sampling effort and lineage counts as the estimators of diversity.

Prevalence

Prevalence is defined as the number of birds positively identified as being infected with *Leucocytozoon* divided by the total number of hosts screened. We used a chi-square analysis to test for significant factors affecting prevalence in several separate categories including Geographic Location, Habitat, and Host Family. All samples screened were included in tests on Geographic Location and Habitat. To detect significant differences in prevalence among host families I only considered those with 20 or more blood samples screened.

CHAPTER THREE

RESULTS

Prevalence of *Leucocytozoon*

Of the 3,375 different birds I screened for the presence of *Leucocytozoon*, a total of 787 tested positive for *Leucocytozoon*, giving an overall prevalence of 23.32%. At different sampling areas, prevalence varied from 3.9% to 62.64%. Prevalence at different sampling areas can be seen in Table 2 and Figure 4. The five most well sampled host families showed varying degrees of prevalence; Coliidae (9 positive of 296 individuals screened, 3.04% prevalence), Alaudidae (5 positive of 332 individuals screened, 1.51% prevalence), Pycnonotidae (178 positive of 371 individuals screened, 47.98% prevalence), Muscicapidae (71 positive of 270 individuals screened, 26.30% prevalence), and Ploceidae (96 positive of 313 individuals screened, 30.67% prevalence). *Leucocytozoon* prevalence by host family can be seen in Table 3 and Figure 5.

Country	Sampling Area	n	p	o
DRC	Kahuzi-Biega National Park	91	57	62.64%
DRC	Kangala Forest	100	60	60.00%
UGA	Kibale National Park, Mainaro	180	30	16.67%
UGA	Kasyoha-Kitomi Forest Reserve	195	90	46.15%
UGA	Kibale National Park, Ngogo Research Camp	158	50	31.65%
Kenya	Laikipia County	481	102	21.21%
Kenya	Nakuru County	498	26	5.22%
Kenya	Nyandarua County	468	49	10.47%
MLW	Vwaza Wildlife Reserve	228	31	13.60%
MLW	Nyika National Park	295	140	47.46%
MLW	Namizimu Forest Reserve	177	28	15.82%
MLW	Mangochi Forest Reserve	127	17	13.39%
MOZ	Gorongosa Mountain	165	90	54.55%
DRC	Luki Biosphere Reserve	53	9	16.98%
DRC	Boende	154	6	3.90%

Table 2: Prevalence of Leucocytozoon by sampling area with (n) total number of screened hosts, (p) number of positive individuals, and (o) overall prevalence for the corresponding site.

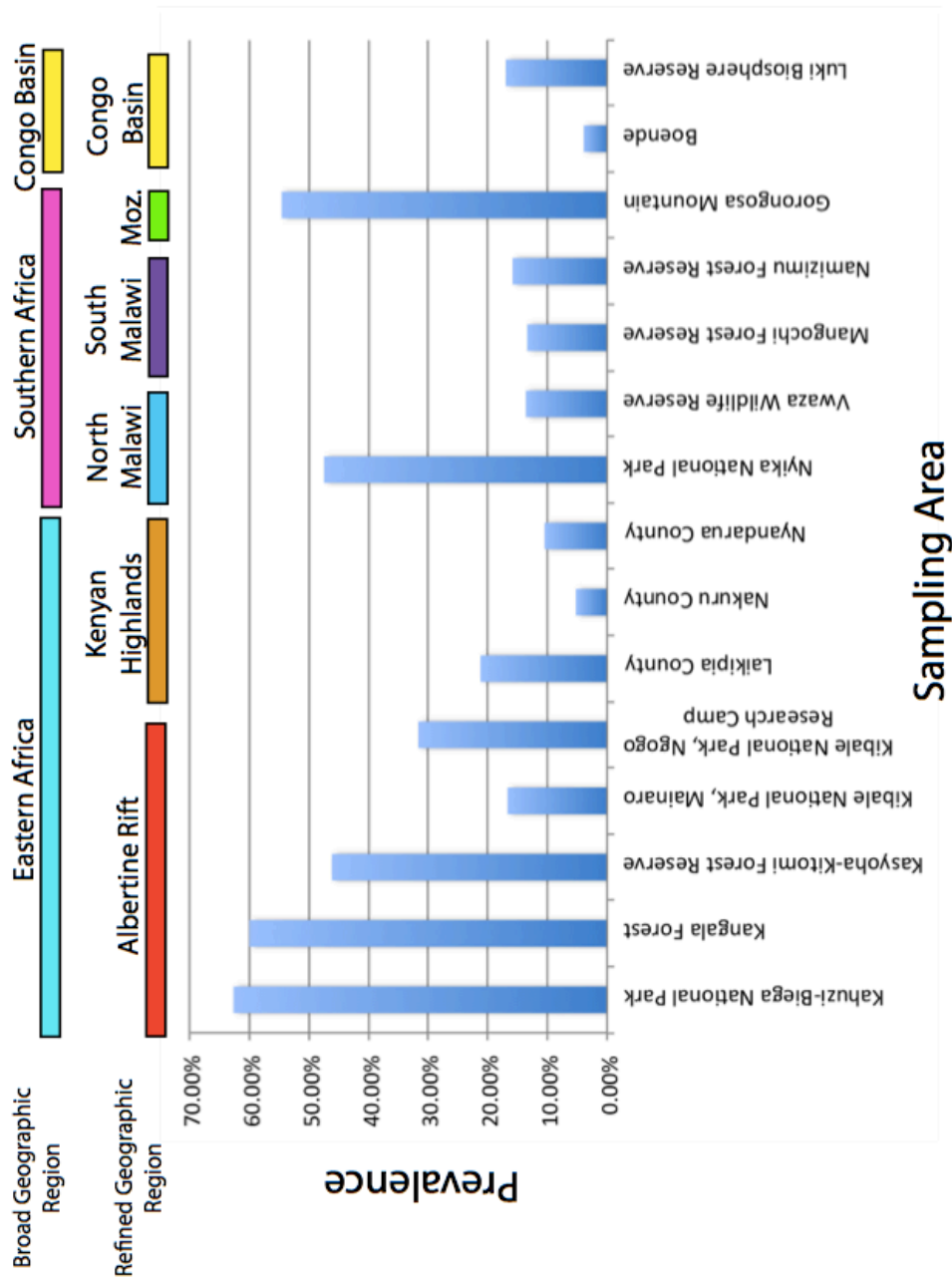


Figure 4: Prevalence by sampling area, corresponding data with Table A, with corresponding information on the Broad Geographic Regions and Refined Geographic Regions.

Table 3: Number of screened birds (n) per host family with the incidences of *Leucocytozoon* infection (p) and overall prevalence (o) within that family. The genus and species columns refer to the number of host genera and species screened per that family. The country columns (DRC, Kenya, MLW, MOZ, UGA) indicate how many individual birds were screened from sampling areas in that country. A (-) indicates no birds from that family were screened from that country.

Order	Family	n	p	o	genus	species	DRC	Kenya	MLW	MOZ	UGA
1	Anseriformes	2	0	0.00%	1	1	-	-	2	-	-
2	Galliformes	1	0	0.00%	1	1	-	-	1	-	-
3	Galliformes	25	8	32.00%	3	5	3	2	11	-	9
4	Pelecaniformes	1	0	0.00%	2	2	-	-	1	-	-
5	Pelecaniformes	9	0	0.00%	1	1	-	-	9	-	-
6	Accipitriformes	1	0	0.00%	1	1	-	1	-	-	-
7	Accipitriformes	16	3	18.75%	7	8	1	9	5	1	-
8	Gruiformes	5	0	0.00%	1	2	2	-	1	-	2
9	Charadriiformes	19	0	0.00%	2	4	-	19	-	-	-
10	Charadriiformes	1	0	0.00%	1	1	-	-	-	-	1
11	Columbiformes	52	12	23.08%	4	11	3	18	14	4	13
12	Cuculiformes	3	1	33.33%	2	3	-	1	2	-	-
13	Cuculiformes	17	2	11.76%	5	9	-	5	7	-	5
14	Strigiformes	2	1	50.00%	2	2	-	-	2	-	-
15	Caprimulgiformes	11	0	0.00%	1	3	-	-	11	-	-
16	Colliformes	296	9	3.04%	2	3	1	290	3	-	2
17	Trogoniformes	5	3	60.00%	1	2	-	1	2	1	1
18	Bucerotiformes	3	0	0.00%	1	1	-	3	-	-	-
19	Bucerotiformes	7	1	14.29%	2	3	1	4	2	-	-
20	Bucerotiformes	3	1	33.33%	1	2	-	-	3	-	-

Order	Family	n	p	o	genus	species	DRC	Kenya	MLW	MOZ	UGA
21	Coraciiformes	44	2	4.55%	5	10	3	2	17	-	22
22	Coraciiformes	2	0	0.00%	1	1	-	-	2	-	-
23	Piciformes	44	8	18.18%	4	14	4	22	7	-	11
24	Piciformes	18	2	11.11%	1	7	5	2	6	1	4
25	Piciformes	40	4	10.00%	3	7	3	17	3	-	17
26	Falconiformes	1	0	0.00%	1	1	-	1	-	-	-
27	Psittaciformes	1	0	0.00%	1	1	-	1	-	-	-
28	Psittaciformes	2	0	0.00%	1	2	-	-	2	-	-
29	Passeriformes	5	2	40.00%	1	2	2	-	3	-	-
30	Passeriformes	2	0	0.00%	1	1	-	-	-	-	2
31	Passeriformes	60	30	50.00%	2	8	2	1	23	14	2
32	Passeriformes	6	5	83.33%	1	1	-	-	6	-	-
33	Passeriformes	74	37	50.00%	6	13	10	22	30	10	2
34	Passeriformes	1	0	0.00%	1	1	-	-	1	-	-
35	Passeriformes	19	2	10.53%	2	5	1	16	2	-	-
36	Passeriformes	11	9	81.82%	1	4	1	3	4	3	-
37	Passeriformes	9	1	11.11%	1	2	-	1	6	2	-
38	Passeriformes	28	1	3.57%	1	3	12	-	1	1	14
39	Passeriformes	3	1	33.33%	1	1	-	-	3	-	-
40	Passeriformes	8	6	75.00%	1	2	2	-	1	-	5
41	Passeriformes	331	5	1.51%	3	4	-	327	4	-	-
42	Passeriformes	12	1	8.33%	4	7	-	5	6	1	-
43	Passeriformes	8	3	37.50%	1	1	-	-	5	3	-
44	Passeriformes	5	4	80.00%	1	3	-	-	5	-	-
45	Passeriformes	1	0	0.00%	1	1	-	-	1	-	-
46	Passeriformes	371	178	47.98%	9	22	127	30	68	18	128

Order	Family	n	p	O	genus	species	DRC	Kenya	MLW	MOZ	UGA
47	Passeriformes	40	4	10.00%	3	4	11	8	3	-	18
48	Passeriformes	12	3	25.00%	1	3	5	-	5	2	-
49	Passeriformes	14	7	50.00%	1	1	4	2	8	-	-
50	Passeriformes	206	33	16.02%	7	28	33	70	75	5	23
51	Passeriformes	32	22	68.75%	1	3	8	10	12	-	2
52	Passeriformes	31	20	64.52%	1	2	5	9	15	1	1
53	Passeriformes	56	13	23.21%	1	4	18	-	1	-	37
54	Passeriformes	20	3	15.00%	1	5	-	20	-	-	-
55	Passeriformes	1	1	100.00%	1	1	1	-	-	-	-
56	Passeriformes	1	1	100.00%	1	1	-	-	1	-	-
57	Passeriformes	270	71	26.30%	18	35	51	42	97	26	54
58	Passeriformes	63	23	36.51%	3	8	5	19	12	3	24
59	Passeriformes	119	18	15.13%	4	6	-	107	12	-	-
60	Passeriformes	199	56	28.14%	8	23	48	37	43	38	33
61	Passeriformes	62	6	9.68%	3	5	-	40	9	7	6
62	Passeriformes	6	0	0.00%	1	4	-	1	5	-	-
63	Passeriformes	82	31	37.80%	1	10	5	45	31	1	-
64	Passeriformes	47	12	25.53%	2	4	-	43	4	-	-
65	Passeriformes	313	96	30.67%	8	25	5	159	97	8	44
66	Passeriformes	170	28	16.47%	15	28	17	25	79	13	36
67	Passeriformes	3	0	0.00%	1	2	-	0	3	-	-
Total	18	3375	787	23.32%	181	402	402	1444	829	163	517

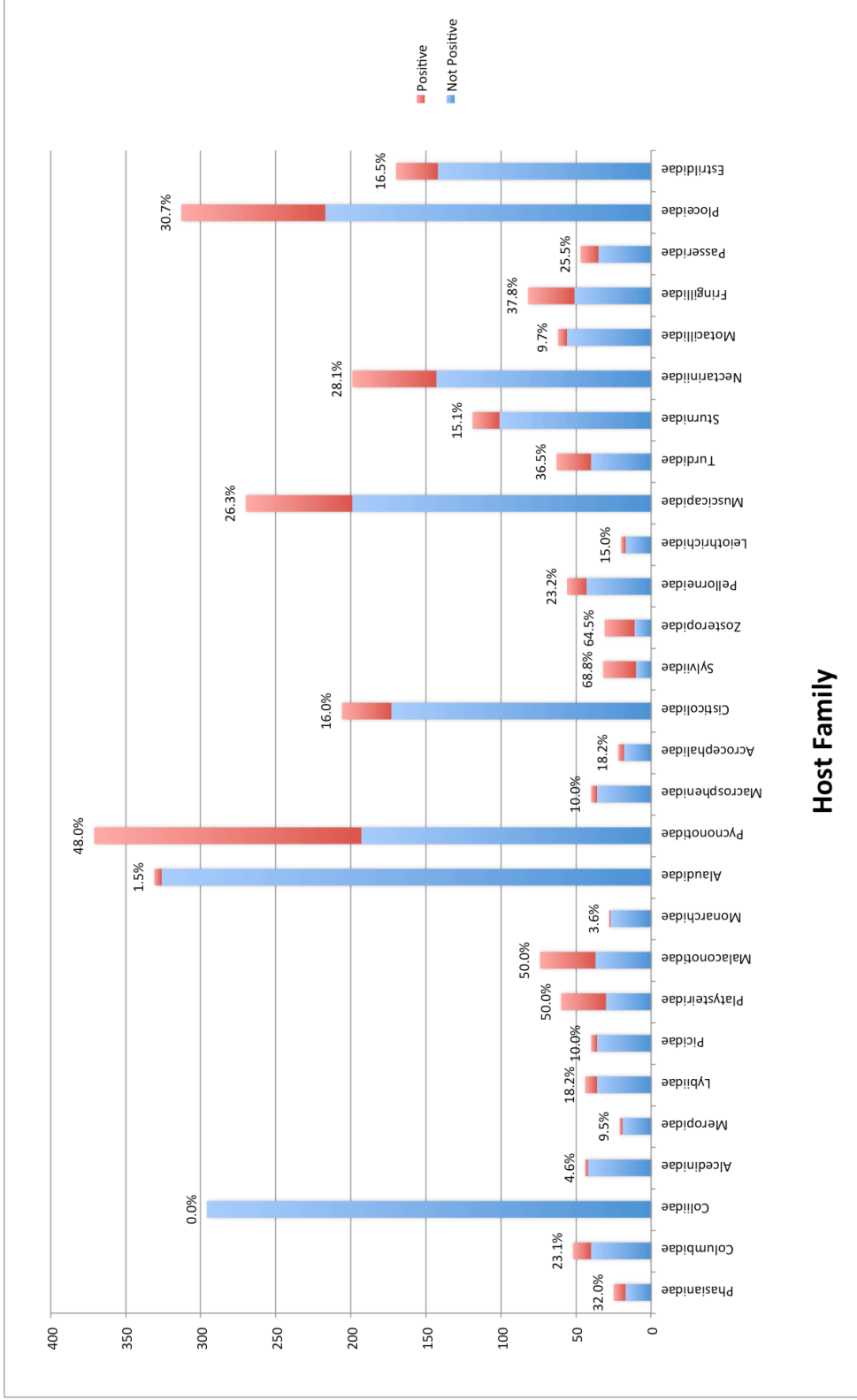


Figure 5: *Leucocytozoon* prevalence of host families with >20 individuals screened. Blue bars represent the number of birds that did not show any indication of being infected with *Leucocytozoon*, red bars show individuals that screened positive for the parasite

All categories tested for effect on prevalence of *Leucocytozoon* showed a statistically significant effect. Broad Geographic Region, Refined Geographic Region, Habitat, and Host family all show significant variation between the different categories, with P-values of <0.001. The summary of the Chi-Square test for independence results can be found in Table 4.

Category	Chi-squared Value	P-value	Degrees of Freedom
Broad Geographic Region	40.47	<0.001	2
Refined Geographic Region	323.21	<0.001	5
Habitat	379.6	<0.001	3
Host Family	505.17	<0.001	27

Table 4: Tests of statistical significance of Geographic Regions, Habitat, and Host family on the prevalence of *Leucocytozoon*.

Co-Infections

Co-infections were present in 216 birds, of which 69 were able to be visually resolved. Of the co-infections that were able to be visually resolved, 61 showed dual infections and 8 presented with three different lineages of *Leucocytozoon*. The remaining 147 co-infected samples were not able to be resolved. The hosts of these unresolvable co-infected were indicated as being positive for the presence of *Leucocytozoon* and were included in prevalence analyses but were not included in tests of haplotype or nucleotide diversity.

Distribution of lineages

In total, 324 lineages of *Leucocytozoon* spp. were identified in this study. The majority of these lineages, 209, were found in only one host, with 64 lineages being present in two hosts and 53 lineages identified from three or more hosts. The most prominent lineage was found in 22 different hosts. Geographically, lineages shared by more than one bird were nearly as likely to be found in multiple sampling areas (54.5% of shared lineages) as to be found in one sampling area (45.4% of shared lineages). The most geographically widespread lineage, AfroLeu002, was found in eight different sampling areas across four countries. Similarly, 46.2% of shared haplotypes were found in hosts of the same family and 53.8% were found in hosts of different families. The most widespread lineage in terms of host is AfroLeu005, which was found to be present in 8 different host families.

Identification of *Leucocytozoon* lineages included determining which haplotypes have been recorded through previous research. This study generated 76

lineages that were previously discovered and 250 novel lineages. Host information associated with all haplotypes and unresolvable co-infections is listed in Table 5.

Table 5: Host and Locality information for all birds that screened positive for the presence of *Leucocytozoon*.

¹Additional locality information on sampling areas can be found in Table B

²Lineages with 100% pairwise identity were assigned a unique identifier, AftrLeu###. Unresolvable coinfections are labeled Unres. CoInf.

³All haplotypes were compared across GenBank and the MalAvi Database. Those that aligned with known haplotypes are noted with the GenBank Accession number of MalAvi lineage name.

Host Collection Number	Host Order	Host Family	Host Genus	Host species	Country	Sampling Area ¹	Haplotype Name ²	Parasite GenBank Accession Number ³	MalAvi Lineage Name ³
487087	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>natalensis</i>	UGA	Kibale National Park, Ngogo Research Camp	AftrLeu001		
487234	Passeriformes	Muscicapidae	<i>Myioparus</i>	<i>griseigularis</i>	UGA	Kibale National Park, Mainaro	AftrLeu001		
487031	Passeriformes	Nicatoridae	<i>Nicator</i>	<i>chloris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AftrLeu001		
487159	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>fulvescens</i>	UGA	Kasyoha-Kitomi Forest Reserve	AftrLeu001		
487157	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>fulvescens</i>	UGA	Kibale National Park, Mainaro	AftrLeu001		
487150	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>fulvescens</i>	UGA	Kibale National Park, Ngogo Research Camp	AftrLeu001		
487143	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>rufipennis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AftrLeu001		
486983	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AftrLeu001		
486976	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Mainaro	AftrLeu001		
486979	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Mainaro	AftrLeu001		
486981	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Mainaro	AftrLeu001		

Mainaro									
486933	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu001		
486935	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu001		
486931	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kibale National Park, Mainaro	AfrLeu001		
486928	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kibale National Park, Nkoko Research Camp	AfrLeu001		
486929	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kibale National Park, Nkoko Research Camp	AfrLeu001		
486954	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu001		
486959	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu001		
486945	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kibale National Park, Nkoko Research Camp	AfrLeu001		
490079	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>albigularis</i>	DRC	Luki Biosphere Reserve	AfrLeu001		
486992	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>hypochloris</i>	UGA	Kibale National Park, Nkoko Research Camp	AfrLeu001		
486989	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>xavieri</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu001		
AA28862	Passeriformes	Cisticolidae	<i>Cisticola</i>	<i>chiniana</i>	Kenya	Nakuru County	AfrLeu002	KM056530	AFR212
481156	Passeriformes	Cisticolidae	<i>Prinia</i>	<i>bairdii</i>	DRC	Kahuzi-Biega National Park	AfrLeu002		
481300	Passeriformes	Cisticolidae	<i>Prinia</i>	<i>bairdii</i>	DRC	Kahuzi-Biega National Park	AfrLeu002		
468463	Passeriformes	Estrildidae	<i>Coccygia</i>	<i>quartina</i>	MLW	Nyika National Park	AfrLeu002		
468425	Passeriformes	Estrildidae	<i>Cryptospiza</i>	<i>reichenovii</i>	MLW	Nyika National Park	AfrLeu002		
468428	Passeriformes	Estrildidae	<i>Cryptospiza</i>	<i>reichenovii</i>	MLW	Nyika National Park	AfrLeu002		
468435	Passeriformes	Estrildidae	<i>Cryptospiza</i>	<i>reichenovii</i>	MLW	Nyika National Park	AfrLeu002		
468436	Passeriformes	Estrildidae	<i>Cryptospiza</i>	<i>reichenovii</i>	MLW	Nyika National Park	AfrLeu002		
468438	Passeriformes	Estrildidae	<i>Cryptospiza</i>	<i>reichenovii</i>	MLW	Nyika National Park	AfrLeu002		

481603	Passeriformes	Estrildidae	<i>Estrilda</i>	<i>perreini</i>	MOZ	Gorongosa Mountain	AfrLeu002
481590	Passeriformes	Estrildidae	<i>Mandingoa</i>	<i>nitidula</i>	MOZ	Gorongosa Mountain	AfrLeu002
468417	Passeriformes	Estrildidae	<i>Pytilia</i>	<i>afra</i>	MLW	Vwaza Wildlife Reserve	AfrLeu002
468342	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>ludovicensis</i>	MLW	Nyika National Park	AfrLeu002
481240	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>rockefelleri</i>	DRC	Kangala Forest	AfrLeu002
468535	Passeriformes	Ploceidae	<i>Euplectes</i>	<i>psammacromius</i>	MLW	Nyika National Park	AfrLeu002
K86511	Passeriformes	Ploceidae	<i>Quelea</i>	<i>quelea</i>	Kenya	Nyandarua County	AfrLeu002
K90032	Passeriformes	Ploceidae	<i>Quelea</i>	<i>quelea</i>	Kenya	Laikipia County	AfrLeu002
T55000	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	Kenya	Laikipia County	AfrLeu002
467911	Coraciiformes	Meropidae	<i>Merops</i>	<i>pusillus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu003
468195	Passeriformes	Cisticolidae	<i>Cisticola</i>	<i>nigriloris</i>	MLW	Nyika National Park	AfrLeu003
468266	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	AfrLeu003
467996	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu003
468594	Passeriformes	Sturnidae	<i>Neocichla</i>	<i>gutturalis</i>	MLW	Vwaza Wildlife Reserve	AfrLeu003
468395	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu003
468397	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu003
468399	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu003
468399	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu003
468400	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu003
468401	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu003
468402	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu003
481589	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MOZ	Gorongosa Mountain	AfrLeu003
481272	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	DRC	Kangala Forest	AfrLeu003
468260	Passeriformes	Cisticolidae	<i>Calamanastes</i>	<i>undosus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu004
468176	Passeriformes	Cisticolidae	<i>Prinia</i>	<i>erythroptera</i>	MLW	Vwaza Wildlife Reserve	AfrLeu004
T58115	Passeriformes	Estrildidae	<i>Uraeginthus</i>	<i>bengalus</i>	Kenya	Laikipia County	AfrLeu004

AA27908	Passeriformes	Malacostridae	<i>Dryoscopus gambensis</i>	Kenya	Laikipia County	AfrLeu004
468021	Passeriformes	Malacostridae	<i>Tchagra minutus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu004
K77941	Passeriformes	Nectariniidae	<i>Nectarinia tacazze</i>	Kenya	Nyandarua County	AfrLeu004
AA22008	Passeriformes	Passeridae	<i>Passer rufocinctus</i>	Kenya	Nyandarua County	AfrLeu004
AA22002	Passeriformes	Passeridae	<i>Passer rufocinctus</i>	Kenya	Nyandarua County	AfrLeu004
AA22084	Passeriformes	Passeridae	<i>Passer rufocinctus</i>	Kenya	Laikipia County	AfrLeu004
AA22077	Passeriformes	Passeridae	<i>Passer rufocinctus</i>	Kenya	Laikipia County	AfrLeu004
AA22078	Passeriformes	Passeridae	<i>Passer rufocinctus</i>	Kenya	Laikipia County	AfrLeu004
AA28831	Passeriformes	Passeridae	<i>Passer rufocinctus</i>	Kenya	Laikipia County	AfrLeu004
AA27966	Passeriformes	Passeridae	<i>Petronia pyrgita</i>	Kenya	Laikipia County	AfrLeu004
468522	Passeriformes	Ploceidae	<i>Ploceus ocularis</i>	MLW	Vwaza Wildlife Reserve	AfrLeu004
K89799	Passeriformes	Ploceidae	<i>Quelea quelea</i>	Kenya	Laikipia County	AfrLeu004
BB13653	Passeriformes	Sturnidae	<i>Lamprolornis superbus</i>	Kenya	Laikipia County	AfrLeu004
AA27921	Piciformes	Lybiidae	<i>Tricholaema lacrymosa</i>	Kenya	Laikipia County	AfrLeu004
474890	Passeriformes	Cisticolidae	<i>Apalis flavida</i>	MLW	Mangochi Forest Reserve	AfrLeu005
474899	Passeriformes	Cisticolidae	<i>Cisticola erythrops</i>	MLW	Mangochi Forest Reserve	AfrLeu005
474900	Passeriformes	Cisticolidae	<i>Cisticola erythrops</i>	MLW	Mangochi Forest Reserve	AfrLeu005
AA28874	Passeriformes	Cisticolidae	<i>Eminia lepida</i>	Kenya	Nakuru County	AfrLeu005
468176	Passeriformes	Cisticolidae	<i>Prinia erythroptera</i>	MLW	Vwaza Wildlife Reserve	AfrLeu005
T54970	Passeriformes	Cisticolidae	<i>Prinia subflava</i>	Kenya	Nakuru County	AfrLeu005
474896	Passeriformes	Hylotiidae	<i>Hylota flavigaster</i>	MLW	Mangochi Forest Reserve	AfrLeu005
474887	Passeriformes	Macrosphenidae	<i>Sylvietta whytii</i>	MLW	Mangochi Forest Reserve	AfrLeu005
468037	Passeriformes	Malacostridae	<i>Laniarius major</i>	MLW	Vwaza Wildlife Reserve	AfrLeu005
474778	Passeriformes	Motacillidae	<i>Anthus cinnamomeus</i>	MLW	Mangochi Forest Reserve	AfrLeu005
474782	Passeriformes	Motacillidae	<i>Macronyx croceus</i>	MLW	Mangochi Forest Reserve	AfrLeu005
474841	Passeriformes	Muscicapidae	<i>Cercotrichas leucophrys</i>	MLW	Mangochi Forest Reserve	AfrLeu005

AA27963	Passeriformes	Passeridae	<i>Petronia</i>	<i>pyrgita</i>	Kenya	Laikipia County	AfrLeu005
468542	Passeriformes	Ploceidae	<i>Euplectes</i>	<i>capensis</i>	MLW	Vwaza Wildlife Reserve	AfrLeu005
468529	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>velatus</i>	MLW	Nyika National Park	AfrLeu005
467974	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu006 KM056550 AFR236
467972	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu006
467971	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu006
467977	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu006
467982	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu006
467988	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu006
467989	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu006
468120	Passeriformes	Turdidae	<i>Geokichla</i>	<i>gurneyi</i>	MLW	Nyika National Park	AfrLeu006
468127	Passeriformes	Turdidae	<i>Turdus</i>	<i>abyssinicus</i>	MLW	Nyika National Park	AfrLeu006
468071					MLW	Nyika National Park	AfrLeu006
AA15335	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	AfrLeu007
481229	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>regius</i>	DRC	Kahuzi-Biega National Park	AfrLeu007
481232	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>regius</i>	DRC	Kahuzi-Biega National Park	AfrLeu007
481258	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>venustus</i>	DRC	Kangala Forest	AfrLeu007
481242	Passeriformes	Nectariniidae	<i>Hedylipna</i>	<i>collaris</i>	DRC	Kangala Forest	AfrLeu007
481073	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu007
	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu007
481085						Kangala Forest	
481089	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu007
481090	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu007
481290	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu007
AA27955	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	Kenya	Laikipia County	AfrLeu007

BB15107	Passeriformes	Sturnidae	<i>Lamprotornis chalybaeus</i>	Kenya	Laikipia County	AfrLeu008
BB13590	Passeriformes	Sturnidae	<i>Lamprotornis superbus</i>	Kenya	Laikipia County	AfrLeu008
BB13540	Passeriformes	Sturnidae	<i>Lamprotornis superbus</i>	Kenya	Laikipia County	AfrLeu008
BB13654	Passeriformes	Sturnidae	<i>Lamprotornis superbus</i>	Kenya	Laikipia County	AfrLeu008
BB13552	Passeriformes	Sturnidae	<i>Lamprotornis superbus</i>	Kenya	Laikipia County	AfrLeu008
BB13543	Passeriformes	Sturnidae	<i>Lamprotornis superbus</i>	Kenya	Laikipia County	AfrLeu008
BB13544	Passeriformes	Sturnidae	<i>Lamprotornis superbus</i>	Kenya	Laikipia County	AfrLeu008
BB13545	Passeriformes	Sturnidae	<i>Lamprotornis superbus</i>	Kenya	Laikipia County	AfrLeu008
AB4830	Coliiformes	Coliidae	<i>Urocolius macrourus</i>	Kenya	Laikipia County	AfrLeu009 DQ847226 YMW 2
AB4825	Passeriformes	Alaudidae	<i>Mirafra africana</i>	Kenya	Laikipia County	AfrLeu009 KM056649
AA27929	Passeriformes	Cisticolidae	<i>Cisticola chiniana</i>	Kenya	Laikipia County	AfrLeu009
AA27957	Passeriformes	Ploceidae	<i>Ploceus cucullatus</i>	Kenya	Laikipia County	AfrLeu009
AA27959	Passeriformes	Ploceidae	<i>Ploceus cucullatus</i>	Kenya	Laikipia County	AfrLeu009
AA27979	Passeriformes	Ploceidae	<i>Ploceus spekei</i>	Kenya	Laikipia County	AfrLeu009
AA27982	Passeriformes	Ploceidae	<i>Ploceus spekei</i>	Kenya	Laikipia County	AfrLeu009
AA27984	Passeriformes	Ploceidae	<i>Ploceus spekei</i>	Kenya	Laikipia County	AfrLeu009
AA22076	Passeriformes	Ploceidae	<i>Ploceus spekei</i>	Kenya	Laikipia County	AfrLeu009
AA28858	Passeriformes	Ploceidae	<i>Ploceus spekei</i>	Kenya	Laikipia County	AfrLeu009
487164	Passeriformes	Cisticolidae	<i>Camaroptera brachyura</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu010
481415	Passeriformes	Muscicapidae	<i>Muscicapa adusta</i>	MOZ	Gorongosa Mountain	AfrLeu010
487119	Passeriformes	Muscicapidae	<i>Pseudalethe poliocephala</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu010
481559	Passeriformes	Nectariniidae	<i>Cinnyris venustus</i>	MOZ	Gorongosa Mountain	AfrLeu010
481629	Passeriformes	Nectariniidae	<i>Cyanomitra olivacea</i>	MOZ	Gorongosa Mountain	AfrLeu010
481630	Passeriformes	Nectariniidae	<i>Cyanomitra olivacea</i>	MOZ	Gorongosa Mountain	AfrLeu010
481587	Passeriformes	Nectariniidae	<i>Hedylipna collaris</i>	MOZ	Gorongosa Mountain	AfrLeu010

481585	Passeriformes	Nectariniidae	<i>Hedydipna collaris</i>	MOZ	Gorongosa Mountain	AfrLeu010
487336	Passeriformes	Ploceidae	<i>Ploceus nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu010
487327	Passeriformes	Ploceidae	<i>Ploceus nigricollis</i>	UGA	Kibale National Park, Mainaro	AfrLeu010
487328	Passeriformes	Ploceidae	<i>Ploceus nigricollis</i>	UGA	Kibale National Park, Mainaro	AfrLeu010
468240	Passeriformes	Acrocephalidae	<i>Iduna similis</i>	MLW	Nyika National Park	AfrLeu011 KM056531 AFR214
468433	Passeriformes	Estrildidae	<i>Cryptospiza reichenovii</i>	MLW	Nyika National Park	AfrLeu011
468362	Passeriformes	Fringillidae	<i>Serinus whytii</i>	MLW	Nyika National Park	AfrLeu011
468086	Passeriformes	Muscicapidae	<i>Cossypha caffra</i>	MLW	Nyika National Park	AfrLeu011
468092	Passeriformes	Muscicapidae	<i>Cossypha caffra</i>	MLW	Nyika National Park	AfrLeu011
468062	Passeriformes	Muscicapidae	<i>Pogonocichla stellata</i>	MLW	Nyika National Park	AfrLeu011
468500	Passeriformes	Ploceidae	<i>Ploceus baglafecht</i>	MLW	Nyika National Park	AfrLeu011
MLW3849	Galliformes	Phasianidae	<i>Gallus gallus</i>	MLW	Other	AfrLeu011
481421	Passeriformes	Cisticolidae	<i>Apalis thoracica</i>	MOZ	Gorongosa Mountain	AfrLeu012
481451	Passeriformes	Estrildidae	<i>Cryptospiza reichenovii</i>	MOZ	Gorongosa Mountain	AfrLeu012
481383	Passeriformes	Muscicapidae	<i>Cossypha caffra</i>	MOZ	Gorongosa Mountain	AfrLeu012
481381	Passeriformes	Muscicapidae	<i>Pseudaethes fuelleborni</i>	MOZ	Gorongosa Mountain	AfrLeu012
481394	Passeriformes	Muscicapidae	<i>Swynnertonia swynnertonii</i>	MOZ	Gorongosa Mountain	AfrLeu012
481397	Passeriformes	Muscicapidae	<i>Swynnertonia swynnertonii</i>	MOZ	Gorongosa Mountain	AfrLeu012
481468	Passeriformes	Nectariniidae	<i>Chalcomitra amethystina</i>	MOZ	Gorongosa Mountain	AfrLeu012
481571	Passeriformes	Nectariniidae	<i>Cyanomitra olivacea</i>	MOZ	Gorongosa Mountain	AfrLeu012
481576	Passeriformes	Nectariniidae	<i>Cyanomitra olivacea</i>	MOZ	Gorongosa Mountain	AfrLeu012
468382	Passeriformes	Fringillidae	<i>Serinus flavivertex</i>	MLW	Nyika National Park	AfrLeu013 KM056532 AFR213
468359	Passeriformes	Fringillidae	<i>Serinus whytii</i>	MLW	Nyika National Park	AfrLeu013
468361	Passeriformes	Fringillidae	<i>Serinus whytii</i>	MLW	Nyika National Park	AfrLeu013
468106	Passeriformes	Muscicapidae	<i>Cossypha anomala</i>	MLW	Nyika National Park	AfrLeu013

468089	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	MLW	Nyika National Park	AfrLeu013
468092	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	MLW	Nyika National Park	AfrLeu013
468239	Passeriformes	Acrocephalidae	<i>Iduna</i>	<i>similis</i>	MLW	Nyika National Park	AfrLeu014
AA28860	Passeriformes	Cisticolidae	<i>Cisticola</i>	<i>chiniana</i>	Kenya	Nakuru County	AfrLeu014
468627	Passeriformes	Corvidae	<i>Corvus</i>	<i>albicollis</i>	MLW	Nyika National Park	AfrLeu014
468101	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>anomala</i>	MLW	Nyika National Park	AfrLeu014
468106	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>anomala</i>	MLW	Nyika National Park	AfrLeu014
K89777	Passeriformes	Muscicapidae	<i>Pogonocichla</i>	<i>stellata</i>	Kenya	Laikipia County	AfrLeu014
K77918	Passeriformes	Muscicapidae	<i>Saxicola</i>	<i>torquatus</i>	Kenya	Nyandarua County	AfrLeu014
468292	Passeriformes	Stenostiridae	<i>Elminia</i>	<i>albonotata</i>	MLW	Nyika National Park	AfrLeu014
468091	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	MLW	Nyika National Park	AfrLeu015
490181	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>obscura</i>	DRC	Luki Biosphere Reserve	AfrLeu015
490177	Passeriformes	Nectariniidae	<i>Hedyaipna</i>	<i>collaris</i>	DRC	Luki Biosphere Reserve	AfrLeu015
467985	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu015
467987	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu015
490067	Passeriformes	Pycnonotidae	<i>Bleda</i>	<i>syndactylus</i>	DRC	Luki Biosphere Reserve	AfrLeu015
468015	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>flavostratus</i>	MLW	Nyika National Park	AfrLeu015
468589	Passeriformes	Sturnidae	<i>Onychognathus</i>	<i>tenuirostris</i>	MLW	Nyika National Park	AfrLeu015
468279	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	AfrLeu016
468286	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	AfrLeu016
468288	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	AfrLeu016
487218	Passeriformes	Platysteiridae	<i>Platysteira</i>	<i>castanea</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu016
487219	Passeriformes	Platysteiridae	<i>Platysteira</i>	<i>castanea</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu016
MLW4069	Galliformes	Phasianidae	<i>Gallus</i>	<i>gallus</i>	MLW	Other	AfrLeu016
481188	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>archeri</i>	DRC	Kahuzi-Biega National Park	AfrLeu017

481191	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>archeri</i>	DRC	Kahuzi-Biega National Park	AfrLeu017	
481192	Passeriformes	Muscicapidae	<i>Pogonocichla</i>	<i>stellata</i>	DRC	Kahuzi-Biega National Park	AfrLeu017	
481195	Passeriformes	Muscicapidae	<i>Pogonocichla</i>	<i>stellata</i>	DRC	Kahuzi-Biega National Park	AfrLeu017	
481200	Passeriformes	Muscicapidae	<i>Pogonocichla</i>	<i>stellata</i>	DRC	Kahuzi-Biega National Park	AfrLeu017	
481178	Passeriformes	Muscicapidae	<i>Pseudalethe</i>	<i>poliophrys</i>	DRC	Kahuzi-Biega National Park	AfrLeu017	
481180	Passeriformes	Muscicapidae	<i>Pseudalethe</i>	<i>poliophrys</i>	DRC	Kahuzi-Biega National Park	AfrLeu017	
487316	Passeriformes	Estrildidae	<i>Nigrita</i>	<i>canicapillus</i>	UGA	Kibale National Park, Mainaro	AfrLeu018	KP696494 HIRUS1 1
487313	Passeriformes	Estrildidae	<i>Nigrita</i>	<i>canicapillus</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu018	
487315	Passeriformes	Estrildidae	<i>Nigrita</i>	<i>canicapillus</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu018	
487268	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>obscura</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu018	
487269	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>obscura</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu018	
487274	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>obscura</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu018	
487256	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>obscura</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu018	
487292	Passeriformes	Estrildidae	<i>Mandingoa</i>	<i>nitidula</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu019	
481082	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kahuzi-Biega National Park	AfrLeu019	
486921	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu019	
486922	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu019	
486955	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu019	

486943	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu019
486944	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu019
AA21950	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	Kenya	Nyandarua County	AfrLeu020
481260	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>venustus</i>	DRC	Kangala Forest	AfrLeu020
T58133	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>venustus</i>	Kenya	Nakuru County	AfrLeu020
T54983	Passeriformes	Nectariniidae	<i>Hedylipna</i>	<i>collaris</i>	Kenya	Laikipia County	AfrLeu020
AB4721	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglafaecht</i>	Kenya	Laikipia County	AfrLeu020
481088	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu020
AA22087	Passeriformes	Passeridae	<i>Petronia</i>	<i>pyrgita</i>	Kenya	Laikipia County	AfrLeu021 KM056552 AFR238
468498	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglafaecht</i>	MLW	Nyika National Park	AfrLeu021
468593	Passeriformes	Sturnidae	<i>Neocichla</i>	<i>gutturialis</i>	MLW	Vwaza Wildlife Reserve	AfrLeu021
474989	Passeriformes	Vangidae	<i>Prionops</i>	<i>plumatus</i>	MLW	Mangochi Forest Reserve	AfrLeu021
467939	Piciformes	Picidae	<i>Campethera</i>	<i>abingoni</i>	MLW	Vwaza Wildlife Reserve	AfrLeu021
481295	Passeriformes	Cisticolidae	<i>Camaroptera</i>	<i>brachyura</i>	DRC	Kangala Forest	AfrLeu022
481560	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>venustus</i>	MOZ	Gorongosa Mountain	AfrLeu022
481075	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu022
481076	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu022
481084	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu022
486934	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu022
468432	Passeriformes	Estrildidae	<i>Cryptospiza</i>	<i>reichenovii</i>	MLW	Nyika National Park	AfrLeu023 KM056551 AFR237
468434	Passeriformes	Estrildidae	<i>Cryptospiza</i>	<i>reichenovii</i>	MLW	Nyika National Park	AfrLeu023
467967	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu023
467970	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu023
467981	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu023
467986	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu023

468097	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>anomala</i>	MLW	Nyika National Park	AfrLeu024	KM056534	AFR219
468102	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>anomala</i>	MLW	Nyika National Park	AfrLeu024		
468107	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>anomala</i>	MLW	Nyika National Park	AfrLeu024		
468094	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	MLW	Nyika National Park	AfrLeu024		
AA22011	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	Kenya	Nyandarua County	AfrLeu024		
AB4832	Coliiformes	Coliidae	<i>Urocolius</i>	<i>macrourus</i>	Kenya	Laikipia County	AfrLeu025		
AB4837	Coliiformes	Coliidae	<i>Urocolius</i>	<i>macrourus</i>	Kenya	Laikipia County	AfrLeu025		
AB4701	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nakuru County	AfrLeu025		
AA22028	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>ocularis</i>	Kenya	Nakuru County	AfrLeu025		
K86519	Passeriformes	Ploceidae	<i>Quelea</i>	<i>quelea</i>	Kenya	Nyandarua County	AfrLeu025		
K86526	Passeriformes	Ploceidae	<i>Quelea</i>	<i>quelea</i>	Kenya	Nyandarua County	AfrLeu025		
467861	Columbiformes	Columbidae	<i>Streptopelia</i>	<i>capicola</i>	MLW	Vwaza Wildlife Reserve	AfrLeu026	JN032657	STPIC01
474706	Columbiformes	Columbidae	<i>Streptopelia</i>	<i>capicola</i>	MLW	Mangochi Forest Reserve	AfrLeu026		
474707	Columbiformes	Columbidae	<i>Streptopelia</i>	<i>capicola</i>	MLW	Mangochi Forest Reserve	AfrLeu026		
C11228	Columbiformes	Columbidae	<i>Streptopelia</i>	<i>capicola</i>	Kenya	Nyandarua County	AfrLeu026		
H00443	Columbiformes	Columbidae	<i>Streptopelia</i>	<i>semitorquata</i>	Kenya	Nakuru County	AfrLeu026		
AA27904	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Laikipia County	AfrLeu026		
481275	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>alienus</i>	DRC	Kahuzi-Biega National Park	AfrLeu027	KM0566487	AFR168
468497	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	MLW	Nyika National Park	AfrLeu027		
468505	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	MLW	Nyika National Park	AfrLeu027		
AA27981	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>spekei</i>	Kenya	Laikipia County	AfrLeu027		
K86527	Passeriformes	Ploceidae	<i>Quelea</i>	<i>quelea</i>	Kenya	Nyandarua County	AfrLeu027		
UGA340	Galliformes	Phasianidae	<i>Gallus</i>	<i>gallus</i>	UGA	Kibale National Park, Mainaro	AfrLeu028	KM056646	GALLUS 06
474692	Galliformes	Phasianidae	<i>Gallus</i>	<i>gallus</i>	MLW	Other	AfrLeu028		
468628	Galliformes	Phasianidae	<i>Gallus</i>	<i>gallus</i>	MLW	Nyika National Park	AfrLeu028		

487280	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>cyanolaema</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu028
490152	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>obscura</i>	DRC	Boende	AfrLeu028
K77902	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nakuru County	AfrLeu029
K77567	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	AfrLeu029
K77904	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	AfrLeu029
K77583	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	AfrLeu029
K86534	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Laikipia County	AfrLeu029
486973	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Mainaro	AfrLeu030
486978	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Mainaro	AfrLeu030
486969	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu030
486971	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu030
486972	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu030
481211	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>pyrrhoptera</i>	DRC	Kahuzi-Biega National Park	AfrLeu031
481212	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>pyrrhoptera</i>	DRC	Kahuzi-Biega National Park	AfrLeu031
481213	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>pyrrhoptera</i>	DRC	Kahuzi-Biega National Park	AfrLeu031
481214	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>pyrrhoptera</i>	DRC	Kahuzi-Biega National Park	AfrLeu031
481215	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>pyrrhoptera</i>	DRC	Kahuzi-Biega National Park	AfrLeu031
481106	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	DRC	Kangala Forest	AfrLeu032
487019	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu032
467991	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu032
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487015	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	UGA	Kibale National Park, Mainaro	AfrLeu032
474789	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	MLW	Mangochi Forest Reserve	AfrLeu032
486970	Passeriformes	Pycnonotidae	<i>Eurillas curvirostris</i>	UGA	Kibale National Park, Nogo Research Camp	AfrLeu033
481080	Passeriformes	Pycnonotidae	<i>Eurillas latirostris</i>	DRC	Kahuzi-Biega National Park	AfrLeu033
486930	Passeriformes	Pycnonotidae	<i>Eurillas latirostris</i>	UGA	Kibale National Park, Mainaro	AfrLeu033
486924	Passeriformes	Pycnonotidae	<i>Eurillas latirostris</i>	UGA	Kibale National Park, Nogo Research Camp	AfrLeu033
486956	Passeriformes	Pycnonotidae	<i>Eurillas virens</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu033
481217	Coraciiformes	Phoeniculidae	<i>Phoeniculus ballei</i>	DRC	Kangala Forest	AfrLeu034
K86134	Passeriformes	Alaudidae	<i>Calandrella cinerea</i>	Kenya	Nyandarua County	AfrLeu034
K86170	Passeriformes	Alaudidae	<i>Calandrella cinerea</i>	Kenya	Nyandarua County	AfrLeu034
K86188	Passeriformes	Alaudidae	<i>Calandrella cinerea</i>	Kenya	Nyandarua County	AfrLeu034
481160	Passeriformes	Macrosphenidae	<i>Sylvietta leucophrys</i>	DRC	Kahuzi-Biega National Park	AfrLeu034
487262	Passeriformes	Nectariniidae	<i>Cyanomitra obscura</i>	UGA	Kibale National Park, Mainaro	AfrLeu035
487029	Passeriformes	Nicatoridae	<i>Nicator chloris</i>	UGA	Kibale National Park, Mainaro	AfrLeu035
487030	Passeriformes	Nicatoridae	<i>Nicator chloris</i>	UGA	Kibale National Park, Mainaro	AfrLeu035
487028	Passeriformes	Nicatoridae	<i>Nicator chloris</i>	UGA	Kibale National Park, Nogo Research Camp	AfrLeu035
487151	Passeriformes	Pellorneidae	<i>Illadopsis fulvescens</i>	UGA	Kibale National Park, Nogo Research Camp	AfrLeu035
468533	Passeriformes	Ploceidae	<i>Euplectes psammocromius</i>	MLW	Nyika National Park	AfrLeu036
468498	Passeriformes	Ploceidae	<i>Ploceus baglajecht</i>	MLW	Nyika National Park	AfrLeu036
468499	Passeriformes	Ploceidae	<i>Ploceus baglajecht</i>	MLW	Nyika National Park	AfrLeu036
468502	Passeriformes	Ploceidae	<i>Ploceus baglajecht</i>	MLW	Nyika National Park	AfrLeu036

468142	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	MLW	Nyika National Park	AfrLeu037	KM056650	ZOABY0 2
481270	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	DRC	Kangala Forest	AfrLeu037	JN032642	
468406	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu037		
468406	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu037		
468409	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu037		
468031	Passeriformes	Malacoenotidae	<i>Laniarius</i>	<i>fuelleborni</i>	MLW	Nyika National Park	AfrLeu038	KM056536	AFR222
468033	Passeriformes	Malacoenotidae	<i>Laniarius</i>	<i>fuelleborni</i>	MLW	Nyika National Park	AfrLeu038		
468334	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>mediocris</i>	MLW	Nyika National Park	AfrLeu038		
479646	Passeriformes	Estrildidae	<i>Lagonosticta</i>	<i>rubricata</i>	MLW	Vwaza Wildlife Reserve	AfrLeu039	KM056477	AFR157
481363	Passeriformes	Malacoenotidae	<i>Dryoscopus</i>	<i>cupla</i>	MOZ	Gorongosa Mountain	AfrLeu039		
481365	Passeriformes	Malacoenotidae	<i>Dryoscopus</i>	<i>cupla</i>	MOZ	Gorongosa Mountain	AfrLeu039		
481369	Passeriformes	Malacoenotidae	<i>Dryoscopus</i>	<i>cupla</i>	MOZ	Gorongosa Mountain	AfrLeu039		
474972	Passeriformes	Malacoenotidae	<i>Dryoscopus</i>	<i>cupla</i>	MLW	Mangochi Forest Reserve	AfrLeu039		
481345	Passeriformes	Malacoenotidae	<i>Tchagra</i>	<i>minutus</i>	MOZ	Gorongosa Mountain	AfrLeu040		
481456	Passeriformes	Oriolidae	<i>Oriolus</i>	<i>larvatus</i>	MOZ	Gorongosa Mountain	AfrLeu040		
481457	Passeriformes	Oriolidae	<i>Oriolus</i>	<i>larvatus</i>	MOZ	Gorongosa Mountain	AfrLeu040		
AA27934	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Laikipia County	AfrLeu040		
481592	Passeriformes	Estrildidae	<i>Hypargos</i>	<i>niveoguttatus</i>	MOZ	Gorongosa Mountain	AfrLeu041	KM056559	AFR246
481595	Passeriformes	Estrildidae	<i>Lagonosticta</i>	<i>rubricata</i>	MOZ	Gorongosa Mountain	AfrLeu041		
468338	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>mediocris</i>	MLW	Nyika National Park	AfrLeu041		
475000	Passeriformes	Fringillidae	<i>Serinus</i>	<i>hypostictus</i>	MLW	Mangochi Forest Reserve	AfrLeu042	KM056521	AFR203
474983	Passeriformes	Malacoenotidae	<i>Laniarius</i>	<i>major</i>	MLW	Mangochi Forest Reserve	AfrLeu042		
468030	Passeriformes	Malacoenotidae	<i>Laniarius</i>	<i>major</i>	MLW	Nyika National Park	AfrLeu042		
481380	Passeriformes	Muscicapidae	<i>Pseudaethya</i>	<i>fuelleborni</i>	MOZ	Gorongosa Mountain	AfrLeu043		
474944	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>olivacea</i>	MLW	Mangochi Forest Reserve	AfrLeu043		
468589	Passeriformes	Sturnidae	<i>Onychognathus</i>	<i>tenuirostris</i>	MLW	Nyika National Park	AfrLeu043		

487060	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu043
AB4789	Passeriformes	Laniidae	<i>Lanius</i>	<i>collaris</i>	Kenya	Laikipia County	AfrLeu044 DQ451434
AA21947	Passeriformes	Ploceidae	<i>Anaplectes</i>	<i>rubriceps</i>	Kenya	Nakuru County	AfrLeu044
BB13683	Passeriformes	Sturnidae	<i>Lamprolornis</i>	<i>superbus</i>	Kenya	Laikipia County	AfrLeu044
486861	Coliiformes	Coliidae	<i>Colius</i>	<i>striatus</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu045
486852	Columbiformes	Columbidae	<i>Turtur</i>	<i>tympanistris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu045
486843	Columbiformes	Columbidae	<i>Turtur</i>	<i>tympanistris</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu045
UGA381	Galliformes	Phasianidae	<i>Gallus</i>	<i>gallus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu045
486913	Piciformes	Lybiidae	<i>Pogoniulus</i>	<i>bilineatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu046
486911	Piciformes	Lybiidae	<i>Pogoniulus</i>	<i>bilineatus</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu046
486912	Piciformes	Lybiidae	<i>Pogoniulus</i>	<i>bilineatus</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu046
486909	Piciformes	Lybiidae	<i>Pogoniulus</i>	<i>subsulphureus</i>	UGA	Kibale National Park, Mainaro	AfrLeu046
468070	Passeriformes	Muscicapidae	<i>Pogonocichla</i>	<i>stellata</i>	MLW	Nyika National Park	AfrLeu047 KM056542 AFR228
468008	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>cerviniventris</i>	MLW	Nyika National Park	AfrLeu047
468258	Passeriformes	Cisticolidae	<i>Calamonastes</i>	<i>undosus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu048
468542	Passeriformes	Ploceidae	<i>Euplectes</i>	<i>capensis</i>	MLW	Vwaza Wildlife Reserve	AfrLeu048
468542	Passeriformes	Ploceidae	<i>Euplectes</i>	<i>capensis</i>	MLW	Vwaza Wildlife Reserve	AfrLeu048
474990	Passeriformes	Vangidae	<i>Prionops</i>	<i>plumatus</i>	MLW	Mangochi Forest Reserve	AfrLeu048
481146	Passeriformes	Cisticolidae	<i>Camaroptera</i>	<i>brachyura</i>	DRC	Kangala Forest	AfrLeu049
481099	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>cabanisi</i>	DRC	Kangala Forest	AfrLeu049
481102	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>cabanisi</i>	DRC	Kangala Forest	AfrLeu049
468010	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>flavostrisatus</i>	MLW	Nyika National Park	AfrLeu049

AB4785	Passeriformes	Oriolidae	<i>Oriolus</i>	<i>larvatus</i>	Kenya	Laikipia County	AfrLeu050	
K90010	Passeriformes	Ploceidae	<i>Pseudonigrita</i>	<i>arnaudi</i>	Kenya	Laikipia County	AfrLeu050	
AA27914	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Laikipia County	AfrLeu050	
AB4775	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Laikipia County	AfrLeu050	
468188	Passeriformes	Cisticolidae	<i>Cisticola</i>	<i>nigriloris</i>	MLW	Nyika National Park	AfrLeu051	KM056491 AFR173
468192	Passeriformes	Cisticolidae	<i>Cisticola</i>	<i>nigriloris</i>	MLW	Nyika National Park	AfrLeu051	
468193	Passeriformes	Cisticolidae	<i>Cisticola</i>	<i>nigriloris</i>	MLW	Nyika National Park	AfrLeu051	
AB4796	Passeriformes	Oriolidae	<i>Oriolus</i>	<i>larvatus</i>	Kenya	Laikipia County	AfrLeu052	
AB4749	Passeriformes	Oriolidae	<i>Oriolus</i>	<i>larvatus</i>	Kenya	Nakuru County	AfrLeu052	
468292	Passeriformes	Stenostiridae	<i>Elminia</i>	<i>albonotata</i>	MLW	Nyika National Park	AfrLeu053	KM056548 AFR234
468294	Passeriformes	Stenostiridae	<i>Elminia</i>	<i>albonotata</i>	MLW	Nyika National Park	AfrLeu053	
481097	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>cabanisi</i>	DRC	Kangala Forest	AfrLeu054	
481100	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>cabanisi</i>	DRC	Kangala Forest	AfrLeu054	
481294	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>cabanisi</i>	DRC	Kangala Forest	AfrLeu054	
481233	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>regius</i>	DRC	Kahuzi-Biega National Park	AfrLeu055	KM056509 AFR191
481253	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>alinae</i>	DRC	Kahuzi-Biega National Park	AfrLeu055	
481216	Passeriformes	Promeropidae	<i>Kakamega</i>	<i>poliothorax</i>	DRC	Kahuzi-Biega National Park	AfrLeu055	
468623	Galliformes	Phasianidae	<i>Gallus</i>	<i>gallus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu056	GALLUS 07
487366	Galliformes	Phasianidae	<i>Gallus</i>	<i>gallus</i>	UGA	Kibale National Park, Mainaro	AfrLeu056	
481118	Passeriformes	Malaconotidae	<i>Laniarius</i>	<i>poensis</i>	DRC	Kahuzi-Biega National Park	AfrLeu057	
481119	Passeriformes	Malaconotidae	<i>Laniarius</i>	<i>poensis</i>	DRC	Kahuzi-Biega National Park	AfrLeu057	
481117	Passeriformes	Malaconotidae	<i>Laniarius</i>	<i>poensis</i>	DRC	Kangala Forest	AfrLeu057	
487010	Passeriformes	Pycnonotidae	<i>Criniger</i>	<i>calurus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu058	

487013	Passeriformes	Pycnonotidae	<i>Criniger</i>	<i>calurus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu058
487014	Passeriformes	Pycnonotidae	<i>Criniger</i>	<i>calurus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu058
486933	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu059
486939	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu059
486927	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu059
487070	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu060
487072	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu060
487074	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu060
486883	Coraciiformes	Alcedinidae	<i>Halcyon</i>	<i>malimbica</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu061
487117	Passeriformes	Muscicapidae	<i>Pseudaethe</i>	<i>poliocephala</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu061
487069	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu061
487073	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu061
487966	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>milanjensis</i>	MLW	Nyika National Park	AfrLeu062
487981	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu062
487983	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu062
K86207	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>atricapilla</i>	Kenya	Nyandarua County	KJ488655 SYAT22
K86506	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>atricapilla</i>	Kenya	Laikipia County	DQ847236
K86508	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>atricapilla</i>	Kenya	Laikipia County	HF543640
468535	Passeriformes	Ploceidae	<i>Euplectes</i>	<i>psammocromius</i>	MLW	Nyika National Park	AfrLeu064
468506	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	MLW	Nyika National Park	AfrLeu064
468503	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	MLW	Nyika National Park	AfrLeu064

E6802	Passeriformes	Hirundinidae	<i>Cecropis daurica</i>	Kenya	Nakuru County	AfrLeu065
468101	Passeriformes	Muscicapidae	<i>Cossypha anomala</i>	MLW	Nyika National Park	AfrLeu065
481412	Passeriformes	Stenostiridae	<i>Elminia albonotata</i>	MOZ	Gorongosa Mountain	AfrLeu065
468002	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	MLW	Nyika National Park	AfrLeu066 KM056492 AFR174
474796	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	MLW	Mangochi Forest Reserve	AfrLeu066
468247	Passeriformes	Acrocephalidae	<i>Iduna natalensis</i>	MLW	Nyika National Park	AfrLeu067 KM056494 AFR176
468155	Passeriformes	Locustellidae	<i>Bradypterus cinnamomeus</i>	MLW	Nyika National Park	AfrLeu067
468097	Passeriformes	Muscicapidae	<i>Cossypha anomala</i>	MLW	Nyika National Park	AfrLeu068 KM056539 AFR225
468098	Passeriformes	Muscicapidae	<i>Cossypha anomala</i>	MLW	Nyika National Park	AfrLeu068
467981	Passeriformes	Pycnonotidae	<i>Arizelocichla nigriceps</i>	MLW	Nyika National Park	AfrLeu068
468010	Passeriformes	Pycnonotidae	<i>Phyllastrephus flavostriatus</i>	MLW	Nyika National Park	AfrLeu069 KM056541 AFR227
468011	Passeriformes	Pycnonotidae	<i>Phyllastrephus flavostriatus</i>	MLW	Nyika National Park	AfrLeu069
468015	Passeriformes	Pycnonotidae	<i>Phyllastrephus flavostriatus</i>	MLW	Nyika National Park	AfrLeu069
468100	Passeriformes	Muscicapidae	<i>Cossypha anomala</i>	MLW	Nyika National Park	AfrLeu070 KM056540 AFR226
467982	Passeriformes	Pycnonotidae	<i>Arizelocichla nigriceps</i>	MLW	Nyika National Park	AfrLeu070
468073				MLW	Nyika National Park	AfrLeu070
468096	Passeriformes	Muscicapidae	<i>Cossypha caffra</i>	MLW	Nyika National Park	AfrLeu071 KM056553 AFR239
468134	Passeriformes	Muscicapidae	<i>Sheppardia sharpei</i>	MLW	Nyika National Park	AfrLeu071
468282	Passeriformes	Platysteiridae	<i>Batis capensis</i>	MLW	Nyika National Park	AfrLeu071
K86555	Passeriformes	Fringillidae	<i>Serinus sulphuratus</i>	Kenya	Laikipia County	AfrLeu072
K90006	Passeriformes	Passeridae	<i>Passer emimibey</i>	Kenya	Laikipia County	AfrLeu072
487085	Passeriformes	Muscicapidae	<i>Cossypha cyanocampter</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu073
481378	Passeriformes	Muscicapidae	<i>Pseudathya fuelleborni</i>	MOZ	Gorongosa Mountain	AfrLeu073
481416	Passeriformes	Cisticolidae	<i>Apalis thoracica</i>	MOZ	Gorongosa Mountain	AfrLeu074
481396	Passeriformes	Muscicapidae	<i>Swynnertonia swynnertoni</i>	MOZ	Gorongosa Mountain	AfrLeu074
481163	Passeriformes	Locustellidae	<i>Bradypterus cinnamomeus</i>	DRC	Kangala Forest	AfrLeu075

481164	Passeriformes	Locustellidae	<i>Bradypterus</i>	<i>cinnamomeus</i>	DRC	Kangala Forest	AfrLeu075
487222	Passeriformes	Platysteiridae	<i>Platysteira</i>	<i>castanea</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu076
487208	Passeriformes	Platysteiridae	<i>Platysteira</i>	<i>concreta</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu076
AA22036	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	AfrLeu077
AB4726	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	AfrLeu077
AA22036	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	AfrLeu078
AA27961	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>cucullatus</i>	Kenya	Laikipia County	AfrLeu078
468141	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	MLW	Nyika National Park	AfrLeu079
468143	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	MLW	Nyika National Park	AfrLeu079
AB4722	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Nyandarua County	AfrLeu080
AA28835	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Laikipia County	AfrLeu080
T58134	Piciformes	Lybiidae	<i>Pogoniulus</i>	<i>pusillus</i>	Kenya	Nakuru County	AfrLeu081 DQ451432, CIAE02 KJ488908, KP000840, HF543631, GQ371174, EF607287, KJ577832
AB4748	Piciformes	Picidae	<i>Campethera</i>	<i>nubica</i>	Kenya	Nakuru County	AfrLeu081
487161	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>fulvescens</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu082
487359	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigerrimus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu082
487282	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>chloropygius</i>	UGA	Kibale National Park, Mainaro	AfrLeu083
481241	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>rockefelleri</i>	DRC	Kangala Forest	AfrLeu083
486857	Cuculiformes	Cuculidae	<i>Cuculus</i>	<i>solitarius</i>	UGA	Kibale National Park, Mainaro	AfrLeu084
486916	Piciformes	Indicatoridae	<i>Indicator</i>	<i>exilis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu084

487080	Passeriformes	Turdidae	<i>Neocossyphus fraseri</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu085
487077	Passeriformes	Turdidae	<i>Neocossyphus fraseri</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu085
490076	Passeriformes	Pycnonotidae	<i>Criniger calurus</i>	DRC	Boende	AfrLeu086
490046	Passeriformes	Pycnonotidae	<i>Phyllastrephus icterinus</i>	DRC	Boende	AfrLeu086
487010	Passeriformes	Pycnonotidae	<i>Criniger calurus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu087
486992	Passeriformes	Pycnonotidae	<i>Phyllastrephus hypochloris</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu087
490078	Passeriformes	Pycnonotidae	<i>Phyllastrephus albigularis</i>	DRC	Luki Biosphere Reserve	AfrLeu088
490079	Passeriformes	Pycnonotidae	<i>Phyllastrephus albigularis</i>	DRC	Luki Biosphere Reserve	AfrLeu088
AB4739	Passeriformes	Malacoctidae	<i>Laniarius aethiopicus</i>	Kenya	Nyandarua County	AfrLeu089
BB11496	Passeriformes	Malacoctidae	<i>Laniarius aethiopicus</i>	Kenya	Nyandarua County	AfrLeu089
468276	Passeriformes	Platysteiridae	<i>Batis capensis</i>	MLW	Nyika National Park	AfrLeu090
468283	Passeriformes	Platysteiridae	<i>Batis capensis</i>	MLW	Nyika National Park	AfrLeu090
481259	Passeriformes	Nectariniidae	<i>Cinnyris venustus</i>	DRC	Kangala Forest	AfrLeu091 DQ847216 COSUN 1
481564	Passeriformes	Nectariniidae	<i>Cinnyris venustus</i>	MOZ	Gorongosa Mountain	AfrLeu091
486974	Passeriformes	Pycnonotidae	<i>Eurillas curvirostris</i>	UGA	Kibale National Park, Mainaro	AfrLeu092
486979	Passeriformes	Pycnonotidae	<i>Eurillas curvirostris</i>	UGA	Kibale National Park, Mainaro	AfrLeu092
C11250	Columbiformes	Columbidae	<i>Streptopelia capicola</i>	Kenya	Laikipia County	AfrLeu093 HF543622
C11261	Columbiformes	Columbidae	<i>Streptopelia capicola</i>	Kenya	Laikipia County	AfrLeu093
481261	Passeriformes	Nectariniidae	<i>Cinnyris venustus</i>	DRC	Kangala Forest	AfrLeu094
481245	Passeriformes	Nectariniidae	<i>Hedyalipna collaris</i>	DRC	Kangala Forest	AfrLeu094
481246	Passeriformes	Nectariniidae	<i>Hedyalipna collaris</i>	DRC	Kangala Forest	AfrLeu095
481247	Passeriformes	Nectariniidae	<i>Hedyalipna collaris</i>	DRC	Kangala Forest	AfrLeu095
K86502	Passeriformes	Sylviidae	<i>Sylvia atricapilla</i>	Kenya	Laikipia County	AfrLeu096 KJ488665 SYAT42

K86504	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>atricapilla</i>	Kenya	Laikipia County	AfrLeu096
481619	Passeriformes	Malacoctidae	<i>Tchagra</i>	<i>senegalus</i>	MOZ	Gorongosa Mountain	AfrLeu097
468022	Passeriformes	Malacoctidae	<i>Tchagra</i>	<i>senegalus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu097
468315	Passeriformes	Paridae	<i>Melaniparus</i>	<i>griseiventris</i>	MLW	Nyika National Park	AfrLeu098
474937	Passeriformes	Paridae	<i>Melaniparus</i>	<i>rufiventris</i>	MLW	Mangochi Forest Reserve	AfrLeu098
AA21937	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>intermedius</i>	Kenya	Nakuru County	AfrLeu099
K86524	Passeriformes	Ploceidae	<i>Quelea</i>	<i>quelea</i>	Kenya	Nyandarua County	AfrLeu099
481443	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MOZ	Gorongosa Mountain	AfrLeu100
481444	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MOZ	Gorongosa Mountain	AfrLeu100
481202	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	DRC	Kahuzi-Biega National Park	AfrLeu101
481208	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	DRC	Kahuzi-Biega National Park	AfrLeu101
474830	Passeriformes	Muscicapidae	<i>Cercotrichas</i>	<i>quadrivirgata</i>	MLW	Mangochi Forest Reserve	AfrLeu102
474790	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Mangochi Forest Reserve	AfrLeu102
AA22051	Passeriformes	Motacillidae	<i>Anthus</i>	<i>cinnamomeus</i>	Kenya	Nyandarua County	AfrLeu103
BB13496	Passeriformes	Turdidae	<i>Turdus</i>	<i>olivaceus</i>	Kenya	Nyandarua County	AfrLeu103
487272	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>obscura</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu104
487014	Passeriformes	Pycnonotidae	<i>Criniger</i>	<i>calurus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu104
AA28825	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>spekei</i>	Kenya	Laikipia County	AfrLeu105
468002	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Nyika National Park	AfrLeu105
481137	Passeriformes	Cisticolidae	<i>Cisticola</i>	<i>chubbi</i>	DRC	Kangala Forest	AfrLeu106
468432	Passeriformes	Estrildidae	<i>Cryptospiza</i>	<i>reichenovii</i>	MLW	Nyika National Park	AfrLeu106
Z0654	Cuculiformes	Musophagidae	<i>Corythaixoides</i>	<i>leucogaster</i>	Kenya	Laikipia County	AfrLeu107
AA28809	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>spekei</i>	Kenya	Laikipia County	AfrLeu107
468139	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	MLW	Nyika National Park	AfrLeu108
							KM056556 AFR243

481339	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>milanensis</i>	MOZ	Gorongosa Mountain	AfrLeu109	KM056513	AFR195
468356	Passeriformes	Fringillidae	<i>Serinus</i>	<i>hypostictus</i>	MLW	Nyika National Park	AfrLeu110	KM056557	AFR244
481568	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>olivacea</i>	MOZ	Gorongosa Mountain	AfrLeu111	KM056643	
468323	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>olivacea</i>	MLW	Nyika National Park	AfrLeu111		
481591	Passeriformes	Estrilidae	<i>Hypargos</i>	<i>niveoguttatus</i>	MOZ	Gorongosa Mountain	AfrLeu112	DQ847209	REB6
468554	Passeriformes	Ploceidae	<i>Euplectes</i>	<i>ardens</i>	MLW	Vwaza Wildlife Reserve	AfrLeu112	KM056644	
468015	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>flavostrigatus</i>	MLW	Nyika National Park	AfrLeu113	KM056515	AFR197
468408	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu113		
481345	Passeriformes	Malacoconidae	<i>Tchagra</i>	<i>minutus</i>	MOZ	Gorongosa Mountain	AfrLeu114		
481608	Passeriformes	Ploceidae	<i>Euplectes</i>	<i>ardens</i>	MOZ	Gorongosa Mountain	AfrLeu114		
474988	Passeriformes	Vangidae	<i>Prionops</i>	<i>plumatus</i>	MLW	Mangochi Forest Reserve	AfrLeu115		
474989	Passeriformes	Vangidae	<i>Prionops</i>	<i>plumatus</i>	MLW	Mangochi Forest Reserve	AfrLeu115		
467896	Trogoniformes	Trogonidae	<i>Apaloderma</i>	<i>vittatum</i>	MLW	Nyika National Park	AfrLeu116	KM056520	AFR202
467897	Trogoniformes	Trogonidae	<i>Apaloderma</i>	<i>vittatum</i>	MLW	Nyika National Park	AfrLeu116		
468351	Passeriformes	Nectariniidae	<i>Chalcomitra</i>	<i>amethystina</i>	MLW	Vwaza Wildlife Reserve	AfrLeu117	KM056483	AFR164
AA22087	Passeriformes	Passeridae	<i>Petronia</i>	<i>pyrgita</i>	Kenya	Laikipia County	AfrLeu117		
468374	Passeriformes	Fringillidae	<i>Serinus</i>	<i>mozambicus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu118	DQ847218	REB7
468608	Passeriformes	Sturnidae	<i>Lamprotornis</i>	<i>chloropterus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu118	KM056647	
468254	Passeriformes	Cisticolidae	<i>Apalis</i>	<i>thoracica</i>	MLW	Nyika National Park	AfrLeu119	KM056500	AFR182
468103	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>anomala</i>	MLW	Nyika National Park	AfrLeu120	KM056549	AFR235
468141	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	MLW	Nyika National Park	AfrLeu120		
467965	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>milanensis</i>	MLW	Nyika National Park	AfrLeu121	KM056533	AFR218
468075					MLW	Nyika National Park	AfrLeu121		
490076	Passeriformes	Pycnonotidae	<i>Criniger</i>	<i>calurus</i>	DRC	Boende	AfrLeu122		
490034	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	DRC	Boende	AfrLeu122		
AA21949	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	Kenya	Nyandarua County	AfrLeu123	DQ847210, KM056645	WW6

AA2195			Kenya	Other	AfrLeu124	
AA2195			Kenya	Other	AfrLeu125	
AA22002	Passeriformes	Passeridae	Kenya	Nyandarua County	AfrLeu126	DQ451435, DQ451436, KJ488649, KM056648
AA22008	Passeriformes	Passeridae	Kenya	Nyandarua County	AfrLeu127	DQ847219 REB8
AA22084	Passeriformes	Passeridae	Kenya	Laikipia County	AfrLeu128	
AA27905	Passeriformes	Cisticolidae	Kenya	Laikipia County	AfrLeu129	
AA27912	Passeriformes	Pycnonotidae	Kenya	Laikipia County	AfrLeu130	
AA27914	Passeriformes	Pycnonotidae	Kenya	Laikipia County	AfrLeu131	
AA27919	Passeriformes	Malacoerotidae	Kenya	Laikipia County	AfrLeu132	
AA27930	Passeriformes	Pycnonotidae	Kenya	Laikipia County	AfrLeu133	
AA27948	Passeriformes	Pycnonotidae	Kenya	Laikipia County	AfrLeu134	
AA27961	Passeriformes	Ploceidae	Kenya	Laikipia County	AfrLeu135	
AA27966	Passeriformes	Passeridae	Kenya	Laikipia County	AfrLeu136	
AA28875	Passeriformes	Ploceidae	Kenya	Nakuru County	AfrLeu137	
AB4731	Passeriformes	Ploceidae	Kenya	Nyandarua County	AfrLeu138	
AB4742	Passeriformes	Ploceidae	Kenya	Nyandarua County	AfrLeu139	
AB4772	Passeriformes	Ploceidae	Kenya	Laikipia County	AfrLeu140	
AB4776	Piciformes	Picidae	Kenya	Laikipia County	AfrLeu141	
AB4831	Coliiformes	Coliidae	Kenya	Laikipia County	AfrLeu142	
BB11373	Passeriformes	Sturnidae	Kenya	Nakuru County	AfrLeu143	
BB11481	Coliiformes	Coliidae	Kenya	Laikipia County	AfrLeu144	
BB13545	Passeriformes	Sturnidae	Kenya	Laikipia County	AfrLeu145	
BB13593	Passeriformes	Sturnidae	Kenya	Laikipia County	AfrLeu146	
BB13600	Passeriformes	Laniidae	Kenya	Laikipia County	AfrLeu147	

BB13612	Passeriformes	Leiothrichidae	<i>Turdoides</i>	<i>rubiginosa</i>	Kenya	Laikipia County	AfrLeu148
BB13619	Coliiformes	Coliidae	<i>Colius</i>	<i>striatus</i>	Kenya	Laikipia County	AfrLeu149
BB13676	Passeriformes	Sturnidae	<i>Creatophora</i>	<i>cinerea</i>	Kenya	Laikipia County	AfrLeu150
BB13449	Passeriformes	Leiothrichidae	<i>Turdoides</i>	<i>jardineii</i>	Kenya	Nakuru County	AfrLeu151
BB15119	Passeriformes	Malacoenotidae	<i>Laniarius</i>	<i>aethiopicus</i>	Kenya	Nakuru County	AfrLeu152
CTFClippe d	Columbiformes	Columbidae	<i>Streptopelia</i>	<i>lugens</i>	Kenya	Laikipia County	AfrLeu153
481091	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kangala Forest	AfrLeu154
481099	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>cabanisi</i>	DRC	Kangala Forest	AfrLeu155
481280	Passeriformes	Estrildidae	<i>Cryptospiza</i>	<i>jacksoni</i>	DRC	Kangala Forest	AfrLeu156
481112	Passeriformes	Malacoenotidae	<i>Telophorus</i>	<i>dohertyi</i>	DRC	Kangala Forest	AfrLeu157
481093	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>cabanisi</i>	DRC	Kangala Forest	AfrLeu158
481169	Passeriformes	Acrocephalidae	<i>Iduna</i>	<i>similis</i>	DRC	Kangala Forest	AfrLeu159
481221	Passeriformes	Fringillidae	<i>Serinus</i>	<i>burtoni</i>	DRC	Kangala Forest	AfrLeu160
481175	Passeriformes	Phylloscopidae	<i>Phylloscopus</i>	<i>umbrovirens</i>	DRC	Kangala Forest	AfrLeu161
481110	Passeriformes	Malacoenotidae	<i>Dryoscopus</i>	<i>gambensis</i>	DRC	Kangala Forest	AfrLeu162
481298	Passeriformes	Locustellidae	<i>Bradypterus</i>	<i>cinnamomeus</i>	DRC	Kangala Forest	AfrLeu163
481260	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>venustus</i>	DRC	Kangala Forest	AfrLeu164
481074	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	DRC	Kahuzi-Biega National Park	AfrLeu165
481249	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>alinae</i>	DRC	Kahuzi-Biega National Park	AfrLeu166
481249	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>alinae</i>	DRC	Kahuzi-Biega National Park	AfrLeu167
481249	Passeriformes	Nectariniidae	<i>Cyanomitra</i>	<i>alinae</i>	DRC	Kahuzi-Biega National Park	AfrLeu168
481199	Passeriformes	Muscicapidae	<i>Pogonocichla</i>	<i>stellata</i>	DRC	Kahuzi-Biega National Park	AfrLeu169
481125	Passeriformes	Platysteiridae	<i>Batis</i>	<i>diops</i>	DRC	Kahuzi-Biega National Park	AfrLeu170
							KC682873 SYBOR3 3

481208	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	DRC	Kahuzi-Biega National Park	AfrLeu171	
481210	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	DRC	Kahuzi-Biega National Park	AfrLeu172	JN032635, JN032636, JN032637, HYMAD 01
481189	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>archeri</i>	DRC	Kahuzi-Biega National Park	AfrLeu173	KM056480 AFR161
481176	Passeriformes	Muscicapidae	<i>Pseudalethe</i>	<i>paliophrys</i>	DRC	Kahuzi-Biega National Park	AfrLeu174	
481203	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	DRC	Kahuzi-Biega National Park	AfrLeu175	
481222	Passeriformes	Fringillidae	<i>Serinus</i>	<i>burtoni</i>	DRC	Kahuzi-Biega National Park	AfrLeu176	
481223	Passeriformes	Fringillidae	<i>Serinus</i>	<i>burtoni</i>	DRC	Kahuzi-Biega National Park	AfrLeu177	
490212	Passeriformes	Platysteiridae	<i>Platysteira</i>	<i>castanea</i>	DRC	Boende	AfrLeu178	
490083	Passeriformes	Nicatoridae	<i>Nicator</i>	<i>chloris</i>	DRC	Luki Biosphere Reserve	AfrLeu179	
490071	Passeriformes	Pycnonotidae	<i>Criniger</i>	<i>calurus</i>	DRC	Luki Biosphere Reserve	AfrLeu180	
K77538	Passeriformes	Alaudidae	<i>Calandrella</i>	<i>cinerea</i>	Kenya	Nakuru County	AfrLeu181	
K77572	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	AfrLeu182	
K77809	Passeriformes	Fringillidae	<i>Serinus</i>	<i>citrinelloides</i>	Kenya	Nakuru County	AfrLeu183	
K77908	Passeriformes	Cisticolidae	<i>Cisticola</i>	<i>hunteri</i>	Kenya	Nyandarua County	AfrLeu184	DQ451437
K77923	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	AfrLeu185	
K77929	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	AfrLeu186	
K86215	Passeriformes	Locustellidae	<i>Bradypterus</i>	<i>cinnamomeus</i>	Kenya	Nyandarua County	AfrLeu187	
K86265	Passeriformes	Alaudidae	<i>Calandrella</i>	<i>cinerea</i>	Kenya	Nakuru County	AfrLeu188	
K86314	Passeriformes	Motacillidae	<i>Motacilla</i>	<i>flava</i>	Kenya	Nakuru County	AfrLeu189	ROF16
K86370	Passeriformes	Muscicapidae	<i>Bradornis</i>	<i>pallidus</i>	Kenya	Nakuru County	AfrLeu190	DQ847220 YMWWD 1
K86518	Passeriformes	Nectariniidae	<i>Nectarinia</i>	<i>famosa</i>	Kenya	Nyandarua County	AfrLeu191	
K86585	Passeriformes	Fringillidae	<i>Serinus</i>	<i>sulphuratus</i>	Kenya	Laikipia County	AfrLeu192	

K89778	Passeriformes	Locustellidae	<i>Bradypterus</i>	<i>cinnamomeus</i>	Kenya	Laikipia County	AfrLeu193
K89778	Passeriformes	Locustellidae	<i>Bradypterus</i>	<i>cinnamomeus</i>	Kenya	Laikipia County	AfrLeu194
K89778	Passeriformes	Locustellidae	<i>Bradypterus</i>	<i>cinnamomeus</i>	Kenya	Laikipia County	AfrLeu195
K90056	Passeriformes	Cisticolidae	<i>Camaroptera</i>	<i>brachyura</i>	Kenya	Nakuru County	AfrLeu196
467991	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu197
467993	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu198
467995	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu199 KM056454 AFR231
468312	Passeriformes	Paridae	<i>Melaniparus</i>	<i>niger</i>	MLW	Vwaza Wildlife Reserve	AfrLeu200 KM056479 AFR159
467999	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu201
468593	Passeriformes	Sturnidae	<i>Neocichla</i>	<i>gutturalis</i>	MLW	Vwaza Wildlife Reserve	AfrLeu202 KM056482 AFR163
468613	Passeriformes	Oriolidae	<i>Oriolus</i>	<i>auratus</i>	MLW	Vwaza Wildlife Reserve	AfrLeu203
468086	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	MLW	Nyika National Park	AfrLeu204
468399	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu205 KM056529 AFR211
468272	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	AfrLeu206
467943	Passeriformes	Calyptomenidae	<i>Smithornis</i>	<i>capensis</i>	MLW	Nyika National Park	AfrLeu207 KM056493 AFR175
468032	Passeriformes	Malaconotidae	<i>Laniarius</i>	<i>fuelleborni</i>	MLW	Nyika National Park	AfrLeu208 KM056555 AFR242
467972	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu209
468155	Passeriformes	Locustellidae	<i>Bradypterus</i>	<i>cinnamomeus</i>	MLW	Nyika National Park	AfrLeu210
467973	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	AfrLeu211
468405	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	AfrLeu212 KM056546 AFR232
467845	Galliformes	Phasianidae	<i>Francolinus</i>	<i>levaillantii</i>	MLW	Nyika National Park	AfrLeu213 KM056558 AFR245
467867	Columbiformes	Columbidae	<i>Columba</i>	<i>arquatrix</i>	MLW	Nyika National Park	AfrLeu214 KM056496 AFR178
468118	Passeriformes	Turdidae	<i>Geokichla</i>	<i>gurneyi</i>	MLW	Nyika National Park	AfrLeu215
468118	Passeriformes	Turdidae	<i>Geokichla</i>	<i>gurneyi</i>	MLW	Nyika National Park	AfrLeu216
468074	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	AfrLeu217
468279	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	AfrLeu218 KM056498 AFR180

468101	Passeriformes	Muscicapidae	<i>Cossypha anomala</i>	MLW	Nyika National Park	AfrLeu219
467964	Passeriformes	Pycnonotidae	<i>Arizelocichla milanjensis</i>	MLW	Nyika National Park	AfrLeu220
467964	Passeriformes	Pycnonotidae	<i>Arizelocichla milanjensis</i>	MLW	Nyika National Park	AfrLeu221
467986	Passeriformes	Pycnonotidae	<i>Arizelocichla nigriceps</i>	MLW	Nyika National Park	AfrLeu222 KM056544 AFR230
468179	Passeriformes	Phylloscopidae	<i>Phylloscopus ruficapilla</i>	MLW	Nyika National Park	AfrLeu223 KM056516 AFR198
468121	Passeriformes	Turdidae	<i>Geokichla gurneyi</i>	MLW	Nyika National Park	AfrLeu224 KM056519 AFR201
468130	Passeriformes	Turdidae	<i>Turdus abyssinicus</i>	MLW	Nyika National Park	AfrLeu225 KM056561 AFR248
468130	Passeriformes	Turdidae	<i>Turdus abyssinicus</i>	MLW	Nyika National Park	AfrLeu226
468130	Passeriformes	Turdidae	<i>Turdus abyssinicus</i>	MLW	Nyika National Park	AfrLeu227
468083	Passeriformes	Muscicapidae	<i>Cossypha heuglini</i>	MLW	Nyika National Park	AfrLeu228 KJ488648, AFR205 KM056523
467918	Coraciiformes	Bucerotidae	<i>Tockus alboterminatus</i>	MLW	Nyika National Park	AfrLeu229 KM056525 AFR207
474986	Passeriformes	Malacostridae	<i>Malacostrus blanchoti</i>	MLW	Mangochi Forest Reserve	AfrLeu230
475052	Passeriformes	Ploceidae	<i>Euplectes ardens</i>	MLW	Mangochi Forest Reserve	AfrLeu231 KM056535 AFR220
475052	Passeriformes	Ploceidae	<i>Euplectes ardens</i>	MLW	Mangochi Forest Reserve	AfrLeu232
474970	Passeriformes	Malacostridae	<i>Dryoscopus cuba</i>	MLW	Mangochi Forest Reserve	AfrLeu233
475000	Passeriformes	Fringillidae	<i>Serinus hypostictus</i>	MLW	Mangochi Forest Reserve	AfrLeu234
474992	Passeriformes	Vangidae	<i>Prionops plumatus</i>	MLW	Mangochi Forest Reserve	AfrLeu235
474993	Passeriformes	Vangidae	<i>Prionops plumatus</i>	MLW	Mangochi Forest Reserve	AfrLeu236
474896	Passeriformes	Hyliotidae	<i>Hyliota flavigaster</i>	MLW	Mangochi Forest Reserve	AfrLeu237
475028	Passeriformes	Ploceidae	<i>Ploceus ocularis</i>	MLW	Mangochi Forest Reserve	AfrLeu238
474965	Passeriformes	Oriolidae	<i>Oriolus oriolus</i>	MLW	Mangochi Forest Reserve	AfrLeu239
474726	Strigiformes	Strigidae	<i>Glaucidium perlatum</i>	MLW	Mangochi Forest Reserve	AfrLeu240
474781	Passeriformes	Motacillidae	<i>Anthus lineiventris</i>	MLW	Mangochi Forest Reserve	AfrLeu241
474799	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	MLW	Mangochi Forest Reserve	AfrLeu242 KM056537 AFR223
475031	Passeriformes	Ploceidae	<i>Ploceus ocularis</i>	MLW	Mangochi Forest Reserve	AfrLeu243
474974	Passeriformes	Malacostridae	<i>Dryoscopus cuba</i>	MLW	Mangochi Forest Reserve	AfrLeu244

474974	Passeriformes	Malacoenotidae	<i>Dryoscopus cubla</i>	MLW	Mangochi Forest Reserve	AfrLeu245
475032	Passeriformes	Ploceidae	<i>Ploceus ocularis</i>	MLW	Mangochi Forest Reserve	AfrLeu246
481366	Passeriformes	Malacoenotidae	<i>Dryoscopus cubla</i>	MOZ	Gorongosa Mountain	AfrLeu247
481320	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	MOZ	Gorongosa Mountain	AfrLeu248
481320	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	MOZ	Gorongosa Mountain	AfrLeu249
481326	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	MOZ	Gorongosa Mountain	AfrLeu250
481455	Passeriformes	Oriolidae	<i>Oriolus larvatus</i>	MOZ	Gorongosa Mountain	AfrLeu251
481455	Passeriformes	Oriolidae	<i>Oriolus larvatus</i>	MOZ	Gorongosa Mountain	AfrLeu252
481429	Passeriformes	Platysteiridae	<i>Batis soror</i>	MOZ	Gorongosa Mountain	AfrLeu253
481407	Passeriformes	Malacoenotidae	<i>Malacoenotus blanchoti</i>	MOZ	Gorongosa Mountain	AfrLeu254
481560	Passeriformes	Nectariniidae	<i>Cinnyris venustus</i>	MOZ	Gorongosa Mountain	AfrLeu255
481324	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	MOZ	Gorongosa Mountain	AfrLeu256
481458	Passeriformes	Ploceidae	<i>Ploceus ocularis</i>	MOZ	Gorongosa Mountain	AfrLeu257
481605	Passeriformes	Ploceidae	<i>Euplectes capensis</i>	MOZ	Gorongosa Mountain	AfrLeu258
481367	Passeriformes	Malacoenotidae	<i>Dryoscopus cubla</i>	MOZ	Gorongosa Mountain	AfrLeu259
481388	Passeriformes	Muscicapidae	<i>Pogonocichla stellata</i>	MOZ	Gorongosa Mountain	AfrLeu260
481363	Passeriformes	Malacoenotidae	<i>Dryoscopus cubla</i>	MOZ	Gorongosa Mountain	AfrLeu261
481336	Passeriformes	Pycnonotidae	<i>Arizelocichla milanensis</i>	MOZ	Gorongosa Mountain	AfrLeu262
481571	Passeriformes	Nectariniidae	<i>Cyanomitra olivacea</i>	MOZ	Gorongosa Mountain	AfrLeu263
481440	Passeriformes	Dicruridae	<i>Dicrurus ludwigii</i>	MOZ	Gorongosa Mountain	AfrLeu264
481401	Passeriformes	Muscicapidae	<i>Swynnertonia swynnertoni</i>	MOZ	Gorongosa Mountain	AfrLeu265
481402	Passeriformes	Muscicapidae	<i>Swynnertonia swynnertoni</i>	MOZ	Gorongosa Mountain	AfrLeu266
481580	Passeriformes	Nectariniidae	<i>Cyanomitra olivacea</i>	MOZ	Gorongosa Mountain	AfrLeu267
481398	Passeriformes	Muscicapidae	<i>Swynnertonia swynnertoni</i>	MOZ	Gorongosa Mountain	AfrLeu268
481342	Passeriformes	Pycnonotidae	<i>Arizelocichla milanensis</i>	MOZ	Gorongosa Mountain	AfrLeu269
481446	Passeriformes	Platysteiridae	<i>Batis capensis</i>	MOZ	Gorongosa Mountain	AfrLeu270

481360	Passeriformes	Turdidae	<i>Geokichla</i>	<i>gurneyi</i>	MOZ	Gorongosa Mountain	AfrLeu271
481434	Passeriformes	Platysteiridae	<i>Batis</i>	<i>soror</i>	MOZ	Gorongosa Mountain	AfrLeu272
T54964	Passeriformes	Cisticolidae	<i>Apalis</i>	<i>porphyrolaema</i>	Kenya	Nyandarua County	AfrLeu273
T54964	Passeriformes	Cisticolidae	<i>Apalis</i>	<i>porphyrolaema</i>	Kenya	Nyandarua County	AfrLeu274
T58127	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	Kenya	Laikipia County	AfrLeu275
T58131	Passeriformes	Fringillidae	<i>Serinus</i>	<i>reichenowi</i>	Kenya	Laikipia County	AfrLeu276
486997	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>albigularis</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu277
486965	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu278
486966	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu279
487210	Passeriformes	Platysteiridae	<i>Platysteira</i>	<i>castanea</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu280
486914	Piciformes	Indicatoridae	<i>Indicator</i>	<i>conirostris</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu281
486947	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu282
486905	Piciformes	Lybiidae	<i>Trichalaema</i>	<i>hirsuta</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu283
486905	Piciformes	Lybiidae	<i>Trichalaema</i>	<i>hirsuta</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu284
487086	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>natalensis</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu285
486969	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu286
486992	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>hypochloris</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu287
487065	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu288
487180	Passeriformes	Macrosphenidae	<i>Sylvietta</i>	<i>virens</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu289
487077	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>fraseri</i>	UGA	Kibale National Park, Nogogo Research Camp	AfrLeu290

487203	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>borin</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu291	KJ488656, FJ828531, DQ847237, DQ847241	SYBORO 6
487066	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu292		
487066	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu293		
486972	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Ngogo Research Camp	AfrLeu294		
487235	Passeriformes	Muscicapidae	<i>Myioparus</i>	<i>griseigularis</i>	UGA	Kibale National Park, Mainaro	AfrLeu295		
487153	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>fulvescens</i>	UGA	Kibale National Park, Mainaro	AfrLeu296		
487153	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>fulvescens</i>	UGA	Kibale National Park, Mainaro	AfrLeu297		
487030	Passeriformes	Nicatoridae	<i>Nicator</i>	<i>chloris</i>	UGA	Kibale National Park, Mainaro	AfrLeu298		
487297	Passeriformes	Estrildidae	<i>Mandingoa</i>	<i>nitidula</i>	UGA	Kibale National Park, Mainaro	AfrLeu299		
486977	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Mainaro	AfrLeu300		
486981	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Mainaro	AfrLeu301		
UGA340	Galliformes	Phasianidae	<i>Gallus</i>	<i>gallus</i>	UGA	Kibale National Park, Mainaro	AfrLeu302		
486955	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu303		
487008	Passeriformes	Pycnonotidae	<i>Criniger</i>	<i>calurus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu304		
UGA356	Coraciiformes	Alcedinidae	<i>Halcyon</i>	<i>senegalensis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu305		
487097	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>natalensis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu306		
486989	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>xavieri</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu307		

487300	Passeriformes	Estrildidae	<i>Mandingoa</i>	<i>nitidula</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu308
487220	Passeriformes	Platysteiridae	<i>Platysteira</i>	<i>castanea</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu309
487220	Passeriformes	Platysteiridae	<i>Platysteira</i>	<i>castanea</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu310
487330	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu311
487330	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu312
487032	Passeriformes	Nicatoridae	<i>Nicator</i>	<i>chloris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu313
486860	Cuculiformes	Cuculidae	<i>Centropus</i>	<i>superciliosus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu314
486960	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu315
487228	Passeriformes	Muscicapidae	<i>Muscicapa</i>	<i>infuscata</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu316
487337	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu317
487338	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu318
486988	Passeriformes	Pycnonotidae	<i>Stelgidillas</i>	<i>gracilirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu319
487361	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigerrimus</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu320
487198	Passeriformes	Cisticolidae	<i>Cisticola</i>	<i>erythropis</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu321
486991	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>xavieri</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu322
486985	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu323
487277	Passeriformes	Nectariniidae	<i>Cyanamitra</i>	<i>obscura</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu324
487324	Passeriformes	Ploceidae	<i>Amblyospiza</i>	<i>albifrons</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu325

486986	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	AfrLeu326
481111	Passeriformes	Malacoctidae	<i>Dryoscopus</i>	<i>gambensis</i>	DRC	Kangala Forest	Unres. Colnf.
481218	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	DRC	Kangala Forest	Unres. Colnf.
481108	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	DRC	Kangala Forest	Unres. Colnf.
481166	Passeriformes	Locustellidae	<i>Bradypterus</i>	<i>cinnamomeus</i>	DRC	Kangala Forest	Unres. Colnf.
482751	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	DRC	Kangala Forest	Unres. Colnf.
468398	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	MLW	Nyika National Park	Unres. Colnf.
468390	Passeriformes	Fringillidae	<i>Serinus</i>	<i>flavivertex</i>	MLW	Nyika National Park	Unres. Colnf.
468273	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	Unres. Colnf.
468274	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	Unres. Colnf.
MOZ113	Galliformes	<i>Gallus</i>	<i>gallus</i>	MLW	MOZ	Gorongosa Mountain	Unres. Colnf.
481442	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481375	Passeriformes	Muscicapidae	<i>Pseudaethes</i>	<i>fuelleborni</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481448	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481399	Passeriformes	Muscicapidae	<i>Swynnertonia</i>	<i>swynnertoni</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481445	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481332	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>flavostrigatus</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481330	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>flavostrigatus</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481341	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>milanjensis</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481616	Passeriformes	Phylloscopidae	<i>Phylloscopus</i>	<i>ruficapilla</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481563	Passeriformes	Nectariniidae	<i>Cinnyris</i>	<i>venustus</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481322	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481600	Passeriformes	Estrildidae	<i>Lagonosticta</i>	<i>rhodopareia</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481609	Passeriformes	Ploceidae	<i>Euplectes</i>	<i>ardens</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481432	Passeriformes	Platysteiridae	<i>Batis</i>	<i>soror</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481433	Passeriformes	Platysteiridae	<i>Batis</i>	<i>soror</i>	MOZ	Gorongosa Mountain	Unres. Colnf.

481327	Passeriformes	Pycnonotidae	<i>Pycnonotus barbatus</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481460	Passeriformes	Ploceidae	<i>Ploceus ocularis</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481370	Passeriformes	Malacoctidae	<i>Dryoscopus cuba</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481312	Columbiformes	Columbidae	<i>Turtur tympanistris</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481335	Passeriformes	Pycnonotidae	<i>Arizelacichla milanjensis</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481604	Passeriformes	Estrildidae	<i>Estrilda perreini</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481357	Passeriformes	Pycnonotidae	<i>Phyllastrephus terrestris</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481597	Passeriformes	Estrildidae	<i>Lagonosticta rubricata</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481351	Passeriformes	Motacillidae	<i>Motacilla clara</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481462	Passeriformes	Nectariniidae	<i>Chalcomitra amethystina</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481575	Passeriformes	Nectariniidae	<i>Cyanomitra olivacea</i>	MOZ	Gorongosa Mountain	Unres. Colnf.
481235	Passeriformes	Nectariniidae	<i>Cinnyris regius</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481116	Passeriformes	Malacoctidae	<i>Laniarius poensis</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481190	Passeriformes	Muscicapidae	<i>Cossypha archeri</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481243	Passeriformes	Nectariniidae	<i>Hedyalipna collaris</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481209	Passeriformes	Sylviidae	<i>Sylvia abyssinica</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481205	Passeriformes	Sylviidae	<i>Sylvia abyssinica</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481155	Passeriformes	Cisticolidae	<i>Prinia bairdii</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481114	Passeriformes	Malacoctidae	<i>Laniarius poensis</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481177	Passeriformes	Muscicapidae	<i>Pseudaethes poliophrys</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481278	Passeriformes	Ploceidae	<i>Ploceus alienus</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.
481204	Passeriformes	Sylviidae	<i>Sylvia abyssinica</i>	DRC	Kahuzi-Biega National Park, Bugulumiza	Unres. Colnf.

		Park, Bugulumiza			
481274	Passeriformes	Ploceidae	<i>Ploceus alienus</i>	DRC	Kahuzi-Biega National Park, Bugulumiza Unres. Colnf.
481277	Passeriformes	Ploceidae	<i>Ploceus alienus</i>	DRC	Kahuzi-Biega National Park, Bugulumiza Unres. Colnf.
481227	Passeriformes	Oriolidae	<i>Oriolus percivali</i>	DRC	Kahuzi-Biega National Park, Bugulumiza Unres. Colnf.
481207	Passeriformes	Sylviidae	<i>Sylvia abyssinica</i>	DRC	Kahuzi-Biega National Park, Bugulumiza Unres. Colnf.
481276	Passeriformes	Ploceidae	<i>Ploceus alienus</i>	DRC	Kahuzi-Biega National Park, Bugulumiza Unres. Colnf.
481252	Passeriformes	Nectariniidae	<i>Cyanamitra alinae</i>	DRC	Kahuzi-Biega National Park, Bugulumiza Unres. Colnf.
481079	Passeriformes	Pycnonotidae	<i>Eurillas latirostris</i>	DRC	Kangala Forest Unres. Colnf.
481086	Passeriformes	Pycnonotidae	<i>Eurillas latirostris</i>	DRC	Kangala Forest Unres. Colnf.
481092	Passeriformes	Pycnonotidae	<i>Phyllastrephus cabanisi</i>	DRC	Kangala Forest Unres. Colnf.
481078	Passeriformes	Pycnonotidae	<i>Eurillas latirostris</i>	DRC	Kangala Forest Unres. Colnf.
481101	Passeriformes	Pycnonotidae	<i>Phyllastrephus cabanisi</i>	DRC	Kangala Forest Unres. Colnf.
481096	Passeriformes	Pycnonotidae	<i>Phyllastrephus cabanisi</i>	DRC	Kangala Forest Unres. Colnf.
481094	Passeriformes	Pycnonotidae	<i>Phyllastrephus cabanisi</i>	DRC	Kangala Forest Unres. Colnf.
481291	Passeriformes	Pycnonotidae	<i>Eurillas latirostris</i>	DRC	Kangala Forest Unres. Colnf.
481104	Passeriformes	Pycnonotidae	<i>Phyllastrephus cabanisi</i>	DRC	Kangala Forest Unres. Colnf.
481103	Passeriformes	Pycnonotidae	<i>Phyllastrephus cabanisi</i>	DRC	Kangala Forest Unres. Colnf.
487009	Passeriformes	Pycnonotidae	<i>Criniger calurus</i>	UGA	Kasyoha-Kitomi Forest Reserve Unres. Colnf.
487071	Passeriformes	Turdidae	<i>Neocossyphus poensis</i>	UGA	Kasyoha-Kitomi Forest Reserve Unres. Colnf.
486982	Passeriformes	Pycnonotidae	<i>Eurillas curvirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve Unres. Colnf.
486932	Passeriformes	Pycnonotidae	<i>Eurillas latirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve Unres. Colnf.

	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487016	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487017	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487018	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
486937	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487020	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487011	Passeriformes	Pycnonotidae	<i>Criniger</i>	<i>calurus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487021	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487331	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487022	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
486984	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487023	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487335	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
UGA474	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487024	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487025	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487026	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487243	Passeriformes	Monarchidae	<i>Terpsiphone</i>	<i>viridis</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.

486987	Passeriformes	Pycnonotidae	<i>Stelgidillas</i>	<i>gracilirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487333	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487081	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>fraseri</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
487079	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>fraseri</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
486941	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kasyoha-Kitomi Forest Reserve	Unres. Colnf.
468038	Passeriformes	Malacoenotidae	<i>Laniarius</i>	<i>major</i>	MLW	Vwaza Wildlife Reserve	Unres. Colnf.
486975	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>curvirostris</i>	UGA	Kibale National Park, Mainaro	Unres. Colnf.
487068	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kibale National Park, Mainaro	Unres. Colnf.
487325	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigricollis</i>	UGA	Kibale National Park, Mainaro	Unres. Colnf.
487340	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>nigerrimus</i>	UGA	Kibale National Park, Mainaro	Unres. Colnf.
486920	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>latirostris</i>	UGA	Kibale National Park, Ngogo Research Camp	Unres. Colnf.
487076	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>fraseri</i>	UGA	Kibale National Park, Ngogo Research Camp	Unres. Colnf.
487103	Passeriformes	Muscicapidae	<i>Pseudalethe</i>	<i>palliocephala</i>	UGA	Kibale National Park, Ngogo Research Camp	Unres. Colnf.
487061	Passeriformes	Turdidae	<i>Neocossyphus</i>	<i>poensis</i>	UGA	Kibale National Park, Ngogo Research Camp	Unres. Colnf.
487209	Passeriformes	Platysteiridae	<i>Platysteira</i>	<i>castanea</i>	UGA	Kibale National Park, Ngogo Research Camp	Unres. Colnf.
486948	Passeriformes	Pycnonotidae	<i>Eurillas</i>	<i>virens</i>	UGA	Kibale National Park, Ngogo Research Camp	Unres. Colnf.
486863					UGA	Kibale National Park, Ngogo Research Camp	Unres. Colnf.
487202	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>borin</i>	UGA	Kibale National Park, Ngogo Research Camp	Unres. Colnf.
487178	Passeriformes	Macrosphenidae	<i>Sylvietta</i>	<i>virens</i>	UGA	Kibale National Park, Ngogo Research Camp	Unres. Colnf.

Ngogo Research Camp									
BB13602	Passeriformes	Leiothrichidae	<i>Turdoides</i>	<i>plebejus</i>	Kenya	Laikipia County	Unres. Colnf.		
T58116	Passeriformes	Fringillidae	<i>Serinus</i>	<i>reichenowi</i>	Kenya	Laikipia County	Unres. Colnf.		
T58117	Passeriformes	Fringillidae	<i>Serinus</i>	<i>reichenowi</i>	Kenya	Laikipia County	Unres. Colnf.		
AA27915	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	Kenya	Laikipia County	Unres. Colnf.		
T58102	Passeriformes	Zosteropidae	<i>Zosterops</i>	<i>senegalensis</i>	Kenya	Laikipia County	Unres. Colnf.		
K86577	Passeriformes	Cisticolidae	<i>Camaroptera</i>	<i>brachyura</i>	Kenya	Laikipia County	Unres. Colnf.		
AA27925	Passeriformes	Muscicapidae	<i>Bradornis</i>	<i>microrhynchus</i>	Kenya	Laikipia County	Unres. Colnf.		
474794	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Mangochi Forest Reserve	Unres. Colnf.		
474962	Passeriformes	Nectariniidae	<i>Hedylipna</i>	<i>collaris</i>	MLW	Mangochi Forest Reserve	Unres. Colnf.		
474936	Passeriformes	Paridae	<i>Melaniparus</i>	<i>rufiventris</i>	MLW	Mangochi Forest Reserve	Unres. Colnf.		
468009	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>flavostrigatus</i>	MLW	Nyika National Park	Unres. Colnf.		
468280	Passeriformes	Platysteiridae	<i>Batis</i>	<i>capensis</i>	MLW	Nyika National Park	Unres. Colnf.		
468012	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>flavostrigatus</i>	MLW	Nyika National Park	Unres. Colnf.		
468140	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>abyssinica</i>	MLW	Nyika National Park	Unres. Colnf.		
468013	Passeriformes	Pycnonotidae	<i>Phyllastrephus</i>	<i>flavostrigatus</i>	MLW	Nyika National Park	Unres. Colnf.		
467980	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	Unres. Colnf.		
467990	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	MLW	Nyika National Park	Unres. Colnf.		
468144	Passeriformes	Pellorneidae	<i>Illadopsis</i>	<i>pyrrhoptera</i>	MLW	Nyika National Park	Unres. Colnf.		
K86364	Passeriformes	Cisticolidae	<i>Calamonastes</i>	<i>simplex</i>	Kenya	Nakuru County	Unres. Colnf.		
474918	Passeriformes	Muscicapidae	<i>Bradornis</i>	<i>pallidus</i>	MLW	Namizimu Forest Reserve	Unres. Colnf.		
474856	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>borin</i>	MLW	Namizimu Forest Reserve	Unres. Colnf.		
474857	Passeriformes	Sylviidae	<i>Sylvia</i>	<i>borin</i>	MLW	Namizimu Forest Reserve	Unres. Colnf.		
474786	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Namizimu Forest Reserve	Unres. Colnf.		
474976	Passeriformes	Malacoconidae	<i>Tchagra</i>	<i>minutus</i>	MLW	Namizimu Forest Reserve	Unres. Colnf.		
474791	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Namizimu Forest Reserve	Unres. Colnf.		

481269	Passeriformes	Zosteropidae	Zosterops	<i>senegalensis</i>	DRC	Kangala Forest	Unres. Colnf.
AB4702	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4708	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>spekei</i>	Kenya	Nyandarua County	Unres. Colnf.
AA21962	Passeriformes	Pycnonotidae	<i>Arizelocichla</i>	<i>nigriceps</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4713	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
K77928	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4668	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4670	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4752	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
AA21674	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4662	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
K77936	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4757	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
K86328	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4758	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Nyandarua County	Unres. Colnf.
AA22010	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4737	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4738	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4741	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4740	Passeriformes	Malaconotidae	<i>Laniarius</i>	<i>aethiopicus</i>	Kenya	Nyandarua County	Unres. Colnf.
A21998	Passeriformes	Passeridae	<i>Passer</i>	<i>rufocinctus</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4770	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
AB4771	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Nyandarua County	Unres. Colnf.
K86113	Passeriformes	Ploceidae	<i>Euplectes</i>	<i>ardens</i>	Kenya	Nyandarua County	Unres. Colnf.
K86512	Passeriformes	Ploceidae	<i>Quelea</i>	<i>quelea</i>	Kenya	Nyandarua County	Unres. Colnf.
AA21991	Passeriformes	Muscicapidae	<i>Cossypha</i>	<i>caffra</i>	Kenya	Laikipia County	Unres. Colnf.

T54982	Passeriformes	Zosteropidae	Zosterops	<i>senegalensis</i>	Kenya	Laikipia County	Unres. Colnf.
AA27958	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>cucullatus</i>	Kenya	Laikipia County	Unres. Colnf.
K86535	Passeriformes	Fringillidae	<i>Serinus</i>	<i>striolatus</i>	Kenya	Nyandarua County	Unres. Colnf.
AA27969	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Laikipia County	Unres. Colnf.
K89800	Passeriformes	Muscicapidae	<i>Bradornis</i>	<i>microrhynchus</i>	Kenya	Laikipia County	Unres. Colnf.
AA27983	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>spekei</i>	Kenya	Laikipia County	Unres. Colnf.
AB4833	Coliiformes	Coliidae	<i>Urocolius</i>	<i>macrourus</i>	Kenya	Laikipia County	Unres. Colnf.
AB4835	Coliiformes	Coliidae	<i>Urocolius</i>	<i>macrourus</i>	Kenya	Laikipia County	Unres. Colnf.
AB4836	Piciformes	Picidae	<i>Campethera</i>	<i>nubica</i>	Kenya	Laikipia County	Unres. Colnf.
BB13589	Passeriformes	Sturnidae	<i>Lamprotornis</i>	<i>superbus</i>	Kenya	Laikipia County	Unres. Colnf.
C11257	Columbiformes	Columbidae	<i>Streptopelia</i>	<i>capicola</i>	Kenya	Laikipia County	Unres. Colnf.
AA28834	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Laikipia County	Unres. Colnf.
K90037	Passeriformes	Passeridae	<i>Passer</i>	<i>eminibey</i>	Kenya	Laikipia County	Unres. Colnf.
AA27994	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>spekei</i>	Kenya	Laikipia County	Unres. Colnf.
AA28822	Piciformes	Lybiidae	<i>Trachyphonus</i>	<i>darnaudii</i>	Kenya	Laikipia County	Unres. Colnf.
AA28823	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>spekei</i>	Kenya	Laikipia County	Unres. Colnf.
467844	Galliformes	Phasianidae	<i>Francolinus</i>	<i>levaillantii</i>	MLW	Nyika National Park	Unres. Colnf.
AA28861	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	Kenya	Naukuru County	Unres. Colnf.
AA28866	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>ocularis</i>	Kenya	Naukuru County	Unres. Colnf.
AA28871	Passeriformes	Ploceidae	<i>Ploceus</i>	<i>baglajecht</i>	Kenya	Naukuru County	Unres. Colnf.
AA28873	Passeriformes	Cisticolidae	<i>Eminia</i>	<i>lepida</i>	Kenya	Naukuru County	Unres. Colnf.
468003	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>barbatus</i>	MLW	Nyika National Park	Unres. Colnf.
467915	Coraciiformes	Meropidae	<i>Merops</i>	<i>apiaster</i>	MLW	Vwaza Wildlife Reserve	Unres. Colnf.

Haplotype and Nucleotide Diversity

The average nucleotide diversity for all sequences is 4.34% with a range of 0.1%-16.6%. The overall haplotype diversity is 0.989. Average nucleotide diversity ranged from 3.06%-4.42% within the Broad Geographic Regions, 3.06%-5.55% within the Refined Geographic Regions, and 3.57%-5.25% in the different habitats. Broad Geographic Regions has the greatest variation in nucleotide diversity. Haplotype diversity varied from 0.934-0.989 in Broad Geographic Regions, 0.934-0.983 in Refined Geographic Regions, and 0.959-0.986 in habitats. Table 6 shows the individual results for all categories.

		Number of Sequences	Number of Haplotypes	Haplotype Diversity	Nucleotide Diversity
Broad Geographic Region	1	578	218	0.989	0.04389
	2	108	68	0.981	0.04415
	3	14	9	0.934	0.03062
Refined Geographic Region	1	233	113	0.983	0.03826
	2	155	80	0.976	0.03569
	3	190	82	0.980	0.05555
	4	41	30	0.961	0.04302
	5	67	43	0.971	0.04435
	6	14	9	0.934	0.03062
Habitat	LF	162	80	0.973	0.03284
	MF	264	107	0.986	0.05250
	O	172	82	0.977	0.03568
	M	102	56	0.959	0.04252

Table 6: The haplotype and nucleotide diversity for Broad Geographic Region, Refined Geographic Region, and Habitat, with the corresponding number of sequences and haplotypes included in each analysis

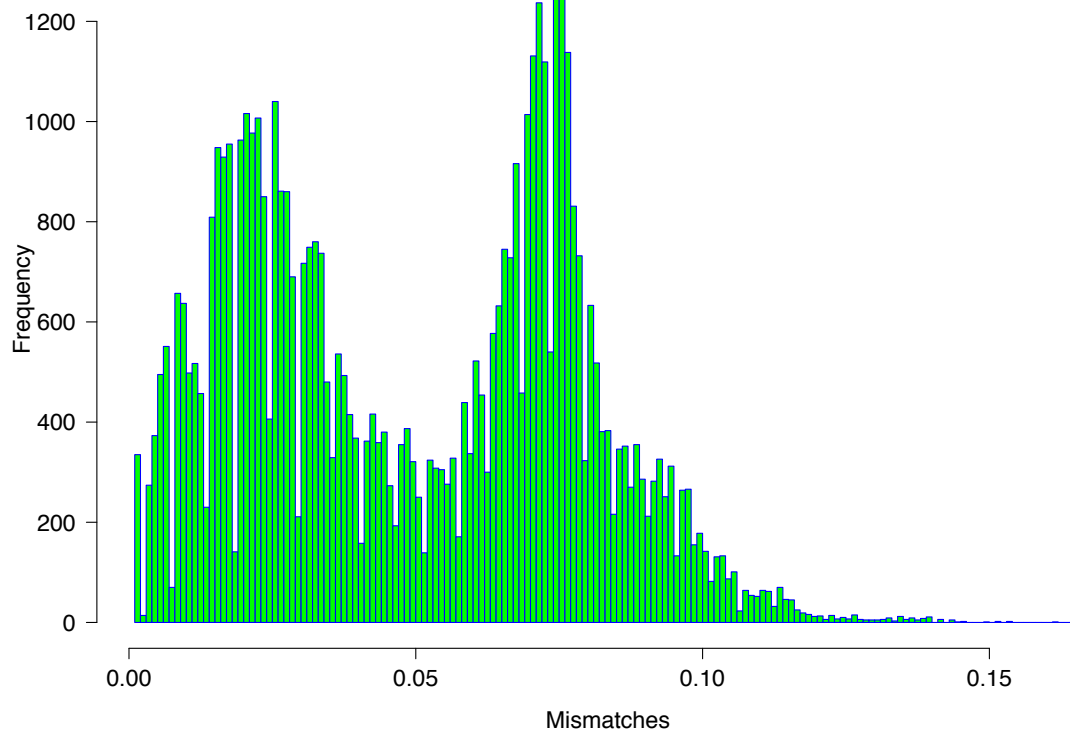


Figure 6: Histogram of base pair mismatched generated in a pairwise distance matrix of all sequences. The range differences between sequences is 0.1%-16.6%.

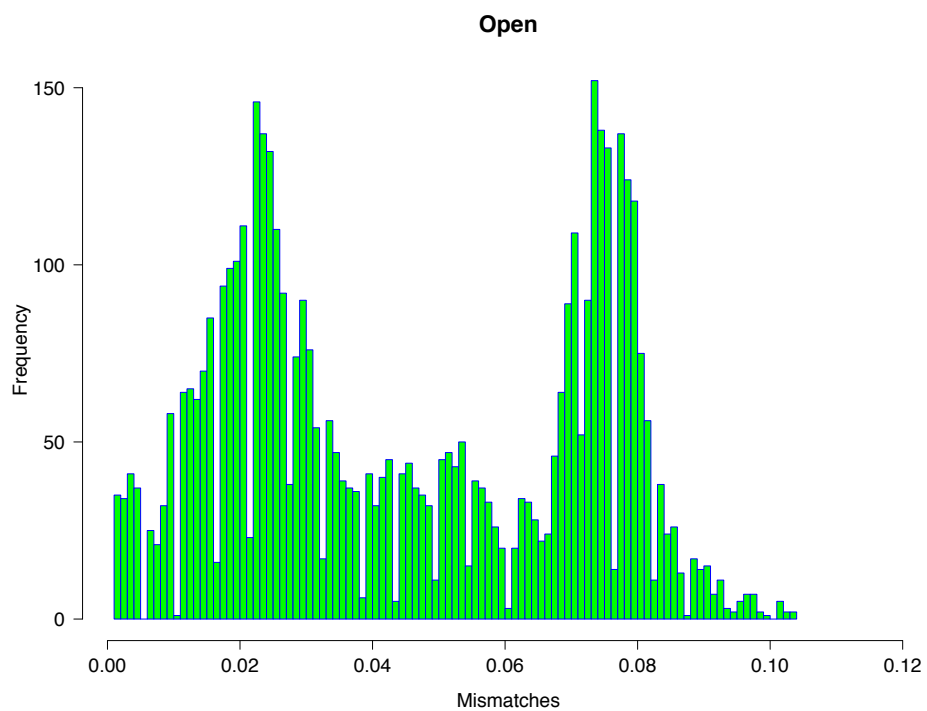


Figure 7a: Histogram of pairwise differences among the sequences of the Open Habitat.

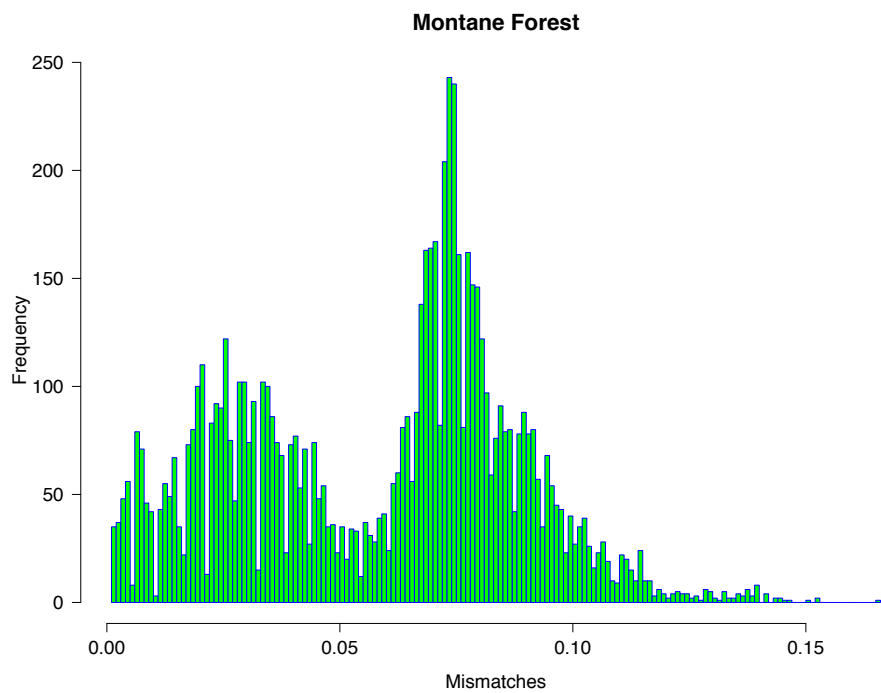


Figure 7b: Histogram of pairwise differences among the sequences of the Montane Forest Habitat.

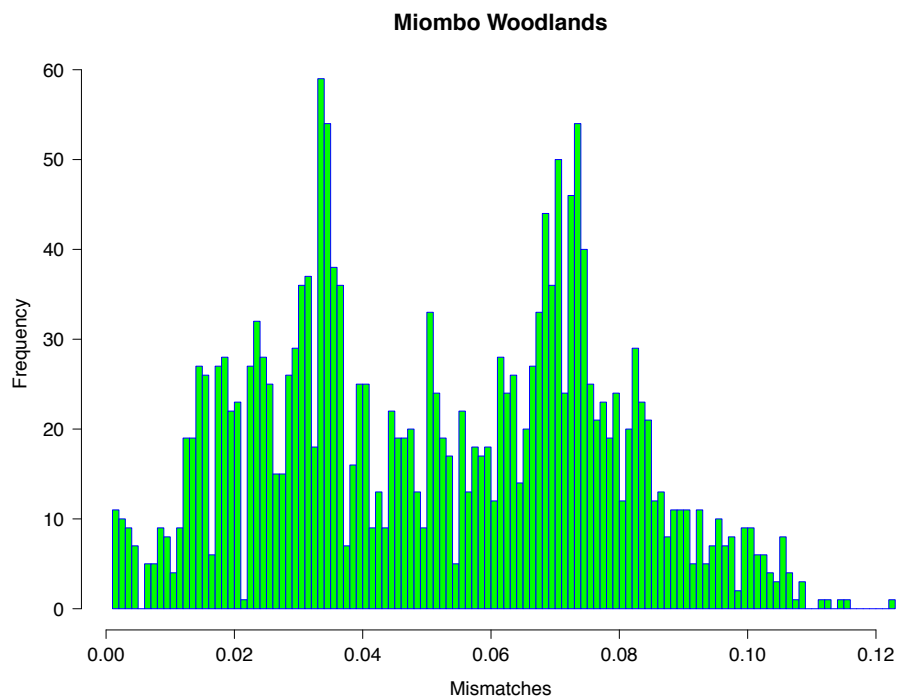


Figure 7c: Histogram of pairwise differences among the sequences of the Miombo Woodlands Habitat.

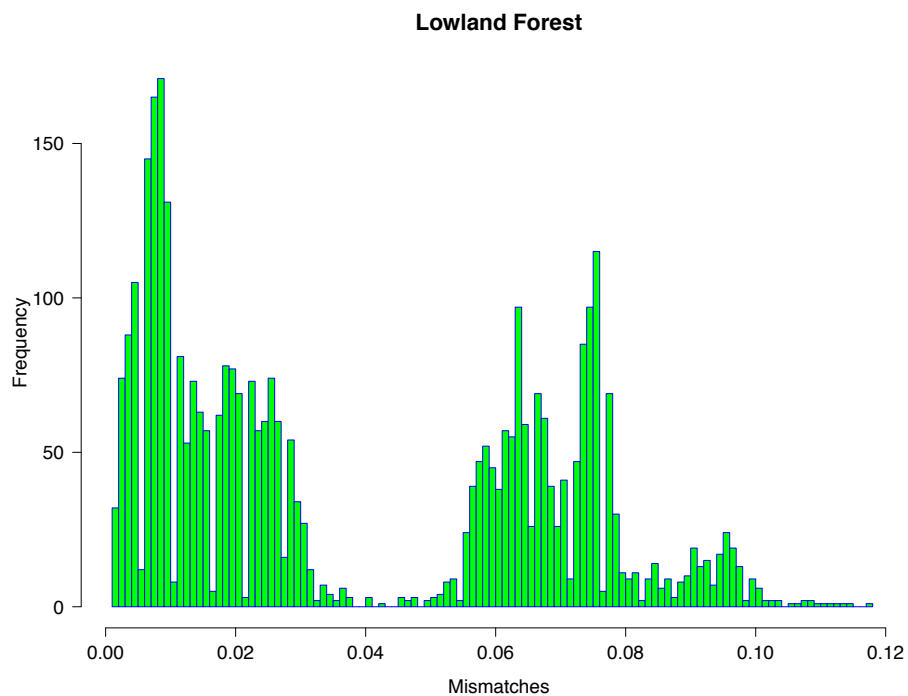


Figure 7b: Histogram of pairwise differences among the sequences of the Lowland Forest Habitat.

Lineage Accumulation Curves

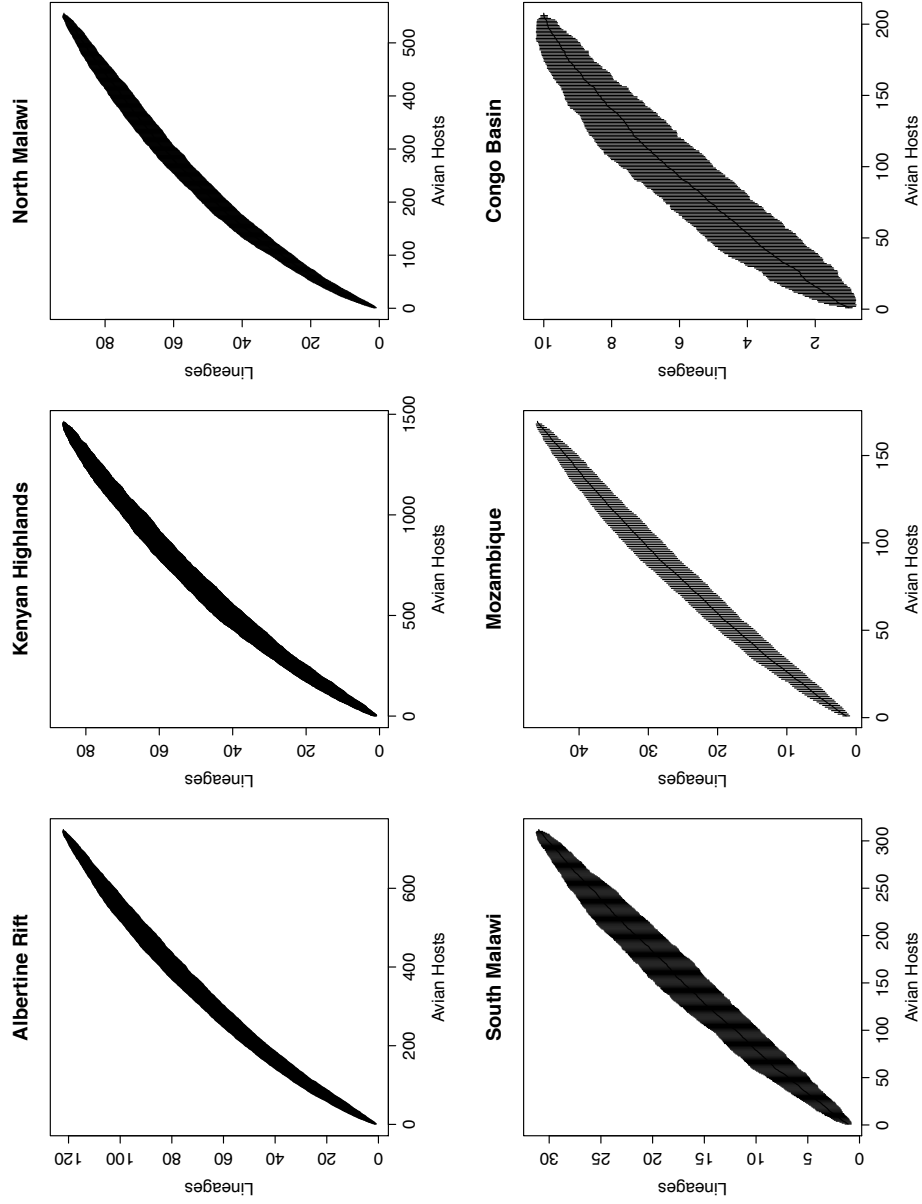


Figure 8a: Species accumulation curves for the refined geographic regions. Curves estimated using number of birds sampled as the effort quantification and number of *Leucocytozoon* lineages as the species richness. Each graph shows the curve with a confidence interval of 1.

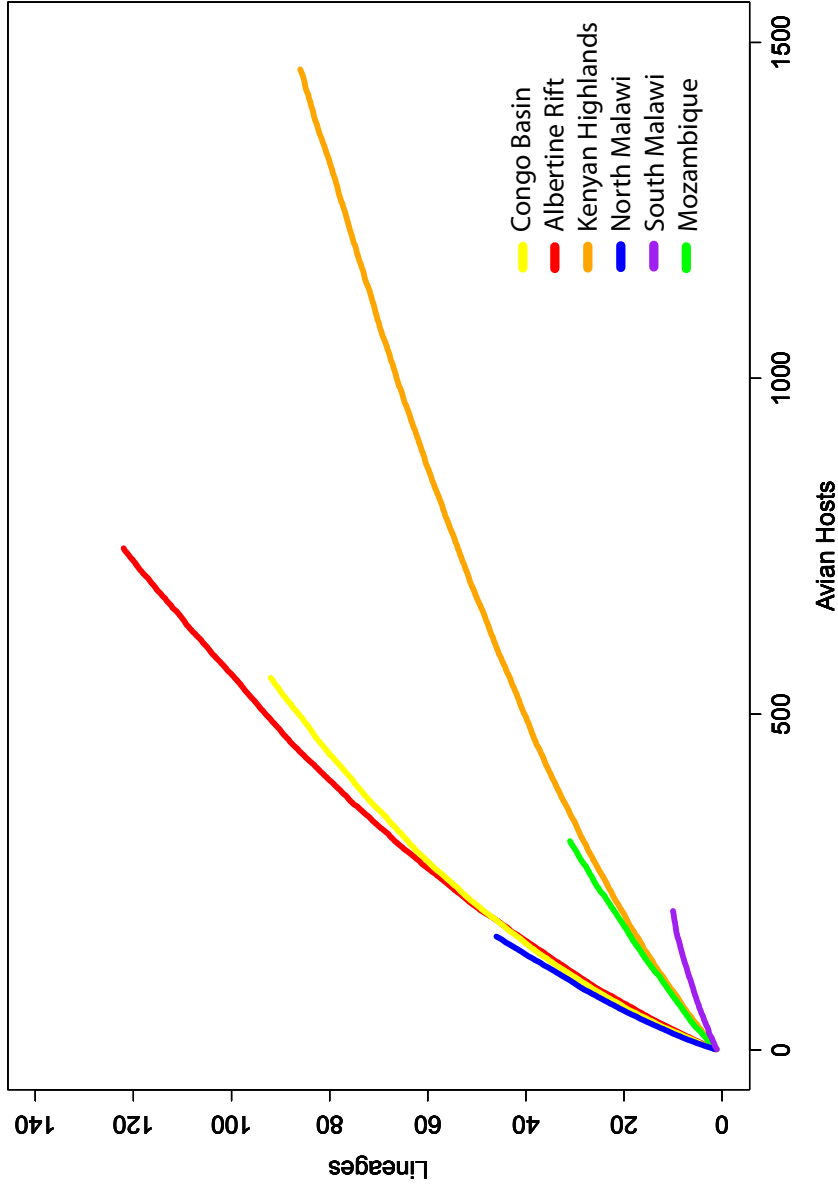


Figure 8b: Species accumulation curves for refined geographic regions compared against each other. Curves estimated using number of birds sampled as the effort quantification and number of *Leucocytozoon* lineages as the species richness.

Experimental Design

Each blood samples was subjected to three separate PCR reactions. The reactions were identical except for the Taq polymerase used. Roche Taq was used in two reactions and Platinum Taq was used in one reaction. Half of the samples were randomly selected and the number of positive amplifications from each sample was quantified. In total, reactions using Roche Taq amplified parasitic DNA from 529 samples and Platinum Taq amplified parasitic DNA from 599 samples. A two-tailed t-test of these data results in a p-value < 0.05.

CHAPTER FOUR

DISCUSSION

Prevalence of *Leucocytozoon*

In this study I analyzed the overall prevalence and diversity of the Haemosporidian parasite *Leucocytozoon* in a near continental assembly of sub-Saharan African birds. The avian hosts were represented by 18 orders and 69 families, constituting the most taxonomically diverse group of hosts in a single study of *Leucocytozoon*. The average prevalence across this study was 23.32%, with a range of 3.9%-62.64% across the 15 sampling areas. Previous studies have also detected *Leucocytozoon* prevalence within this range (Chasar et al. 2008; Lutz et al. 2015; Sehgal et al. 2006).

The wide difference in prevalence among sampling areas indicates that there are factors influencing the ability of this parasite to successfully infect hosts and spread throughout communities. Previous studies have demonstrated correlations between avian blood parasites and abiotic environmental factors (Chasar et al., 2008; Louiseau et al., 2010) as well as with biotic and host characters (Murdock et al., 2015; Lutz et al., 2015). This study supports both habitat and geographic location as influencing prevalence on a macroecological scale.

Avian host family also showed a significant effect on prevalence. It has been documented that host characters, such as nesting habits or diet, play a role in parasite prevalence (Lutz et al, 2015). Certain host families, like Pycnonotidae and Cisticolidae, showed fairly equivalent prevalence at the different samples areas while host family Ploceidae showed higher prevalence rates in the Congo and MOZ, when compared to Kenya, MLW, and UGA. Host family and geographic locality both play a role in influencing the prevalence of *Leucocytozoon* within a population but the prevalence is not based solely on one or the other.

Host families showed highly variable differences in prevalence. Certain families presented with higher than expected incidences of infection. Host family Malaconotidae had a 50% infection rate of *Leucocytozoon* (37 of 74 birds screened positive). These birds are most commonly found in scrub or open woodlands, habitats which generally have lower prevalence rates when compared to denser and wetter habitats. This is a surprising high prevalence rate indicating *Leucocytozoon* has an affinity for this host family given the habitat. On the other end of the prevalence spectrum, host families Coliidae and Alaudidae showed very low prevalence rates, 3.04% and 1.50% respectively. Both Coliidae and Alaudidae were among the most well sampled families, though their samples came mainly from Kenya. It is likely that the low prevalence seen in these families is due to the dry climate of the Kenyan sampling areas. The vectors of *Leucocytozoon*, simuliid flies, are generally found around running water (Krama et al., 2015). Since Kenya is drier,

compared to the habitats of the other sampling areas, it is likely there are fewer simuliid flies present to spread *Leucocytozoon*.

The habitat with the most instances of *Leucocytozoon* is Montane Forest, with an overall prevalence of 54.81%. This result is not surprising as two of the most well know aspects of higher *Leucocytozoon* prevalence, proximity to water and elevation (Krama et al., 2015; van Rooyan et al., 2013), occur in Montane Forest. While both elevation and precipitation are influences on the prevalence rates, both must occur in the right conditions to be effective. The Kenyan Highlands, with the open habitat, are at a high elevation yet do not show similar levels of infection as with Montane Forest. Similarly, lowland forests receive a comparable amount of average rainfall but again do not have similar prevalence rates.

Experimental Design: How Taq affects the ability to detect infections

Two different types of Taq were used during the amplification of parasitic DNA from the avian blood samples, Roche Taq, an 'average' level polymerase, and Platinum Taq, considered a 'high quality' polymerase. When analyzing the prevalence of a population it is essential to have the most accurate count of incidences of infection possible. Low levels of parasitaemia in hosts may be difficult to amplify and identify, resulting in inaccurate prevalence counts. Platinum Taq consistently amplified parasite DNA in more samples than Roche Taq.

Sampling Effect

When utilizing samples of wild caught animals collected at different times by different people it is important to account for potential differences in the effort put

forth by the collectors. This effort can be represented by number of days spent at the field site, the number of hours the mist nets were open each day, or by how many people were working each day. For this study I measured effort by the number of birds caught at each site and occurrences of *Leucocytozoon* haplotypes as the richness of the site. The species accumulation curves for each Refined Geographic Region (Figures 8a and 8b) show results unlike what an asymptotic or logarithmic curve may look like if the true diversity of *Leucocytozoon* has been approached within the scope of this study. This has interesting implications for the diversity of *Leucocytozoon*.

The species accumulation curves for the Refined Geographic Regions are more linear than asymptotic, with little to no curve indicating an approach to a point where all or most lineages have been found. *Leucocytozoon*, as well as *Haemoproteus* and *Plasmodium*, are a highly diverse group of parasites and it currently unknown as to how many lineages of these parasites there truly are. It has been hypothesized that there are approximately 10,000 unique lineages (Valkiunas, 2005). Given how diverse this group is, it is unsurprising that there is no indication of a leveling off point of lineage richness present in the species accumulation curves, even given how large a number of hosts were screened.

Nucleotide Diversity

The cytochrome b genetic marker that is used for barcoding Haemosporidian parasites has a high mutation rate, indicating the possibility of high nucleotide diversity. The results of this study confirm this. Lineage pairwise differences

ranged from 0.1% to 16.6%. The average nucleotide diversity varied in geographic regions from 3.06%-5.55%. As a parasite with both a primary and secondary host, *Leucocytozoon* must adapt to two separate environments pushing the organism to evolve more rapidly. In addition to adapting to multiple environments, *Leucocytozoon* may have to compete with *Haemoproteus* and *Plasmodium* within the secondary host, further necessitating rapid adaptation.

Lutz et al (2015) conducted a study of *Haemoproteus*, *Plasmodium*, and *Leucocytozoon* at two of the same sampling areas as in this study, Vwaza Wildlife Reserve and Nyika National Park. This study found an exceptionally high prevalence rate, 80% for all three parasite genera combined. *Leucocytozoon* is an opportunistic parasite that is more capable of infecting a host when the host's immune system is already compromised due to an infection by *Plasmodium* or *Haemoproteus*. Therefore, one of the factors influencing a high prevalence of *Leucocytozoon* may be the competition between *Leucocytozoon* and *Haemoproteus* or *Plasmodium*. In this study, North MLW has the highest nucleotide diversity of any geographic region at 5.55% as well as one of the highest prevalence rates. The high nucleotide diversity may be the result of rapid evolution of *Leucocytozoon* in order to adapt to a high competition environment. Similarly, the high levels of *Leucocytozoon* in North MLW may be a result of the concurrent high levels of *Plasmodium* and *Haemoproteus*. In future work on this project I will compare nucleotide diversity to overall Haemosporidian prevalence within sampling areas to test if there is a correlation between diversity and prevalence.

The bimodal shape of the pairwise distance matrix histogram (Figure 6) for all sequences in this study indicates that there is intermixing of *Leucocytozoon* haplotype between host communities. The similar bimodal shape for the pairwise distance matrices of the sequences from each habitat support this conclusion. If the distribution of nucleotide mismatches from each habitat more closely represented that of a community of organisms evolving with little outside influence, we would expect it be more asymptotic in shape. The bimodal distribution of all sequences could be an affect of comparing more distantly related communities.

Distribution and number of unique lineages

As of September 2015 Malawi had 535 recorded lineages of *Leucocytozoon*, 166 of which were found in sub-Saharan Africa. The data generated from this study will contribute 326 lineages to the database, 250 of which are novel. This is a significant amount of new information for *Leucocytozoon*. The high number of lineages recovered in this study again highlights the diversity of this parasite and the distribution of these lineages is indicative of intermixing of parasite populations.

Geographic specificity is low in *Leucocytozoon*. Most lineages found in five or more hosts were also found at multiple sampling sites, indicating that many lineages are not restricted to specific geographic locations or habitats. Migratory birds, birds with large ranges, and Simuliid flies may all play a role in distributing *Leucocytozoon* across major biogeographic regions and this parasite's general lack of biogeographic affinity allows it to survive in hosts across multiple habitats and geographic areas. This highlights the ability of this parasite to spread without the geographic or

habitat restrictions that would hinder many other organisms. For example, the most geographically widespread lineage was AftrLeu002. This lineage was found in 18 birds at 8 different sampling sites in four countries and three different habitats. However, there were instances, such as with AftrLeu006 and AftrLeu009, where a lineage recovered from multiple birds was only found at one sampling site. This demonstrates the parasite's ability to infect multiple individuals and spread throughout a single population.

Similar to geographic specificity, *Leucocytozoon* exhibits varying degrees of host specificity. Many lineages were present in multiple host families. The general hypothesis is that Haemosporidian parasites are host specific at the familial level. There was no specific pattern of host specificity found within this study. Several lineages, such as AftrLeu030-AftrLeu032, were each found in five birds of the same species, indicative of that lineage have a preference for the host. On the opposite end of the host specificity spectrum is lineage Aftr045, which was recovered from four birds in three separate orders, Coliiformes, Columbiformes, and Piciformes.

Conclusions

Analysis of parasite prevalence and diversity in wild populations of animals is inherently subject to the methodologies used in the collection of host tissues and detection of the parasite within those samples. No method will detect 100% of infections and there is still debate about what truly accounts for an infection. Extremely low levels of parasitaemia may not constitute a true infection. In addition these low levels may be difficult to detect using current molecular techniques. PCR-

based methods are not able to tell us if the parasite will eventually develop into a successful host infection, simply that the parasite is present in the blood (Valkiunas, 2005). Furthermore, the calculated prevalence of a parasite is only that of the hosts that were screened. While this study has large scope, it is not truly comprehensive. This study has shown, through the widespread sampling of numerous hosts and biogeographic regions, that host family and geographic do play a significant role in influencing the prevalence and genetic diversity of *Leucocytozoon* within a population. However, we need more data to fully support a conclusion as to the level of specificity the parasite has for a host taxonomical group or biogeographic region.

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VITA

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