

PROVISIONAL FIELD GUIDE TO THE  
**SQUIRRELS OF  
WESTERN AFRICA**

A GUIDE TO IDENTIFYING  
SQUIRRELS AND ANOMALURES



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## COLOPHON

Drukker, D. 2023.

Provisional field guide to the Squirrels of Western Africa

A guide to identifying squirrels and anomalures

Squirrel identification guides 1

Published on

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Photos front page: Small Sun Squirrel *Heliosciurus punctatus*, Kakum, Jan van Leeuwen, Slender-tailed Squirrel *Protoxerus aubinii*, Nimba, Marc Languy, Lord Derby's Anomlure *Anomalurus derbianus*, Dja, Ben Schweinhart

Photo last page: Red-Legged Sun Squirrel *Heliosciurus rufobrachium*, Accra, Leo J.R. Boon

Or on [Mammalwatching.com](http://Mammalwatching.com) in the Mammal Vocalization Library

## Introduction

West-Africa has a very rich biodiversity and the family of the Squirrels is no exception to this. No less than 18 species occur within the geographic scope of this book. Squirrels are cute and nice looking rodents. They are appealing, but relatively unknown. They run away quickly and especially in the rainforests, they can “disappear” in the thick canopy. Getting a good look at them or getting a photograph can be quite the challenge. This might be even more the case in the strange family of Anomalures or Scaly-tailed Flying Squirrels, as they are nocturnal. Anomalures are not related to squirrels, but they are very similar in appearance to North-American and Eurasian Flying Squirrels. For that reason I treat them here as well.

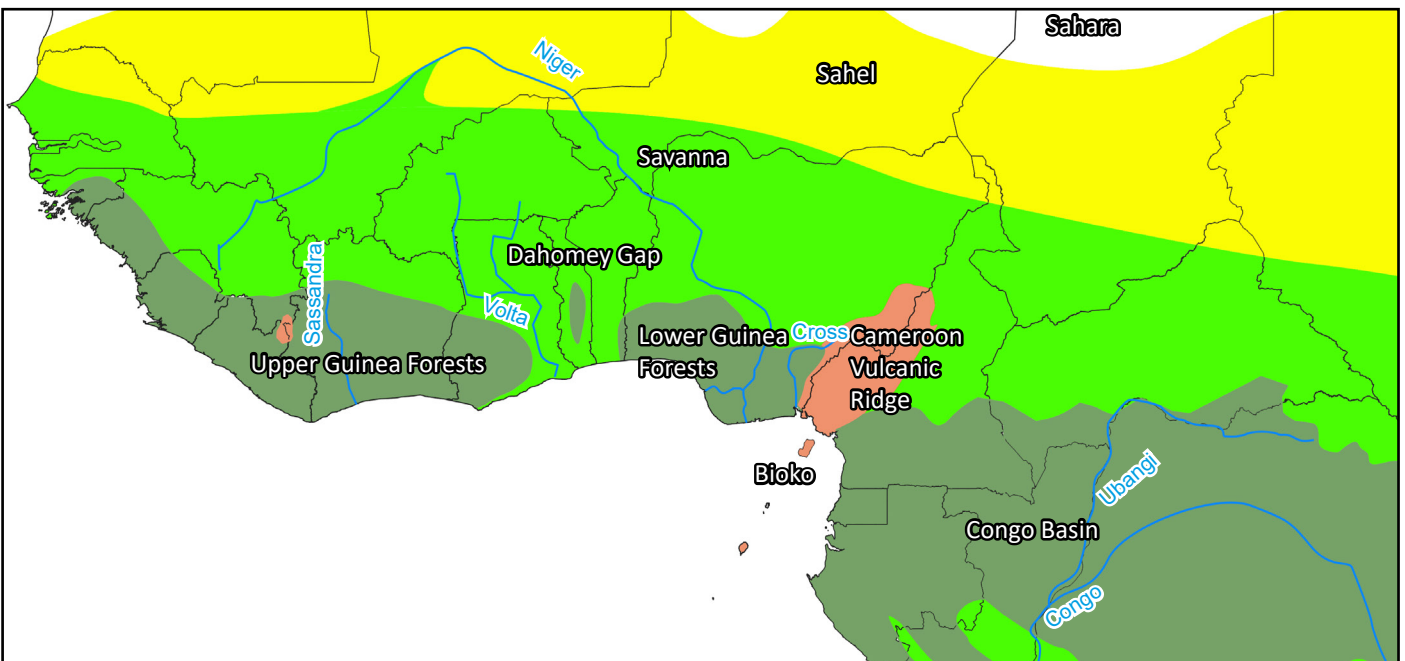
Because there are so many species and observing them is so hard, I have compiled information for naturalists on how to identify these squirrels. I’m doing this for all squirrel species, and I plan to publish these as booklets per region. This West-African booklet is the first in the series, together with Squirrels of Mongolia. It is important to know that there is a lot still unknown. Identification of rodents has always been done based on dead specimens in natural history museums. This book focusses on identifying living specimens in the field, in particular using photographs and sounds. The problem is that there are very few photographs or sound recordings available. The best way to identify any group of species is to spend a lot of time in the field studying them. Personally I have only been to Ghana once (and also Morocco), and saw only 11 of the 24 species treated here. I was able to compare and identify lots of squirrels photographed by others, and I was able to study

museum specimens of Naturalis Biodiversity Center in Leiden, the Netherlands and in the AfricaMuseum in Tervuren, Belgium, as well. It is therefore important to know that this work is provisional. New insights can shed new light on the identification features, and the beauty is that you can help with this! How? By photographing every squirrel that you see.

When you have seen and/or photographed a squirrel, you can contribute to our knowledge by sharing your observation on Observation.org or iNaturalist.org. I personally prefer Observation.org because you can also submit observations without a photo there. Additionally, I will directly be able to check these observations. You can also send photos and questions to me directly via e-mail. Sound recordings of squirrel calls are even more appreciated, as these are still very understudied.

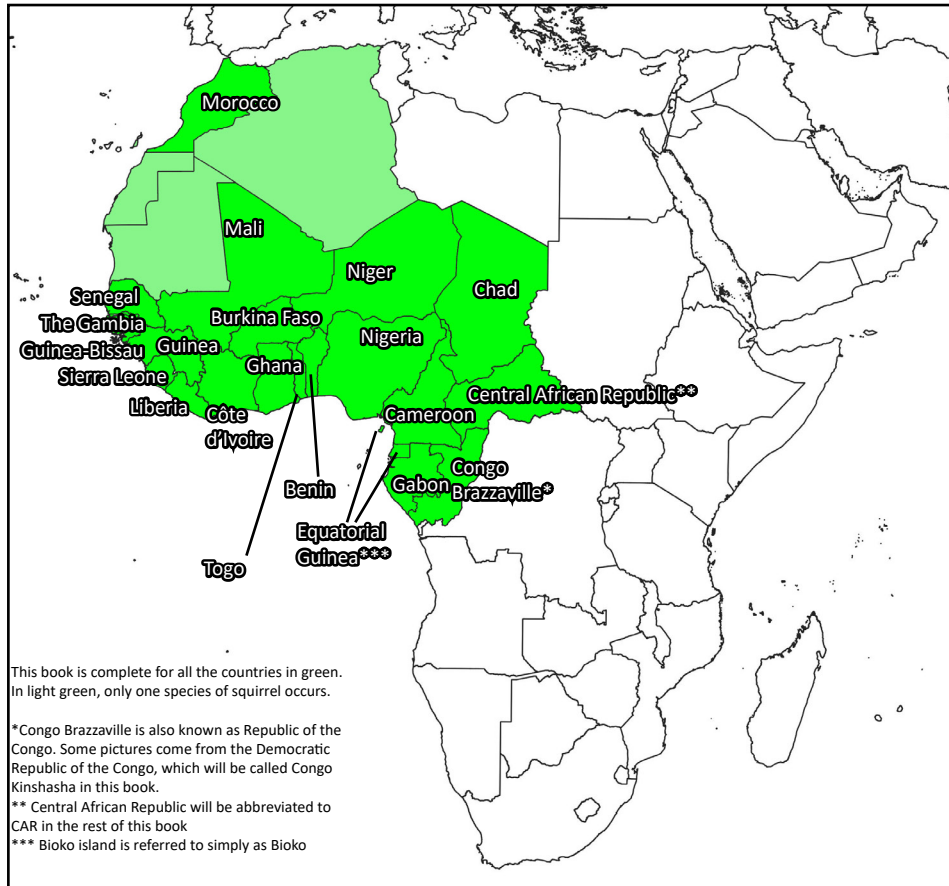
## Acknowledgements

I would like to thank everyone who submitted their observations to citizen science platforms Observation.org and iNaturalist.org, as well as all photographers and sound recordists. Thanks to Pepijn Kamminga of Naturalis for his help in the collection of Naturalis and Emmanuel Gilissen in the AfricaMuseum at Tervuren. Rod Cassidy, Ewan Davies, Paul Mensah, Kalu Afasi, Ben Schweinhart and Louise Emmons are thanked for their advice and correspondence. I’d like to thank my my travel mates to Morocco and Ghana too: Jurriën van Deijk, Jacob Lotz and Ruben Vermeer. Also thanks to Jan van Leeuwen and Rick Buesink who photographed every squirrel they saw on my request.



Map of the primary zones of climate and vegetation of the area, with important geographical areas named.

Map of the area treated here. In green all the countries for which this book is complete (light green countries only have one species).



## Area

For the sake of simplicity, the area treated here is defined by political boundaries instead of biogeographical. I have decided not to restrict to purely the UN and ECOWAS definition of West-Africa, but extend to the area covered by the Helm Field Guide to the Birds of Western Africa and also treat the two species that occur in Morocco. That means this guide can be useful in the following countries (see also map above): Morocco, Mali, Burkina Faso, Niger, Chad, Central African Republic, Nigeria, Equatorial Guinea, Cameroon, Congo (Brazzaville), Gabon, Benin, Togo, Ghana, Côte d'Ivoire, Liberia, Guinea, Guinea-Bissau, Senegal and The Gambia.

Within West-Africa there are several important ecozones that influence the distribution of squirrel species. The hills bordering the Volta basin in combination with the part of the coastline that lies parallel with the moist southwesterly winds cause a sudden “gap” within in the Guinean rainforest zone. This is called the “Dahomey Gap”, a savanna zone that separates the so called Upper Guinean Forests from the Lower Guinean Forests and the Congo Basin. The Lower Guinea Forests are separated from the Congo Basin by the Cameroon Volcanic Ridge. These mountains in Cameroon and Nigeria are the only mountains of significance in the region, together with Mount Nimba. This is all illustrated in the map below.

In the Upper Guinean Forests, the Dahomey Gap, the Cameroon Volcanic Ridge and the Western Congo Basin, there are mammal species which only occur in those

regions respectively. For birds less important, but for mammals a lot more, is the presence of large rivers. The two most important rivers that are drivers for speciation in the region are the Volta and the Niger. While the Volta is some kind of extra barrier within the Dahomey Gap, the massive Niger is thought to cause a division between the Western and Eastern Savanna and Sahel.

## How to observe squirrels

Squirrels are notoriously difficult to get prolonged views of. They are agile, quick and can disappear in thick vegetation on almost any occasion. For Ground Squirrels, it is sufficient to drive around in half open savanna landscapes and check open spaces as well as the road in front of you. For almost all other species in West-Africa, this will not suffice.

The best way to observe squirrels is with patience. Walking around through wooded savannas and rainforest and being sharp on any movements in the canopy and undergrowth will enable you to discover them. But that is not even the hard part, because you have to keep them in frame after that. It is probably best not to make noise or sudden movements. A tele lens can help you enormously in identifying squirrels, especially the lighter ones. That way you can quickly photograph them. In more open forests, a telescope can be useful too.





Construction of torch attached to thermal scope helps to find rodents.

Listening for squirrel sounds is also very important. Some species are quite vocal and make themselves noted by their (alarm) calls. Some of these alarm calls can be used to localise and to identify the species, although this aspect is relatively understudied. It requires some skill to pick out squirrel sounds amidst the overwhelming array of jungle sounds, but many local (bird) guides will be able to at least distinguish it as being a squirrel sound and some of them will even know from which squirrel species it comes. It is the best however to record the sound of squirrels and add them to e.g. Observation.org. Even recordings with your phone can contribute to the understanding. Please note if you have seen the squirrel that made the sound too.

Anomalures are nocturnal and therefore require a completely different approach. A spotlighting torch is essential, and a thermal scope can be very useful, as anomalures are quite often found with thermal scopes. There are some technical tricks you can use to optimise your chances, such as attaching your torch to your thermal scope, see above on p. 4.

## Literature

In order to compile this field guide, I consulted numerous books and papers. No single work could be used to identify all West-African squirrels, but all together they are indispensable. I will discuss them in this chapter.

The most important book is *The Squirrels of the World* (2012), where all squirrel species are described with references to scientific literature and photographs of quite many (but not all) species alive.

*Thorington Jr, R.W., Koprowski, J. L., Steele, M. A., & Whetton, J. F. (2012). Squirrels of the world. John Hopkins University Pres, Baltimore.*

Additionally, the descriptions, references and especially the drawings of the *Handbook of the Mammals of the World* volume 6 (2016) are very useful. The squirrel part is written by some of the same authors as *The Squirrels of the World*, so there is quite some overlap. There are some beautiful photos in the introductory chapter and all species is depicted with a drawing too. These drawings are often very good, but not all the time, which

can cause identification issues. Contrary to *The Squirrels of the World*, this includes the Anomalures too.

*Wilson, D.E., Lacher Jr., T.E. & Mittermeier, R.A. eds. (2016). Handbook of the Mammals of the World. Vol. 6. Lagomorphs and Rodents I. Lynx Edicions, Barcelona.*

Another great reference with drawings, descriptions and references to scientific works is the *Mammals of Africa* volume 3 (2013). The drawings are by Jonathan Kingdon, but not every species is depicted. Some interesting identification tables are present, but many characters are only useful for museum specimens.

*Happold, D.C.D (ed.) (2013). Mammals of Africa. Vol. 3: Rodents, Hares and Rabbits. Bloomsbury Publishing, London.*

The fantastic drawings of Jonathan Kingdon are the exact same ones as those in his iconic *Field Guide to African Mammals* (2015). Be mindful that these plates are not all suitable for identification of the West-African species, and that some species are lacking.

*Kingdon, J. (2015). Kingdon Field Guide to the African Mammals, second edition. Bloomsbury Publishing, London.*

Specifically for flying rodents, the *Gliding Mammals of the World* (2012) is very nice, with some beautiful plates.

*Jackson, S. & Schouten, P. (2012) Gliding Mammals of the World. Csiro Publishing, Collingwood.*

A much older work, but just because of that very useful and interesting, is the book *Rodents of West Africa* (1969), where detailed descriptions of the species in the West-African context are very good. The taxonomy is quite old, which might complicate things, but it was very useful in the process of this field guide, also because of the sound descriptions

*Rosevear, D.R. (1969). The Rodents of West Africa. British Museum (Nat. Hist.), London.*

For the Anomalures, the works of Schunke and Hutterer are very important. Their paper on the *Variance of Variation* (2005) is very important, as well as the more extensive dissertation:

*Schunke, A. C., & Hutterer, R. (2005). The variance of variation: Geographic patterns of coat colouration in Anomaluropus and Anomalurus (Mammalia, Rodentia, Anomaluridae). Bonner Zoologische Beiträge, 53, 169-185.*

*Schunke, A. C. (2005). Systematics and Biogeography of the African Scaly-tailed Squirrels (Mammalia: Rodentia: Anomaluridae).*

For some species, it was very important to dive deep into the scientific papers. These are given here:

*Verheyen, W.N. (1963). Contribution à la systématique*

du genre *Idiurus* (Rodentia Anomaluridae). *Revue de Zoologie et de Botanique Africaines* 68: 157–197.

Adejumo, D.O., T.A. Adeyanju & T.E. Adeyanju (2020). Range extension and first confirmed record of the flightless Anomalure *Zenkerella insignis* (Matschie, 1898) (Mammalia: Rodentia: Anomaluridae) in Nigeria. *Journal of Threatened Taxa* 12(13): 16900–16903

Dinets, V. (2017). First observations on the behaviour of the flightless anomalure (*Zenkerella insignis*). *Zoology*

123: 121–123.

Emmons, L. H. (1978). Sound communication among African rainforest squirrels. *Zeitschrift für Tierpsychologie*, 47(1), 1-49.

Brugière, D., Fleury, M. C., & Colyn, M. (2005). Structure of the squirrel community in the Forêt des Abeilles, central Gabon: rediscovery and revalidation of *Funisciurus duchaillui* Sanborn, 1953.

Family Sciuridae

Subfamily Xerinae

Tribe Xerini

1 Barbary Ground Squirrel *Atlantoxerus getulus* **Maghreb endemic**

2 Striped Ground Squirrel *Xerus erythropus*

*X. e. erythropus* (Morocco and West-African Sahel up to Nigeria)

*X. e. chadensis* (NE Niger to Chad and Sudan)

*X. e. leucoumbrinus* (Scattered in Sudan woodlands from Senegal to Ethiopia)

*X. e. microdon* (West-African Guinea woodlands)

Tribe Protoxerini

3 African Pygmy Squirrel *Myosciurus pumilio* **Western Congo basin endemic**

4 Gambian Sun Squirrel *Heliosciurus gambianus*

*H. g. gambianus* (Guinea woodlands Gambia to E Nigeria)

*H. g. abassensis* (Senegal to Sudan)

*H. g. bongensis* (Riverine woodlands in CAR, Chad and Sudan)

*H. g. limbatus* (Streamside forests in CAR and Cameroon)

*H. g. senescens* (Coastal woodland in Senegal and Guinea)

5 Small Sun Squirrel *Heliosciurus punctatus* **Upper Guinea forest endemic**

*H. p. punctatus* (rainforest op Upper Guinea)

*H. p. savannius* (savannah of Côte d'Ivoire, taxonomy unclear)

6 Red-legged Sun Squirrel *Heliosciurus rufobrachium*

*H. r. rufobrachium* (Bioko)

*H. r. aubryi* (Gabon, CAR, DR Congo)

*H. r. benga* (Equatorial Guinea)

*H. r. caurinus* (Guinea Bissau)

*H. r. emissus* (Nigeria)

*H. r. hardyi* (Côte d'Ivoire)

*H. r. isabellinus* (Togo to E Nigeria)

*H. r. leonensis* (Sierra Leone)

*H. r. maculatus* (E Sierra Leone to Ghana)

*H. r. obfuscatas* (SE Nigeria and Mount Cameroon)

*H. r. occidentalis* (Guinea-Bissau)

7 Forest Giant Squirrel *Protoxerus stangeri*

*P. s. stangeri* (Bioko)

*P. s. eborivorus* (W Congo basin up to CAR)

*P. s. nigeriae* (Togo, Benin, Nigeria)









*P. s. temmincki* (Sierra Leone to Ghana)



- 8 Slender-tailed Squirrel *Protoxerus aubinnii* **Upper Guinea forest endemic**  
*P. a. aubinnii* (Côte d'Ivoire and Ghana)  
*P. a. salae* (Sierra Leone, Guinea, Liberia)
- 9 Western Palm Squirrel *Epixerus ebii*  
*E. e. ebii* (Côte d'Ivoire and Ghana)  
*E. e. jonesi* (Sierra Leone and Liberia)  
*E. e. wilsoni* (W Congo basin up to CAR)
- 10 Fire-footed Rope Squirrel *Funisciurus pyrropus*  
*F. p. pyrropus* (Gabon)  
*F. p. leonis* (Liberia)  
*F. p. leucostigma* (Ghana)  
*F. p. mandingo* (Gambia)  
*F. p. nigrensis* (Nigeria between Niger river and Cross river)  
*F. p. pembertoni* (S Cameroon to Nayumbe in Congo)  
*F. p. talboti* (SE Nigeria and Mount Cameroon)
- 11 Kintampo Rope Squirrel *Funisciurus substriatus* **Dahomey gap endemic**
- 12 Red-cheeked Rope Squirrel *Funisciurus leucogenys*  
*F. l. leucogenys* (Bioko)  
*F. l. auriculatus* (Equatorial Guinea and Cameroon)  
*F. l. oliviae* (probably from W Ghana to CAR)
- 13 Thomas's Rope Squirrel *Funisciurus anerythrus*  
*F. a. raptorum* (Lower Guinea forests of Benin and Nigeria)  
*F. a. bandarum* (CAR to Chad)  
*F. a. mystax* (S Cameroon to Gabon)
- 14 Du Chaillu's Rope Squirrel *Funisciurus duchaillui* **Gabon endemic**
- 15 Lady Burton's Rope Squirrel *Funisciurus isabella* **Western Congo basin endemic**
- 16 Ribbioned Rope Squirrel *Funisciurus lemniscatus* **Western Congo basin endemic**  
*F. l. lemniscatus* (North of Ogouée river in Gabon)  
*F. l. mayumbicus* (South of Ogouée river in Gabon)
- 17 Green Bush Squirrel *Paraxerus poensis*
- 18 Cooper's Mountain Squirrel *Paraxerus cooperi* **Cameroon volcanic ridge endemic**

#### Family Anomaluridae

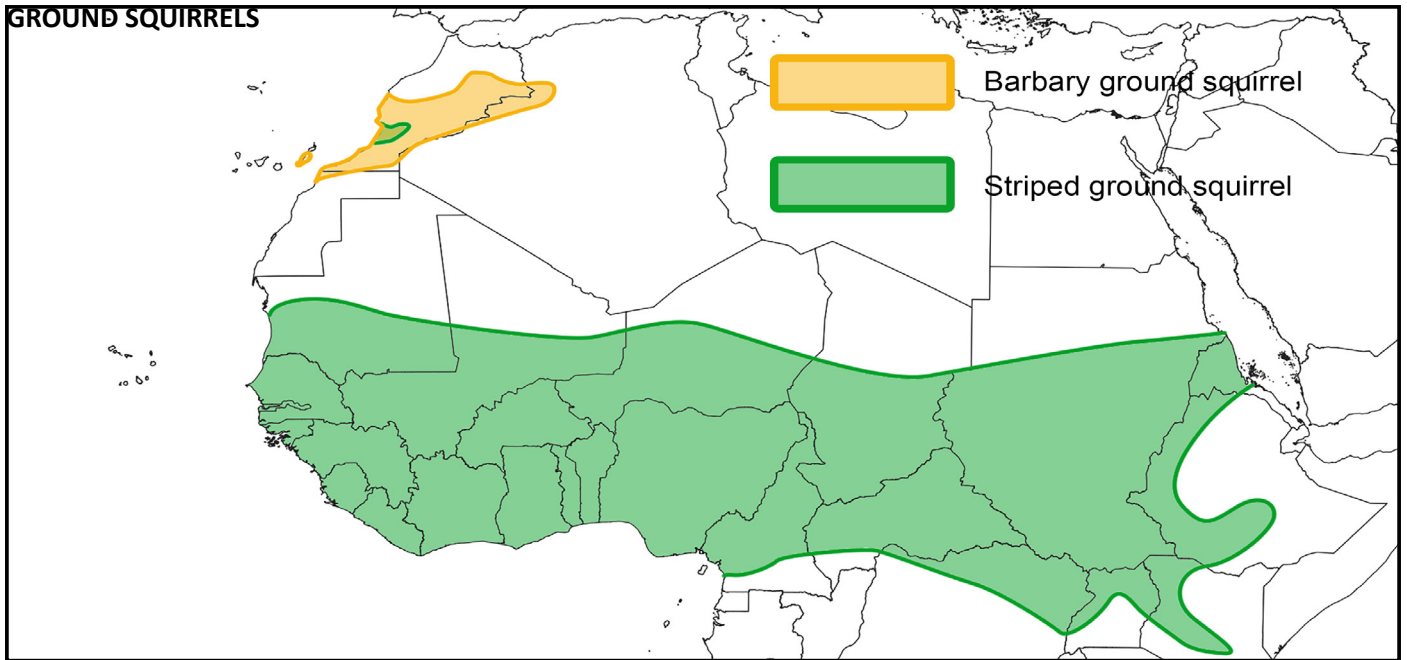
- 1 Beecroft's Anomalure *Anomalurus beecrofti*
- 2 Pel's Anomalure *Anomalurus pelii* **Upper Guinea forest endemic**  
*A. p. pelii* (Ghana and Côte d'Ivoire E of Bandama river)  
*A. p. peralbus* (Côte d'Ivoire between Bandama river and Sassandra river)  
*A. p. auzembergeri* (Liberia and Côte d'Ivoire W of Sassandra river)
- 3 Lord Derby's Anomalure *Anomalurus derbianus*
- 4 Lesser Anomalure *Anomalurus pusillus*
- 5 Long-eared Pygmy Anomalure *Idiurus macrotis*
- 6 Cameroon Anomalure *Zenkerella insignis*

SQUIRREL GROUPS		
<b>Ground Squirrels</b>	Medium to large size, light brown with white flank stripe. Live on ground and almost never found on branches or trees. Inhabit drier and open parts, including savanna, but also cultivated land in the tropical region.	
<b>Rope Squirrels</b>	Medium size, brown to olive to red pelage, always with white flank stripe. Live in bushes and sometimes on the ground. Not in the canopy.	
<b>Bush Squirrels</b>	Small to medium size. Dark pelage, always with some olive tint. No flank stripe. Live in lower layers of the forest, sometimes on the ground or in the canopy.	
<b>Sun Squirrels</b>	Medium size. Pelage lacks olive green tint. Slender body and tail. Live in the canopy, but also in lower layers of the forest. Not on the ground.	
<b>Larger Tree Squirrels</b>	Medium to large forest dwellers. Variable in colouration and body shape. Middle and upper layers of the canopy or on the forest floor.	
<b>African Pygmy Squirrel</b>	Unmistakable due to very small size and typical white ear + eye ring.	
<b>Large Anomalures</b>	Nocturnal, large. Gliding membrane.	
<b>Small Anomalures</b>	Nocturnal, small. Gliding membrane present or absent.	

Top to bottom: Striped Ground Squirrel *Xerus erythropus erythropus* © Koen Thonissen, The Gambia. Fire-footed Rope Squirrel *Funisciurus pyrropus* © Ben Schweinhart, Dja, Cameroon. Green Bush Squirrel *Paraxerus poensis* © Marc Languy, Nimba, Liberia. Gambian Sun Squirrel *Heliosciurus gambianus cf limbatus* © Mathias D'haen, Chinko CAR. Forest Giant Squirrel *Protoxerus stangeri temminckii* © Jan van Leeuwen, Boabeng, Ghana. African Pygmy Squirrel *Myosciurus pumilio* © Ben Schweinhart, Dja, Cameroon. Lord Derby's Anomalure *Anomalurus derbyianus* © Jon Hall, Tiwai, Sierra Leone. Cf. Long-eared Flying Mouse *Idiurus cf. macrotis* © Jan van Leeuwen, Cross river, Nigeria.



**GROUND SQUIRRELS**



**Barbary Ground Squirrel**



**Striped Ground Squirrel**



Above: Barbary Ground Squirrel *Atlantoxerus getulus* © Daan Drukker, Souss Massa, Morocco. Below: Striped Ground Squirrel *Xerus erythropus erythropus* © Jacob Lotz, Mole, Ghana.

Ground squirrels honour their name as they are almost always found on the ground and do not climb trees or bushes. They have a white flank stripe, but are very differently proportioned compared to rope squirrels *Funisciurus*. The two species of ground squirrel are quite similar, but there is only one area where their ranges overlap: the Souss valley in Morocco.

ROPE SQUIRRELS	Flank stripes	Red on pelage	Tail	General colour	Notes
<b>Fire-footed Rope Squirrel</b>	Whitish flank stripe with black stripe below and black above continuing on the back	Red on limbs, also on head and flanks	Black, red and white hairs	Reddish brown and black, with a pure white belly	Very typical high intensity alarm call
<b>Kintampo Rope Squirrel</b>	Unremarkable white flank stripe	No red	Brown and black hairs, without silvery white frosting	Olive brown	Very similar to Thomas's Rope Squirrel. Dahomey Gap
<b>Thomas's Rope Squirrel</b>	Unremarkable white flank stripe	No red	Brown and black hairs, usually with silvery white frosting on the edges	Olive brown	Very similar to Kintampo Rope Squirrel. East of Dahomey Gap and Congo Basin
<b>Red-cheeked Rope Squirrel</b>	Narrow flank stripe consisting of white spots with dark gray stripe below and above continuing on the back	Orange-red on the head. Orange on belly. No red on limbs	Black, red and white hairs	Grey, red and orange	On Bioko island, the belly is white instead of light orange
<b>Lady Burton's Rope Squirrel</b>	Two black flank stripes that begin between the ears with light brown between them.	No red	Brown and black hairs	Light brown with black with pale gray belly	Smaller than Ribboned Rope Squirrel. Different high intensity alarm calls
<b>Ribboned Rope Squirrel</b>	Two black flank stripes that begin on the shoulders with light yellowish brown between them on the flank, darker on the median central stripe.	No red	Brown and black hairs	Light brown with black. White belly north of Ogooué river, cream south of it	Larger than Lady Burton's Rope Squirrel. Different high intensity alarm calls
<b>Du Chaillu's Rope Squirrel</b>	Two dark flank stripes that begin behind the head with light brown between them.	No red except on tail base	Red with a black tip	Grey, olive brown with dark brown flank stripes	Very range restricted in Gabon. Photographs of living specimens?

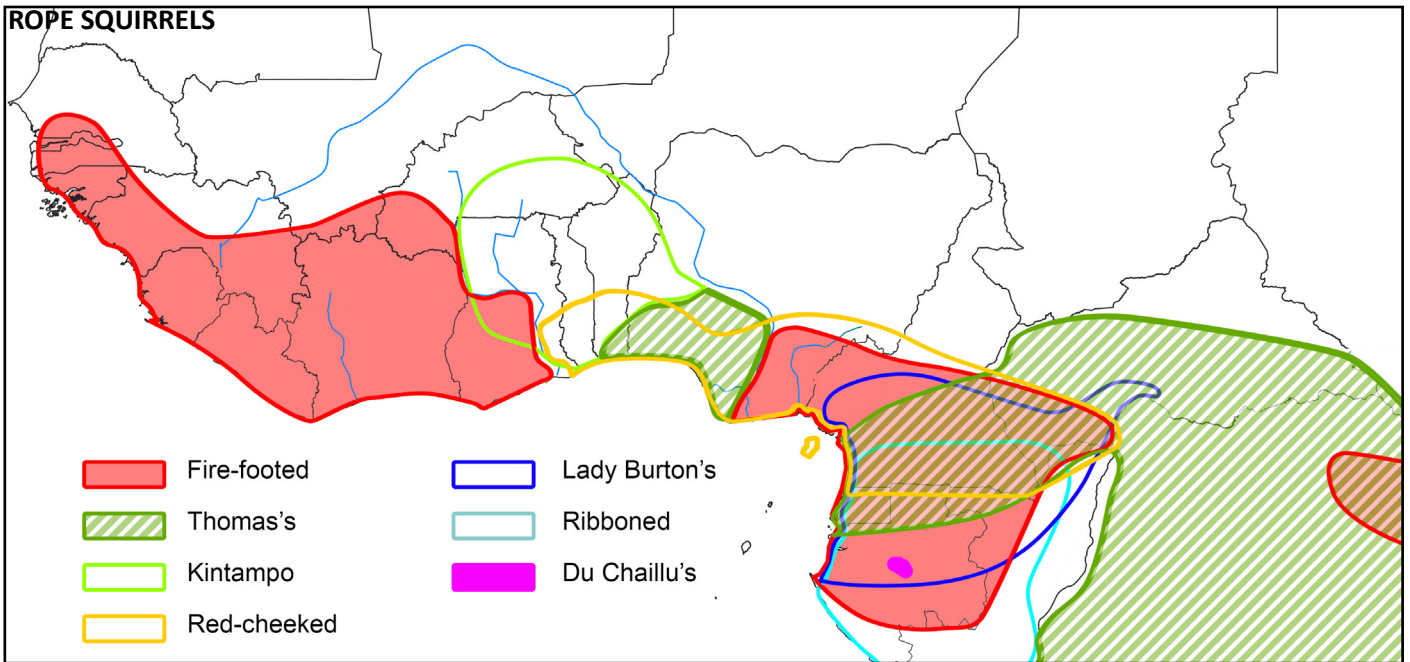
Upper row: Kintampo Rope Squirrel *Funisciurus substriatus* © Richard de Jonckheere, Mole, Ghana. Thomas's Rope Squirrel *F. anerythrus raptorum* © Babajide Agboola, Omò, Nigeria.

Middle row: Fire-footed Rope Squirrel *F. pyrrhopus leucostigma* © Thijs de Groot, Kintampo, Ghana. Red-cheeked Rope Squirrel *F. leucogenys oliviae* © Sjeff Ollers, Mbéli bay, Congo Brazzaville. Photos on next page

Bottom row: Lady Burton's Rope Squirrel *F. isabella* © Judith van Eijnatten, Yaoundé, Cameroon. Ribboned Rope Squirrel *F. lemniscatus mayumbicus* © Markus Gmeiner, Moukalala-Doudou, Gabon.



**ROPE SQUIRRELS**



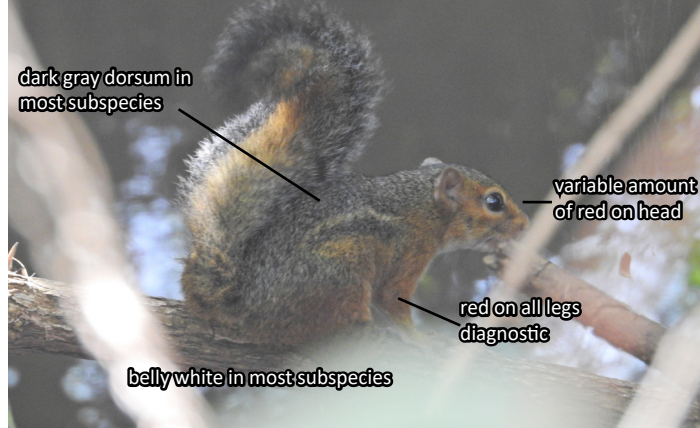
Kintampo Rope Squirrel



Thomas's Rope Squirrel *raptorum* (Nigeria)



Fire-footed Rope Squirrel *leucostigma* (Ghana)



Red-cheeked Rope Squirrel *oliviae* (Gabon)



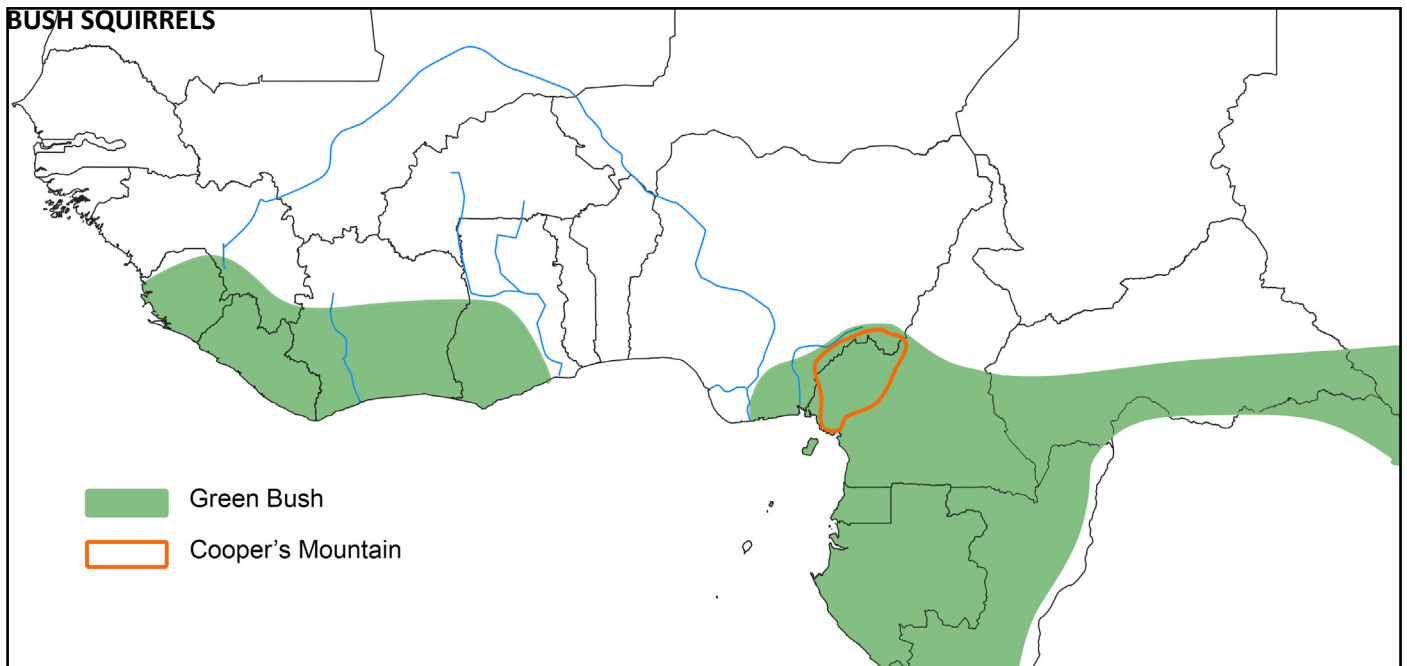
Lady Burton's Rope Squirrel



Ribboned Rope Squirrel







Green Bush Squirrel *Paraxerus poensis* © Daan Drukker, Kakum, Ghaha.

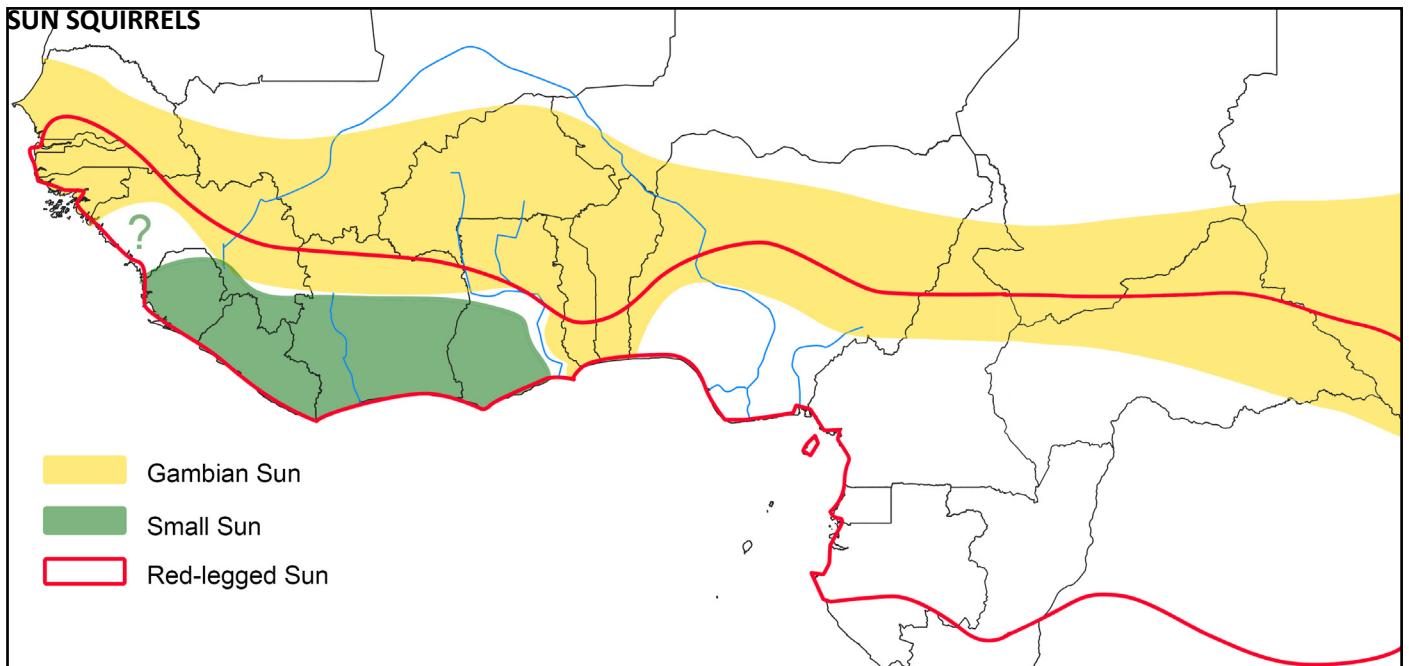


Cooper's Mountain Squirrel *P. cooperi* © Rick Buesink, Obudu plateau, Nigeria.

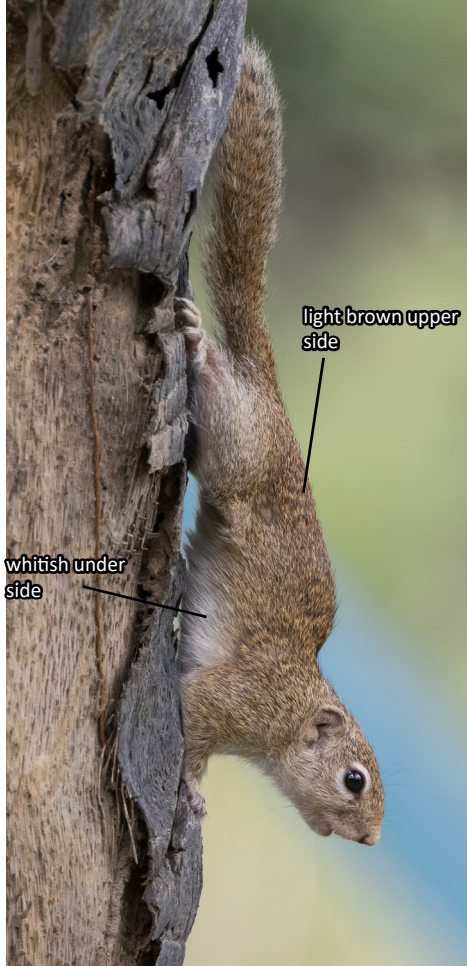
Bush squirrels *Paraxerus* are small to medium arboreal squirrels. As a group they can be told apart from sun squirrels *Heliosciurus* by their slightly thicker and less pointed tail. Characteristic (within Western Africa) is that the two species have olive-green hairs on their upper side. They live in the understory and on medium high in the canopy.



SUN SQUIRRELS



Gambian Sun Squirrel



Gambian Sun Squirrel *Heliosciurus gambianus gambianus* © Maarten Hotting, The Gambia.

Small Sun Squirrel



Small Sun Squirrel *H. punctatus* © Bruno Boedts, Abidjan, Côte d'Ivoire.

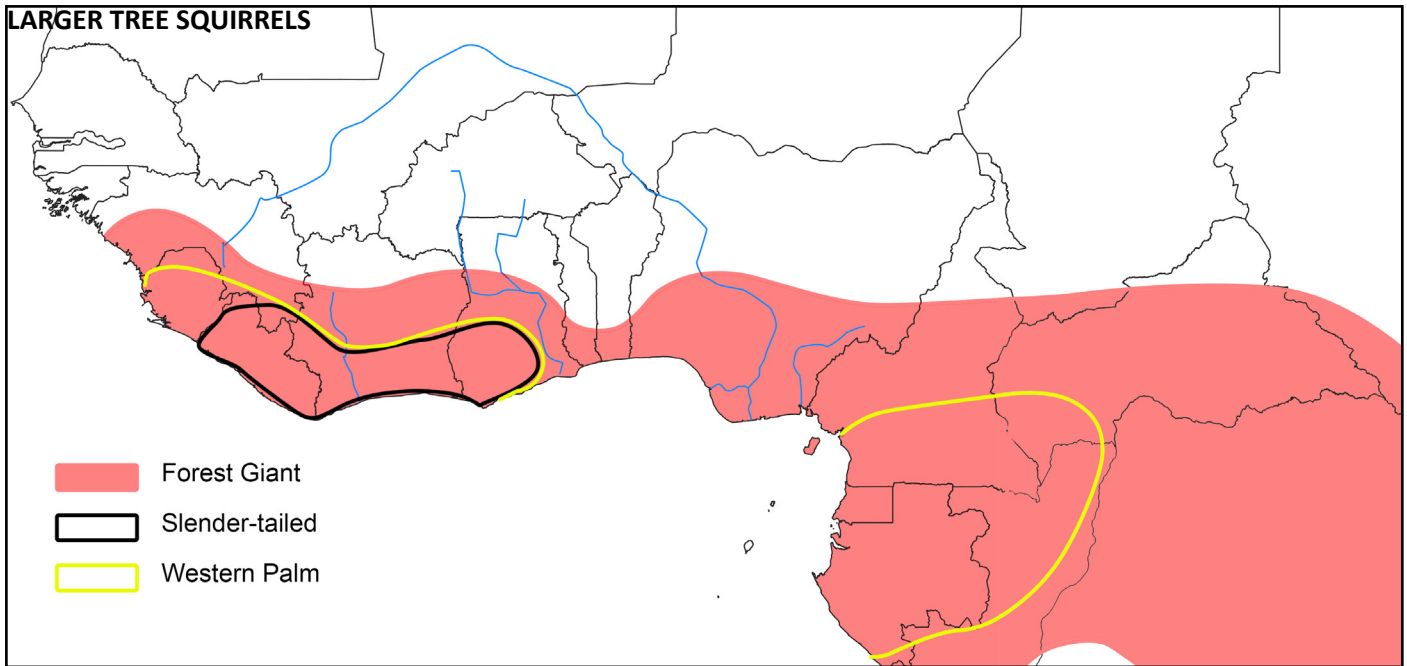
Red-legged Sun Squirrel



Red-legged Sun Squirrel *H. rufobrachium* cf. *pasha* © Mathias D'Haen, Chinko, CAR.

Sun squirrels *Heliosciurus* are typical arboreal squirrels, medium sized. They have long, slender tails, which have a pointy tip and light rings. Note that these characteristics are not well visible when tails are ragged, which happens often. They all have a pale eye ring. They live in the canopy, but regularly descend to the understory.





Slender-tailed Squirrel *salae* (Liberia)



Red-legged Sun Squirrel



Above: Slender-tailed Squirrel *Protoxerus aubinii salae* © Marc Languy, Mount Nimba, Liberia. Below: Red-legged Sun Squirrel *Heliosciurus rufobrachium maculatus* © Bruno Boedts, Abidjan, Côte d'Ivoire (idem for the inset).

In Upper Guinea rainforests, the very dark Slender-tailed Squirrel *Protoxerus aubinii* occurs. With its long legs, slender, unringed tail and large round head without pale eye ring, identification should cause no problem, except for that it is very rarely seen. From a distance or with bad photographs, it can be confused with dark Red-legged Sun Squirrels *Heliosciurus rufobrachium*. See differences above.



Western Palm Squirrel *wilsoni* (Gabon)



rump and thighs orange brown

pointed and slender snout

no white cheek patch (only useful from Ghana westward)

Forest Giant Squirrel *temminckii* (Ghana)



bulky and round head and snout

upper side uniformly maroon (but see below)

white cheek patch (western subspecies only)

white line on flank (not always present)

Western Palm Squirrel *Epixerus ebii wilsoni* © Jon Hall, Lope, Gabon.

Forest Giant Squirrel *Protoxerus stangeri temminckii* © Ruben Vermeer, Kakum, Ghana.

In the Upper Guinea rainforests (from Ghana westwards) the differences between the large tree squirrels (*Protoxerus* and *Epixerus*) are straightforward. See above. In the Congo basin however, Forest Giant Squirrels lack the typical white cheek patch and often the white flank line as well. They even are more gray and less maroon, which makes confusion with Western Palm Squirrel possible. Best is to look at the shape of the head and snout and record the sounds.

Western Palm Squirrel *wilsoni* (CAR)



variable amount of gray on first part of upper body

thighs and rump always orange brown

more slender, pointed snout

Forest Giant Squirrel *eborivorus* (Cameroon)



bulky, round head most distinguishing feature

can be gray on head and first part of upper body

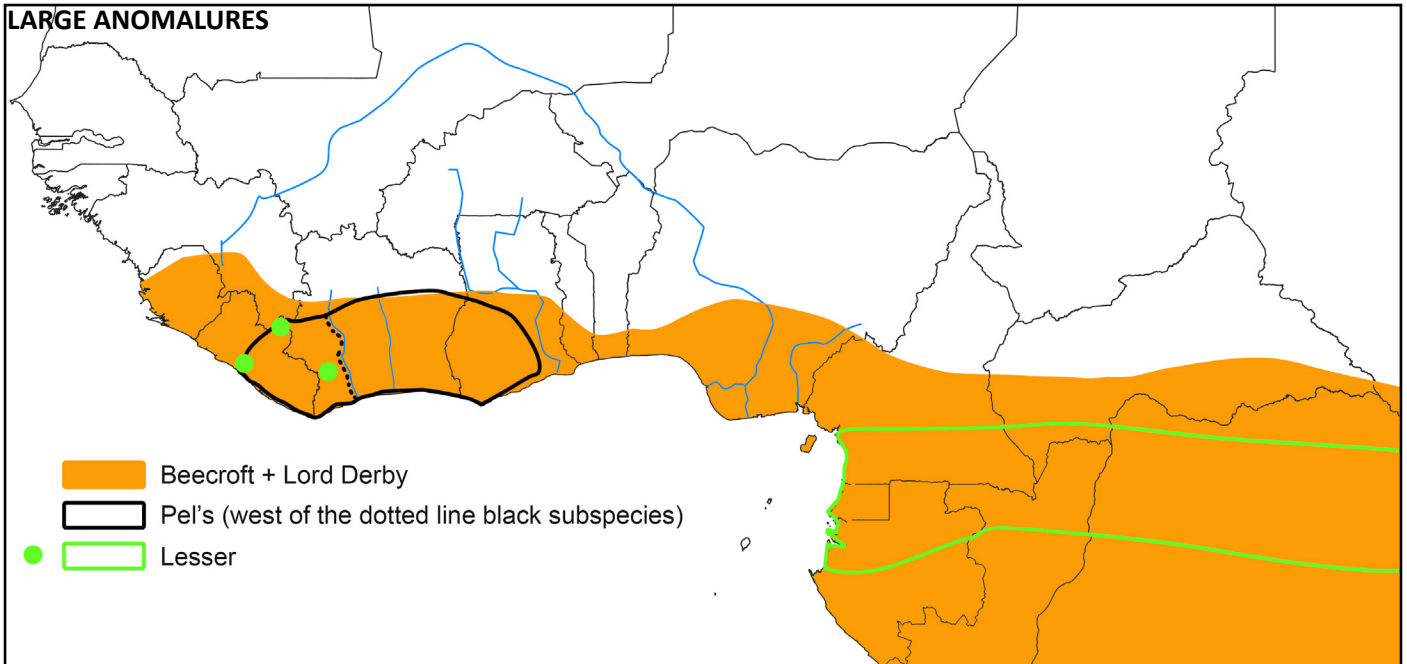
also note sounds

Western Palm Squirrel *E. ebii wilsoni* © Rod Cassidy – Sangha Lodge, Sangha, CAR.

Forest Giant Squirrel *P. stangeri eborivorus* © Ben Schweinhart, Dja, Cameroon.



**LARGE ANOMALURES**



Beecroft's Anomalure



Pel's Anomalure *pelii* (Ghana)



Lord Derby's Anomalure



Lesser Anomalure



Upper row: Beecroft's Anomalure *Anomalurus beecrofti* © Rick Buesink, Cross River, Nigeria. Pel's Anomalure *A. pelii pelii* © Daan Drukker, Bobiri, Ghana. Lord Derby's Anomalure *A. derbianus* © Jan van Leeuwen, Bobiri, Ghana. Lesser Anomalure *A. pusillus* © Anh Galat-Luong-IRD, Tai, Côte d'Ivoire.

The first step for *Anomalurus* identification is to look at the tail. Beecroft's Anomalure is the only species without a real tuft. Pel's Anomalure is fully furred with a white tail except in Western Ivory Coast and Liberia, where it is completely black (see next page). Lord Derby's Anomalure has a tuft and a fully furred tail base, while Lesser Anomalure has a nearly naked tail base. The next step is to look behind the ears and on the throat.

Lord Derby's Anomalure

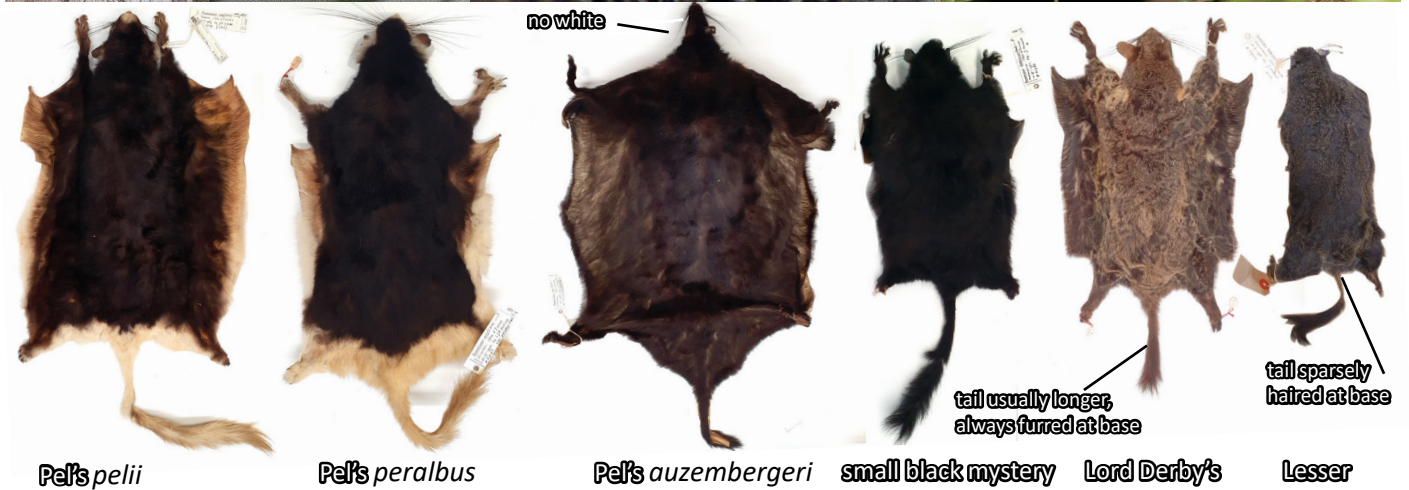


Lesser Anomalure



Bottom row: Lord Derby's Anomalure *A. derbianus* © Jan van Leeuwen, Cross river, Nigeria. Lesser Anomalure *A. pusillus* © Ben Schweinhart, Tai, Côte d'Ivoire.





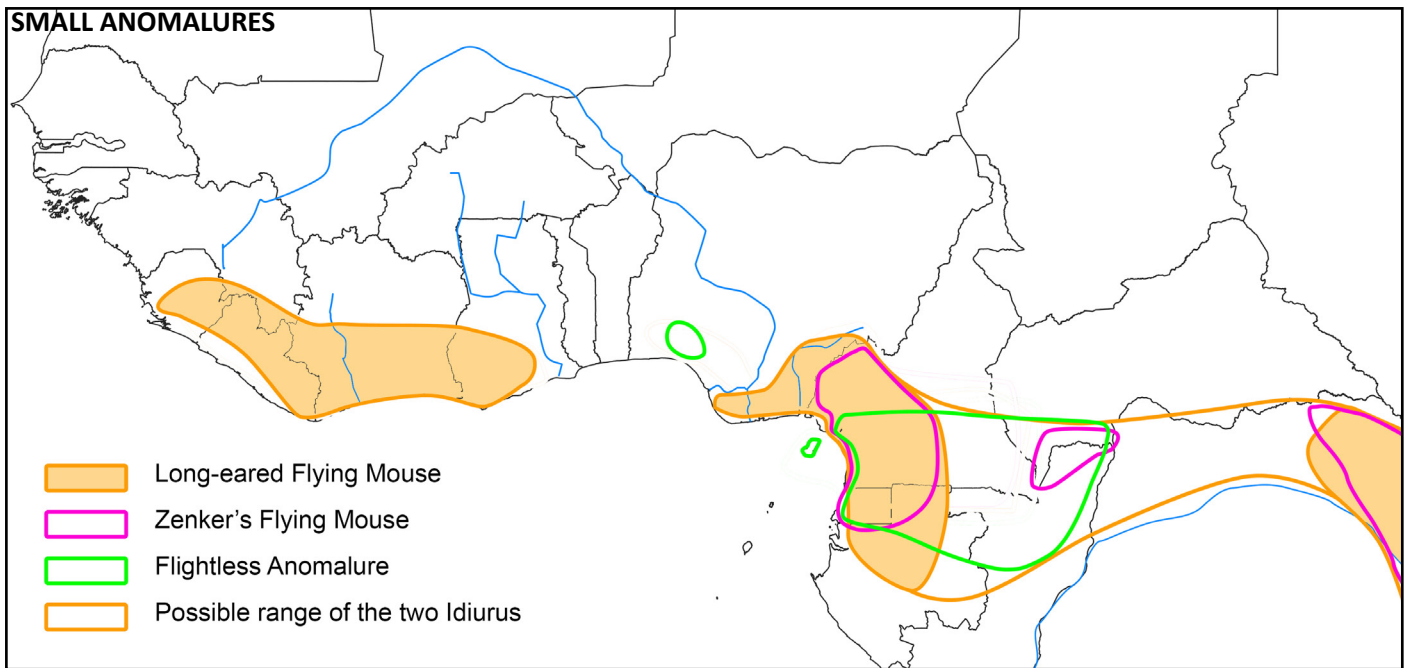
Skins of anomalures from musea to show subspecies and variations of which there are no photos of living specimens. The small black mystery anomalure is from western Ivory Coast either a very small Pel's ssp *auzembergeri* or a melanistic *derbianus*. Note the tail shapes and colours.

Upper row: Lord Derby's Anomalurus *Anomalurus derbianus* © Jon Hall, Tiwai, Sierra Leone. Lord Derby's Anomalurus *A. derbianus* © Jan van Leeuwen, Bobiri, Ghana. Lord Derby's Anomalurus *A. derbianus* © Ben Schweinhart, Dja, Cameroon.

Middle row: Beecroft's Anomalurus *A. beecrofti* © Ben Schweinhart, Dja, Cameroon. Lesser Anomalurus *A. pusillus* © Anh Galat-Luong-IRD, Tai, Côte d'Ivoire. Lesser Anomalurus *A. pusillus* © Ben Schweinhart, Tai, Côte d'Ivoire.

Bottom row: Pel's Anomalurus *A. pelii pelii* @ Naturalis, Ehania, Côte d'Ivoire. Pel's Anomalurus *A. pelii peralbus* @ Naturalis, Oliredou, Côte d'Ivoire. Pel's Anomalurus *A. pelii auzembergeri* @ Naturalis, Ziombly, Côte d'Ivoire. Mystery black anomalure @ Naturalis, Mantouguine, Côte d'Ivoire. Lord Derby's Anomalurus *A. derbianus* @ Naturalis, Niakoussou, Côte d'Ivoire. Lesser Anomalurus *A. pusillus* @ AfricaMuseum, Congo Kinshasha.





The enigmatic Flightless Anomalure *Zenkerella insignis* can only be confused with African Dormice *Graphiurus*. The Pygmy Anomalures ore Flying Mice *Idiurus* are much more difficult however, and I have not been able to find field characters to separate the two species in the genus yet.

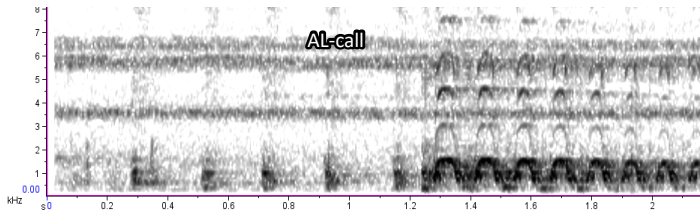


Above: Nagtglas's African Dormouse *Graphiurus nagtglasii* © Daan Drukker, Ankasa, Ghana. Flightless Anomalure *Zenkerella insignis* © Dolapo Adejumo, Omò, Nigeria.  
 Below: cf. Long-eared Flying Mouse *Idiurus cf. macrotis* © Jan van Leeuwen, Cross river, Nigeria. Skins of Long-eared *I. macrotis* and Zenker's Flying Mouse *I. zenkeri*, @ AfricaMuseum, Congo Kinshasha.

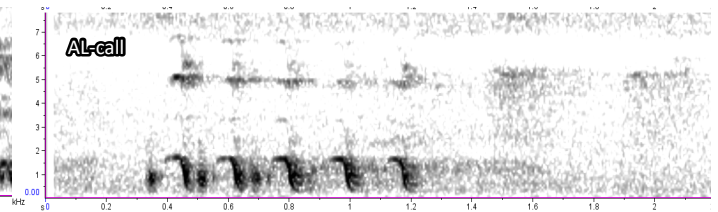


Squirrel sounds are far from complete. All species have their own specific set of sounds, but it is important to know what type of call they produce. For identification purposes it is sufficient to look at the two types of Alarm calls. The Loud Calls (AL) are the most characteristic. The regular Alarm calls (A) consist in many species of “chucks” that are harder to differentiate. I have gathered here all available recordings on the internet, including my own. There are more recordings made by Louise Emmons in the 1970’s, but these still have to be digitized, which hopefully can be done and combined with new recordings for the completion of this squirrel-project. Potential differences found compared to Emmons (1978) are discussed in the species descriptions. **Download the tracks [here on the sound library](#).**

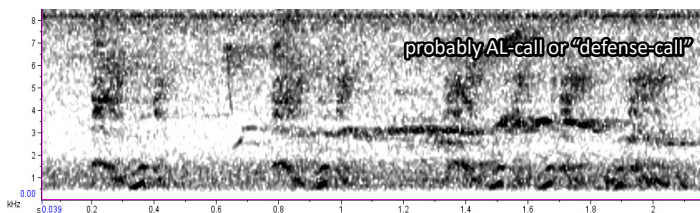
**Forest Giant Squirrel Track 1**



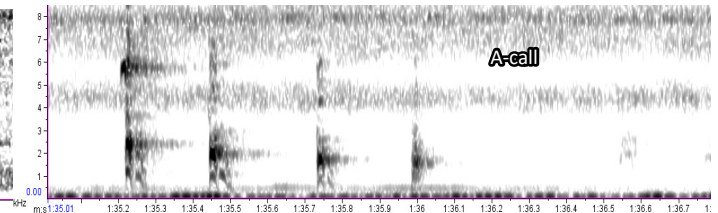
**Forest Giant Squirrel Track 2**



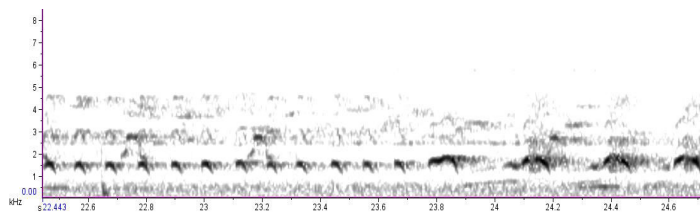
**Gambian Sun Squirrel Track 3**



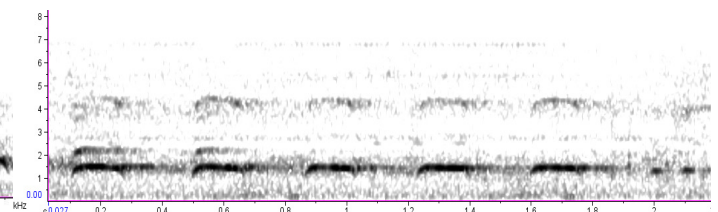
**Fire-footed Rope Squirrel Track 4**



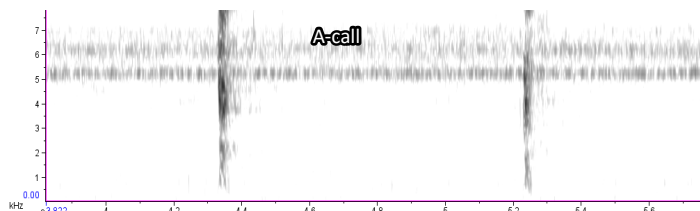
**Fire-footed Rope Squirrel Track 8**



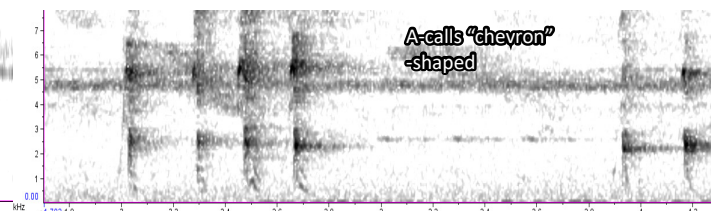
**Fire-footed Rope Squirrel Track 9**



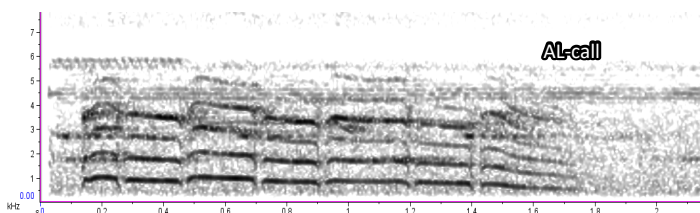
**Red-checked Rope Squirrel Track 10**



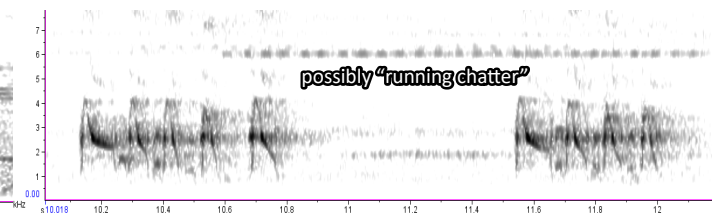
**Thomas's Rope Squirrel Track 11**



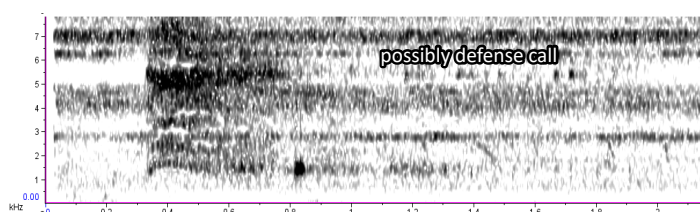
**Lady Burton's Rope Squirrel Track 12**



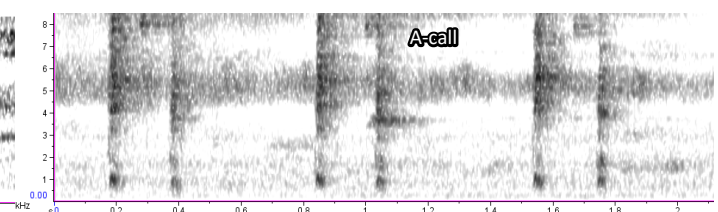
**Ribboned Rope Squirrel Track 16**



**Green Bush Squirrel Track 17**



**Green Bush Squirrel Track 18**



**Track 1:** Forest Giant Squirrel *Protoxerus stangeri eborivorus* © Ben Schweinhart, Dja Cameroon. **Track 2:** Forest Giant Squirrel *Protoxerus stangeri eborivorus* © Rod Cassidy – Sangha Lodge, Sangha, CAR. **Track 3:** Gambian Sun Squirrel *Heliosciurus gambianus cf. bongensis* © Mathias D’haen, La Garamba, Congo Kinshasha. **Track 4:** Fire-footed Rope Squirrel *Funisciurus pyrropus leonis* © Mike Andersen, Sierra Leone. **Track 5:** Fire-footed Rope Squirrel *Funisciurus pyrropus leucostigma/niveatus* © Bruno Boedts, Banco, Côte d’Ivoire. **Track 6:** Fire-footed Rope Squirrel *Funisciurus pyrropus leucostigma* © Daan Drukker, Ankasa, Ghana. **Track 8:** Fire-footed Rope Squirrel *Funisciurus pyrropus leucostigma/niveatus* © Dolly Minis, Macaulay Library, Cornell, Abidjan Côte d’Ivoire. **Track 9:** Fire-footed Rope Squirrel *Funisciurus pyrropus leucostigma* © Daan Drukker, Atewa, Ghana. **Track 10:** Red-cheeked Rope Squirrel *Funisciurus leucogenys oliviae* © Ewan Davies, Sangha Lodge, CAR. **Track 11:** Thomas’s Rope Squirrel *Funisciurus atherynus bandarum* © Rod Cassidy – Sangha Lodge, Sangha, CAR. **Track 12:** Lady Burton’s Rope Squirrel *Funisciurus isabella* © Rod Cassidy – Sangha Lodge, Sangha, CAR. **Track 13:** Presumed Ribboned Rope Squirrel *Funisciurus cf. lemniscatus* © Benjamin Bureau, Lekedi, Gabon. **Track 14:** Presumed Ribboned Rope Squirrel *Funisciurus cf. lemniscatus* © Mathias D’haen, Odzala, Congo Brazzaville. **Track 15:** Presumed Ribboned Rope Squirrel *Funisciurus cf. lemniscatus* © Ben Schweinhart, Dja, Cameroon. **Track 16:** Presumed Ribboned Rope Squirrel *Funisciurus cf. lemniscatus* © Rod Cassidy – Sangha Lodge, Sangha, CAR. **Track 17:** Green Bush Squirrel *Paraxerus poensis* © Rod Cassidy – Sangha Lodge, Sangha, CAR. **Track 18:** Green Bush Squirrel *Paraxerus poensis* © Daan Drukker, Kakum, Ghana.





Above: Barbary Ground Squirrel *Atlantoxerus getulus* © Daan Drukker, Souss Massa, Morocco. Below: Barbary Ground Squirrel *A. getulus* © Roland Wantia, Draa, Morocco.

**Barbary Ground Squirrel *Atlantoxerus getulus***

**FR:** Écureuil de Barbarie

Occurs in open areas and Mediterranean and Mountain vegetations, as well as some agricultural areas. Restricted to North Africa in Morocco and Algeria. Introduced to Fuerteventura (Canary Islands), where it is quite common. Lives on the ground.

**Identification** Unmistakable in its range except for in the Souss valley in Morocco, where confusion can take place with the Striped Ground Squirrel. Barbary Ground Squirrel has a sharper contrast between white belly and dark brown flank (with light brown limbs), while the Striped Ground Squirrel has a less sharp demarcation between light belly and light brown flank, dorsum and thighs.

**Sounds** Vocal during mating season, when males stand upright to call for females. Also has alarm calls. No recordings available yet.



Above: Striped Ground Squirrel *Xerus erythropus erythropus* © Koen Thonissen, The Gambia. Below: Striped Ground Squirrel *X. erythropus limitaneus* © Mathias D'haen, Zakouma, Chad.

**Striped Ground Squirrel *Xerus erythropus***

**FR:** Écureuil de Geoffroy

**Other names:** Geoffroy's Ground Squirrel, West-African Ground Squirrel, *Euxerus erythropus*

Occurs in open areas in the Savanna, Sahel and agricultural land. Missing in rainforests and denser woodlands and deserts. Its distribution ranges from Ethiopia and Eritrea in the east to the Atlantic in the west. An isolated population can be found in the Souss valley in Morocco. Can be found on the ground, crossing dirt roads and on open areas.

**Identification** Unmistakable in the largest part of its range due to combination of large size, narrow white flank stripe and terrestrial habits. Rope squirrels differently proportioned. Only in the Souss valley in Morocco, confusion can take place with the Barbary Ground Squirrel. This species has a sharper contrast between white belly and dark brown flank (with light brown limbs), while the Striped Ground Squirrel has a less sharp demarcation between light belly and light brown flank, dorsum and thighs. There is a lot of subspecific colour variation within the geographic scope, but the differences pose no identification problems with other species

**Sounds** Has a wide range of calls which have not been studied for the purpose of this book.





Left: Fire-footed Rope Squirrel *Funisciurus pyrropus leucostigma* both © Bruno Boedts, Banco, Côte d'Ivoire. Right above: Fire-footed Rope Squirrel *F. pyrropus talboti* © Jan van Leeuwen, Cross river, Nigeria. Right below: Fire-footed Rope Squirrel *F. pyrropus pyrropus* © Benjamin Bureau, Lekoko, Gabon.

## Fire-footed Rope Squirrel *Funisciurus pyrropus*

FR: Écureuil de Cuvier

Disjunct distribution in rainforests and other dense woodlands. Its range extends from the Congo basin into Nigeria up to the Niger, but the species is lacking in the interfluvium between the Niger and the Volta. From the Volta westward it occurs again in Ghana and Burkina Faso up to Senegal and The Gambia. Lives on the forest floor and on lower and middle levels of the trees.

**Identification** The red to reddish brown thighs and feet are unique among the rope squirrels, which makes identification easy, especially in combination with its sounds. The belly is also pure white, which makes them quite recognisable even when the flanks are not visible. Other pelage colourations are very variable and depend on the subspecies. The western subspecies *leonis* and *mandingo* have more rufous in the crown, while eastward to Côte d'Ivoire (*niveatus*) and Ghana (*leucostigma*) the head gradually becomes browner. In Nigeria (between Niger and Cross river), *nigrensis* the head lacks most red tones. In the mountains of extreme southeast Nigeria and adjacent Cameroon, the form *talboti* occurs, also quite a brownish subspecies. In the western Congo basin, the head is again more red in the nominate *pyrropus* and ssp *pembertoni*.

**Sounds** The Fire-footed Rope Squirrel is loud and vocal. The low intensity alarm call (A-call) is described as single or double chucks in the nominate *pyrropus* from Gabon (Emmons 1978). In Ghana, Côte d'Ivoire and Sierra Leone the recordings show a repeated session of around four chucks however (**track 5, 6 and 7**). The animal itself was not seen in the recordings from Ghana and Côte d'Ivoire (5 and 6), but it was recognised as this species by local guides based on the call. As the calls of Small Sun Squirrel are unknown, that species is not completely ruled out. The "loud call" (AL-call) is very remarkable, as it is a very loud, somewhat melodious, series of calls lasting about 20-40 seconds interspersed with higher "inhaling" notes "dadadada....dadaWEEhoWEEhoWEEhoWEEdadad...dada" (**track 8 and 9**). Emmons (1978), does not describe these inhaling notes from Gabon, so this might be different per subspecies. That would mean that in the Congo basin, the AL call is only the staccato "dada-dada...", which would be remarkably similar to Western Palm Squirrel (only ssp *wilsoni* was examined).





Above: Kintampo Rope Squirrel *Funisciurus substriatus* © Richard de Jonckheere, Mole, Ghana. Below: Kintampo Rope Squirrel *F. substriatus* © Yves Bas, Alibori, Benin.

No photos are available of Du Chaillu's Rope Squirrel *F. duchailui*.

### **Kintampo Rope Squirrel *Funisciurus substriatus***

**FR:** Écureuil de Kintampo

Endemic to the Dahomey Gap, the Kintampo Rope Squirrel occurs in savanna in bushes and shrubs along water courses. It can be found in Ghana, Burkina Faso, Togo, Benin and extreme southern Niger. It often is found on the ground and rocks, but also in bushes.

**Identification** This species is very similar to Thomas's Rope Squirrel, and little is known about the overlap in distribution and whether there is reproductive isolation where the two species meet in south-eastern Benin. The most important difference separating Kintampo Rope Squirrel from Thomas's Rope Squirrel is the lack of long silvery hairs in the tail. Other species within its range are Red-cheeked and Fire-footed Rope Squirrel, both of which have red to orange in their fur and are therefore not predominantly brown.

**Sounds** Not known, so recordings would be most welcome.

### **Du Chaillu's Rope Squirrel *Funisciurus duchailui***

**FR:** Écureuil de Du Chaillu

This is a very range restricted species that only occurs in the Du Chaillu Mountains between the Ogooué and Ngounié rivers in Gabon. It lives in dense rainforests. More study is needed to investigate the taxonomic status of this taxon, and to find usable characteristics. According to Brugière et al. (2013), it might be expected in the Lékoumou region of Congo-Brazzaville as well.

**Identification** As there are no photos of living specimens to my knowledge, it is uncertain how this species can be identified in the field. It has four black stripes, similar to sympatric Lady Burton's and Ribboned Rope Squirrels. It might have a more reddish tail with a black tip, and more greenish tints on the pelage. The striping pattern is similar to Lady Burton's Rope Squirrel, with the black stripes starting between the ears. The gray colour on the belly extends much more on the flanks and legs compared to Lady Burton's Rope Squirrel.

**Sounds** Unknown.





Above: Red-cheeked Rope Squirrel *Funisciurus leucogenys oliviae* © Rod Cassidy-Sangha Lodge, Sangha, CAR. Below: idem.



Above: Thomas's Rope Squirrel *F. anerythrus raptorum* © Babajide Agboola, Ikere, Nigeria. Below: Thomas's Rope Squirrel *F. anerythrus bandarum* © Mathias D'haen, Chinko, CAR.

### Red-cheeked Rope Squirrel *Funisciurus leucogenys*

FR: Écureuil à tête orange

Range restricted distribution in the Lower Guinea forests with an extension into the Congo basin in the Central African Republic and Cameroon. Western limit in Ghana at the banks of the Volta river. Lives in rainforests in river valleys and mildly disturbed forest fringes and plantations. It often is found on the ground, such as shorelines and rocky grounds, but also in palm trees and undergrowth of rainforests.

**Identification** Distinguished from other rope squirrels by combination of no red in the limbs and at least some red in the face. Fire-footed Rope Squirrel can also have a red face, but this species always has red limbs. The belly is pale orange in Red-cheeked Rope Squirrel, while the belly of Fire-footed is pure white. On Bioko island, Red-cheeked (nominated subspecies) also has a white belly, but Fire-footed does not occur there.

**Sounds** Not known in detail, but is known to give excited staccato chattering and single chucks (**track 10**).

### Thomas's Rope Squirrel *Funisciurus anerythrus*

FR: Écureuil de Thomas

Disjunct population (ssp. *raptorum*) in West-Africa separated by the Niger river and the Cameroon Volcanic range from the other populations in the Congo basin *bandarum* and *mystax*. Often occurs near water, such as raffia palm swamps or near rivers and gallery forests. Occurs both on the ground as well as in trees.

**Identification** Very similar to Kintampo Rope Squirrel, from which it is mainly identified based on range, but also thanks to their scattered long silvery hairs in the tail, that are lacking in Kintampo Rope. Can be mistaken with the more brownish Lower Guinea subspecies *nigrensis* of Fire-footed Rope Squirrel, also because of the more whitish belly, but Fire-footed always has reddish limbs.

**Sounds** Very vocal (and social), with repeated series or singles of high pitched calls and chucks (A-call, **track 11**). The high intensity alarm call (AL) is very distinctive and birdlike "dada dada dadada ... dadadweeeou".





Above: Lady Burton's Rope Squirrel *Funisciurus isabella* © Mathias D'Haen, Odzala, Congo Brazzaville.  
Below: Lady Burton's Rope Squirrel *F. isabella* © Judith van Eijnatten, Yaoundé, Cameroon.

Above: Presumed Ribbioned Rope Squirrel *F. lemniscatus* © Rod Cassidy – Sangha Lodge, Sangha, CAR.  
Below: presumed Ribbioned Rope Squirrel *F. cf. lemniscatus* © Mathias D'haen, same individual as on track 14, Odzala, Congo Brazzaville.

**Lady Burton's Rope Squirrel *Funisciurus isabella***

FR: Écureuil de Lady Burton

The range of this species is restricted to the western part of the Congo basin. It inhabits a wide range of rainforest types, from mature forests to gardens in cultivated areas, as long as there is thick brush and vines.

**Identification** Similar to Ribbioned Rope Squirrel, with which it shares most of its range. Both are small brown rope squirrels with four black flank stripes in total. Lady Burton's is slightly smaller, and the central black stripes begin between the ears, while they begin at the shoulders in Ribbioned Rope Squirrel. Furthermore, the pale bands between the black bands are all the same pale colour in Lady Burton's, while in Ribbioned Rope Squirrel, the outer flank stripes are much paler than the brown central pale stripe. The belly is whitish gray.

**Sounds** The low intensity alarm calls (A) are repeated series of chucks, sometimes very similar to Ribbioned Rope Squirrel, but sometimes also distinctive. Unfortunately no certain recordings are available digitally of A-calls at the moment. The AL-calls are very distinctive, sounding like a raw bath-duck in a specific series: "WEEwaaWEE-waaWeewaawiew" (track 12).

Note that there are many uncertainties regarding the identification of these Rope Squirrels with four black flank stripes. See also 'Open questions' on p.33.

**Ribbioned Rope Squirrel *Funisciurus lemniscatus***

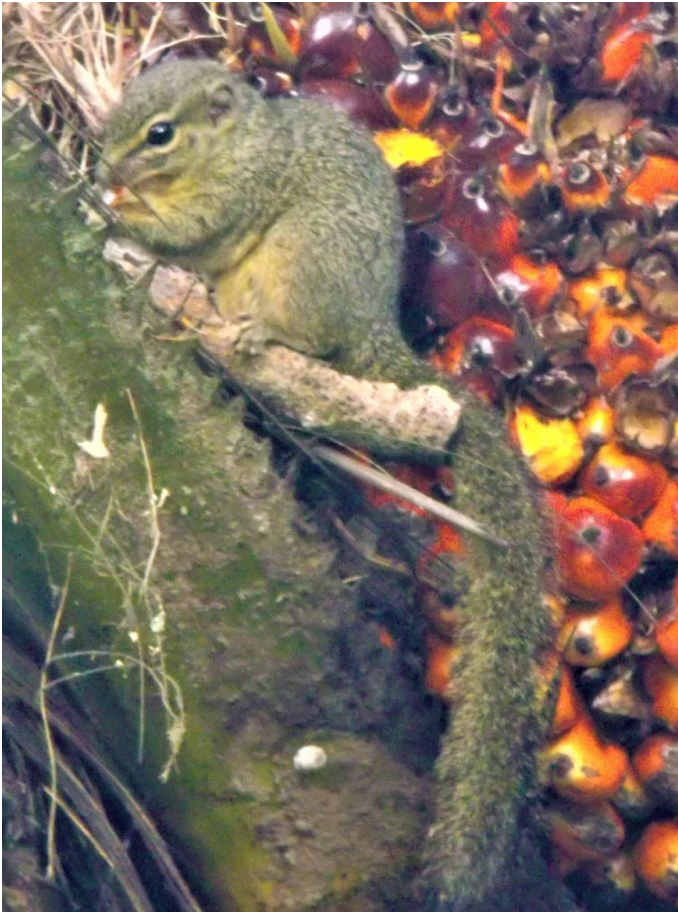
FR: Écureuil rubané

Limited distribution in the western part of the Congo basin. Probably extending to Sangha (CAR) in the east and to the river Congo bordering Angola in the south. It shares its habitat preferences with the Lady Burton's Rope Squirrel.

**Identification** Similar to Lady Burton's Rope Squirrel, with which it shares most of its range. Both are small brown rope squirrels with four black flank stripes in total. Lady Burton's is slightly smaller, and the central black stripes begin between the ears, while they begin at the shoulders in Ribbioned Rope Squirrel. Furthermore, the pale bands between the black bands are all the same pale colour in Lady Burton's, while in Ribbioned Rope Squirrel, the outer flank stripes are much paler than the brown central pale stripe. The belly is white in the nominate subspecies *lemniscatus* (north of the river Ogooué in Gabon) and cream coloured in the subspecies *mayumbicus* (south of the Ogooué).

**Sounds** The low intensity alarm calls (A) are repeated series of explosive chucks, sometimes double (track 14), but usually grouped more widely (track 13, 15). During running they can produce more whistling sounds according to Emmons (1978), which might be the case in track 16. The AL-calls are of the same sounds as Lady Burton's, but with a different structure.





Green Bush Squirrel *Paraxerus poensis* © Rod Cassidy-Sangha Lodge, Sangha, CAR.

Above: Cooper's Mountain Squirrel *P. cooperi* © Jan van Leeuwen, Obudu plateau, Nigeria. Below: Cooper's Mountain Squirrel *P. cooperi* © Rick Buesink, Obudu plateau, Nigeria.

### Green Bush Squirrel *Paraxerus poensis*

FR: Écureuil de Fernando Po

The range is discontinuous within the rainforest zone of Africa and in West Africa it occurs from Sierra Leone to the Volta river in Ghana, but it is absent in the interfluvium between the Volta and the Niger. East of the Niger, it reappears and its range continues on to the Cameroon Volcanic Range and into the Congo Basin, as well as on Bioko island. It is found in lowland rainforests, brush, secondary forests and around villages and agriculture. Found in lower canopy and undergrowth.

**Identification** This squirrel is plain olive green with only a slightly lighter belly and a remarkable head pattern, consisting of a whitish yellow eyering that is broken in the middle. Vague lighter stripes continue along the eyebrow lines and below the eyes, but these are not always easily visible.

**Sounds** Vocal and with many different sounds. Remarkable is the whizzing “*bzzreww*” (**track 17**) as well as the repeated series of “chucks” or “chets”, sometimes uttered in duets in response to humans (**track 18**).

### Cooper's Mountain Squirrel *Paraxerus cooperi*

FR: Écureuil de Cooper

A species with a very restricted distribution, as it only occurs in the Cameroon Volcanic Range in south-eastern Nigeria and Cameroon. It occurs in tropical montane forests and their higher altitude edges. It prefers the lower canopy.

**Identification** Small to medium sized dark squirrel that is best distinguished by the golden hairs in the pelage of the limbs and the head, causing a yellowish golden tinge. The rest of the pelage is dark brownish grey with an olive tinge. Quite similar to Green Bush Squirrel, but Cooper's Mountain Squirrel lacks the sharply demarcated whitish eyering.

**Sounds** Not known.





Above: Gambian Sun Squirrel *Heliosciurus gambianus gambianus* © Maarten Hotting, The Gambia.  
Below: Gambian Sun Squirrel *H. gambianus bongensis* or *limbatus* © Mathias D'haen, Chinko, CAR.



Above and below: Small Sun Squirrel *H. punctatus punctatus* © Daan Drukker, Kakum, Ghana.

### Gambian Sun Squirrel *Heliosciurus gambianus*

FR: Écureuil de Gambie

This species has a very wide distribution in almost the entire savanna zone of Africa. It knows many subspecies. These look quite different in Ethiopia and Sudan, but within West-Africa, the species is more uniform. It can be found in Riverine and Guinea woodlands (*bongensis*, *limbatus* and nominate subspecies), drier savannas (probably ssp. *abassensis*) and coastal woodland in a narrow area in Senegal and Guinea (ssp. *senescens*). They can be found in trees in the savanna and near villages as well as farmland.

**Identification** Only arboreal squirrel in large parts of its distribution, but there are some areas where attention is needed. The distribution border between Gambian Sun Squirrel and its rainforest dwelling relative the Small Sun Squirrel is not well known in some areas. Gambian Sun Squirrel is much lighter, with a brown back and a light belly. Small Sun Squirrel is darker grey, with a relatively darker belly. Relatively little is known about the subspecies *savannius* of Small Sun Squirrel of the inland savannas of Côte d'Ivoire, except that this form is paler than the nominate Small Sun Squirrel and should therefore look more like the Gambian Sun Squirrel. The subspecies from CAR (*bongensis* and *limbatus*) have a reddish brown tinge on the neck and back.

**Sounds** Vocal, with many different sounds, described as chatters, half second trills and “ker ker”-calls (**track 3**). The latter was given in response to a dog attack. It is un-

known if there are differences in calls geographically or compared to Small Sun Squirrel.

### Small Sun Squirrel *Heliosciurus punctatus*

FR: Écureuil pointillé

Upper Guinea Forest endemic that was formerly considered conspecific with Gambian Sun Squirrel. It replaces that species in the tropical rainforests of Sierra Leone, Liberia, Côte d'Ivoire and Ghana up to the Volta/Dahomey Gap. It is an agile, arboreal squirrel that can be found in the canopy and sometimes the undergrowth of lowland primary and secondary rainforests. Also in farmbush and other disturbed agricultural areas. The subspecies *savannius* in the southern savanna regions of Côte d'Ivoire might be some sort of overlap form with Gambian Sun Squirrel, but little is known about this.

**Identification** Small Sun Squirrel is darker grey, with a relatively darker belly compared to the lighter and above browner Gambian Sun Squirrel. Shares its habitat with Red-legged Sun Squirrel, which is quite similar if views are limited and size is not clear. As Red-legged Sun Squirrel only has red on the inner sides of its limbs, this feature is often not well visible. This means that one has to observe a squirrel long enough until one can confirm that there is no red on the limbs or belly. Be also mindful of Green Bush Squirrel, which is quite similar in short views, and best distinguished by the olive green dorsal colour.

**Sounds** Vocal with many calls and chatters, often squeaks. The chatter is the most frequently heard as it probably is the most carrying sound.





Red-legged Sun Squirrel *Heliosciurus rufobrachium maculatus* © Bruno Boedts, Abidjan, Côte d'Ivoire.



Above: Forest Giant Squirrel *Protoxerus stangeri eborivorus* © Rick Buesink, Cross river, Nigeria. Below: Forest Giant Squirrel *P. stangeri eborivorus* © Ewan Davies, Sangha, CAR.

### Red-legged Sun Squirrel *Heliosciurus rufobrachium*

FR: Écureuil de Waterhouse

**Other names:** Isabelline Red-legged Sun Squirrel

Found in the entire African rainforest zone from Senegal to Kenya in numerous subspecies. They are arboreal, like other sun squirrels, and spend most their time in the middle and upper parts of the canopy. They can be found in a range of forested habitats, from primary rainforest to mangrove, to savanna and in gardens and agricultural plantations.

**Identification** In all subspecies this squirrel has a dark brownish grey body pelage with a pale rusty, brown or orange belly and red inner sides of the limbs. The red on the limbs extends to the outer sides as well, but not as far as for example in fire-footed rope squirrel. When the limbs and/or belly can be observed, identification poses no problem, but under bad conditions, Red-legged Sun Squirrel can be confused with other dark species, such as the larger and more round-headed Slender-tailed Squirrel or the smaller Small Sun Squirrel.

**Sounds** Not as vocal as many other species, but their calls are well described. Low intensity (A) alarm call is a single or double bark which is repeated for a few minutes. High intensity (AL) alarm call is described as a whine descending in pitch followed by a short quick trill of low frequency notes. All these vocalisations are described to be distinctively reminiscent of the cooing of a dove due to their long intervals. Also known to give simple chucks.

### Forest Giant Squirrel *Protoxerus stangeri*

FR: Écureuil de Stanger

**Other names:** African Giant Squirrel

Species of high trees in the rainforest zone, usually only found in the higher and middle canopy.

**Identification** One of the largest squirrels of the area, with a dark brown back and yellowish white belly. Head brown or grey. The two West-African subspecies *temminckii* and *nigeriae* are very easy to recognise, as they have a narrow white line just above the demarcation line between back and belly. Additionally from Ghana westwards (*temminckii*) they have a well-defined white cheek patch that extends towards the ear base and continues on the throat. The nominate subspecies on Bioko and ssp. *eborivorus* from Nigeria to the Congo basin lack the white cheek patch and often the white flank line too, resulting in a potential ID-pitfall with Western Palm Squirrel and Red-legged Sun Squirrel. Sounds and the shape of the head are the best features, as well as habitat (arboreal vs. terrestrial).

**Sounds** The A-calls are simple or repeated chucks and sniffs. The High intensity AL-calls are very distinctive: a burst of booming calls (**track 1 and 2**), sometimes preceded by low chucks (**track 1**).





Above and below: Slender-tailed Squirrel *Protoxerus aubinnii salae* © Marc Languy, Mount Nimba, Liberia.

### Slender-tailed Squirrel *Protoxerus aubinnii*

FR: Écureuil à queue fine

Rare endemic of the Upper Guinea rainforests. This species is found mostly in the canopy, but there are very few observations.

**Identification** Large dark squirrel with long and slender tail. The head is remarkably round and broad, with densely haired rounded ears. Might be mistaken for a darker sun squirrel when size is not obvious and observation conditions are not well, but the rounded head and long limbs are a good indication Slender-tailed Squirrel. There are two subspecies, with the western *salae* (Southern Guinea, Sierra Leone and Liberia) is the darkest, while the nominate in Ghana and Côte d'Ivoire is slightly lighter.

**Sounds** Only known from second hand descriptions, but the calls are described as booming. This means that they might be similar to that of Forest Giant Squirrel.

### Western Palm Squirrel *Epixerus ebii*

FR: Écureuil ébien

#### Other names:

Disjunct distribution across the rainforests of Africa, but rarely seen in the whole of its range. Its western population ranges from Sierra Leone to Ghana. Furthermore it is found in Cameroon to Gabon and in the Republic of Congo to the Central African Republic. These squirrels prefer the undergrowth and forest floor of tropical rainforests, with for example *Raphia* palms. They are also



Above: Western Palm Squirrel *Epixerus ebii wilsoni* © Julie Dewilde, Bambama, Congo Brazzaville. Below: Western Palm Squirrel *E. ebii wilsoni* © Rod Cassidy-Sangha Lodge, Sangha, CAR.

found higher up in hills and mountains. They are very difficult to observe, as they live in thick undergrowth and are quite shy. Local people apparently know how to hunt them with nets. They are mainly active in the morning.

**Identification** With good views this beautiful species can be recognised easily, but they are somewhat similar to Forest Giant Squirrel. They lack a white line on the flank between the demarcation of the belly and the back, and do not have a white neck/cheek patch. Their snout is more slender than the more blunt Forest Giant Squirrel. The colouration of Western Palm Squirrel is quite variable. They always have a creamy light belly and some reddish brown in the limbs and on the back, at least on the rump connected with the hips. From the rump to the head, the colour varies between grey, orange red and muted red. The type specimens from Ghana had a more greyish back, similar to the photos taken at Sangha (CAR), but more to the west the subspecies *jonesi* is said to be more red on head and back. That should be more like the specimens photographed in the Republic of Congo, although that subspecies is called *wilsoni*. Their tail is very large and bushy. From above and from the side it is grey, but there are some red, black and grey patterns on the underside, which is rarely seen on photos though. Pay attention to their ground-dwelling behaviour as well, as their look-a-likes are rarely found on the ground.

**Sounds** Their staccato AL-call is loud and melodic, apparently similar to (nominate ssp) Fire-footed Rope Squirrel. A-call is softer chatter and chucking (Emmons 1978). Calls are described in Gabon.





Above: African Pygmy Squirrel *Myosciurus pumilio* © Ben Schweinhart, Dja, Cameroon. Below: African Pygmy Squirrel *M. pumilio* © Benjamin Bureau, Lekoko, Gabon.

### African Pygmy Squirrel *Myosciurus pumilio*

FR: Écureuil de Gabon

This species lives on Bioko island and in the western part of the Congo basin, from Cameroon in the north to Central Gabon in the south, in lowland tropical rainforests. Its presence on the Nigerian side of the Cameroon Volcanic ridge was suspected and recently reported by Ben Balmford from the Mbe Mountains. It inhabits all arboreal vegetation levels, but it is mainly found in the lower 5 meters.

**Identification** One of the world's smallest squirrels and certainly the smallest squirrel of Africa. It is unmistakable due to its mouselike size, white eyering and white outer edge of the ear.

**Sounds** The alarm call is a slow series of low pulses, described as a "piping" sound (Emmons 1978).



Above and below: Flightless Anomalure *Zenkerella insignis* © Dolapo Adejumo, Omò, Nigeria.

### Flightless Anomalure *Zenkerella insignis*

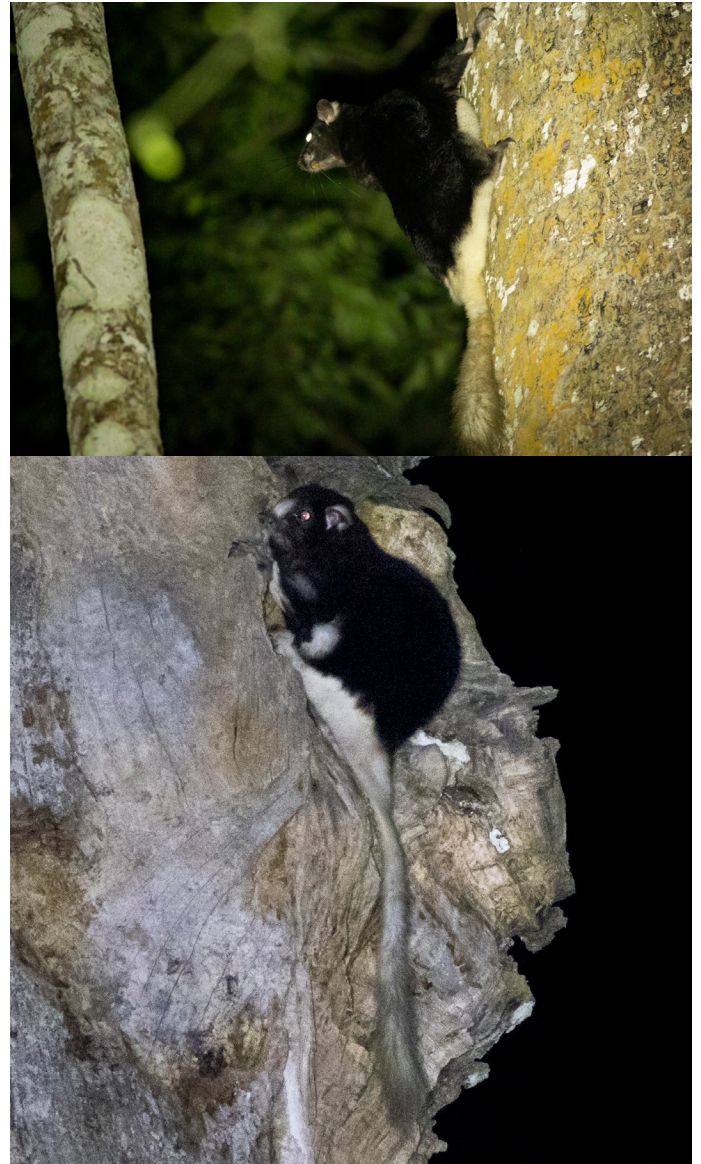
FR: Anomalure aptère

**Other names:** Cameroon Scaly-tail

This remarkable species has recently been discovered in western Nigeria, being identified on the iNaturalist citizen science platform (Adejumo et al. 2020). This is an incredible range extension, as was only known from Cameroon to Gabon and the Central African Republic, as well as from Bioko Island. It is nocturnal and cannot glide. It lives in thick undergrowth of rainforests.

**Identification** Relative small size and absence of a patagium make confusion with another anomalure unlikely, but it can look a lot like an African Dormouse of the genus *Graphiurus*. Note the black tail with sparse but long black hairs eventually forming a tuft, and the black spots on the ankles which separates it from all other rodents, especially when the scales on the underside of the tail can be seen.





**Beecroft's Anomalure *Anomalurus beecrofti***

FR: Anomalure de Beecroft

This anomalure is distributed all over the tropical rainforest area of Africa, in primary forests, especially with swamps and palms, as well as in more disturbed areas. They can be found in suitable habitat in all of West-Africa, including Bioko island and with an outpost in Senegal. Nocturnal.

**Identification** Separated from all other species by its slender tail that has no clear tuft. The orange throat, that sometimes extends all over the belly, is also characteristic. The backside and head are greyish olive with an variable amount of golden hairs along the centre of the back. The untufted tail is blackish. No mask and no black behind the ears. The head has a different structure compared to all other large anomalures.

Above: Beecroft's Anomalure *Anomalurus beecrofti* © Ben Schweinhart, Dja, Cameroon. Below: Beecroft's Anomalure *A. beecrofti* © Jurriën van Deijk, Nsuta, Ghana.

Above: Pel's Anomalure *A. pelii pelii* © Jan van Leeuwen, Bobiri, Ghana. Below: Pel's Anomalure *A. pelii pelii* © Jurriën van Deijk, Bobiri Ghana.

**Pel's Anomalure *Anomalurus pelii***

FR: Anomalure de Pel

This impressive nocturnal beast is endemic to the Upper Guinea rainforests of Liberia, Côte d'Ivoire and Ghana. It can be found in primary forests, where they leave their dens (sometimes occupied by several specimens) after dusk. It forages high up in trees.

**Identification** The two western subspecies *peralbus* and *pelii* (largest part of range in Côte d'Ivoire east of the Sasandra river and Ghana) are unmistakable due to large size, black fur with beautiful long white tail, white on edges of patagium and white above the nose and behind the ears. The subspecies *auzembergeri* from extreme western Côte d'Ivoire and Liberia is completely black however. Still quite distinctive due to large size, but one must be wary of the dark colour variants of Lord Derby's Anomalure. Melanistic, completely black specimens have been documented, and a silvery grey form is also found, both in or close to the range of *auzembergeri*. Note that the silvery grey form of Lord Derby's Anomalure still has black behind the ears darker than the rest of the body.



## Lord Derby's Anomalure *Anomalurus derbianus*

FR: Anomalure de Derby

**Other names:** Derby's Anomalure

Wide distribution all over tropical Africa in a variety of forest habitats, from primary rainforest to woodland savanna. In West-Africa widely distributed and including Bioko Island. Can be found at night in trees.

**Identification** Very variable in pelage colouration. Usually easily identifiable, but certain forms in certain regions might be confused with other species. Structural characteristics are important; it is medium sized with a large black tuft on the tail. A very important pelage character is the colour behind the ears. Lord Derby's Anomalure always has a black area behind the ears, which is in sharp contrast with the rest of the backside (except in completely melanistic individuals). This black area encircles the ears and often continues on the front side, forming a dark eye mask on the face. These specimens are easiest to recognise, but this mask is in a lot of cases not present or very vague. In those cases it is imperative to check the backside of the ears. The colouration on the rest of the body is variable too, grouped in morphs from uniformly brown to silvery black/grey and grey with reddish brown back. West of the Sassandra river in Côte d'Ivoire and further on, melanistic or silvery black specimens can be confused with the all black subspecies *auzembergeri* of Pel's Anomalure. Forms without a mask and brownish upper side can be confused with either Lesser Anomalure or Beecroft's Anomalure. Always check behind the ears, as the other species lack the black band behind the ears that is always present for Lord Derby's Anomalure. Lesser is much smaller and has a sparsely haired base of the tail, while Beecroft's has an orange throat and an untufted narrow tail.



Above: Lord Derby's Anomalure *Anomalurus derbianus* © Jon Hall, Tiwai, Sierra Leone. Below: Lord Derby's Anomalure *A. derbianus* © Rick Buesink, Cross river, Nigeria.





Above: Lesser Anomalure *Anomalurus pusillus* © Ben Schweinhart, Tai, Côte d'Ivoire. Below: Lesser Anomalure *A. pusillus* © Anh Galat-Luong-IRD, Tai, Côte d'Ivoire.

**Lesser Anomalure *Anomalurus pusillus***

**FR:** Anomalure pygmée

**Other names:** Dwarf Scaly-tailed Squirrel, Dwarf Anomalure

This species is one of the least frequently seen anomalures. They occur in the Congo basin and additionally there are a few records from western Upper Guinea. For a long time it was only known there from a single specimen from the Du River in Liberia in 1930, which was met with some scepticism as it was 2400 km away from the rest of its range. However there was another record from Liberia and later also a specimen was photographed at Tai in Côte d'Ivoire in 1984, identified on iNaturalist. In Tai, it was photographed again by Ben Schweinhart in 2022. There was also another record apparently somewhere in Côte d'Ivoire. Not much is known about the behaviour of the species, except that it occurs in primary rainforests.

**Identification** This species is best recognised by the absence of clear characters, as well as its small size compared to the other "large" anomalures. It is plain brownish grey without black markings behind the ears. Perhaps the best character is that the first part of the tail, before the tuft, is very sparsely haired. Similar looking Lord Derby's Anomalures always have thicker fur on that part of the tail. Beecroft's Anomalure has no tuft on the tail.



Cf. Long-eared Flying Mouse *Idiurus cf. macrotis* © Rick Buesink (left) and Jan van Leeuwen (right), Cross river, Nigeria.

**Long-eared Flying Mouse *Idiurus macrotis***

**FR:** Anomalure à oreilles longues

**Other names:** Long-eared Pygmy Anomalure

Rarely seen species, known from Sierra Leone, Côte d'Ivoire and Ghana in Upper Guinea (where there are no records of the very similar Zenker's Pygmy Anomalure), as well as in Nigeria, Cameroon and Gabon and scattered records towards the east of the Congo basin. Arboreal species that emerges around dusk from their shelters in hollow trees in tropical rainforests.

**Identification** Very difficult to separate from the slightly smaller Zenker's Pygmy Anomalure in the field. At the moment, I have not been able to find usable characters, although its snout is proportionately longer and less swollen according to Verheyen (1963). More photos of identified pygmy anomalures are needed.

**Zenker's Flying Mouse *Idiurus zenkeri***

**FR:** Anomalure de Zenker

**Other names** Pygmy Scaly-tailed Flying Squirrel, Zenker's Pygmy Anomalure

Only known from the western an eastern end of the Congo basin, plus records in the Central African Republic. Just like the Long-eared Pygmy Anomalure very agile and can even make circles in gliding. Found in tropical rainforests.

**Identification** Very difficult to separate from the slightly larger Long-eared Pygmy Anomalure in the field. At the moment, I have not been able to find usable characters, although its snout is proportionately shorter and more swollen according to Verheyen (1963). More photos of identified pygmy anomalures are needed.



## Open questions

What subspecies of Red-legged Sun Squirrel occurs in Senegal? Photos show a pale individual: <https://observation.org/observation/257421662/>

Do the Fire-footed Rope Squirrels indeed have different A and AL-calls in the disjunct subspecies west of the Dahomey Gap compared to the nominate? Sound descriptions and sonograms from Congo Basin do not stroke with recordings from Upper Guinea. Actual recordings are needed from Congo Basin.

How do Western Palm Squirrels (in Upper Guinea) sound like?

Can Long-eared and Zenker's Flying Mouse be separated in the field or from photos?

How does the nominate subspecies of Slender-tailed Squirrel look like in the field?

Can the *Funisciurus*-species be separated from each other by their low intensity alarm (A) calls?

How do the *Heliosciurus*-species sound like and are there differences between the species?

To which species of sun squirrel belongs the taxon *savannius* of Middle Côte d'Ivoire?

What is the mystery small black anomalure from Côte d'Ivoire? A small *auzembergeri* or a melanistic *derbianus*?

Are there any other characters to separate Lady Burton's Rope Squirrel from Ribboned Rope Squirrel? These two species cause most confusion. The photos of Ribboned Rope Squirrel on p. 24 should not be used for definite ID. How could you rule out Alexander's Bush Squirrel *Paraxerus alexandri* on the photo from Sangha? And why does the specimen from Congo Brazzaville have less pale outer flank stripes? Could it be a Lady Burton's with a cream belly?

What does Du Chailu's Rope Squirrel look like alive? And how does it sound?

What is the status of Pel's Anomalure in Sierra Leone? There is a report of an anomalure with a white patagium there, but geographically speaking the all black subspecies *auzembergeri* has the closest distribution to the Sierra Leonan border.

This publication was made in my free time. It would not have been possible without the excellent observations of the other photographers and recordists. I would not have been able to find these photos if they had not been added to the databases of Observation.org, iNaturalist.org, the Macaulay Library of Cornell and Mammalwatching.com. In the future, it might become even easier for sound recordings when Xeno-Canto.org opens up to mammal sounds as well, with which the developers are busy at the moment. Be sure to have a look at these websites!



iNaturalist



The Cornell Lab of Ornithology  
Macaulay Library

xeno-canto  
Sharing wildlife sounds from around the world







This field guide is meant to help observers, researchers, ecotourists, professional wildlife guides and nature lovers in general to identify squirrels and anomalures in Western Africa. Squirrels are well known and loved by many, but often ignored as they are considered difficult to identify. Anomalures are also known as Scaly-tailed Flying Squirrels, and not necessarily related to the “real” squirrels, but due to their resemblance to the Flying squirrels of Eurasia and North-America, they are treated here as well. The anomalures are nocturnal and a thrilling sight during a spotlighting session in the rainforest. This field guide is “provisional” because there is still so much unknown about these exciting species. That means that you can contribute a great deal to our knowledge by photographing, filming or sound recording these rodents the next time you find one in the great forests and savannas of the African continent.