

# Uganda Malaise trapping 2014–2015 Rhyssinae ecology data

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<https://doi.org/10.5281/zenodo.2554871>, please consider also citing the associated paper (see <https://doi.org/10.5281/zenodo.2554871> for a link).

This dataset contains the data and analyses of our paper on the ecology of Ugandan Rhyssinae (see <https://doi.org/10.5281/zenodo.2554871> for a link). We collected rhyssines by Malaise trapping in tropical forest in Kibale National Park 2014–2015. The dataset contains background data such as weather and vegetation around the traps, data on the 447 rhyssines caught, the figures in the paper, and the script used to analyse the data.

Here, we describe the files in this dataset (section [Files](#)).

The script ([2 Rhyssinae ecology.R](#)) will usually be of the greatest interest. It contains the R code used to explore and analyse the data, and to create the figures in the paper.

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# Files



## 0 ReadMe Uganda Malaise trapping 2014–2015 Rhyssinae ecology data.pdf



This file. Description of the files in the dataset "Uganda Malaise trapping 2014–2015 Rhyssinae ecology data".

## 1 Data



Folder containing the data. Mostly background data such as weather and vegetation, which has been copied from <https://doi.org/10.5281/zenodo.2225643> (the folder "1 Processed data"). Also contains data on the rhyssine wasps and the analysis results.

One CSV file with rhyssine data: [Uganda Rhyssinae data.csv](#).

Two files with analysis results: [Uganda Rhyssinae glm results.RData](#), [Uganda Rhyssinae section 4 results.RData](#).

Seven CSV files with background data: [Uganda GPS tracks.csv](#), [Uganda GPS waypoints.csv](#), [Uganda vegetation.csv](#), [Uganda vegetation matrices.csv](#), [Uganda weather data.csv](#), [Uganda trap data.csv](#), [Uganda sample data.csv](#).

## Uganda Rhyssinae data.csv



Data on the 447 rhyssines caught by Malaise trapping September 2014 – September 2015 in Kibale National Park. This includes data on when and where the rhyssines were caught (date and time, trap site, coordinates), and what species they belong to. Most of the data is from the Kotka Collection Management System (downloaded 7.3.2019, see e.g. <http://mus.utu.fi/ZMUT.53>).

CSV file with each specimen (individual rhyssine) on a separate row.

Columns:

<i>MYNamespaceID</i>	The first half of the specimen's ID in the Kotka database. Always "utu:ZMUT" for specimens of the Zoological Museum of the University of Turku.
<i>MYObjectID</i>	Name of the specimen. A sequential number.
<i>MZDateEdited</i>	The date and time when the specimen was last edited in Kotka
<i>MYDatasetID.0.</i>	Kotka dataset which the specimen belongs to. Same for all the specimens ("Uganda 2014-2015 Ichneumonoids", <a href="http://tun.fi/GX.1930">http://tun.fi/GX.1930</a> ).
<i>MYDatasetID.1.</i>	Kotka dataset which the specimen belongs to. Same for all the specimens ("Uganda 2014-2015 Ichneumonoids", <a href="http://tun.fi/GX.1931">http://tun.fi/GX.1931</a> ).
<i>MYDatasetID.2.</i>	Which Malaise trap the specimen came from. In Kotka format (this has been made human-readable in column <i>trap</i> ).
<i>MYDatasetID.3.</i>	Which site the specimen came from. In Kotka format (this has been made human-readable in column <i>site</i> ).

<i>MYDatasetID.4.</i>	Kotka dataset which the specimen belongs to. Same for all the specimens ("Uganda 2014-2015", <a href="http://tun.fi/GX.1998">http://tun.fi/GX.1998</a> ).
<i>MYDatasetID.5.</i>	Kotka dataset which the specimen belongs to. Blank unless the specimen was damaged and has been treated with trisodium phosphate Na <sub>3</sub> PO <sub>4</sub> ( <a href="http://tun.fi/GX.3754">http://tun.fi/GX.3754</a> ), or comes from a sample which was split into subsamples ( <a href="http://tun.fi/GX.3753">http://tun.fi/GX.3753</a> ).
<i>MYCollectionID</i>	Which museum collection the specimen belongs to. Same for all the specimens.
<i>MYStatus</i>	"Ok" for all specimens
<i>MYVerificationStatus</i>	"Ok" for all specimens.
<i>MYSeparatedFrom</i>	Kotka ID of the Malaise sample the specimen comes from
<i>MYPreservation.0.</i>	How the specimen is preserved. All the specimens are either pinned or kept in approximately 80% ethanol. Most of the latter will be pinned at some point.
<i>MYLanguage</i>	"english" for all specimens
<i>MYDNASampleLocation</i>	The location of any DNA sample taken from this specimen
<i>MYOriginalSpecimenID</i>	Original name of the specimen. Blank unless we took a leg from the specimen for DNA in Uganda. The name consists of the sample name followed by a sequential number.
<i>MYGathering.0..MYLeg.0.</i>	Who collected the specimen. Same for all specimens.
<i>MYGathering.0..MYHabitatDescription.</i>	Description of the habitat near the trap. Includes a general description of the forest compartment or area, a longer description of the trap site, and the original description of the trap site written in Uganda (often full of typos and errors).
<i>MYGathering.0..MYDateBegin.</i>	Date when the specimen started to be collected (UTC+3). In format dd.mm.YYYY
<i>MYGathering.0..MYDateEnd.</i>	Date when the specimen stopped being collected (UTC+3). In format dd.mm.YYYY
<i>MYGathering.0..MYLatitude.</i>	Latitude in decimal degrees (WGS 84)
<i>MYGathering.0..MYLongitude.</i>	Longitude in decimal degrees (WGS 84)
<i>MYGathering.0..MYCoordinateSystem.</i>	Coordinate system. Same (WGS84) for all specimens.
<i>MYGathering.0..MYAlt.</i>	Elevation in metres (WGS 84)
<i>MYGathering.0..MYCoordinateSource.</i>	How the coordinates were obtained. Same for all specimens.
<i>MYGathering.0..MYCountry.</i>	Country where the specimen was collected. Same for all specimens.
<i>MYGathering.0..MYAdministrativeProvince.</i>	District where the specimen was collected. Same for all specimens.
<i>MYGathering.0..MYMunicipality.</i>	Municipality where the specimen was collected. Same for all specimens.
<i>MYGathering.0..MYLocality.</i>	Locality where the specimen was collected. Same (Kibale National Park) for all specimens.
<i>MYGathering.0..MYLocalityDescription.</i>	Description of where the trap was. In format "Site XX, Malaise trap XXXX, Kanyawara".
<i>MYGathering.0..MYDateVerbatim.</i>	Time period when the specimen was collected (UTC+3). In format "dd.mm.YYYY hh:(min)(min) - dd.mm.YYYY hh:(min)(min)". The hours and minutes are mainly based on GPS track data, but some are more rough estimates.
<i>MYGathering.0..MYSamplingMethod.</i>	How the specimen was collected. Same for all specimens.
<i>MYGathering.0..MYCollectingEventName.</i>	Name of the collecting event. Same for all specimens.

<i>MYGathering.</i> <i>0..MYUnit..</i> <i>0..MYRecordBasis.</i>	What kind of record this is in the Kotka database (specimen, observation..). Same for all specimens.
<i>MYGathering.</i> <i>0..MYUnit..</i> <i>0..MYLifeStage.</i>	What life stage the specimen belongs to. Same (adult) for all specimens.
<i>MYGathering.</i> <i>0..MYUnit..</i> <i>0..MYNotes.</i>	Notes on the specimen in the Kotka database.
<i>MYGathering.</i> <i>0..MYUnit..0..MYSex.</i>	The sex of the specimen. M (male), F (female) or U (unknown, for a specimen on loan).
<i>MYGathering.</i> <i>0..MYUnit..</i> <i>0..MYIdentification..</i> <i>0..MYTaxonRank.</i>	What rank the specimen has been identified to. Same (species) for all specimens.
<i>MYGathering.</i> <i>0..MYUnit..</i> <i>0..MYIdentification..</i> <i>0..MYTaxon.</i>	What species the specimen belongs to
<i>MYGathering.</i> <i>0..MYUnit..</i> <i>0..MYIdentification..</i> <i>0..MYAuthor.</i>	Author of the taxon. Not yet filled in for most specimens.
<i>MYGathering.</i> <i>0..MYUnit..</i> <i>0..MYIdentification..</i> <i>0..MYDet.</i>	Who identified the specimen. Same for all specimens.
<i>trap</i>	Name of the Malaise trap the specimen comes from. Traps whose name contains a slash were moved by a few metres at some point (e.g. K30ST1 / K30ST4 was re-erected after being trampled by elephants).
<i>site</i>	Name of the site
<i>sample</i>	Name of the Malaise sample. The name consists of the trap name followed by the year, month and day.

## Uganda Rhyssinae glm results.RData ↑

The results of the GLM (generalised linear model) analyses used in the associated paper. These have been saved by the script [2 Rhyssinae ecology.R](#). The script loads them by default instead of running the analyses. We saved the results because the analyses can take 40 minutes to run, and give slightly different results each time.

RData file with five R objects: *s1*, *s1.2*, *s1.3*, *s1.4*, *bootid*.

## Uganda Rhyssinae section 4 results.RData ↑

The results of the exploratory analyses. These have been saved by the script [2 Rhyssinae ecology.R](#) (section 4 of the script). The script loads them by default instead of running the analyses. We saved the results because the analyses can take ten minutes to run, and give slightly different results each time.

RData file with eleven R objects: *s1*, *s2*, *s1.adj*, *s2.adj*, *s1.2*, *s1.3*, *s1.4*, *bootid0*, *bootid*, *ci1*, *ci2*.

### **Uganda GPS tracks.csv**



GPS tracks of our movements in Kibale National Park. These include trap emptying trips and general exploration of the forest. Collected by a Garmin GPS which was on most of the time, though there are several gaps where the batteries ran out or memory was full.

Copied from <https://doi.org/10.5281/zenodo.2225643>. The file is described in greater detail there.

### **Uganda GPS waypoints.csv**



GPS waypoints from Kibale National Park. These include trap sites, places where we hand-netted insects, and other places of interest. The notes are mostly what was written in Uganda, and are not guaranteed to be accurate or correctly spelt.

Copied from <https://doi.org/10.5281/zenodo.2225643>. The file is described in greater detail there.

### **Uganda vegetation.csv**



Data on the vegetation surrounding 34 Malaise traps at Kibale National Park. These have been collected in a 5 x 5 metre square centred on each trap (presence / absence of plant species), and in two 50 x 2.5 metre transects centred on each trap (tree species of at least 5cm diameter at breast height, including dead logs of over 5 cm diameter).

Copied from <https://doi.org/10.5281/zenodo.2225643>. The file is described in greater detail there.

### **Uganda vegetation matrices.csv**



Community matrices of the vegetation surrounding 34 Malaise traps at Kibale National Park. These are based on the data in "[Uganda vegetation.csv](#)". There is no new data here, this file is just for convenience to save the effort of creating community matrices from scratch.

Copied from <https://doi.org/10.5281/zenodo.2225643>. The file is described in greater detail there.

### **Uganda weather data.csv**



Weather data from Kibale National Park. These have been collected daily at the Makerere University Biological Field Station. The station had two thermometers (one in the open, one under the tree canopy) and one rain gauge. Weather data has probably been collected at about 9 am (UTC+3) each day, but there is some uncertainty about this and it may have varied. Contains the weather from 1.8.2014 – 4.9.2015.

Copied from <https://doi.org/10.5281/zenodo.2225643>. The file is described in greater detail there.

## Uganda trap data.csv



Data on the 34 Malaise trap sites in Kibale National Park. This includes data on the trap's location, vegetation, forest type and the total sampling effort at each trap site.

Copied from <https://doi.org/10.5281/zenodo.2225643>. The file is described in greater detail there.

## Uganda sample data.csv



Data on 876 insect samples, collected by 34 Malaise traps September 2014 – September 2015 in Kibale National Park. This includes data on the trap site, the weather, and the date and time when the sample was collected. Also includes all the data in the Kotka Collection Management System (downloaded 14.9.2016, see e.g. <http://mus.utu.fi/ZMUT.CCT1-141022>).

Copied from <https://doi.org/10.5281/zenodo.2225643>. The file is described in greater detail there.

## 2 Rhyssinae ecology.R



R script for analysing the data. Contains the analyses used in the paper (section 5), and exploratory analyses (sections 1-4). To use the script, rename the working directory at the start of the script.

The exploratory analyses include plots of rhyssine catches over time and in different traps, and modelling of how factors such as weather and forest type affected catches. Much of the code is self-explanatory or is described in the script.

The script loads its data from [1 Data](#) and saves figures and tables in [4 Figures](#).

The code is in R (<https://www.R-project.org/>), and also uses the packages mvabund (<https://cran.r-project.org/package=mvabund>) and vegan (<https://CRAN.R-project.org/package=vegan>). Uses the functions in [3 R functions](#) to process and plot the data.

## 3 R functions



Eleven R functions used by [2 Rhyssinae ecology.R](#). These include functions for plotting the rhyssine catches over time and in different traps (*plot.day*, *plot.trap*, *plot.overview*), processing the data so it can be plotted (*wasps.per.day*, *get.overview*), and functions used in analysing the data (*explore.models*, *calculate.CI*, *predict.mg*, *makebootID*, *get.pairwisegroups*).

The functions are designed to work with any Ugandan specimens, not just rhyssine data, and should be usable for other data if modified. Each function is described at the start of the file. The easiest way to find out what the functions do is to run through the exploratory analyses in [2 Rhyssinae ecology.R](#).

The code is in R (<https://www.R-project.org/>).

## 4 Figures



Figures and tables created by [2 Rhyssinae ecology.R](#). These include the figures and tables used in the paper (folder "Article" and "Tables"), and some figures created by the exploratory analyses (folder "General overview").

The figures are largely self-explanatory. They are a small subset of what can be drawn: to get more details on the figures, modify them, or create more, run through [2 Rhyssinae ecology.R](#).

Figure 1, a map of the study site, is from the background dataset <https://doi.org/10.5281/zenodo.2225643>.