



Finding *Phlogis*

Discovery of an unusual & very rarely found leafhopper

by Alvin Helden FLS

As an entomologist and all-round natural historian, I have always been fascinated by the natural world. For me, part of that fascination has been a desire to record and name what I see. So in 2015, when I began taking undergraduate field trips to the forest of Kibale National Park in Uganda, I was confronted by the challenge of trying to learn something of the huge diversity of unfamiliar species that I found there. Some things, like many mammals and birds, are easy to identify, but the vast majority of species are of course from other groups. Being an entomologist, I particularly wanted to be able to name some of the insects at Kibale. As part of our field course, we did a butterfly recording exercise, and with the help of expert local Ugandan field assistants, we were able to put a name to many butterflies. By taking photographs, making use of some excellent websites and some published species records, alongside a little expert help, I was also able to make good progress with identifying hawkmoths (Sphingidae) and tortoise beetles (Cassidinae). However, what I really wanted to do was to try and identify some of my specialist group of insects, the Auchenorrhyncha—the leafhoppers, planthoppers and relatives.

ABOVE: Dense vegetation in Kibale National Park, Uganda.

Discovery in Uganda

Although I have expertise in identifying Auchenorrhyncha from the UK and other European countries, I had not worked on the African fauna before. Of course, before I could make a start in this area, I had to get the necessary agreements and permission from the Ugandan Wildlife Authority and the Ugandan National Council for Science and Technology. Once secured, I made a start collecting specimens during our field course in 2017, at the Makerere University Biological Field Station (MUBFS). I used several techniques to collect Auchenorrhyncha: a moth sheet; sweep netting; and tree beating. It was while sweep netting some bushes around the field station in 2018 that I came across a particularly unusual looking leafhopper.

I then photographed the live specimen. In fact, for my work in Uganda I have photographed all the specimens I have collected. What I wanted to avoid with this project was to just collect a set of specimens that would remain relatively inaccessible, except to a specialist. The intention was to create a photographic record, so that anyone, expert or not, could engage with the species I found. My aim is to publish all the morphological information for the specialist, but also in a way that anyone, especially a Ugandan who may visit the field station, can see something more of the wonderful diversity of insects that might otherwise receive little notice. I have already made photographs of the butterflies, hawkmoths and tortoise beetles freely available to anyone, on Figshare (Helden *et al.* 2020; Helden 2021a, 2021b).



ABOVE: Male specimen of *Phlogis kibalensis* Helden, 2022, shortly after it was collected in Kibale National Park, Uganda.

An unusual specimen

For Auchenorrhyncha, photographs of specimens will certainly be helpful in identifying the different families, tribes and genera, and are also good for the non-expert to become familiar with this group of insects. However, for many species we rely on genital structures, particularly of males. So, back in the UK I have spent a good deal of time dissecting and photographing the genitalia of the specimens, as well as preserving the insects. Once that was done, the final step was to try to identify the species. One of the biggest challenges in identifying African Auchenorrhyncha is to locate the literature needed. Species descriptions, keys and illustrations of features are scattered in a very wide range of sources, with some dating from the 19th century. There are none of the same detailed identification guides with broad taxonomic coverage that have been published for European species, although there are some very good, well-illustrated sources for certain specific groups. As ever, when identifying species, I was relying on the great work of others who had written all of these sources. Amongst the many authors, there were two giants of identification, as it were, on whose shoulders I was standing. The first, Henri Synave, focused on planthoppers, and the second, Rauno Linnavuori, on leafhoppers. Both did a very significant amount

of work on African species, and it was one of Linnavuori's papers that led to my discovery of the new species.

When I collected the specimen in Uganda, I knew this leafhopper was unusual, but it was not until I brought it back to the UK that I discovered how rare it was. I was looking through a copy of Linnavuori (1979), when I came across a series of line drawings illustrating the external features of a specimen of *Phlogis mirabilis*, which looked very like the specimen I had collected; in particular, a drawing of the lateral view of the head and thorax, which showed the very distinctive humped profile of the pronotum. I knew straight away that the specimen had to be the same genus, but was it the same species?

Fortunately, there had been some more recent work done on the tribe of leafhoppers to which *Phlogis* belongs (Phlogisini), including a detailed and well-illustrated description of a male specimen of *P. mirabilis* (Takiya *et al.* 2013; Viraktamath & Dietrich 2017). I was able to compare the specimen I had collected and realised that it was different, primarily in terms of the fine structure of the male genitalia, but also with a difference in size and colour of the base of the abdomen (Helden 2022). It was then that I knew when I looked down the microscope that I was the first person ever to see the

internal genital structures of this species. It was an exciting but humbling feeling.

Finding a previously unknown insect is not unusual, as many species are newly described each year. However, what made *P. kibalensis* so interesting was that only two specimens of the same genus have ever been found before. One was the *P. mirabilis* specimen described by Linnavuori in 1979 and the other the male *P. mirabilis*, described first in 2017 but originally collected in 1969. Therefore, there had been no scientific record of this genus alive for over 40 years, and none prior to 52 years ago. Is this because it is genuinely rare, or it is just hard to find? It is impossible to know.

Hope for the species

What we do know is that many species, almost certainly including *P. kibalensis*, are dependent on their tropical forest habitat for survival. Deforestation is undoubtedly leading to extinction in both the short and long term. Fortunately, Kibale National Park, despite being largely isolated by deforestation in the surrounding region (Hartter & Southworth 2009), is well protected. It does have its challenges of human-wildlife conflict and illegal resource extraction, but the forest remains intact and there are great efforts being made to engage with local communities and provide them benefit from the park (MacKenzie *et al.* 2017). In fact, much of the area near where *P. kibalensis* was found was once logged and is now recovering (Chapman *et al.* 2018). Therefore, there is hope that *P. kibalensis* and its forest home will survive.

Due to the disruption of the COVID-19 pandemic, I have not been able to return to Uganda since 2019, but I do hope to continue my work on the Auchenorrhyncha of Kibale. There is still a great deal to discover, especially about their ecology, and maybe one day I will find out something more about the mysterious *Phlogis kibalensis*.

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