



Conference Abstract

# The carabids in the trees: rapid biodiversity assessment of an Ecuadorian rainforest

Beulah Garner<sup>‡</sup>, Alfried Vogler<sup>§</sup>, Terry L. Erwin<sup>|</sup>, Laura S Zamorano<sup>¶</sup>

<sup>‡</sup> Natural History Museum, London, United Kingdom

<sup>§</sup> Imperial College London, London, United Kingdom

<sup>|</sup> National Museum of Natural History, Smithsonian Institution, Washington, Washington DC, United States of America

<sup>¶</sup> CNRS, Montpellier, France

Corresponding author: Beulah Garner ([b.garner@nhm.ac.uk](mailto:b.garner@nhm.ac.uk))

Received: 19 Aug 2019 | Published: 20 Aug 2019

Citation: Garner B, Vogler A, Erwin TL, Zamorano LS (2019) The carabids in the trees: rapid biodiversity assessment of an Ecuadorian rainforest. ARPHA Conference Abstracts 2: e39251. <https://doi.org/10.3897/aca.2.e39251>

## Abstract

Accessing extreme environments historically unexplored by entomologists poses logistical financial and scientific challenges. Today, much of the world's natural habitats are under threat, particularly in the Neotropics. Threats from human development, exploration and indeed climate change pose the necessity for rapid arthropod biodiversity discovery and documentation. This study forms part of a long-term ecological assessment of the effects of an oil company road on primary forest within the Yasuni National Park, Ecuador.

In the past 40 years this study has generated thousands of carabid specimens from the rainforest canopy by employing insecticide fogging techniques. The latest study in October 2018 yielded >260,000 Coleoptera specimens of which Carabidae contributed a diverse component. This complex diversity of the rainforest canopy limits our understanding of ecological and evolutionary patterns and processes on a global scale.

Morphological taxonomy has laid the foundations for our interpretation of carabid species richness and diversity through time; however rapid species discovery is achievable by employing high through-put molecular sequencing methods. A high resolution macro imaging procedure is used to direct the sequencing protocol by isolating identifiable morphospecies from bulk samples. A dual approach of reference sequence and metabarcoding is employed. The reference sequences, being mitogenomes, allow for

phylogenetics and the link to global carabid diversity, while the metabarcoding and species recognition against the reference set allows us to look at change through space (along the road) and time (since the first fogging event in 1994).

With this technique we are able to better study the carabid community of the rainforest canopy, not only improving our knowledge of the hyper-diversity living in this habitat but also their place in evolutionary time. Currently 50 bulk samples have been imaged revealing, for example, an even greater diversity within the species rich genus *Agra* (Lebiinae), than previously recognized.

This study forms a component of the SITE-100 project which is an ambitious effort towards documenting the species diversity and evolutionary history of insects on Earth for a global comparative analysis.

## **Keywords**

Carabidae rainforest canopy ground beetle diversity metabarcoding morphospecies

## **Presenting author**

Beulah Garner

## **Presented at**

19th European Carabidologists Meeting, Primiero (TN) Italy