Costa Rica Fieldwork Expedition 2023

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UNIVERSITY OF DURHAM

Picture credit: Jonathan Drury

Genomic & Behavioural Mechanisms Driving the Evolution of a Novel Visual Signal in Smokey Rubyspot Damselflies (Hetaerina titia).

THE FIELD TEAM

Dr Jonathan Drury (Associate professor)- Durham University

Hannah Cowling (MBiol)- Durham University

Rebe Yaxha (MSc)- Costa Rica

Rogelio Barajas (MSc)- North America

Meal time with our excellent hosts at La Charanga.

Team at our favourite restaurant ‘Mi Choza’ with crocodiles in the estuary behind.



THE PROJECT

EXECUTIVE SUMMARY

The project consisted of 5 weeks of fieldwork based in Golfito, Costa Rica. Behavioural experiments were conducted and several specimens of the smokey rubyspot damselfly (*Hetearina titia*) were collected with the aim to elucidate the evolutionary origins and mechanisms of wing pigmentation.

OBJECTIVES

1. Behavioural experiments were conducted in an established fieldwork site to measure the impact of extensive wing melanisation of smoky rubyspot damselfly on mate and competitor recognition using established techniques (Drury *et al.,* 2015) in Pacific coast populations with low levels of wing pigmentation.
2. The collection and preservation of specimens from the fieldwork site to be used for subsequent RNA-seq analyses, genomic annotation and bioinformatic analyses back in the Durham laboratory including those required for Hannah's MBiol project based upon 'Genomic approaches to studying reproductive interference in rubyspot damselflies'.

Many species including white-nosed coatis, yellow-fronted toucans and Central American agoutis lived in the forest surrounding the station.

ACCOMODATION

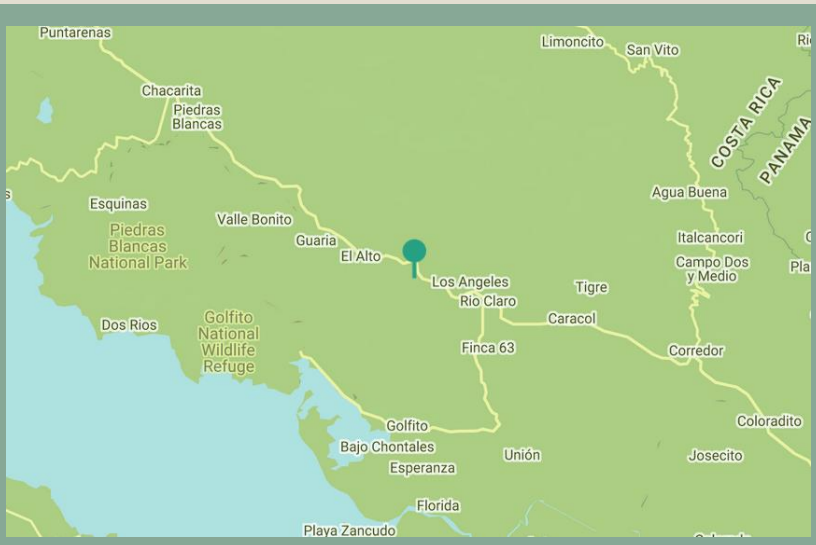
La Charanga Research station, Golfito, Costa Rica.

Located near the small town of Rio Claro in the Puntarenas province of Costa Rica is La Charanga research station. Regularly hosting scientists and researchers it aims to promote higher education and conservation. The station was an excellent place to stay, nestled amongst plantations and rainforest. A personal highlight of this location was the awesome spectacle of fireflies, beetles in the Lampriadae family, dancing all over the surrounding lawns on the occasional dry evening.

Casado or “married man” (Spanish) is a typical Costa Rican meal we would eat daily consisting of rice, beans, plantains & meat.

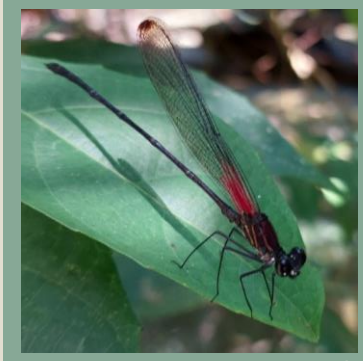
FIELDWORK LOCATION

The fieldwork site consisted of half a kilometre stretch of river dissecting tropical rainforest. Host to an abundance of life. During the fieldwork there were many exciting sightings including spider, capuchin and howler monkeys, a glass frog, hummingbirds, a female troupe of white-nosed coatis, peccaries and a spectacular array of birds, insects, plants and fungi.



Kilometre 29, Golfito, Costa Rica.

The blue *morpho menelaus* butterfly was particularly spectacular, with iridescent blue wings and a wingspan of 12cm.



Hetaerina Occisa male.

Hetaerina tita female.

A marked *Hetaerina* specimen ready for release.

CAPTURE, MARK, RELEASE

Specimens were carefully marked using paint pens.

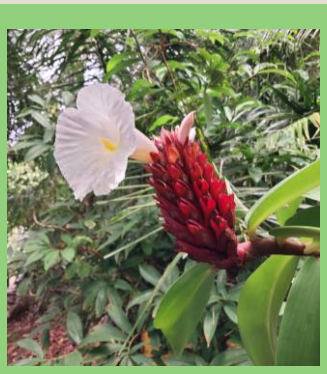
Both males and females of *Hetaerina* specimens were collected, predominantly from species *titia, Occisa & fuscoguttata.* Over 600 individuals were gathered in total.

The different sexes were quite distinct. Males have dark coloured bodies with red in the base of their wings. Females are a paler, golden-brown colour with an iridescent green/ blue thorax. Distinguishing between species was more difficult as some phenotypic variation exists, and the interspecies differences were subtle. However, with practice this became easier.

Once captured, the specimens were marked on their abdomen with a unique four colour code. 50% of captured *titia* males had a small portion of their wings treated to mimic melanisation seen in the species in other regions. Data was collected on the location of capture, species and age, specimens were photographed and released in their original location.

Nets used for capture.

Before release, specimens were carefully placed in a slide and photographed.



BEHAVIORAL DATA COLLECTION

Once a significant population of specimens had been marked, behavioural data was collected on waterproof handheld mesa tablets. Using binoculars, we traversed the half kilometre stretch of river recording three main events: sightings of marked specimens, territorial fights between males and copulations.

Length and intensity of fight was recorded. In copulation events, the stage of copulation and outcome were recorded. In all cases, data was taken regarding specimen species, sex, location and type of vegetation in surrounding metre^2.

Titia pair in the 'tandem' stage of mating.

Base camp where specimens were marked and photographed.

Additional predation experiments using handmade plasticine models were also conducted to assess the effect of wing melanisation on predation.

FUNDING SUMMARY

EXPENDITURE

Food, accommodation & petrol

£45 per day x 38 days = £1,710

Accommodation in San Jose

1 night= £22

International flights

£1,150

Domestic flights (CR)

£194

Taxis to/from airport (CR & UK)

£130

Medical supplies

£40

Food in San Jose/at airport, non-sterling transaction fees

£55

TOTAL

£3,643

FUNDING SOURCES

Curtesy of Jonathan Drury's funder

£1,710

Durham expedition fund

£650

Grey College Trust Fund

£500

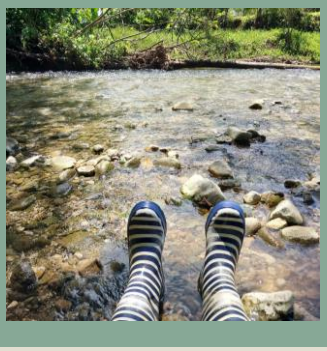
Personal Contribution

£419

TOTAL

£3,643

Costa Rica is known to have almost 300 known species of Ordinata (Dragonflies and damselflies) many of which we observed in our field site.


PERSONAL REFLECTION

This expedition has had a profound impact on me, and I am immensely grateful for the opportunity. It's been a tough couple of years plodding on with my degree through the isolation of COVID and recent personal illness and this experience has been reinvigorating.

On a personal level, being immersed in a culture and environment totally novel to me was both magical and a little intimidating at moments . The tropics are an intense place both in their beauty and harshness and conducting fieldwork in these conditions is no walk in the park. However, in moments of difficulty the kindness of both strangers and members of my field team always saved the day. I feel marked by the immensity of the beauty of the nature I observed. I spent the largest portion of the expedition in awe of this. Notably, after the fieldwork I took a trip to Cano Island biological reserve where I was lucky enough to observe humpback whales returning to the area to breed. This was just one of many wonderful and unforgettable memories made on this trip.

On an academic level, it gave me my first experience of fieldwork. As I am at a critical stage in my academic career deciding the direction of my future study, this was invaluable. I learnt many practical skills and thoroughly enjoyed being part of such a motivated and talented team.






WITH MANY THANKS

I would like to extend my deepest gratitude and thanks to all my funding sources including Jonathan Drury's funder, Durham Expedition fund and The Grey College Trust Fund. Without whom, this experience would not have been possible.

Additionally, I would like to thank Jonathan Drury and all the members of our fieldwork team who taught me so much and who's patience, humour and rice & beans made the experience so enjoyable.

Lastly, thank you to our kind hosts at La Charanga Research Station who welcomed us so warmly, cooked such delicious meals and put up with my terrible Spanish.