Tropical butterfly diversity and environmental gradients

Dr Rick Bodmer, University of Kent

Lepidoptera – butterflies and moths – are the second most diverse order of insects. Currently 165,000 species have been described and many more await description. Diversity of Lepidoptera can reflect overall biodiversity within an area due to their dependence on specific larval host plants, interactions with predators, and their role as long-distance pollinators. This dependence of butterflies and moths on site diversity, coupled with their rapid life cycle which means they respond to changes in the environment very quickly, make them excellent bio-indicators (Brown 1997). For this reason, the monitoring of Neotropical butterflies as indicators of environmental change is well established (Uehara- Prado et al. 2007; Daily and Ehrlich, 1995; Sparrow et al., 1994; Fiedler and Schulze, 2004).

The benefits of Lepidoptera as indicators for environmental change means they are being used at our Peru site as part of the long-term data collection programme to monitor climate change. However, tropical Lepidoptera are not just useful as indicators, but since they represent 90% of all butterfly species understanding and documenting their ecology is also important for the conservation of this group in its own right (Bonebrake et al. 2010). Knowledge of tropical Lepidoptera is severely lacking, particularly in the Amazon, so this honours project offers the chance to make an important contribution to scientific understanding.

The habitats of the Loreto region of the Peruvian Amazon offer many natural environmental gradients which may be affecting Lepidoptera diversity, but which have not yet been studied. The forest is a patchy landscape and documenting the response of Lepidoptera to canopy gaps could help us understand how diversity is maintained across the reserve (Hill et al. 2001). The Lepidoptera community is likely to respond to natural edges, such as that between the river and the forest, but does this response vary between moths and butterflies? Or between different feeding guilds? Tropical forest are highly structured environments with the majority of the biomass being in the canopy, meaning the canopy and understorey are likely to contain different Lepidoptera communities (Schulze *et al.* 2011, Fermon et al. 2005). Lepidoptera also respond to environmental characteristics at very small scales, so you could investigate responses to vegetation structural characteristics, air temperature or bait choice.

Methods

Data will be collected in the Loreto region of the Peruvian Amazon Basin, specifically at the Lower Yarapa River basin in the extensive forest and river system belonging to the indigenous Cocama Indians that connects two major protected areas: the Pacaya-Samiria National Reserve and the Tamshiyacu-Tahuayo Regional Community Reserve. Community-based conservation dominates the landscape of Loreto with large community-based reserves, community co-managed reserves and indigenous territories covering 98,800 km2.

The primary survey method used to monitor Lepidoptera will fruit baited traps which is a well-established methodology (Hughes et al. 1998). This can be combined with walked transect counts (Calades and Robbins, 2003) which is also a validated method for use by students and volunteers, but which often catches different but complementary species.

To protect the rich biodiversity of butterflies in the Loreto region the collection of specimens is not permitted. However, the use of morphospecies (where species are described in the field and given a number) is common in the tropics, especially since the biodiversity is so high and many species are still undescribed to science. The use of morphospecies has been shown to be a useful tool in the analysis of insect communities when identification to species is not always possible and has been demonstrated to be especially accurate for butterflies (Derraik et al, 2002) compared to other insect groups.

This project offers a wide scope of possibilities which can be tailored to your particular interests and which could make a real contribution to Lepidoptera conservation.

Further reading:

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