Where have all the TIGER cynipoids gone?

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I am sure that many of you out there in TIGER Land have been pondering this fascinating question. The short answer was, until recently, that all the Thailand TIGER cynipoids were sitting neatly in the freezer at the USNM in Washington DC.

Fortunately for all of us, a very talented, enthusiastic and reliable intern by the name of Peter Harrison took a position with me at the USNM to learn the curatorial arts of microhymenoptera. In the process of finding projects for our various interns to work on, I taught Peter the joy and excitement of card mounting cynipoids: the palpable anticipation of dehydrating specimens over the vacuum pump, the thrill of the perfect drop of shellac gel, the careful and often fanciful arrangement of wasps on the mounting stage, and above all, the exuberance of the perfectly mounted and labeled eucoiline wasp!

Peter came to the USNM through the Smithsonian Institution intern website, hosted by Mary Sangrey. Mike Gates and I posted several projects this year, ranging from digital imaging, illustration and fieldwork, to the sorting, mounting and labeling of microhymns.

Peter is a DC resident, and is presently an undergraduate at the American University pursuing a degree in the School of Public Affairs. Peter greets each day in the Hym Unit with a smile and loads of enthusiasm, and does not seem to be too put-off by some of the rather interesting humor that takes place in the Hym Unit on a daily basis.

To date, Peter has mounted and labeled nearly three solid drawers of cynipoids, nearly all restricted to the figitid subfamily Eucoilinae. I have examined several unit trays worth of material, and there are some real
gems in these samples. Just today, I found what I think is an undescribed genus of Anacharitinae, but I need to see more specimens to be sure. Another fantastic group that has hardly been recorded from SE Asia are the Liopteridae, a rarely collected group of rather large (ca. 7-10mm) cynipoids; to date, over 12 have been mounted and labeled. In total, I estimate 5-6 USNM drawers will be filled with the TIGER cynipoids by the time Peter finishes mounting and labeling all the samples currently in the USNM freezers.

My work with the TIGER Project concentrates on empidoid Diptera (a large and varied superfamily comprising Empididae, Hybotidae, Dolichopodidae, Brachystomatidae and Atelestidae which may account for as much as 10% of world dipteran diversity). With more than enough taxa to work up, division of labour and collaborations with other empidoid specialists are appropriate so dolichopodids are sent directly to Marc Pollet while I sort the rest for distribution to Christophe Daugeron, Patrick Grootaert and Igor Shamshev, retaining certain focus taxa for my own research (mostly the empidid subfamily Hemerodromiinae, Brachystomatidae and some taxa within Hybotidae).

In sorting empidoid taxa and commencing work on my own interest groups, it was soon apparent that one particular site, the mountain Doi Inthanon in Chiang Mai Province, held an especially rich and varied empidoid fauna (even when sampling biases arising from being only partway through the TIGER Project are taken into account). For example of the 14 species of the hemerodromiine genus *Chelipoda* so far found in Thailand, 11 were recorded on Doi Inthanon and 7 were apparently endemic to the mountain (Plant, 2009a). Many of these species were also abundant there as 91% of the 911 specimens so far captured were from the site.

Doi Inthanon is of course well known as a major hot spot for diversity of groups as varied as mammals, birds, reptiles and plants so it is perhaps no surprise that empidoid Diptera might now be included in this list. The mountain is part of the Thanon Thongchai Range, itself an offshoot of the main Tenasserim Range and a part of the Indo-Burma biodiversity hotspot identified by Myers et al. (2000) as being of global significance. Whilst the surrounding mountains of northern Thailand are floristically and faunistically very diverse, a growing awareness of Doi Inthanon’s exceptional richness within these mountains is worthy of further investigation.

Many thanks on behalf of Peter and myself for all the hard work the TIGER researchers, staff and collaborators have put into this project. Next stop, Malaysia!
Doi Inthanon is a metamorphic core complex which has been uplifted and is now considerably higher than the surrounding uplands. Its large altitudinal variation supports a greater range of altitudinal succession zones than elsewhere in the northern mountains and the availability of multiple moist forest biotopes at higher elevations may partially explain the richness of the fauna; especially for moisture sensitive taxa such as Hemerodromiinae.

Orogenesis of northern Thailand mountains has probably been ongoing throughout the last 50 MY, following the collision of India with the Eurasian plate. Some 20-30 MYA southeast Asia’s climate was probably warmer than at present with less seasonally dependant rainfall patterns and more extensive development of tropical rain forests extending into northern Thailand and southern China (Zhu 2008). The ongoing orogenesis of the Himalaya, and especially the formation Tibetan Plateau, had profound climatic consequences leading to the onset of a seasonal monsoon, perhaps as early as 15-20 MYA (Harris 2006). Consequently, during the Pleistocene, tropical forests retreated southwards in response to increasingly seasonal rainfall patterns and progressive cooling. Fossil evidence from plants (Werner, 1997), mammals (Tougard, 2001), pollen analysis (Penny, 2005) and a molecular phylogeographic reconstruction of the population history of the simulid fly Simulium tani (Pramual et al., 2005) are examples of studies providing evidence for migration of southeast Asian biota in response to climatic changes during this period.

Dating studies of the Doi Inthanon core complex suggest that its uplifting probably began 20 MYA (e.g. Searle & Morley, 2009), coincident with the development of a seasonal monsoon. Although a pronounced dry season developed at lower altitudes, it is likely that, as at the present time, seasonality was relaxed at higher altitudes which probably experienced more even annual precipitation patterns. It seems reasonable to hypothesise that the exceptional biodiversity on the mountain may have resulted, at least in part, from altitudinal migrations in response to climatic fluctuations? A wide range of altitudinal succession zones in close approximation on the mountains’ slopes would have facilitated dynamic vertical dispersal into montane refugia as populations struggled to adapt to seasonal water stresses and consequent vegetation changes. Furthermore, because the Doi Inthanon core complex has been lifted to an elevation well in excess of the surrounding mountains at the same time as monsoonal seasonality has intensified, higher altitude populations could have speciated in response to their isolation, especially those associated with the remarkable moist hill evergreen forest rich in Magnoliaceae, Theaceae and Ericaceae which have developed on the upper slopes (In the ombrophilous genus Chelipoda, species richness increases with altitude on Doi Inthanon and 3 of the mountains’ 7 endemics are confined to this upper zone:- it would be interesting to attempt a correlation of divergence chronology of Chelipoda on the mountain with a history of geological uplifting).

Other ‘marooning’ mechanisms might have contributed to the exceptional biodiversity on Doi Inthanon. For example, the summit slopes show some affinities with the Palaearctic:- the genus Rhododendron for instance
is conspicuous on the upper slopes and numerous floristic affinities with the eastern Himalaya have been chronicled (e.g. Hara et al., 2002). As pointed out earlier, the mountains of northern Thailand, Myanmar (Burma) and Yunnan China arose mostly as a tectonic consequence of the collision of India with Eurasia with the increased elevation of Doi Inthanon being accounted for by other causes. The intervening ridges between the Himalaya and Tenasserim might have provided corridors of montane habitats along which Palaearctic elements spread into the Oriental, subsequently becoming marooned as Doi Inthanon emerged above the surrounding ridges? Some dipteran evidence for this hypothesis is provided by the essentially Palaearctic brachystomatid genus Trichopeza (Plant 2009b), with two endemic Thai species confined to the upper slopes of Doi Inthanon. Other possible cases are being investigated.

As the TIGER Project progresses, there can be little doubt that the Doi Inthanon hotspot will prove fertile ground for investigating these and other problems of systematics and biogeography.

References


Entomological Exchange Emporium (EEE) (Mike Sharkey)

This is a new section that we hope will be of use to many of our collaborators. The idea is to post any insect samples that you wish to trade and to request samples from different parts of the world. These might be Malaise, pan trap, FIT, or whatever. I have thrown out many old Malaise trap residues over the years and it always seems like a waste.

Presently I have hundreds of Malaise trap samples from The Republic of Congo and hundreds more from various localities in Kentucky. They have been kept in a -20 freezer and are up to 1.5 years old. I have sorted these into large, medium and fine fractions. For the most part, Symphyta and Braconidae are the only taxa that have been removed. If any readers are interested in trading for any of these samples please get in touch with me (msharkey@uky.edu).

I hope that some of you will take this opportunity to advertise samples that you would like to offer for trade. Of course some of you may simply wish to give samples away. There are no rules here, please feel free to offer what you like with any conditions that you wish to make. Contact Stephanie Clutts to post an offer or to make a request.

TIGER COLLABORATORS AND STAFF


Credits for this Issue

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