

# TIGER

Thailand Inventory Group for Entomological Research

Hymenoptera Institute, University of Kentucky  
<http://sharkeylab.org/tiger/>

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**Hoping for some contributions from you collaborators!**

## Hymenoptera Hit List

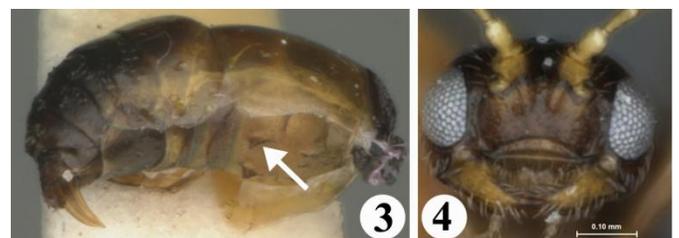
by Andy Boring

I am a graduate student of Mike Sharkey's at The University of Kentucky (USA) and before I begin my story I want to thank everyone in Thailand for their enormous efforts to collect and sort the material from the TIGER project, and particularly Dr. Chaweewan Hutacharern for leading the efforts. I also thank Mike who receives the braconid fractions from Thailand and sorts them to subfamily. He passes specimens of Euphorinae (Hymenoptera: Braconidae) to me, and included in these samples there have been some sensational hits, including three new genera and also two bizarre genera that are rarely collected; these are the topic of this article.

For my Ph.D. thesis, I am revising the genera of Euphorinae. The only recorded synapomorphy for members of this subfamily is that they attack adult or nymphal insects. Members of most other subfamilies of Braconidae oviposit into the egg or larval stages of their hosts. Surprisingly, and happily, my molecular evidence supports monophyly of the subfamily with some minor additions. One of the three new genera represents the most peculiar braconid that I have ever seen. Figures 1 and 2 show an image of the animal. Before you read on, take a moment to speculate on the function of the matt of setae (hairs) on the ventral surface of the thorax. To see the locality where the specimen was collected, click [HERE](#).



I do not know the function of the setae; however I can take an educated guess. As mentioned earlier, one of the peculiar things about euphorines is that they attack adult and nymphal insects. These are typically far more active and capable of resisting assault than most insect larvae (and certainly more than eggs are). Therefore, not unlike female members of the aculeate wasp family Dryinidae, which have chelate forelegs to help them grasp their adult and nymphal leafhopper hosts, disparate taxa of euphorines have developed a multitude of morphological attributes to maintain purchase on their hosts during oviposition. Included in these "adaptations" are: abdominal spines, as in members of *Allurus* that attack adult weevils (Fig. 3, see arrow); enlarged mandibles, as in members of *Cosmophorus* that attack adult bark beetles (Fig. 4) antennae modified into grasping organs, as in female members of *Streblocera* that attack adult leaf beetles (Fig. 5).





Therefore I expect that the matt of setae (Figs.1, 2) functions to temporarily adhere the wasp to the surface of its host. For the matt of setae to be effective, the host would have to have a smooth exoskeleton. The wasp is a member of the tribe Syntretini. The few host records for the tribe are all for members of the genus *Syntretus* which parasitizes adult bumble bees (*Bombus* spp.). Some bumble bees have glabrous (hairless) areas but they seem to be an unlikely host for this wasp. A better guess might be other bees with less pilosity or perhaps even an adult beetle. The matt of setae would probably not adhere to the host without some secreted liquid. I only suspect this because in his highly recommended book, "For the Love of Insects", Thomas Eisner gives an explanation for how the hairy tarsi of the chrysomelid beetle *Hemisphaerota cyanea* function (Eisner 2003) and this explanation seems applicable in this case as well. Dr. Eisner explains "What the beetle does have on its feet is bristles, thousands of bristles, sticking out from the sole of each foot--the ventral tarsal surface--like hairs on a brush. Bristles are a common feature of beetle tarsi generally, but I had never seen them in such quantity per foot...Each tarsus was subdivided into three bristle-bearing subsegments, called tarsomeres. We counted the bristles and found that there were about 10,000 per tarsus, making a total of 60,000 per beetle. Each bristle was forked at the tip, which means, if we assumed the bristle endings to be the contact points with the substrate, that the beetles had the option of relying on 120,000 such points...The bristle endings of *H. cyanea* did indeed turn out to be padlike, and they were wetted...We now know that fluid is an oil, consisting of a mixture of long-chain hydrocarbons." (Eisner 2003, p. 134-135). It is fairly

clear from the image in figures 1 and 2 that the tips of the setal matt are forked or feathered in some way. I will eventually clip a few of the setae from the wasp and take SEM images to see if there are residues of oil remaining, and to check the morphology of the tips.

Another very strange and (to my knowledge) completely unique character is in the morphology this wasp's ovipositor sheaths. For you non-hymenopterists, these are a pair of appendages that cover the ovipositor. In most hymenopterans they are flexible and fold back during oviposition, however here they are heavily sclerotized, pointed at the apex, and (most amazingly) they are fused together (Fig. 2). I cannot help but speculate again... The reason for the highly sclerotized and fused sheathes is to provide a brace for the ovipositor and this would only be necessary if the host cuticle were thick and difficult to penetrate, consistent with the idea that an adult beetle or highly sclerotized bee is the host.

The second new genus is shown in fig. 6. To see the locality where the specimen was collected, click [HERE](#).



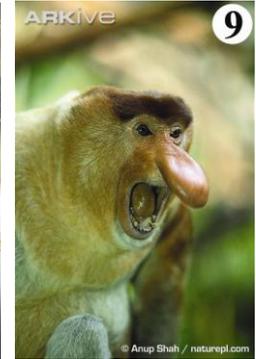
This is another new genus in the tribe Syntretini. Like many euphorinae and unlike most other braconids, the petiole of the metasoma (apparent abdomen) is very narrow and long. Extrapolating from a few known cases, it is thought that this enables the wasp to oviposit while facing the host, and this is accomplished by rotating the metasoma between the hind legs. What is peculiar about this wasp is the extreme anterior position of the ovipositor. Typically the ovipositor originates near the apex of the abdomen. Sorry, but I have no ideas on the function of this position. Any ideas from readers are most welcome.

The third and final new genus has a highly modified head (Fig. 7a-c). To see the locality where the specimen was collected, click [HERE](#). The face is strongly concave and the basal flagellomeres are flattened with dense setae covering the ventral surface. The mandibles cross in an 'X' shape and the antennal scapes are thick and elongate. The concave face and strange mandibles are also found in the euphorine genus *Plynops* and are thought to hold their bark beetle hosts during oviposition. Another genus of Euphorinae, *Marshiella*, has similarly modified antennae that I believe are also used in the capture and manipulation of the host, apart from possible sensory functions. The dense setae may represent yet another case of an oil secreting setal matt that helps maintain a grip on the host. The scapes are undoubtedly highly muscled to add strength to the modified basal flagellomeres. The antennal flagellum operates much like our fingers do. Most of the muscles that allow us to grip with our fingers are in our forearms. In the case of insects the flagellum is entirely without muscles and all flagellar movement is operated by muscles in the scape. Therefore a large scape suggests that the flagellum is powerful.

Present conjecture on the phylogeny of the Euphorinae does not consider *Plynops* and *Marshiella* to be closely related, so this specimen may bring about new insights into euphorine relationships or demonstrate that there is extreme morphological convergence. The sequence data will be incorporated into my phylogenetic analysis soon.

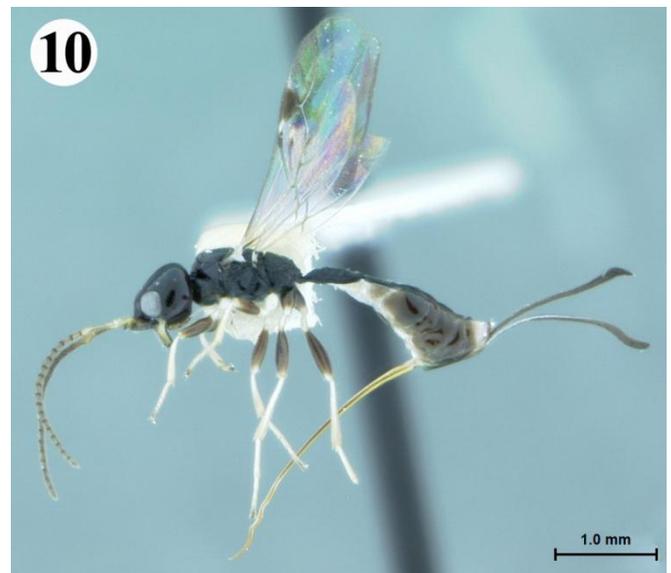


Two more spectacular hits from Thailand are the bizarre and rarely collected genera *Proclithrophorus* (Fig. 8) and *Sinuatophorus* (Fig. 10). Neither of these has been recorded from Thailand. Thailand is now the southernmost record for *Proclithrophorus*. To see the locality where the specimen was collected, click [HERE](#).



*Proclithrophorus* has a flattened, protruding clypeus (Fig. 8, see arrow) and elongate mandibles. The clypeus brings to mind the nose of the proboscis monkey (Fig. 9). The mandibles and enlarged clypeus may be used to manipulate and hold its host during oviposition; the mandibles may also be employed as shovels to dig out of wood after pupation.

*Sinuatophorus* has been collected in Indonesia and Malaysia (on the peninsula and Borneo). Thailand now represents the northernmost distribution for this genus. To see the locality where the specimen was collected, click [HERE](#). *Sinuatophorus* has a wavy, ribbon-like ovipositor (Fig. 10) and Dr. Donald Quicke (who is also a TIGER collaborator) wrote an excellent description for how this wavy shape allows the ovipositor to bend as it navigates through preexisting tunnels in wood, presumably in search of its host (Quicke 2001).



It is very likely that *Proclithrophorus*, *Sinuatophorus*, and *Cosmophorus* form a monophyletic tribe, and interestingly Thailand is the only known location where all three genera occur.

Formal descriptions of the new genera are in preparation; however I have only one specimen for each of these, and I hope that the TIGER machine comes up with more. These two genera illustrate why Thailand has such diverse fauna. It is at the junction of the Oriental and Palearctic regions and I believe that northern and southern records will be common when the TIGER samples are more closely studied.

Eisner, T. 2003. *For Love of Insects*. Cambridge, MA: The Belknap Press of Harvard University Press. 448 p.

Quicke, D.L.J. 1991. Ovipositor mechanics of the braconine wasp genus *Zaglyptogastra* and the ichneumonid genus *Pristomerus*. *Journal of Natural History* 25:971-977.

Appendix. The TIGER samples include 18 genera of euphorines, which represent ~33% of the world genera. The list of these follows:

Cosmophorini

*Cosmophorus*  
*Sinuatophorus*

Centistini

*Centistes*

Cryptoxiloini

*Cryptoxilos*

Euphorini

*Chrysopophthorus*  
*Leiophron*  
*Peristenus*  
*Wesmaelia*

Helorimorphini

*Aridelus*  
*Ussuraridelus*

Meteorini

*Meteorus*

Myiocephalini

*Myiocephalus*

Perilitini

*Perilitus*  
*Streblocera (Lecythodella)*  
*Streblocera (Streblocera)*  
*Microctonus*

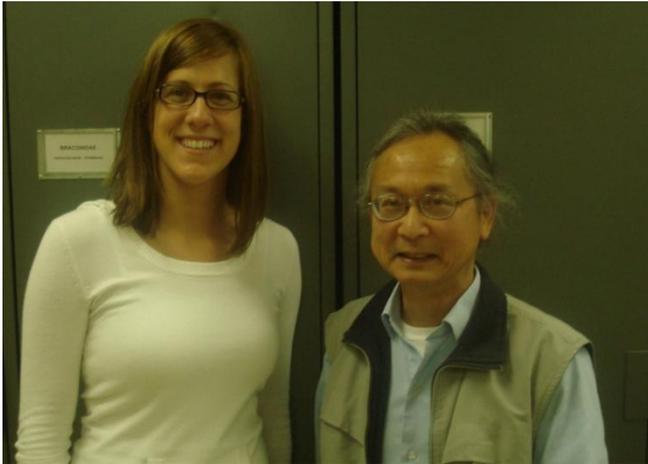
Proclithrophorini

*Proclithrophorus*

Syntretini

*Syntretus*

## TIGER Team - Lexington, Kentucky



Two of the people that are most responsible for managing the TIGER project are Dicky Yu and Stephanie Clutts. Dicky (Sick Ki Yu) is a research analyst in the Sharkey lab, originally from Hong Kong, he did his masters degree at the University of Guelph, Canada and his Ph.D. at the University of California, Riverside, U.S.A., majoring in Entomology and minoring in computer science.

Stephanie Clutts, a senior lab technician in the Sharkey lab, received her Bachelor's of Science in Biological Sciences and a Master's of Science in Zoology from Southern Illinois University, Carbondale, U.S.A. Her master's thesis was a taxonomic treatment of the terrestrial snails of Illinois.

Their main contributions include processing loans and shipping specimens to our wonderful (☺) collaborators, and maintaining the TIGER website. The TIGER website was started by Tom Dodson, and improved on by Krishnakumar Sugumaran, Sarat Tippaluru, Phani Chand Yarlargadda. The website includes information on the collection efforts by our Thai team, the collaborators who help with the identifications, the source of collection labels so crucial to the collection and identification efforts, and Google maps to pin-point the insects collected by the project. Their responsibilities are to improve on the functionalities of the website, update collection data provided by our Thai team and enter identified material provided by our collaborators. We are especially happy with the web pages, translated by Dr. Hutacharern; these contribute tremendously in making our work available to the Thai people.

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