

HOST SPECIFICITY OF LONG-HORNED BEETLES (*Cerambycidae*) IN LOWLAND RAINFOREST

A SUCCESS OF THE BUSH LABORATORY PROJECT

By **Brus Isua and John Auga**
with the assistance of **Lukas Cizek, Vojtech Novotny, Jiri Hulcr and Milan Janda**

The Parataxonomist Training Center Ltd.

P.O. Box 604, Madang, Papua New Guinea; Ph/fax (+675) 852 1587; email: binatangi@datec.com.pg; <http://www.entu.cas.cz/png/>

Abstract

This is a study of species richness and host specificity of long-horned beetles (*Cerambycidae*) developing in wood of rainforest trees. Baits of freshly cut wood from selected tree species are exposed in the forest to allow oviposition by cerambycids. Then the baits are placed in rearing cages and regularly checked for emerging cerambycids. Every obtained specimen is assigned to a morphospecies and recorded to the database. We plan a survey of at least 30 species of trees from various phylogenetic lineages and analyze host specificity of their cerambycid fauna. The project is carried out by Ohu Bush Laboratory - field research facility led by experienced parataxonomist, training and employing local villagers.

Cerambycidae Project

Even in well-studied fauna of tropical longhorned beetles, the lack of quantitative ecological analysis is profound. Therefore we set up a large-scale experiment with



Fig. 1: Baits of wood in the "high shade" position.

Host trees selection

The careful selection of experimental host is the keystone of host specificity analysis. The host specificity of herbivore can be expressed for example as the phylogenetical relatedness or ecological similarity of hosts. Therefore we have chosen 29 species of rainforest trees with variable phylogenetical distances (congeneric, confamilial, allofamilial species) and from both primary and secondary forest types.



Fig. 3: Baits in the rearing cages.

Processing the material

Beetles collected from cages are than mounted, sorted into morphospecies and recorded (fig. 4). For sorting and recording we use the custom-built MS Access database, containing morphological, taxonomical and ecological description and a picture of each species, as well as detailed information about every single specimen collected.

Recorded and preliminarily sorted specimens are than shipped to taxonomy specialists for exact determination. The main coordinators of this overseas collaboration are the Smithsonian Institution and National Museum of Natural History in USA.

rearing the beetles from their host trees to describe the structure of rainforest cerambycids community. This study will be another contribution to our extensive and thorough investigations of all important groups of tropical herbivorous insect. Fieldwork is being carried out in humid rainforest at Ohu village, Madang district, Papua New Guinea.



Fig. 2: Checking the baits in "low shade" position.

Rearing the beetles

Baits of 25 kg of freshly cut wood from desired trees are exposed in the forest to allow oviposition by cerambycids. To lure as many longhorned beetles species as possible and simultaneously record the behavioral differences among the species, we put the baits into four positions:

- in the canopy, exposed to sun (fig. 5)
- in the canopy, shaded (fig. 1)
- in the understorey, exposed to sun
- in the understorey, shaded (fig. 2)

After three weeks, the baits are placed in rearing cages for three months and regularly checked for emerging cerambycids. (fig. 3, 8)



Fig. 4: Mounting and assigning to morphospecies.

Preliminary Results

So far we have finished complete sampling of five species of trees: *Ficus virens*, *Ficus wassa*, *Ficus nodosa*, *Artocarpus communis* and *Pimelodendron amboinicum*. First three are congeneric, first four confamilial (fam. *Moraceae*), the fifth species is from different family (*Euphorbiaceae*).

So far, more than 1,800 cerambycids from almost 40 species have been reared. For analysis we avoided species collected in less than 10 specimens (63% of species).

Host specificity

Most *Cerambycidae* are rather wide generalists even among relatively unrelated host species. For example, all species found on *Pimelodendron amboinicum* (fam. *Euphorbiaceae*) are also found on at least two of *Moraceae* species. Generally, most of the species are found on more than three host species (fig. 6).

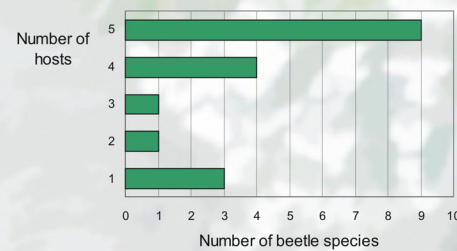


Fig. 6: Host specialisation: proportions of *Cerambycidae* species feeding on certain number of hosts.

Influence of treatment

The difference between cerambycids from different treatments are rather small and most species are emerging from all treatments (fig. 7). There is a larger amount of individuals and species emerging from baits placed in the understorey than from those placed in the canopy, while there is no difference between sunny or shade position.

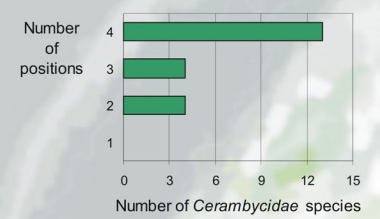


Fig. 7: Specialisation to position of bait: proportions of *Cerambycidae* species occupying certain number of treatments.

Ohu Bush Laboratory



Fig. 8: Ohu Bush Laboratory

To facilitate such extensive studies as the *Cerambycidae* project, our Center founded the Ohu Bush Laboratory in Ohu village, Madang province, Papua New Guinea. The main advantage of the Bush Laboratory is its close proximity to the studied forest and favorable acceptance by local landowners. There are number of projects being carried out by Ohu Bush Laboratory, but the most extensive is the investigation of the host specificity of long-horned beetles (*Cerambycidae*).



Fig. 9: Timber infested by *Cerambycidae* larvae in the rearing cage.



Fig. 10: Pulling fresh timber sample to the canopy.

The Parataxonomy concept

To understand complex ecosystems with numbers of species and relationships, such as the insect community of tropical rainforest, demands thorough quantitative analysis. Such analysis could be reliable only when long-time and large-scale approach is employed. To achieve this, the Parataxonomist Training Center in Madang, Papua New Guinea, has adopted the concept of parataxonomists - talented people from local villages trained to carry out various scientific tasks.

The Ohu Bush Laboratory is led by senior parataxonomist and local landowner Brus Isua.

