PARATAXONOMISTS
A NEW APPROACH TO ECOLOGICAL RESEARCH

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The struggle by scientists to inventory rapidly disappearing biodiversity of the tropical forests is facing many obstacles. Of them the most obvious are the logistical and financial difficulties, experienced by the majority of the short-term intensive expeditions, and a long time required to process all the material by only a few experts.

One promising attempt to overcome these problems is working with trained indigenous people, or parataxonomists, which was pioneered by D. Janzen and W. Hallwachs in Costa Rica.

One of the more extensive parataxonomist projects is now based at The Parataxonomist Training Center Ltd., founded in 1997 in Madang, Papua New Guinea. Today, it employs 11 full time parataxonomists, several trainees and a number of local collaborators, who are active in several ecological studies.

Who is the Parataxonomist ?

The prefix "para" in this context modifies the meaning of the word "taxonomist" to nonprofessional scientific assistant, with rather limited access to standard expert facilities, but yet largely independent and able to solve complex scientific tasks. In the Parataxonomist Training Center, we are trained to use scientific tools, to perform various research activities and to understand broad context of scientific work.

Fig. 1: Lighttrap - fieldwork is the first step.

Communities of leaf-chewing insects in lowland rainforests of Papua New Guinea

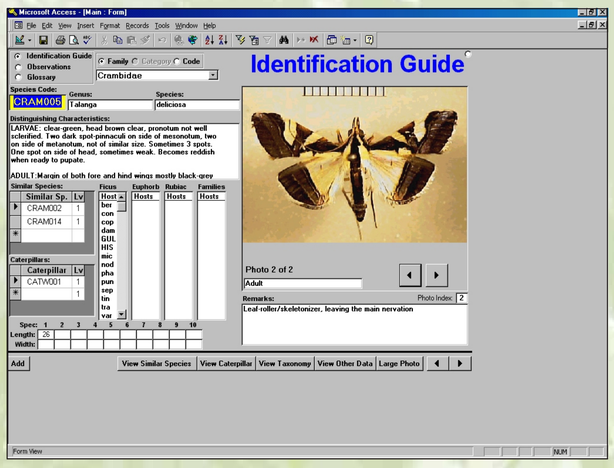

Fig. 2: All information are stored in the custom-build Microsoft Acces database.

In our main long-term project we compare the species composition, species richness, host specificity and overlap in composition of herbivore communities feeding on closely and distantly related hosts. We test whether ecological traits of insect herbivorous communities are related to ecological circumstances, or whether they can be explained by plant phylogeny. Our data analysis is based on 58 588 individuals and 1010 species of leaf-chewing insects collected and reared on 59 species, 39 genera and 18 families of woody plants in a lowland rainforest.

Study revealed that most herbivores had wide host plant ranges, especially with reference to congeneric plants. Only 3.7% of species feeding on these genera were monophagous.

The overlap between herbivore communities decreased gradually with increasing phylogenetic distance between hosts. While majority of beetles and orthopteroids appeared to be a generalists, the communities of *Lepidoptera* feeding on plants from different families were highly distinct. Generally, most herbivores were specialized with respect to plant genera.

Our host specificity data together with improved estimates of some other paramteres, permitted a revision of previous estimate of global arthropod diversity from 31 to 4.9 million species.

Fig. 3: To build our reference collection demanded to acquire considerable taxonomical skills.

Ethnobotany programme

The outstanding traditional knowledge of natural environment possessed by Papua New Guinean grassroots is well known and documented. We cooperate with villagers to collect local names of plant species and the information about their traditional use and other features and assign them to scientific names. We can even compare the scientific and traditional taxonomy. This collaboration allows expert scientists to easily cooperate with local people in the field and obtain the information often unknown for science.

Education by parataxonomists

Center's ultimate goals go beyond the carrying out scientific projects. The other, and by no means less important, is to pass our knowledge on other local people, on landowners, on school children. By producing dozens of educational leaflets, performing lectures in schools and educating grassroots audience in villages, we keep on raising the so necessary environmental awareness of the nation. (Fig.4)

The Database of Insect Herbivores, Host Plants and Their Relationships

This database is a backbone of the Centrum research activities. It's a still growing compendium of observations accumulated over five years of continuous extensive investigations. (Fig. 2) It contains data on various insect orders (for example, 42,000 records of Lepidoptera), plants and fruits as well as their mutual relationships, digital images, development stages etc. We also maintain the collections of plant and insect material as a reference material for the database (fig. 3, 5).

Host specificity of fruit-flies (*Tephritidae*) in lowland rainforests

This was a collaborative study with Griffith University (Australia) and National Agriculture Research Institute (PNG). In order to describe the specificity and distribution of fruitflies among hosts, we have reared more than 7,000 fruitflies, representing 32 species from approximately 500 kg of fruits and 71 species of rainforest trees.

Host specificity of fruit-flies proved to be low on generic level and high on the higher taxonomical levels of host almost all fruit-flies were restricted to a single genus within each host family. Species richness per host was very limited, as even extensively sampled plants or samples with large numbers of hatchouts had a maximum of 3 species.

Fig. 4: Parataxonomists raise the environmental awareness of young generation.

Fig. 5: Maintaining the database and reference collection.

Host specificity of long-horned beetles (Cerambycidae) in lowland rainforests

This is a study of species richness and host specificity of cerambycid larvae (Cerambycidae) developing in wood of rainforest trees. Baits of freshly cut wood from desired trees are exposed in the forest canopy and understorey to allow oviposition by cerambycids (fig. 6), then placed in cages and regularly checked for emerging cerambycids. We plan a survey of at least 30 species of trees from various phylogenetic lineages. So far, more than 1,200 cerambycids have been reared.

Fig. 6: Freshly cut logs are exposed in the forest to attract long-horned beetles (*Cerambycidae*).

Center output facts:

2,500 person-days of fieldwork

71 tree species surveyed

86,000 feeding insects sorted into **1,200** species

21,000 caterpillars successfully reared to adults

over **50,000** insects pinned

over **3,500** digital pictures available on WWW