

## Ode to Taxonomy

Cloudbridge Nature Reserve - Nature Notes No. 21

### Introduction

In early 2004 we received an inquiry from Dr. Zachary Falin, an entomologist at Kansas University's Natural History Museum. We gladly invited him and his team to visit Cloudbridge, to study and collect insects on the Reserve. In the course of our subsequent communication, I spoke of our interest in studies of behavior and evolution and adaptation and mutualism. Zack detected a certain lack of interest on our part in mere bug naming, and responded with a spirited defense of taxonomy and of his particular field. He kindly agreed to let us share his letter (the headings are ours).

### What Drives Three Taxonomists

"Your comments make me believe that perhaps I have misstated my case for the need of generalized arthropod collecting. Permit me to use an analogy. Consider a working ecosystem such as Cloudbridge an enormously complex machine -- a car, say -- with perhaps a million different interacting parts (species). Taxonomy, in the strict sense, is the protocol we use to name those parts (species) so that we can discuss them and differentiate one part from another. Proper taxonomy should also reflect on how one part is related to another part -- as in how all 10mm bolts are "related" to 15mm bolts (how one butterfly species is related to another butterfly species).



as in how all 10mm bolts are "related" to 15mm bolts (how one butterfly species is related to another butterfly species).

"The user's manual for taxonomists is a single book: the International Code of Zoological Nomenclature. In one sense, taxonomy is easy in that anyone can read this book and understand the rules for naming parts or species. The hard part is figuring out which parts have already been named, and which parts deserve names and which are merely subsets of other parts. This takes years, even decades to master.

"We three consider ourselves systematists, the science of systematics being the use of the tool or protocol of taxonomy to properly define these parts (species) and create hypotheses regarding their evolutionary relatedness. In this sense, each of us picks a minute subset of parts of this enormously complex car and studies them in detail. We attempt to determine exactly how many parts there are in our particular subset, where and when they can be found, and how they are all related to each other.

### A Window to Ecology

"Now consider some of the more obvious parts of this car -- the windows, tires, roof, etc. These are analogous to what we call "charismatic megafauna and megaf flora" -- that is, monkeys, birds, gigantic trees, flowers, etc. Because of their

obviousness in this car, these parts have already been named and their evolutionary relationships more or less worked out. Knowing their names and relationships to one another, other scientists can now come in and examine emergent properties of their interactions- how the windshield and roof fit together to block the elements, how the tires interface with the road, etc. This is akin to ecology- the study of how all these parts interact in this giant machine and how the machine interacts with its abiotic environment.

### **You Can't Study It If You Don't Know It Exists**

"Some interactions are easy to witness, some take decades, some are over in milliseconds. Some occur only at night, or in December, or above a certain elevation, or in the presence of a third part, etc. The fact of the matter is, though, for all we know about the obvious parts and how they interact, there are 1,000 or 10,000 or 100,000 times more parts (species) that are rare, difficult to collect, or difficult to differentiate from other parts. The very fact that we don't know how many parts there are in the first place indicates that we need to spend more time and energy collecting, naming, and studying those parts. Only then can we begin to study how they interact. In other words, you can't study what you can't name and don't know exists.

### **Amazing Behaviors**

"A personal example: the beetles I study are, as we discussed, parasitoids of the larvae of other insects. They possess amazing, intricate and, so far, inexplicable behaviors in locating their hosts, escaping from their hosts, finding mates, etc. There is an amazing amount of "behavior and evolution and adaptation and mutualism" to study with these beetles. However, it is also true that they are extremely rare and often very difficult to tell one species from another. In nearly 14 years of study, I have only witnessed them alive in the field three times (and I know how to find them!). I have no expectations whatsoever of being able to find them and study them during our month in Costa Rica, much less our few days at Cloudbridge, even though I know they exist there.



"In order for me to learn about these creatures (and to know that they exist in Costa Rica, for example), I have had to rely on specimens inadvertently collected over 15 decades by hundreds of people. If these people hadn't been out conducting general arthropod collecting, neither I nor anyone else would ever know that these amazing creatures exist. If someone hadn't spent the time and energy describing and naming these beetles -- practicing taxonomy -- neither I nor anyone else would even be able to talk about them in scientific terms. And, in truth, this situation holds for the vast majority of arthropod species. I will probably not be lucky enough to collect one of my beetles while in Costa Rica, but I will, with certainty, be lucky enough to collect some other beetle, or fly, or bee that is equally as amazing and valuable to some other systematist. It may take a year, or 10 years, or 100 years for that specimen to fall into the right hands, but eventually it will.

### **A Noble Pursuit, Oft Maligned**

"To conclude, studying evolution, ecology, etc. is a noble pursuit -- that is why I am in the business. We are well underway in our understanding of this car's windshield and how it works, though we are just beginning to open the hood (or bonnet) and to tinker with the smaller, more obscure parts. Anyone can see that there are a million parts under the hood of Cloudbridge -- all you have to do is look out the window, turn over a log, watch a squash decompose. It is quite another thing to begin to collect, name, and arrange those parts, particularly those parts that are rare, ephemeral, difficult to find and difficult to distinguish. That is the role I feel these "simple" collecting

expeditions fulfill -- to bring back, preserve, and name as many of these parts as we can for other scientists to begin the task of studying their interactions.

"As I mentioned, I feel strongly that the importance and role of taxonomy, systematics, and natural history specimen collection is often misunderstood and nearly as often maligned as insignificant, uninteresting, or unimportant. However, with every opportunity I get, I try to show that there can be no studies of "behavior and evolution and adaptation and mutualism" without first collecting, describing, and categorizing the very organisms themselves. Yes, the trees, monkeys, flowers, etc. of Costa Rica are well known, but the beetles, flies, etc. etc. are not necessarily, and that is our job -- to make them known and available for further study.

"I hope this helps to explain my position and perhaps sheds a bit more light on what I feel the importance is of what we do."

Note: We offered to help Dr Falin by collecting specimens for him at Cloudbridge, but he explained to us that it is necessary to obtain a permit from the Costa Rican government for each collection trip lasting a specified number of days. Instead, he suggested that we offer to assist local scientists in their research.

Link to Dr Falin's website:

<http://entomology.biodiversity.ku.edu/people>

Links to a couple of Insect Taxonomy websites:

<http://www.earthlife.net/insects/six.html>

<http://www.ucmp.berkeley.edu/help/taxaform.html>

