

BUGS IN THE WOODS

Review of:

Allen M. Young 1991. *Sarapiquí Chronicle*. Washington: Smithsonian Inst. Press
301 pp.

[40th in a series on "naturalist-in" books; see
www.ckstarr.net/reviews_of_naturalist.htm]

American entomologist Allen Young has worked at the Milwaukee Public Museum for 40 years, but the great bulk of his field work has been in Central America. He decided early that what was most needed (and what he most wanted to do) in the tropics was basic natural-history studies of particular species. This, then, is his predominant theme, which makes for very engaging writing. Of his 160+ published papers on neotropical insects, something over half are on butterflies, with cicadas and cocoa pollinators also taking large shares of his attention. He is also the author of a book on the cocoa tree (Young 2007).

Young is a hard-core tropical naturalist, and this is a hard-core naturalist-in book set in the Sarapiquí Valley on the atlantic side of Costa Rica. At the time of publication, Young had worked there during part of every year for more than two decades, after two years there right after completing his doctorate. Recall that the ornithologist Alexander Skutch (see review no. 11) did his field work in the El General Valley on the pacific side of the same country. With a continental divide in between, these are two quite different places.

His account opens with a narrative of an early plane trip to Costa Rica and the succeeding road trip to Sarapiquí. The trip went from the airport on the pacific side up to Continental Divide and down onto the atlantic side, where he could see the Sarapiquí River far below. At the confluences of the Sarapiquí and Puerto Viejo Rivers lies La Selva (10°26'N 83°69'W), one of the world's best-known field stations (McDade et al. 1994) and Young's main base. In the large main building Young found plenty of hawk moths, katydids and big beetles coming to the lights at night, with a great many of the big orb weaver *Nephila clavipes* around the building. The forest and its night sounds were nearby. Plainly, he had come to the right place.

Following two introductory chapters are four large chapters on a) morpho butterflies, b) butterfly roosts, c) cicadas, and d) the chemical ecology of butterflies and orchid bees. His accounts are up close and personal, reflecting many happy hours watching their buggy activities. It is all about putting together pieces of a puzzle, with each answer opening up new questions.

A good example of this is provided by the chapter on morpho butterflies, one focus of which is the very widespread *Morpho peleides* (DeVries 1983), known in Trinidad as the emperor butterfly. Young notes frankly that he was attracted to morphos by their beauty, even though he was teased by other biologists for not starting in the fashionable manner with a conceptual problem and only then selecting an appropriate species to test his hypotheses.

He undertook, then, a series of studies to understand the relationship between

morphos and their habitat. He started with the caterpillars and their food plants, a topic beset by a particular difficulty. Even if a butterfly is common, finding its food plant often requires patience and luck and depends on watching adult females. Young came very close to seeing the rare *M. theseus* laying on its food plant, but then it continued to elude him up to the time of writing. *Morpho* is a small genus, yet the larval food plants are quite diverse, which raised the question of what these plants have in common.

It was almost a year before he first saw a female laying eggs, and for a long time he never saw any caterpillars feeding. Did they feed at night? After watching them around the clock, including in persistent drizzle, found that they were not nocturnal but crepuscular, exposing themselves when many predators are least active. And who were their main enemies? How did they defend themselves from attack? They were probably chemically defended, which suggested that the food plants had poison that the caterpillars retained? Might this explain the bright colouration of the adult butterflies, which are the very opposite of cryptic? Endless questions, interspersed with satisfying answers, is the lifeblood of field biology.

Noting that morphos are "attracted to the rot and decay of the rain forest", he lured these and a variety of other butterflies with rotting fruit. Oddly, those attracted to rotting fruit were mostly males. Were they after some particular substance, aside from food, possibly of use in courtship? Another of the questions -- this one still not answered -- that spring from each new answer.

The great irony of field biology is that most of the practitioners are based in the North Temperate Zone, while biodiversity is concentrated in the tropics. As a result, what we know of a great many species derives from short-term studies by biologists who are effectively just down here on a visit. As a museum biologist, unencumbered by the academic year, Young has been able to overcome this limitation through a long series of visits at all times of year.

The effect of this shows in his studies of cicadas. These are large, often abundant insects, and in one sense they are conspicuous on account of the males' persistent noisy calls. On the other hand, they are often hard to see. (As I write this I can hear several of them shrilling in the distance, yet I have never actually seen one here in central Italy.) Furthermore, most of their lives is spent not as adults in the open but as larvae underground. For most of the approximately 2500 species, we do not even know something as basic as the length of the life cycle, although it is assumed usually to be between two and five years. During this long hidden period, the larvae of all species (as far as we know) feed on root sap, whose but we know next to nothing about which trees they utilize. I do not envy Young's bold attempt to dig for them in the underground tangle of the rain forest, nor am I surprised at this lack of success.

He undertook a long-term project in the seasonal emergence patterns of different species. This was facilitated by the fact that species and sex can be identified on the basis of cast skins of emerging larvae. The reader, comfortably seated out of the weather in good light, has to admire Young crawling through understorey, including at night, looking for cicadas as they came up from one world into another and cast the larval cuticle to emerge as adults. By setting emergence

cages on the forest floor, he was also able to trap a great many. His studies allowed him to plot the seasonality of different species and to estimate the average yearly production of the commonest species at about one individual per square meter, with considerable variation among landforms.

During the long underground interlude cicadas are probably vulnerable to very few predators but many fungi and other microorganisms. An emerging adult is not necessarily free of these and may already be doomed by those it has contracted. Young's results allowed him estimate the fraction of such walking dead. This is a critical parameter, as one species may be susceptible to a pathogenic fungus, for example, while another in the same place is not.

Amid these and other major studies is a wonderful little essay on tank bromeliads as a microhabitat for a diversity of animals.

However, *Sarapiquí Chronicle* is not about species, not exactly. It would be overreaching to claim that Young is using the lives of particular species as a way of understanding the ecosystem. (Why did he first turn to the study of morphos? Because they're lovely.) Still, the book is imbued with a sense of the forest as a whole, with much attention to landscape and its details. Tree falls, streams, steep hillsides, tangles of vines, waterfalls, trails, gullies and clearings all have their place and all have meaning in the overall dynamic. At the same time as Young is getting up close and personal with one species, he is concerned with the whole.

A key part of the whole is the constant recycling of matter and energy. "Converting dying or dead tissues into nutrients is what binds the creatures of the tropical rain forest into a functional unit." He thinks that morphos coming to decaying fruit pick up microorganisms and so serve to spread the decay. These gleaming butterflies "symbolize a great deal about the workings of the tropical rain forest."

As all readers of these pages are probably aware, field work or even a nature walk in a tropical forest has its hazards. One may sit down on a tac-tac ant (*Odontomachus*) or, on the atlantic side of Costa Rica, a bullet ant (*Paraponera*) and receive a searing sting. One may step on an army-ant column and get a huge number of ants in one's pants. And of course there are mosquitoes. Their most annoying threat in parts of the neotropics is not from their bite but transmission of the human bot fly, *Dermatobia hominis*. A female bot fly lays an egg on the mosquito, this egg hatches in response to the host animal's warmth and burrows under its skin to grow and develop with rather painful effects on the host. I have never had *D. hominis* in Trinidad & Tobago, where it is apparently uncommon, but like Young I have been the object of its affections in Central America. It is probably something every field biologist should experience, just to have been there, after which one would just as soon leave it in the past.

The local human element is also very much present. Young has always had much affection for the local people, plainly reciprocated. He is pleased to witness the improvements in their lives that come with development, but at a sharp cost. As old roads were improved over the years and new roads opened new territories to farming,

he saw a great deal of expanding deforestation. Costa Rica has perhaps the highest fraction of national territory in the hemisphere under effective environmental protect, and privately-owned La Selva is safe for the foreseeable, but much is being lost.

I have quibbled before (review no. 36) about naturalists who litter a text with terms in the local language for no good reason, and I regret that *Sarapiquí Chronicle* is burdened by this gauche exercise in exoticism. One appreciates that local terms are often necessary where there is no accepted equivalent in the language of the text. However, Young's gratuitous use of such words as *ensalada*, *sopa*, *finca* and *abrazos* -- and, really, a *fábrica de hielo* is just an ice factory -- is out of place in a fine book that you should all read.

References

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