The Shaman's Apprentice

Mark Plotkin talks about Rain Forest Medicines

An Interview with Mark Plotkin, Ph.D., Executive Director, Ethnobiology and Conservation Team, and author of Tales of the Shaman's Apprentice.

by Sean Henahan, Access Excellence

In the early 16th century, European explorers returned home from South America with the dried bark of the cinchona tree (Cinchona officinalis) and reported its use by natives of the New World as a fever cure. This plant contained the alkaloid quinine, to this day the most effective treatment for malaria. This was the first and one of the best known examples of a powerful medicine being developed from a rain forest plant with information provided by indigenous people. Other examples include: cocaine, curare, capsaicin, ipecac, pilocarpine and of course, the well known aphrodisiac, chocolate.

Ijex Morogoyehe, the Jaguar shaman
Photo courtesy M. Plotkin

Now, even as the rain forests are being destroyed by loggers and ranchers, there is a renewed effort to seek out potential medicines with the help of local healers. AE spoke with one of the most active scientists in this field, Mark Plotkin, Ph.D., Executive Director, Ethnobiology and Conservation Team and a Research Associate at the Smithsonian Institution. His book, "Tales of a Shaman's Apprentice" is now in it's 13th printing. The book is widely used as a teaching resource in primary and secondary level science course as well as in college level courses.

In this interview, conducted at the 1996 Access Excellence Summit, Dr. Plotkin gives some background on the field of ethnobotany and describes both the process and romance of seeking out healing substances in the tropical rain forests.

Let's start with the basics. What is ethnobotany?

A: If you ask an ethnobotanist this question you will never get the same answer twice. Whereas, if you ask a chemist what is an oxidation-reduction reaction you should get the same answer each time. Ethnobotany is both an art and a science. Essentially, it is the study of local peoples use of local plants. In my case, as a tropical ethnobotanist, I study the plants and people of the jungle.

How do you conduct your field studies, do you travel with a team?

A: I usually work by myself because I find it easier to get into another culture as the odd man out, while the minute you bring people from your own culture, you are speaking English, are one step removed from the local culture. But in my work as a bioprospector with Shaman Pharmaceuticals I always travel with a physician. Because ethnobotany is so complex you could put together a team of musicologists, chemists, GIS specialists etc. In fact, there does seem to be a move in that direction. But my personal preference is to go alone or with the fewest people possible

Another basic question, what is a shaman?

A: Like the term ethnobotany, there are many definitions of the word shaman. It's the priest, the rabbi, the keeper of tales, the psychopomp, the person who conveys souls to the underworld. Some would define the shaman as the person who stands between our reality and other realities. One thing you learn when working with shamanistic cultures is that other realities, e.g. the spirit world, astral projections into the milky way through the consumption of ayahuasca (the vision vine) and other psychotropic substances are as real to the local peoples as VCRs and mortgages are to us. As an ethnobotanists you learn that just because their reality is something that is incomprehensible to you, you absolutely cannot afford to reject that reality because it doesn't make sense to you.

Unfortunately that's one of the problems of Western education, if you can't understand it or you can't explain it, it is not important, it's not real or its not scientific. My answer to that is, we still don't understand all aspects of how aspirin works in the human body, but it doesn't stop us from taking it. I'm interested in results. And I'm fortunate in the training I had with people like Dr. Schultes that I learned to approach ethnobotany with an open mind, which is probably the single most important thing you can learn as an ethnobotanist.

Dr. Richard Evans Schultes was a pioneer in the field of ethnobotany who was doing field research similar to yours as far back as the 1930s. A lot has changed in Western science since that time, including the technology of how specimens are

analyzed. How do these changes affect what you do?

A: Dr. Schultes started his field work investigating peyote use among the native Americans in Oklahoma, and did some of the seminal work with ayahuasca, the vision vine of the Western Amazon. Even then he said these plants had potential therapeutic uses. Now peyote alkaloids have shown efficacy against penicillin-resistant organisms and ayahuasca is being used to treat cocaine addiction and alcoholism. So in some ways things he was saying 50 years ago are now being validated.

In terms of technology, things have changed by leaps and bounds. In Schultes' time, when he collected something he would dry it and send it back to the lab and maybe it would get there in six months. I can walk through the jungle and slash a tree with my machete and you'll se the sap come out red, then it will turn orange then yellow, the chemical composition is changing before your eyes. Now we carry test kits that allow us to do preliminary analyses right in the rain forest. Working with local scientists, we can set up labs right in the he rain forest. That is the greatest change.

Ironically, when Dr. Schultes would bring these samples back in the 1930's, the pharmaceutical companies were already turning their backs on natural products and he couldn't find anyone to test the stuff. He ended up shipping it to a young Swiss chemist named Albert Hofmann, who among other things discovered LSD.

About 40 years later, Schultes was having dinner with Hofmann, and Schultes wife took some pills out of her purse and Hofmann said "Oh, Viskin, for a heart condition. I'm the person who synthesized Viskin based on extracts from hallucinogenic mushrooms your husband collected in Oaxaca in the 1930's."

Ethnobotany is part ethno (study of cultures) and part botany (study of plants). What are ethnobotanists learning about how the substances are formulated by the shamans?

A: Western medicine has a reductionist tendency, we want that magic bullet, hold the maracas, hold the smoke, give me the alkaloid. Part of the problem with that is if you reach into a plant that contains hundreds of compounds and pick out a specific alkaloid, it doesn't work or it it's toxic or it has side effects. What we are finding is that all of the accouterments, such as the shaman shaking the plant while he dances or praying over it for a day, or insisting that is be collected only on a full moon, have actual biochemical aspects to them which in our reductionist approach we lose sight of.

When we want that one alkaloid to purify and sell to the world, it may turn out that the alkaloid in mixture with 30 other chemicals from three other pants, with possible addition of snake fangs or crushed ants, modify the alkaloid in such a way that makes it more effective and safe to use than using the pure alkaloid.

What part does the scientific method play in all of this?

A: You can't do ethnobotany only by steeping yourself in shamanistic wisdom. You need to learn science in order to do it. The beauty of ethnobotany is that it married the Western scientific approach to the shamanistic approach. You can't say, I don't like physics, I just want to go to the jungle and hang out with the witch doctors and find a cure for herpes. You have to know how to collect data, how to ask questions, know when to ask questions and when not to ask questions and just observe. It is tempting to look at this fantastic stuff in the rain forest and think, wow, these guys have all the answers. They don't. It's also important to realized that Western scientists also do not have all the answers. So, Western science is a tool that allows you to understand shamanistic cultures, take the medicines out of these cultures and put them in a format that will work in the developed world.

Let's face it, the guys in the back of the drug store are not going to be taking off their clothes and dressing in Macaw feathers and penis strings, dancing around and bringing you your medicine. By the same token, if we don't have an appreciation for that shaman we are not going to find those medicines.

What are you looking for on these expeditions? Are you looking for treatments for specific tropical diseases, or antivirals or just whatever the shamans show you?

A: I wear two hats. As a bioprospector I'm interested in finding new medicines. The question is who are the medicines for? There is some overlap. There are some diseases we get that they don't get and vice-versa. Nobody is going to sink 100 million into a new malaria drug, because people who get malaria can't pay for the drug. There are some cases where Western companies provide a benefit. For example, Merck made it's Ivermectin drug, originally a veterinary drug, freely available when it became clear the drug was incredibly effective for African river blindness, a major problem in Africa and parts of the Amazon. Merck made enough money to be able to give the drug away. That's not how it usually works.

Sometimes we just stumble on a new lead. A colleague working in Borneo was treated for some complaint with a certain caterpillar. When asked, the locals said its good for everything. It is used throughout SE Asia. Subsequent laboratory studies indicate that it is very potent against malaria. This is not to say it will make it to the marketplace, but tells us there is value in wisdom of indigenous peoples and there are many leads out there. It may not make it as a treatment for malaria, but it could make it as a treatment for AIDS or for dandruff or as a new fiber, or it may teach us something about pathways of the central nervous system. There is no end to the potential from natural product chemistry.

What do you bring to these indigenous peoples? Do you share modern concepts of science with the shamans?

A: I'm much more of a student than a teacher in that setting. I'm not giving them lectures on viruses and bacteria. But I am struck many times in finding out that they know at least as much about some things, say pollination, as we do. I'm interested in sharing

with them what I've learned, the power of the written word, passing on information to the next generations, in a written culture. These cultures are full of geniuses, as they make their way from pre-literate to literate state, much is lost. We've done some work already, recording some of the plant knowledge in written form in the local language.

Its like when Native American kids have to go to anthropology museums to learn the sacred chants or see the sacred rattles, because the oral tradition has been lost. So my thrust in educating the indigenous peoples is how to record the information they have.

We are also holding lab practicals in the Amazon. When a new crop of shaman's apprentices is learning the uses of medicinal plants, they are assigned to go into the jungle and bring back plants to treat herpes and diarrhea. While they do that, I go into the jungle with the shaman and pick ten more plants for identification by the apprentices. This helps keep the learning process alive.

Describe the idea of reciprocity.

A: Ethnobotany is a selfish science by nature. They have plants that we want, knowledge that we want, and we figure out how do we get it back here. That's how it has been done in the past. That is no longer acceptable. The forests are burning down, the cultures are being obliterated. Now the question is, how can we use the knowledge of these plants to help these people?

If I go to the pharmaceutical company that is making $100 million per year from rosy periwinkle alkaloids (used for cancer treatment) and say, "that came from Madagascar, one of the poorest countries in the world, how about giving one percent of the proceeds back to Madagascar?" they will tell me to take a hike.

However, if I go to the big pharmaceutical company and say "Hey, the market for antivirals is going through the roof, we are looking at hundreds of millions per year. If you will put up some money to help the natives of the Northeast Amazon, money to train local scientists, money for equipment to upgrade labs, and if you will promise a percentage of profits for a trust fund for the local people, we can do some great research." Then the company will be more receptive.

In fact several large pharmaceutical companies are now doing just this kind of work, based on the reciprocity model established by a small company, Shaman Pharmaceuticals.

Another example of reciprocity might include providing polio vaccine and other medicines for diseases the local people have no treatments for. Or we might provide funding for lawyers to assure the peoples' rights to their lands. The National Science Foundation is now sponsoring collaborative efforts between pharmaceutical companies and scientists with the requirement that they look for drugs for leishmaniasis, malaria and other diseases that will benefit native people.

An old Chinese saying is that the first medical text was a cook book. How much is diet a part of the culture of health in the rain forest?

A: Ethnobotany evaluates foods, "tonics", medicine, and industrial uses of plants. In Madagascar there are hundreds of preparations the local people call tonics. A tonic is imply something you take before you get sick. We find that plants have many different uses. For example, pineapple is good to eat, it is also a good meat tenderizer, and it is used for inducing abortions.

The idea of the food pharmacy, and the related study of 'nutriceuticals' is really starting to take off. It's not really my area of expertise. For those with an interest, I recommend the books of J. Duke, as well as those by V. Tyler, Mark Blumenthal and Stephen Foster.

Do you have any suggestions for how teachers can get more immersed in the study of ethnobotany?

A: There are three outfits that run ethnobotany field course which I highly recommend. The School for Field Studies, based outside Boston, Earthwatch also out of Boston, and my favorite, International Expeditions, based in Birmingham , Alabama. They offer ethnobotany workshops for anybody, and also have specific programs for science teachers and also for science students. You can take your students down to the Amazon, work with a shaman, and have a comfortable camp. I sometimes teach a course in this program.

Any suggestions for teaching ethnobotany?

A: A problem I see in science education is that too many science teachers are too successful in squeezing the romance and adventure out of science, and then wonder why kids don't want to go into science. Ethnobotany is the easiest sell to students. As Dr. Schultes said, if you can't make naked people, hallucinogenic plants and the rain forest interesting, you are in the wrong field. It is important to find ways to make science teaching interesting and relevant.

The point is not to make all 17 year old into ethnobotanists. The point is to convey that science education is your ticket to romance and adventure and to try and make the world a better place. It doesn't matter whether you are finding cures for hemophilia at Genentech or tromping through the rain forests of Zaire looking for cures for diabetes, it is all with the same goal in mind.

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