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Shamans

Mark J. Plotkin

Contrary to popular belief, the medicine man, or shaman (usually an accomplished botanist), represents the most ancient profession in the evolution of human culture.

—Dr. Richard Evans Schultes, 1963

He didn't look like a medicine man to me when I first met him.

Having been raised on a steady diet of Tarzan films, I first entered the rain forest expecting to find the medicine man (or "witch doctor") outfitted in full forest regalia: grass skirts, carnivore tooth necklaces, feather headdress. And indeed I did eventually work with shamans wearing even more fantastic costumes (or almost nothing, in some instances) when I entered the jungles of the northeast Amazon in the late 1970s. But as ever-encroaching Western civilization began making its appearance throughout the most remote corners of Amazonia, the young indigenous people lost interest in the old ways. Living in a world where the cultural global icons were people like Bruce Lee, Madonna, and Michael Jordan, the young Indians showed little or no interest in their own traditional cultures. The world of the shamans, with their belief in magic spirit worlds and astral travel, seemed less useful and effective than antibiotics. And if the missionaries or government-sponsored nurses insisted that shamanism was a sham, why pay any attention to a great-grandfather who said otherwise? So I would enter villages to find ancient wizards and plant masters wearing traditional breechcloths and jaguar-tooth necklaces but their descendants dressed in National Basketball Association T-shirts and high-top tennis shoes. In fifteen years of field experience, I had met few shamans who were not at least twice as old (and, more often, thrice as old) as I was.

But this fellow was different.

It was the first day of August, 1995, and I was seated in a cotton hammock under a thatched roof in the western Amazon of Colombia. To get there, I had to fly south from the Andean city of Bogota to the burgeoning frontier town of Florencia, the capital city of the state of Caquetá; then an all-day bus ride past the military checkpoints and through the depressingly deforested landscape. In the 1960s, the national government, with the best of inten-

tions, had encouraged landless peasants to settle on the "fertile" soils of the "uninhabited" Amazon region. The peasants' inability to manage the (admittedly challenging) tropical landscape resulted in forest destruction of staggering proportions. When my mentor Richard Schultes carried out ethnobotanical research here in the 1940s and 1950s, he marveled at "the seemingly limitless forest that stretched unbroken to the far horizon." Schultes returned to the area only a decade later, and writer William Burroughs was there to record the scientist's reaction: "My God, what have they done to the forest.... It's all gone!"

I had traveled to the area at the invitation of a Colombian colleague to participate in an ayahuasca ritual, the vision-vine ceremony conducted by Amazonian shamans for purposes of curing and divination. In South and North America, ayahuasca had attained an enormous and devoted following among certain New Age groups, though none of the practitioners whom I met were Native American shamans. The invitation to the Colombian Amazon seemed to represent the opportunity to participate in a truly traditional ceremony.

On that torrid afternoon, sweat poured off me and a few mosquitoes buzzed hungrily around my ears as I conversed with a fellow who stood leaning against the wooden post from which one end of my hammock was strung. He stood about five-foot-two, the typical height of a forest Indian, though the local campesinos (peasants) were not much taller. He had jet black hair and spoke excellent Spanish, again making it difficult for me to ascertain whether he was a Native American or not (knowing that such a question can be considered extremely rude by both cultures, I would not ask him outright). He took a last, long draught of his warm beer, and asked me if I'd ever been to the jungle before. I replied that I had worked in several South American countries searching for healing plants. A brief smile flickered across his face. "Have you ever participated in a *toma*, an ayahuasca session?" he asked.

"Once," I replied, "in Peru. But I know I have much to learn about the use of the vision vine for curing purposes." A fleeting, Mona Lisa smile played across his face as he stubbed out his cigarette on the dirt floor and said,

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"Then I'll see you at the ceremony tonight." And with that, he wandered off.

The session was held at a small tribal meetinghouse constructed at the edge of the village. I was crestfallen—the poured concrete floor, cinderblock walls, and corrugated aluminum roof seemed the very antithesis of rain forest culture. Where was the traditional *maloca*, the fantastic elongated conical roundhouse that was supposed to be the characteristic indigenous dwelling of the northwest Amazon? I asked a local Ingano fellow who wandered past. "The ayahuasca journey only begins there," he said, pointing with his chin at the structure. "But you will depart very quickly and travel very far away." He smiled and walked on.

The light of the moon on that clear evening was strong enough to illuminate enormous sandstone boulders that marked the edge of a small river running a few hundred meters to the west of the meetinghouse. On the other side of the water began the Andean foothills, home to the only pristine forest in the area. Surrounding the other sides of the meeting hall was nothing but depleted cattle pastures that had harbored magnificent rain forest until a few decades before.

There was an audible murmur from the other Indians as the shaman entered the hut. I marveled at the traditional *cushma*, the sky blue cotton tunic that covered him from shoulders to waist. Wrapped tightly around his thick biceps were dense strings of *shoroshoro* seeds that produced a hissing rattle as he walked. And around his neck was a magnificent necklace of jaguar teeth, the symbol of the shaman in many Amazonian tribes. It was only after admiring the medicine man's finery that I was startled to recognize him as the fellow with whom I had been chatting earlier that afternoon. In his ceremonial garb he looked every inch the great shaman, and I wondered how I could have ever thought otherwise.

The shaman took his seat on a low bench at one end of the hut while the rest of us sat in a circle on the dirt floor at his feet. A chilly breeze blew in from the Andean slopes and I shivered as much from anticipation as from the cold. The night was alive with jungle sounds: crickets buzzed and chirped, frogs croaked and trilled, night jars cooed and whooped. Howler monkeys hooted briefly, indicating that rain would fall the next day.

The shaman dipped a calabash into an earthen pot between his feet. Holding it high over his head with both hands, he mumbled a few incantations before drinking the ayahuasca in a single draught. Wiping his mouth clean with the back of his hand, he refilled the container from the pot, repeated the incantation, and passed it to me.

I looked down at the cup and saw it filled to the brim with a thick reddish brown liquid. I tried to knock it back in one swallow as I had seen the shaman do. The dreadful bitterness of the potion, however, caught me by surprise and I struggled to keep from retching. The Indian seated on the other side of the shaman noted my distress and

passed me a cup of *aguardiente*, a fiery sugar cane brandy whose sweet anise aftertaste erased the disagreeable brackishness of the ayahuasca. I sat and watched the shaman slowly repeat the procedure with everyone in the circle.

All seemed quiet and peaceful until the shaman picked up a handful of *wai-rah sacha* leaves and began to shake them in a fanning motion. The leaves produced a whistling sound not unlike a high wind rushing through the rain forest canopy before a heavy thunderstorm: *shhhhhh-shhhhhh*. He shook it in a slow, rhythmic pattern that proved hypnotic, and I felt as if my brain waves were being organized in a fixed laser like pattern under his control. My body began to relax, and I lay back onto a blanket I had brought to ward off the cold. Glancing around, I noticed that everyone else had also reclined, as if the shaman had willed us to do so. Only the medicine man remained seated upright, and he began a mesmerizing chant: *Hey-yah-hey! Hey-yah-hey!*

What seems simple in retrospect was emotionally enrapturing at the time. And the shaking of the leaves added a layer of complexity and fascination that reverberated through my brain from the right front lobe to the rear left lobe to the rear right lobe to the front left lobe and back again. By now the shaman seemed master of time, space, and my entire being.

I drifted off into a gentle trance. I felt myself lying in tucum palm fiber hammock as comfortable as a giant feather bed. I was floating as in a dream. Looking up I could see a beautiful blue tropical sky with only a few wisps of clouds above me. The hammock was slung between two towering columnar *epena* trees with a distant Amazonian lake below me. At the far edge of the lake I could make out the tiny figure of the shaman in his blue tunic continuing his chant. By the peaceful look on his face that I could just make out at this distance, I could tell that he was deep into his own ayahuasca visions. As I floated there with my hands propped comfortably behind my head, I peacefully reviewed scenes from my life that reenacted themselves for my analysis. Aside from a few mild waves of nausea, all seemed peaceful and calm as I was at one with the cosmos.

Soon the shaman ceased his chant, and I opened my eyes to find myself seated at his feet once more. He filled the calabash, prayed over it, and drank it down. Repeating the first two steps, he then passed the container to me. I drained it but it didn't sit right in my stomach. I tried to ignore the volcanic nausea welling up inside. I promised myself that I would lie back down as soon as everyone had had their turn and began to feel a bit better by focusing all my attention on the shaman. I knew he was able to feel my gaze, and he turned to me. As I did so, the beaded bracelets on his biceps produced a sound of rushing water and turned into tiny glowing amonds that all but obscured my field of vision. As the amonds dissipated, I could see that the shaman was staring at me with a look that combined equal parts of power, disdain, humor, and kindness. I stared at his

pupils growing larger and larger, finally combining into one giant black vortex into which I was sucked. I was underwater now in waters as pitch-black as the Rio Negro. Huge black caimans and anacondas swarmed in the river, menacing me with their size and demeanor, though not attacking me directly. Running out of air, and afraid of the creatures that surrounded me in this aquatic realm, I swam desperately.

I broke the surface and crawled on all fours onto a white sandy beach along the riverbank. Having been underwater too long, I became sick, vomiting and vomiting. I was unable to stop; the life began ebbing from my body. I could not regain my feet and sank face down into the sand, rising up enough only to retch over to the side. I began weeping and begging for help as I continued to fade. Pain racked my body and my head felt as if it had exploded. I tried fighting for my life but no longer had the strength. I had managed to crawl up the riverbank toward the jungle but only made it far enough to pass out in the grass at the edge of the forest. I lay face down. I died.

I don't know how long I lay in the grass, inert, comatose, inanimate. But I could hear something in the back of my head. The shaman continued to chant, deep in the forest in front of me. With a Herculean effort, I managed to raise myself on all fours. I began weeping again because I did not have the strength to go to him. As I sat mired in this predicament, I was frightened by a deep guttural grunt in the jungle in front of me. A jaguar! Now I was weak *and* terrified. But a most extraordinary thing happened: the great cat's roar caused a wave of nausea to well up inside me and I puked as I never had before. Horrible things poured out of me: purple frogs and bloodred snakes and phosphorescent orange scorpions. I thought I was dying a second death, yet when it stopped I felt a bit stronger. So close was the jaguar that I could smell him, yet I was no longer afraid. I stumbled a bit as I followed him into the jungle; I knew that he was leading me toward the shaman. Tripping over roots, I tried to keep pace with the great cat. I momentarily worried about snakes until I realized that nothing could be worse than what I was enduring.

Falling to my knees, I looked up to see the shaman standing over me. He began a peculiar chant that made my head hurt even more until he pressed his palms against my temples and started to squeeze. As he twisted my neck to the right I felt my vertebrae pop; the pain began to abate, ever so slightly. He seated me on a tree trunk and began to dance around me. Taking a swig of an herbal tea, he circled me, spitting the aromatic liquid at me in a cold spray at each of the four cardinal points of the compass. The pain and confusion that racked my body began to subside as he massaged my arms and neck. The sun had started to rise in the east. He sang and rubbed my upper body with leaves, pausing every now and again to cast off some invisible film he seemed to be scraping off me. I managed to croak out a question: "Why did you do this to me?"

He gave a cryptic, Cheshire cat smile and replied: "You have had a glimpse of our world. You have been purged, cleaned, healed. You will never again fear death as you have now died and been reborn."

In a classic treatise on ayahuasca (1979), R. E. Schultes wrote:

There is a magic intoxicant in northwesternmost South America which the Indians believe can free the soul from corporeal confinement, allowing it to wander free and return to the body at will. The soul, thus untrammelled, liberates its owner from the everyday life and introduces him to wondrous realms of what he considers reality and permits him to communicate with his ancestors. The Kechua term for this inebriating drink—ayahuasca ("vine of the soul")—refers to this freeing of the spirit. The plants involved are truly plants of the gods, for their powers are laid to supernatural forces residing in their tissues, and they were the divine gifts to the earliest Indians on earth. The drink employed for prophecy, divination, sorcery, and medical purposes, is so deeply rooted in native mythology and philosophy that there can be no doubt of its great age as part of aboriginal life.

In the northwest Amazon, ayahuasca represents an essential component of most—if not all—shamanic healing ceremonies. Yet there are aspects of these shamanic practices that are used by other cultures around the world, only some of which employ psychotropic plants in their healing rituals. According to Dr. Piers Vitebsky, an authority on Eurasian shamanism, the word "shaman" comes from the language of the Evenk peoples, reindeer herders in Siberia. To the Evenk, a shaman is a person who can "will his or her spirit to leave the body and journey to upper or lower world." Common elements unite the shamanic tradition found on every continent except Antarctica.

Curing disease, preventing famine, controlling the weather, entering trances, fighting evil spirits sent by malevolent shamans of other tribes, traveling up to the spirit world, or conveying souls to the underworld are common denominators among most practitioners of what we consider shamanism. In most groups, the shaman serves as the only tribal member who fully comprehends both the "real" world and the "spirit" world and is therefore responsible for maintaining the balance between the two.

Within the context of the source culture, shamanism is often considered a profoundly holy profession. Unlike in much of the industrialized world, in which healing is essentially divorced from spirituality, the shaman also functions as the priest-rabbi, which greatly augments his or her ability to heal. As Western science finally begins to study and appreciate the therapeutic benefits of spiritual-

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ity, the practice and effectiveness of shamanism becomes not only more comprehensible but also more appreciated.

An integral component of shamanistic healing is what has been called "the placebo effect." Many leaders of the Western medical establishment came of age during the antibiotic revolution, the single greatest therapeutic advance of the mid-twentieth century. However, the development of these drugs also led several generations of physicians to equate (to a large degree) chemistry and healing. Spirituality (its nature and its role in healing) was part of few (if any) medical school curricula. The placebo effect, in which patients recovered because they believed they would, was not in and of itself shunned, but more often noted with bemusement rather than harnessed and put to work.

Shamans, on the other hand, are masters of the placebo effect. Much has been made of the shamanic practice of sucking the "evil darts" (or other foreign substances) out of the patient's body by the healer. References in the literature often refer to it as trickery or sleight of hand, usually in a condescending way. Two aspects, however, are overlooked. First, it often provides the patient some relief, convincing them that they are on the road to recovery and creating a mind-set that facilitates healing. Second, therapeutic compounds, usually in the form of plants, are also employed because the shaman is customarily a master botanist. The shaman's genius as a healer stems from his (or her) ability to combine the spiritual (sucking out evil darts, communing with the forces of nature, etc.) with the chemical (the plants, insects, etc.)

Chief Pierce of Flat Iron, an Oglala Sioux, explained the inextricable link between the holy and the botanical almost a century ago: "From Wakan-Tanka, the Great Mystery, comes all power.... Man knows that all healing plants are given by Wakan-Tanka: therefore they are holy.... The Great Mystery gave to men all things for their food, their clothing, their welfare. And to man he gave also the knowledge how to use these gifts ... how to find the holy healing plants."

The sophisticated botanical knowledge of these "uneducated" shamans astonishes Western researchers. In the rain forest, these healers can sometimes identify almost every single species of tree merely by the smell, appearance, or feel of the bark, a feat no university-trained botanist can accomplish. And their knowledge of the ecology of these plants—when they fruit, when they flower, what pollinates them, what disperses the seeds, what preys on them, what type of soil they prefer—is no less impressive. As nature continues to provide us with a cornucopia of new medicines, these shamans (in the rain forest and elsewhere) will prove to be the ultimate sources of knowledge about which species offer therapeutic promise and how they might best be employed.

Almost every plant species that has been put to use by Western medicine was originally discovered and utilized by indigenous cultures. Despite the fact that a single shaman may know and employ over a hundred species for

medicinal purposes, or that a single tribe (which may have several shamans) may know and utilize several hundred species for medical purposes, few of the world's remaining tribal peoples have been the subject of comprehensive ethnobotanical/ethnomedical studies. Yet the more we study, the more we learn how little we know about how much they know.

Ayahuasca, the vision vine, represents a classic example. The early accounts of ayahuasca focused on a single species of vine (*Banisteriopsis caapi*). Subsequent research has revealed that other plants added to the mixture determine the actual type, intensity, and duration of the hallucinations—proving the sophistication of these shamans as both botanists and chemists. For example, leaves of a species of the *Psychotria* shrub of the coffee family are often added to the ayahuasca mixture. These leaves contain chemicals called tryptamines that induce hallucinations. The compounds, however, are inactive when taken orally unless activated by the presence of another type of chemical known as monoamine oxidase inhibitors. The psychotropic compounds in the ayahuasca vine not only induce hallucinations but also function as monoamine oxidase inhibitors. The result: a brew much more potent than one prepared from either species.

Furthermore, the shamans often have the remarkable ability to distinguish between, describe, and make use of distinct healing and/or chemical properties of different parts of the same plant. A shaman, for example, will note that bark from the upper stem of the ayahuasca vine may cause visions of jaguars, while the root bark results in scenes of anacondas. Schultes wrote:

Among the Tukano of the Colombian Vaupes, for example, six "kinds" of Ayahuasca or Kahi are recognized.... *Kahi riama*, the strongest, produces auditory hallucinations and announces future events. It is said to cause death if improperly employed. The second strongest, *Mene-kahi-ma*, reputedly causes visions of green snakes.... These two "kinds" may not belong to *Banisteriopsis* or even to the family Malpighiaceae. The third in strength is called *Suana-kahi-ma* ("Kahi of the red jaguar"), producing visions in red. *Kahi-vai Bucura-rijoma* ("Kahi of the monkey head") causes monkeys to hallucinate and howl.... All of these "kinds" are referable probably to *Banisteriopsis caapi* [e.g., what to Western botanists is all the same species].

Hallucinogens, while an integral part of shamanic healing practices in the western Amazon, still represent only a very small portion of plants employed for therapeutic purposes. As we have seen before, natural products employed for a particular purpose in one culture may offer promise of a different use in our own culture. In the case of ayahuasca, for example, Western-trained physicians in both Brazil and Peru are using the vine as an experimental treatment for chronic alcoholism and crack addiction, with promising results.

An example of using one therapeutic plant for different purposes in a different culture comes to us from the tropical forests of American Samoa in the South Pacific, where the herbal healers—the *taulasea*—are primarily women. These herbalists know 200 species of plants and recognize 180 types of diseases. Ethnobotanist Dr. Paul Cox of the National Tropical Botanical Garden had been working with this culture for over a decade when, in 1984, a *taulasea* named Epenesa Mauigoa showed him an herbal treatment for acute hepatitis prepared from the inner bark of a local species of rubber tree. Cox was particularly intrigued when she insisted that only one “variety” of the tree could be employed when, in Western botanical terms, both varieties were the same species. Investigation of the plant in the laboratories of the National Cancer Institute outside Washington, D.C., yielded a new molecule that the scientists named prostratin. This compound belongs to a class of chemicals known as phorbols, many of which cause tumors in the human body. Intriguingly, however, prostratin not only inhibited the formation of tumors but, in the test tube, prevented cells from becoming infected by the HIV-1 virus and extended the life of infected cells! Of course, it is a long way from the jungle to the laboratory and, in some ways, an even longer trail from the test tube to the pharmacy. Nonetheless, research on prostratin continues. And it is precisely these finds that validate indigenous wisdom in Western eyes, leading to pharmaceutical companies’ increased interest in shamanic wisdom.

Scientists continue to be astonished at the breadth and depth of indigenous wisdom. Ethnobotanists at the New York Botanical Garden recently conducted a classic comparative study of indigenous ethnobotanical sagacity in the Amazon Basin. Working with the Chacobo tribe in Bolivia, Dr. Brian Boom found they used 95 percent of the local tree species. His colleague Dr. Bill Balee learned that the Tembe peoples of Brazil employed 61.3 percent of local trees while the Ka’apoor tribe used 76.8 percent.

The effectiveness of this wisdom is being validated in the laboratory. Dr. Bernard Ortiz de Montellano of Wayne State University sifted through accounts of the ethnomedicine of the Aztec peoples of ancient Mexico and was able to identify 118 plants that they employed as medicines. When he subjected them to laboratory examination, he found that almost 85 percent were at least somewhat efficacious, strikingly similar to data gathered by Paul Cox and his colleagues in Polynesia. The joint Swedish-American research team tested the Samoan medicinal plants in the laboratory. The results: 86 percent demonstrated significant pharmacological activity.

Of course, new mechanisms must be developed to protect the intellectual property rights of these local peoples and local governments: fortunately, the colonial/neocolonial model of “Let’s take what we need of local plants and wisdom and cart it off to the marketplace” is completely unacceptable as we enter the twenty-first century. New economic models and legal frameworks are being devised and put in

place to share benefits from these new discoveries and avoid the “rape and run” approach to commercializing natural resources that characterized much of human history.

Nonetheless, an enormous body of shamanic knowledge remains untested (or untestable) in the laboratory because we cannot (or have not yet been able to) understand it outside of the context of indigenous culture. The Tirio Indians of the northeast Amazon, for example, employ a series of plants to treat ailments that (they claim) are caused by the breaking of hunting taboos. One ancient medicine man showed me a plant that he explained was “boiled into a tea and given to an infant who was crying at night because he couldn’t sleep because his father had killed a giant anteater.” Another species was used for the same purpose, except that the child suffered insomnia because the father had killed a tapir. Most Westerners would regard these ailments as imaginary. A much more effective utilitarian approach, instead of dismissing this seemingly incomprehensible claim, would be to investigate whether the plant potion contained compounds that might serve as the basis for a safe, effective, nonaddictive sleeping pill—a potion that Western medicine has been unable to devise.

In our culture, we have been taught that our system of medicine (and other things!) is the most advanced, the most successful, the most sophisticated, and so on—a valid statement, in many regards. This “lesson,” however, often results in a cultural arrogance that underestimates or even denigrates other systems, either because they seem “primitive” and/or because we don’t understand what they are trying to tell or teach us. In his brilliant book *Witchdoctors and Psychiatrists*, Dr. E. Fuller Torrey wrote: “A psychiatrist who tells an illiterate African that his phobia is related to fear of failure and a witch doctor who tells an American tourist that his phobia is related to possession by an ancestral spirit will be met by equally blank stares.”

Our culture teaches us to “cut to the chase,” to get that one plant or (better yet) one molecule that is responsible for the shaman’s cure—and you can spare us the magic rattle and the sacred smoke, thank you very much. Some of these cures only work within their cultural context, be it a treatment for possession by an ancestral spirit, a cure that involves ceremony, ritual, and healing plants, or a mundane remedy that simply requires rubbing a few crushed leaves on the afflicted area. Clearly, some of these treatments harness powerful chemicals that can be used effectively far from their site of origin and within a Western (or other) clinical context.

The Western tendency to adopt a reductionist approach is not just an interest in getting to the basic chemistry (preferably a single molecule that is responsible for the therapeutic effect) or merely a question of being in a hurry—it is also a question of safety and economics. It has proven difficult, if not impossible, to patent a complex plant extract that may contain a multitude of chemicals, even if proven safe and effective. Still, our cultural pro-

pensity to reduce everything to the simplest common denominator can cause us to underestimate or even deny the shaman's healing wisdom. A recent example: two ethnobotanists were intrigued by a West African medicine man who appeared to have an extremely potent potion for reducing blood-sugar levels in diabetic patients. They asked whether he might be willing to provide them with the plants he used so they could take them back to the United States for testing. The shaman readily agreed and gave the scientists three different plants. In the lab, they tested species A, which had no effect; they tried species B, which had no effect. They tested species C, still with no positive results. Finally, they boiled them all together and analyzed the resulting potion. Nothing! A year later, back in Africa, they returned to the medicine man. "Your potion doesn't seem to work," said one of the ethnobotanists to the witch doctor.

"What do you mean?" he replied. "You saw me give it to my patients, and measured their blood-sugar levels with your instruments. You yourself told me that the blood-sugar level went down. How could you now claim it doesn't work?"

The ethnobotanists then asked the medicine man if he would be willing to prepare a batch of the potion they could then take with them. He agreed. The shaman boiled water in a big aluminum pot over a wood fire. He added the first plant species, then the second, then the third. Just as he was preparing to take the pot off the fire, he reached into a wet muslin sack, extracted a crab, and dropped it in the pot.

"What is that?" asked one of the ethnobotanists.

"What does it look like?" replied the shaman. "It is a crab!"

"Yeah, I know," responded the scientist. "But why did you add it to the pot? You didn't tell us that was part of the recipe."

The shaman smiled. "Look," he said, "you asked me if I would give you the plants used to make the potion. I did!"

The scientists took the potion back to the United States, found it to be effective at lowering blood sugar, and it is currently being investigated in the lab.

Of course, a shaman's healing wizardry does not necessarily entail the use of nature's chemistry. Dr. Charles Limbach, an American physician with extensive experience in Latin America, recently related an intriguing encounter. A friend of his, also a physician, had returned from a sojourn in the Oriente, the Amazonian territory of eastern Ecuador:

My friend was visiting a missionary acquaintance who was working with the Shuar people, also called the Jivaro, who were once renowned for their then common practice of removing and then shrinking the heads of their enemies. He was sitting on the porch of the missionary's house and chatting with his fellow American

and an elderly Shuar who had a reputation as a powerful shaman. While they were conversing, another Shuar arrived and asked the missionary for help with a botfly larva (through a complicated process, botfly eggs enter the human body and hatch into larvae which feed on human flesh. The standard western treatment is to cut them out with a scalpel). The missionary, who had received some medical training, ducked into the house and came back out with alcohol, cotton swabs, a bandage, and a scalpel. The Shuar shaman asked what he planned to do with all that equipment. The American replied that he would cut out the larva. The shaman smiled, and said he would handle it. He sat the patient in a hammock, leaned over the arm with the botfly and began to sing. Within minutes, the botfly larva emerged from the man's arm, fell onto the floor of the porch, and the shaman crushed it beneath his bare foot.

Neither Limbach nor his colleague was able to explain the incident. Had the shaman sung at a particular frequency maddening to the insect, as opera singers are able to hit a note that can shatter glass? Or did the shaman surreptitiously exhale tobacco smoke into the larva's breathing hole, causing it to crawl out in search of air? In some ways, this situation is analogous to the use of aspirin for most of the past century: even though we didn't fully understand how it functioned in the human body until relatively recently, we nonetheless used the drug because it was safe, effective, and painless.

The extraordinary antiquity of shamanistic practices is well documented. Southern France has long been famous for a series of caves, the walls of which are covered with the oldest known art of human origin. Several years ago, the most ancient of all was discovered not far from other subterranean caverns that had been known and studied for over a century. This cave, christened Chauvet, contained art that was noticeably similar to that found in the earlier discoveries, with portrayals of large mammals like the cave bear and woolly rhinoceros that flourished in Europe at that time. On a hanging rock near the entrance, however, is a striking portrait of a composite creature, the bottom half of which is a human, the upper half a bison. Here, in the earliest known example of human art ever discovered, we see the portrait of the shaman.

Chauvet Cave has been dated at well over thirty thousand years old, which means that this art was created twenty-five thousand years before the more familiar paintings and sculpture of "ancient" Egypt. Similar half-man half-beast motifs are found in many caverns painted and carved in the distant past. The best known and most thoroughly studied of the caves is at Lascaux; a man in a bird mask lies next to a staff with a bird on the end of it. The bird that—unlike most humans—can soar over the forest and through the heavens represents the symbol

the shaman in many cultures. Joseph Campbell suggested that this particular figure lies "rapt in a shamanistic trance" and that "in that remote period of our species the arts of the wizard, shaman, or magician were already well developed."

The Trois Frères sanctuary dates from fourteen thousand years ago and harbors what is probably the most famous prehistoric painting of a shaman: the Dancing Sorcerer. The magnificent portrait features a male creature composed of the parts of many different animals. It has antlers on its head, yet dances on its hind legs in a clearly human manner. Adding further credence that this is a human rather than an animal is the headdress of caribou antlers worn in sacred dances by shamans of Arctic and subarctic tribes, much as Indian medicine men on the Great Plains wore headdresses of buffalo horns.

The antiquity of healing-plant knowledge is assumed to be equally great. A Neanderthal grave at Shanidar in Iraq, near the Iran border, held seven species of plants carefully buried around the corpse. People living in the region today use five of those seven species for medicinal purposes. At Monte Verde in southern Chile, recently concluded to be the site of the earliest known habitation in South America, researchers found what had been gardens of medicinal plants. A ubiquitous species was an evergreen shrub known locally as *boldo*, and widely used as a diuretic, a laxative, and a treatment for liver problems. Laboratory research has proven that this plant is an effective diuretic; investigations in Germany have led to its official approval for the treatment of stomach and intestinal cramps as well as dyspepsia.

The question then arises as to the source of ethnomedical wisdom: simply stated, how did the shamans learn which plants had healing properties? Trial and error undoubtedly played a central role. But in its place like the Amazon, with eighty thousand species of flowering plants (not to mention tens of millions of other organisms), how would the healers know not only which plant to employ but which part of the plant to use? And at what dosage? How did the shaman learn at which phase of the moon these plants should be collected? Even more curious is how they devised such clever recipes that sometimes consist of over twenty components. In the instance of the diabetes case history presented in the introduction, the shaman made the potion from four plants. What would be the odds of recreating that potion using the correct dosage, species, and particular plant parts from a forest of eighty thousand species if we tried to do it based on random collections, which has been the major approach used by most pharmaceutical companies up to the present date?

One key as to how the shamans and others have found and utilized species with therapeutic compounds is the taste test. The concept of "bitter" exists in most cultures, and bitterness often indicates the presence of alkaloids, which represent the single most important chemical com-

ponents of modern medicine. Quinine and ayahuasca are some of the bitterest substances known.

Yet another clue for the shamans also serves as a lead for Western scientists like David Newman or William Fenical, who look for new medicines from marine organisms: color equals chemistry. If a plant (particularly a tree sap) has a peculiar color, it may well contain interesting chemicals. The clear red sap of the *Virola* tree led shamans of the Yanomami people of Venezuela to develop it into a powerful hallucinogenic snuff, just as the brilliant orange sap of the *Vismia* bush of Suriname led the Tirio shamans to use it as an effective treatment for fungal infections of the skin. The milky red sap of the *Croton* tree led Shuar shamans to employ it as a safe and effective agent for healing wounds.

Another key is the so-called doctrine of signatures. Simply stated, if a plant (or plant part) looks like something, it is somehow good for that something. In other words, because a walnut looks like a brain, it must be good for diseases afflicting the brain (a common belief in medieval Europe). As ludicrous as it sounds, the doctrine has yielded at least one medicinal compound in wide use until recently. The Vedas of ancient India were written about four thousand years ago and included a remedy for snakebite from the snakeroot plant, so named because the twisted roots resembled squirming serpents. Tested in the laboratory in the 1950s, it was found ineffective for countering the toxic effects of the snake venom. One of the problems associated with snakebite, however, is that the trauma of being bitten causes the heart to beat faster, thus pumping the poison throughout the system. What the alkaloid in snakeroot does do is slow down the heart-beat and, because of this, was developed into one of the first effective tranquilizers used by Western medicine.

Once again, this demonstrates why we should not reject ideas, gleaned from other medical systems without first investigating them. The Aztecs valued a Mexican species of magnolia with a heart-shaped fruit as a treatment for cardiac problems. Recent investigations in the lab have found that this fruit contains compounds with a digitalis-like activity.

The most intriguing source of ideas for which plants can be utilized medicinally is perhaps the most difficult concept for Westerners to accept: a shaman's dreams. After a ten-year hiatus, in 1995 I returned to the village of Tepoe in Suriname while searching for diabetes treatments and sought out the great shaman Mahshewah. The old healer, though he appeared pleased at my return, said that he was unable to help me. "I'm sorry," he said, "but I don't recall ever seeing that disease so I can't tell you what plant might be useful for treating it."

Six days later, Mahshewah summoned me to his hut, where he related a most interesting occurrence: "This afternoon I was sleeping in my hammock and I had a dream. And in this dream I saw a tree, and the bark of this tree may help to treat this disease that you said is killing your people. If you canoe down the river for about an

hour and a half, you will find a trail on the west bank. If you walk up this trail for about an hour, you will find an enormous tree with yellowish peeling bark. That is the species whose bark may help your people."

I followed his directions down the river and found the trail. I followed his directions up the trail and found the tree. Mahshewah's legs have been paralyzed since he was born. When I asked the other Indians if the old medicine man had ever been up that trail, they told me unequivocally that he had not. How does one explain this through the prism of Western science? I gathered a few scrapings of the bark because my guide said it was a rare and sacred tree that could not be collected in bulk. We still do not know if it might prove efficacious in treating the disease.

The question as to whether something useful can be "discovered" through dreams is one that many people in our society would be inclined to answer negatively. Yet how many remember the discovery of the structure of benzene? Friedrich August Kekulé von Stradowitz, one of the greatest chemists of nineteenth-century Europe, simply could not figure out the structure of the molecule of this enormously important industrial solvent. Quitting in frustration, he decided to turn in for the night and tackle the problem again in the morning. Soon he was dreaming and in his dream he saw several snakes. One of the reptiles began chasing another and then the others joined in, forming a circle. Kekule woke up with the solution to the problem: benzene is a ring! When British scientists dream the answer to perplexing problems, they may become famous, rich, well-respected, and sometimes offered a knighthood. But when Amazonian shamans do it, we dismiss it as "unscientific."

Mother Nature herself is a great teacher. In the words of the gifted natural history writer Sy Montgomery: "In other, older cultures than our own, in which people live closer to the earth, humans do not look down on animals from an imaginary pinnacle. Life is not divided between animals and people, nonhuman and human: life is a continuum, interactive, interdependent. Humans and animals are considered companions and cop layers in the drama of life. Animals' lives, their motives and thoughts and feelings, deserve human attention and respect; dismissing their importance is a grave error."

Characteristic among indigenous cultures of North America was the famous "vision quest," in which a young man (often an apprentice shaman) would go into the wilderness to pray and fast, fast and pray. After several days, he would be visited by visions, often in the form of an animal that would, in the words of the great Inuit shaman Igjugarjuk, "open the mind of a man to all that is hidden to others." As a result of this vision quest, the boy often ended up with a totemic spirit, an animal that served as his personal symbol or protector. The shaman may conclude the process with "animal familiars" or "power animals"—an animal or animals that help him learn and heal. So close is the identification with the animal that the shaman may be perceived as part animal, an

essential component of sacred tribal dances around the world and the ancient cave paintings from Europe. In some cultures, the shamans believe that they actually become the animals, as do the Tirio shamans in the northeast Amazon, who claim the ability to turn into jaguars and roam the jungle at night. Among many tribes, the shaman becomes a bird, omniscient by virtue of his or her ability to look down from above and see things invisible to all others. In the case of the Navajo, as we saw in the last chapter, the bear is the medicinal plant master who taught the Indians about *Ligusticum* and all other healing plants.

The realization that much of shamanic knowledge is based on animals' use of plants is relatively new to Western scientific thought. As we saw in the previous chapter, many healing plants employed by tribes people have probably been learned from local animals. The legends of these cultures often feature sagas explaining how people first learned of useful plants (agricultural and medicinal) from forest creatures. In these cases, animals are, perhaps both metaphorically and literally, the bringers of wisdom.

Joseph Campbell suggested that true shamanism is the religion of the original hunting societies; with the advent of agriculture, cultures became more communally oriented and their religious beliefs changed. While this argument is somewhat hypothetical, what is more certain is that the manifestations of shamanistic religion have been seen as a threat by other organized religions, particularly Christianity, which saw itself in direct competition with belief systems that offered extraordinary experiences to the adherents: "The white goes into his church and talks about Jesus; the Indian walks into his teepee and talks about Jesus," wrote one anthropologist, describing peyote rituals among Native American peoples. But consider the passage from the Book of Job: "But ask now the beasts and they shall teach thee; and the fowls of the air, they shall teach thee."

The supreme irony of our suppression of, or disregard for, shamanic religions or other medical practices that rely on natural products is not only the extraordinary therapeutic gifts they have already provided us, but the undeniable need for more of these healing potions to cure "incurable" diseases. The witches of medieval Europe, burned at the stake for their heretical beliefs, were shamans and/or herbalists of their day. It was their pharmacopeia that gave us aspirin and digitalis. As we had paid closer attention to their custom of applying moldy bread to wounds, we might have discovered penicillin several centuries earlier than Alexander Fleming's research in the 1920s.

A similar situation transpired in our own country. We have all heard about how Squanto and his fellow Indians taught the Pilgrims how to farm the land, but what did the settlers use for medicine? Native American medicinal plants cured the Pilgrims' ailments just as Native American crops filled the European bellies. And prior to the arrival of these Europeans, some of the original Ame-

had learned that mold could hasten the healing of wounds and local foxglove could treat certain heart problems. Native American healers independently invented syringes and enemas, developed a local anesthetic, and conducted head surgery. Every medicinal plant valued by the settlers was taught to them by local tribespeople. Some of these species entered into commercial, over-the-counter drugs: the yellow color of Murine eyedrops was until recently due to alkaloids extracted from the goldenseal herb. Others, like cascara sagrada (a common ingredient in many laxatives), are sold in many pharmacies. And new medicines are still being developed from plants originally employed by Native Americans: extracts of American bloodroot now serve as an antiplaque agent in toothpastes.

Even some of the most troublesome medical problems are being treated by ancient Indian medicines. Benign prostate enlargement (BPH) afflicts tens of thousands of American men. The fruits of the saw palmetto, a scrubby palm from the southeastern United States, have proven extremely effective at reducing the symptoms: as effective, it has been claimed, as a medicine marketed by Merck. Neither nature nor the shaman has all the answers to the ills that plague us, but both have some—I would say many—of these answers. Urgently needed is an approach that is more humble, more spiritual, more environmental, and more open-minded. The great anthropologist Weston LaBarre, who collaborated with R. E. Schultes on his early peyote research, wrote of the South American Indian:

As scientists we cannot afford the luxury of an ethnocentric snobbery which assumes *a priori* that primitive cultures have nothing whatsoever to contribute to civilization. Our civilization is, in fact, a compendium of such borrowings, and it is a demonstrable error to believe that contacts of "higher" and "lower" cultures show benefits flowing exclusively in one direction. Indeed, a good case could probably be made that in the long run it is the "higher" culture which benefits the more through being enriched, while the "lower" culture not uncommonly disappears entirely as a result of the contact.

Twenty years ago, I stumbled across the most moving account of this ongoing tragedy that I have ever seen—and it was all because of an earache.

A common and painful ailment suffered by researchers working in the rain forest is fungal infection of the ear. The hot and wet environment of the tropics turns eardrums into petri dishes ripe for the cultivation of fungal invaders. When I began working in the Amazon in the late 1970s, I developed these infections on such a regular basis that before departing I would schedule appointments to have my ears examined at the university clinic upon my return to the States. I quickly learned that if I mentioned my occupation to the physician on duty, she or he would often tell me at great length that ethnobotany was what they really wanted to do with their careers but that they had student loans, a mortgage, a family, and so on, which was why they had been unable to pursue this dream.

I vividly remember going into the clinic with a terrible earache after an expedition to the jungles of southern Venezuela. After examining my ear, attending physician Dr. Jonathan Strongin asked if I had any idea where I might have picked up such a peculiar fungus. "Sure," I replied, "I've just returned from South America."

He asked what I had been doing south of the border, and I gave a distinctly noncommittal reply. He said, "You know, I lived with Indians in the Peruvian Amazon for several years while I was doing my Ph.D. in anthropology, which is how I became interested in healing."

Intrigued, I made a mental note of his name, looked up his dissertation, and found one of the most poignant statements ever recorded on the inextricable interrelationship between people, plants, healing, and belief:

Since the time of their initial contact, the missionaries have openly discouraged the [shamans], viewing them as AntiChrists.... [Another anthropologist reported] that in the Shima region there was a powerful [shaman] who had to abandon his craft because he felt he no longer had the support of the Machiguenga people in his area. This shaman used ayahuasca to take the form of a bird to travel far and wide at a great height to discern the cause of illness. However, he felt that because the missionaries had so successfully eroded the traditional faith of his people, he could no longer continue to cure. For without the faith of the population, while in the avian form he would not be able to return to his body and [would] crash in the forest far from home ...

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