

Ethnobiology

Elizabeth Anne Olson
John Richard Stepp *Editors*

Plants and Health

New Perspectives on the Health-
Environment-Plant Nexus

 Springer

Ethnobiology

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Editors

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on the Health-Environment-Plant Nexus

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Preface

The case studies collected here are concerned with the theme of plants, humans, and health from anthropological perspectives. The genesis for this volume was a session entitled, “Plants & Health: Producing Anthropologies at the Human-Environment-Health Nexus,” at the American Anthropological Association annual meeting held in Washington D.C. in November 2014. During the session, and spilling into the rest of the afternoon, we engaged in lengthy conversations about the connections between our ethnographic research and the importance of this type of research at this moment in time. Since the conference, we have toiled with these topics further, pushed deeper into our own research, grappled with various theoretical perspectives, refined the case studies (and even added some new ones).

This volume showcases current ethnographic accounts of the ways that people use plants to promote human health and well-being. The goal in this volume is to highlight some contemporary examples of how plants are central to various aspects of healthy environments and healthy minds and bodies. The authors employ diverse analytic frameworks, including interpretive and constructivist, political-ecological, systems theory, phenomenological, and critical studies of the human-environment-state interactions. The case studies represent a wide range have of geographies and contemplate a range of the health appeals that plants and herbs.

The volume begins by considering how plants may intrinsically be “healthful” and the notion that ecosystem health may be a literal concept deployed in contemporary efforts to increase awareness of environmental degradation. The characteristics of specific plant species, and the role of specific species in ecosystems, are significant for socially-attuned conservation. Thinking more about the relationships between the individual and the plants, the production of herbal and plant-based remedies may be therapeutic for the producer who has the advantages of experiencing the plants through the various stages of product production. An example of a woman who produces medicinal plant remedies highlights the apparent embodiment of the healthful attributes of the plant-based remedies she makes and sells. The volume continues with the exploration of the ways in which medically pluralistic societies demonstrate the entanglements of state and citizen. In other examples, we

find that profit-driven models of extraction and production of medicinal plant products can be related to health sovereignty for the state and perhaps also for individuals. Several of the chapters in this volume work to unpack the epistemologies of medicinal plant knowledge and the globalization of medicinal plant knowledge. The translocal and global networks of medicinal plant knowledge are pivotal to productions of medicinal and herbal plant remedies that are used by people in all varieties of societies and cultural groups. Humans produce health through various means and interact with our environments, especially plants, in order to promote health.

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About the Editors

Elizabeth Anne Olson is an assistant professor of anthropology at Southern Utah University in Cedar City, Utah. Her anthropological research has looked at traditional and non-biomedical healing systems in Mexico, Utah, the Bolivian Amazon, and Western Europe. Her work with traditional healing systems has led to a focus on the intersections among health, environments, economic markets, and community development. Her past work has focused on indigenous medicinal plant knowledge, and she is currently studying the ways that globalization influences the transmission of medicinal plant knowledge and use. Dr. Olson's current research concerns the globalization of medicinal plant knowledge and the relationships between indigenous, professional, and lay uses of medicinal plant knowledge across various ethnomedical systems. Her work connects to topics including the health sovereignty movement, as well as other social justice and community-based conservation initiatives. She frequently collaborates with community-based social justice projects in Mexico and the USA. Dr. Olson serves on the Board of Directors of the Culture and Agriculture section of the American Anthropological Association and is the Conference & Awards Coordinator for the Society of Ethnobiology. She is co-editor along with Cynthia Fowler of the monograph series *Global Change/Global Health* for the University of Arizona Press.

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Traditional and Nontraditional Medicine in a Yucatec Maya Community

Eugene N. Anderson

Abstract Traditional Yucatec Maya herbal medicine survives in eastern Quintana Roo. Here, both *hmeen* (curers/ritualists) and ordinary people continue to use traditional herbs, but fewer species over time and with more and more introduction not only of biomedical cures but also of folk cures from other parts of Mexico. The result is a free, open, dynamic system in which individuals choose what seems to work and what seems to offer hope.

Introduction

The Maya of the Yucatan Peninsula maintain an herbal medical tradition that is demonstrably very old. The people in question are the original “Maya,” those who call themselves *Maayah*. With the extension of that word to cover the whole language phylum, the language in question is now known as Yucatec (a Spanish word; the pseudo-Indigenous form “Yukatek” is incorrect). They were the builders of the northern lowlands cities such as Chichen Itza. How far south they extended into the central lowlands in Classic times is unknown; somewhere in the southern peninsula they gave way to their linguistic relatives the Cholans.

Depictions in pre-Columbian art show some of the plants now used medicinally, and show rituals that may include curing ones (personal observation of art in many sites and museums). Documents from the Spanish Conquest onward speak of it and show that the major herbs have been used at least since that time. These documents include very good dictionaries, notably the quite early *Calepino de Motul* (Arzápalo Marín 1996, orig. ca. 1600). Other sources include the astonishing *Ritual of the Bacabs* (Arzápalo Marín 1987; Roys 1965), an early Maya text in Spanish letters that details a series of rituals involving mystical and religious references to many animals and plants, several of them now used in curing; also the Book of the Jew, an eighteenth-century herbal-medical text (Barrera Marin and Barrera Vasquez 1983). With the modern age came extensive ethnobotanical research on the Maya, beginning with Ralph Roys’ classic *Ethno-Botany*

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of the Maya (1976 [1931]) and continuing through the foundational work of Alfredo Barrera Vásquez and his son Alfredo Barrera Marín (Barrera Marín et al. 1976) to subsequent research climaxing in the definitive work of Arellano et al., listing 2166 species (Arellano Rodriguez et al. 2003).

Maya medicine can be divided into naturalistic and personalistic theories (Foster 1994), but the division is fuzzy. Naturalistic medicine, in George Foster's terms, involves causation by natural things: insect stings, sunstroke, thorn stabs, animal bites, and the like. Personalistic causation involves active cause by a god, evil spirit, witch, or other entity working ill. The Maya are not always clear about causation. More, their major causal category is "wind," *ik'*, which can be either a normal natural wind or an evil spirit that appears only as a rush of air, and such spirits can be mindlessly harmful or mindfully malevolent.

My research was carried out between 1989 and 2007 in eastern Quintana Roo, primarily in Chunhuhub but also in the nearby towns of Polyuc, Xpichil, Presidente Juarez, Margaritas, and others. These are agricultural towns, growing maize, vegetables, and fruit, and raising cattle and small livestock. Agriculture was an intensive form of the classic *milpa* (swidden) system, with maize the staple food and a vast variety of plants and animals either raised in the fields or taken in the highly managed forests. The area was at that time quite prosperous by rural Mexican standards, and lands were still held collectively under the *ejido* system. This has eroded since 2000, and private property is now general (Anderson and Anderson 2012). A national law passed in 1993 allowed ejidos to privatize, but those in central Quintana Roo were slow to do it; Chunhuhub did not even begin to break up its ejido landholding system until 2005, and after that privatization proceeded gradually.

My research focused on ethnobiology, including agriculture, forest management, and traditional medicine (Anderson 2003, 2005, 2010a, 2010b, 2011, 2013; Anderson and Medina Tzuc 2005). In addition to widespread questioning of people from all walks of life, I worked intensively with two *hmeen* (traditional healers and ritual specialists), Don Marcos Puc Batab of Presidente Juarez and Don José Cauich Canul of Polyuc. They were very different individuals. Don Marcos was extremely traditional, essentially monolingual in Maya, and also a darkly saturnine person. Don José was friendly, outgoing, eager to teach, fluent in Spanish, and highly eclectic in his curing.

In and around Chunhuhub, I recorded 350 herbal substances (almost all plants, but a few animals) used medicinally. This compares well with the 360 recorded by Ankli (Ankli 2000; Ankli et al. 1999a, 1999b) and with the few hundred medicinally used that are listed in Arellano Rodriguez et al. (2003).

Dimensions of Yucatec Maya Medicine

Yucatec Maya medicine is well described. Robert Redfield and Margaret Park Redfield recorded an astonishing amount of data about it in the 1920s and on through the 1950s. In particular, their work in the town of Dzitas is a neglected gem

of ethnography and ethnology—one of the finest medical ethnographies of all time, unfortunately buried in an obscure report (Redfield and Redfield 1940).

More recently, Hernán García et al. (1999) have produced a fascinating synthesis of a relatively elite, intellectualized form of Yucatec Maya medicine and compared it with Chinese medicine. The Quintana Roo Maya theory of sicknesses and medical problems is fairly simple by comparison to that described in their work. (The following is summarized from Anderson 2003; see documentation and references there.) The most obvious are direct naturalistic problems that anyone can identify as to cause and nature: stings, bites, rashes, minor injuries, broken bones, childbirth, and the like. Then come the many diseases caused by imbalance of hot and cold. This is an indigenous medical theory that has been influenced by Renaissance Spanish medical theory introduced shortly after the Conquest (Foster 1994).

Both theories built on the recognition that extremes of environmental heat and cold can damage the body, and that extremes of bodily heat (fever) and cold (chills, hypothermia) are signs of sickness. Both made the logical connection, especially given the frequent observation that too much exposure to cold is very often followed by chills or fever or both, and that drinking cold liquids when overheated can bring vomiting or cramps or worse. Another observed result of overheat is that overexertion in the blazing Yucatan heat depletes salt very fast, and the result of sudden hyponatremia is weakness, shivering, a feeling of extreme chill, and—without quick relief—collapse or even death. Being quite aware of the problem, the Maya eat a high-salt diet, take in a lot of salt with almost every meal, and carry salt with them to the fields when they work there. Unsurprisingly, indigenous theories of heating and cooling tended to fuse with Spanish ones though differences can still be observed.

With all these observations, it is reasonable that the Maya explain almost all internal conditions, from rheumatism to cancer and from stomach ache and diarrhea to heart attacks, by being suddenly chilled when overheated. Drinking a very cold drink when overheated usually causes stomach and digestive problems and is the usual cause of them. Cold air striking one's knees can produce rheumatism in the knees.

Here, the line between naturalistic and personalistic theories becomes blurred. Winds, *ik'* in Yucatec, range from purely natural and easily felt gusts of air to what anthropologists would call supernatural beings. Even the rain gods (*chaak*) are thought of as winds. More common and dangerous are the *k'as ik'*, “bad winds,” which are disembodied harmful or evil forces. Some are not evidently conscious and are bad merely in their effects; others are actively malevolent. Mysterious winds that may be, but are not clearly, physical or conscious include the *bok'ol ooch* “demon opossum” and the *taankas ik'* “frenzy wind” or “paralysis wind,” both recorded by Robert and Margaret Redfield in Dzitas and Chan Kom as well as by myself in Chuhuhub (Redfield and Redfield 1940:63; Redfield and Villa Rojas 1934). In the Rituals of the Bacabs (Arzápalo Marín 1987), *tankas* is associated with parrots and other birds, and that association is probably still current. Birds such as owls and nightjars are still bad omens, and the gentle little nightjars (*puhuy*) that call all night are sometimes thought to be *k'as ik'*.

More clearly personalistic are sicknesses sent as punishment by gods and saints (again a fusion of Maya and Renaissance Spanish ideas) and the very, very many sicknesses sent by witches. Witchcraft (*brujería*) and witches (*brujos/as*) apparently abound in the Yucatan, as noted by the Redfields and other observers. They usually send chronic, especially chronic but intermittent, conditions. They may be *way*, “transformers,” who appear as goats or other animals. They work their evil especially on Tuesdays and Fridays. This is a purely Spanish reckoning that goes back to Roman paganism: those were the days of Mars and Venus, troublesome and unlucky deities. Thus, anti-witch charms also are often best done on those days.

Finally, more ordinary, less harmful magic can be worked by ordinary people, as when a love-stricken youth tries to sprinkle dried and powdered hummingbird or flycatcher head in his girlfriend’s hair to make her love him. This widespread bit of Mexican folklore may have reached the Yucatec after the Spanish Conquest though the identification of hummingbird with love and flycatchers with passion is apparently very ancient.

Imperfectly blended with all this are varying degrees of knowledges of outside medical traditions. Most important, naturally, is biomedicine—specifically, the form of it taught and used in clinics in Quintana Roo, which runs largely to shots, antibiotic pills and salves, aspirin and other mild analgesics, and necessary surgical interventions in cases of difficult childbirth, major accidents, cancer, and the like. Not only the concepts of germs and infection have been learned; more important in most people’s lives is the coming of awareness of diabetes and its alleged origin from eating sweets and overly processed foods. As in so many other parts of the world, diabetes has gone from virtually unknown to rampantly abundant in Maya towns in the last two generations, as *comida chatarra* (“junk food”) replaces whole-grain maize and nutrient-rich vegetables in the diet.

In 2007, a fully stocked and beautifully appointed clinic came to Chunhuhub, and modern biomedicine has swept the town (Anderson and Anderson 2012). The other communities of my research do not have such facilities, but they can come to Chunhuhub. Traditional midwifery is all but dead; hmeen lore is being forgotten. Don Marcos and Don José have taught their sons, but their sons are active in other realms too, and do not preserve all the old knowledge. Younger people rely more and more on biomedicine, less and less on traditional healing, every generation now.

Family herbal medicine continues, however, because it is cheaper, easier to access, and often more effective than the medicine from the *clínica*. My work has had a modest share in this, since the herbal medical data in my 2003 book was drawn on by a group of local healers during the brief career of their natural-medicine clinic (Marín Martínez et al. 2008). It flourished briefly, providing good herbal products, massage, and the service of one of the parteras, but local residents knew the herbal medicine well enough to prevent the clinic from making a living.

Biomedicine is not the only external influence, however. Folk medicine from all over Mexico and some parts of the Caribbean is available. Spiritualism, in the version introduced to Mexico especially by Allan Kardek in the nineteenth century, is known in the towns, and is an indirect but important influence on Don José Cauich Canul. Conspicuously absent from Mayaland are the *botánicas* (traditional herbal

and spiritualist stores) so extremely abundant elsewhere in Mexico, but anyone visiting a large city has access to them; they supply spiritual and spiritualist remedies, and herbal remedies from all over Mexico.

The most striking thing about Maya medicine is that in practice these varied theories of disease have little effect. They have, in most cases, limited relevance because the Maya have learned empirically over thousands of years which herbs actually work for which conditions.

Thus, for instance, the fact that a skin rash may be due to a plant's itchy hairs or leaf oils or to a bad wind striking the skin or to drinking cold liquid when overheated has little effect on the treatment; what does matter is that if it is a simple itch like a mosquito bite, it can be treated by tea of bark of *chakmoolche'* (*Erythrina standleyana*, extremely tannin-rich). Other tannin-rich barks are used to make skin washes, and apparently work reasonably well. Skin sores and rashes that hurt and continue without clearing up are treatable by *k'anaan* (*Hamelia patens*, which has an antibiotic in its leaves; Arvigo and Balick 1993:143); its virtues were already noted in the early Yucatec/Spanish dictionary *Calepino de Motul* around 1600 (Arzápalo Marín 1996:409). Similarly, infected rashes and other infections can be treated by *siipche'* (*Bunchosia swartziana*). Anita Ankli found this tree contains a very effective antibiotic (Ankli 2000; Ankli et al. 1999a, 1999b). Ankli also found medicinal values in many other Maya healing plants. More have turned up subsequently. Still others need more study. (See also Berlin and Berlin 1996; Berlin et al. 2000, for the highland Tzeltal and Tzotzil, linguistic relatives of the Yucatec but inhabiting a quite different ecosystem.)

Worms are treated with epazote (*Chenopodium ambrosioides*), which is highly effective. Canker sores (*fogajes*) are effectively treated by a mash of the root of *oon ak'* (*Gouania lupuloides*); the root sap contains a soothing and drying chemical (apparently a saponin; personal observation). *Kakaltun* (wild basil, *Ocimum micranthum*) works well for stomach aches. Diabetes is effectively treated by tea of buds of *Cecropia*, by eating nopales (*Opuntia* spp.), by tea of certain grasses, and other local foods. The bark of *chakah* (*Bursera simaruba*) makes a tea effective as a skin wash for rashes caused by contact with *chechem* (*Metopium brownei*), a huge tree closely related to poison ivy and having the same irritant capacities. The abundant *ha'abin* (*Piscidia piscipula*) has bark and roots with toxic compounds and also tannins, and the bark is rasped to make a rash for skin infections, for which it is very effective, with strong antibiotic action (Ankli 2000).

Arnica (here *Tithonia* spp.) is used, as elsewhere, in a tea or alcohol infusion for bruises, skin infections, arthritis, and other pains, as well as itching and mange. *Box elemuy* (*Malmea depressa*), used so widely that it is smuggled up to Maya in Los Angeles, seems to be effective for kidney medicine (Salvador Flores Guido, personal communication), but confirmation is needed. Chaya (*Cnidoscolus chayamansa*) is an effective diuretic. Of several apparently effective stomach-ache remedies, allspice (*Pimenta dioica*, a fairly common native tree) is known in biomedicine to be effective. The irritating, pungent, somewhat toxic sap of euphorbia (notably *hobon k'ak'*, *E. heterophylla*) is put on skin and eye infections and the like.

A semi-medical use is the placement of the extremely sticky leaves of *Martynia annua* to catch fleas, hence its Maya name of *chukch'ik*, “catch-flea.”

Foods are not considered medicines per se, but are known to be nourishing and to prevent malnutrition states of various kinds. There is not, however, the clear recognition that certain foods cure certain states, as in Chinese medicine, in which green vegetables are known to cure scurvy, red meats treat anemia, and many other food cures are well known. The Maya treat anemia with herbal teas, some of which may be iron rich (no one really knows).

All these cures are verified by my experience and the Mayas' and/or by biomedical science. They are widely used for the straightforward reason that they work, in some cases better than drug store remedies. In general, it is obvious that the Yucatec have an herbal medicine that is outstandingly effective in biomedical terms, probably about comparable to the ancient Greek herbal lore of Dioscorides, and apparently more often effective biomedically than Chinese herbs are known to be. Yucatec remedies not known to be effective may actually be ineffective, or may simply not have been studied enough. For instance, *wako ak'* (*Aristolochia maxima*), a medicine so popular it is even brought in some quantity to Los Angeles by migrant Yucatec, has not been studied, but is part of a genus widely known for medicinal but sometimes toxic effects. Like others of its genus, it contains aristolochic acid, which has uncertain effects and is under study. The other plant important enough to be massively shipped to Yucatec Maya in the United States is *kambalhau* (*Dorstenia contrayerva*), used for stomach troubles, and also for snakebite (hence the species name), but its value has not been assessed.

Some clearly ineffective remedies persist because they are easily confused visually or in taste with effective plants. Others may have apparently “worked” for someone and been adopted on the chance that they might work again. Testing is by individuals and the results are shared by word of mouth, so opportunities for error are high and opportunities for verifying are relatively low. Sometimes, dramatic “medical” effects make a plant popular when it has little biomedical effect. *Tankasche'* (*Zanthoxylum caribaeum*) has a dramatic numbing effect on the tongue and mouth, similar to but stronger than that of its close relative Chinese brown pepper. This has given tankasche' a reputation as a magically powerful plant, and it is used to deal with sorcery, witches, and evil winds. My experience and studies of the genus do not disclose much non-magical value.

It is astonishing how much biomedically accurate information is there, and how widespread it is. Roys and the Redfields, and even the early dictionaries, report knowledge that is, today, still widely shared all over the Yucatan Peninsula. Most Maya cures have not been tested in biomedical laboratories, and no doubt many of them work well, but the problems of “biopiracy” (Shiva 1997) and loss of rights to their own plants by the Maya and by the Mexican nation have led to a shutdown of experimentation and testing, so we will never know.¹

¹ See my posting “The Morality of Ethnobiology” on my web site www.krazykioti.com for the Maya case and its relationship to the general question.

Maya midwives also have, or had, a phenomenal amount of empirical knowledge, including a number of strongly antiseptic plants for washing women and babies as well as techniques for delivery, including breech birth and other problematic cases (Anderson et al. 2004).

To these, after the Conquest, were added the most effective Spanish remedies, all of which go back to Greek, Roman, and Arabic medicine. These include mint (*Mentha* spp.), anise (*Pimpinella anisum*), citrus leaves (*Citrus* spp., usually *C. sinensis*, orange), and rue (*Ruta graveolens*, *R. chalepensis*), known to be effective in tea for stomach aches. Also used are wormwood (*Artemisia* spp.) for worms, aloe vera (*Aloe* spp.) for burns and wounds and open sores, old-world basil (*Ocimum basilicum*) as a lesser substitute for kakaltun, and many similar remedies. Garlic, known to be antiseptic and antifungal, is used for respiratory conditions. Cinnamon is used as a digestive or carminative, as elsewhere in the world. Roses, also well known for their very effective antibiotic and antiseptic properties, are widely grown and universally used for teas for sore throat and similar conditions (on the antiseptic and medicinal values of this and other spices and flavorings, see Billing and Sherman 1998).

These remedies were apparently adopted early, judging from Colonial-period dictionaries and herbals. They were probably propagated by Spanish missionaries (as they were elsewhere in Mexico). It should be noted that the Maya are inveterate borrowers and experimenters with plants. Some quite astonishing things turned up in and around Chunchuhub, including European grapevines and apples—hopelessly out of range and unable to fruit, but “interesting to try,” as their planters told me. There are nineteenth-century French rose varieties, almost lost elsewhere in the world, probably cuttings of plants brought to Merida in its golden days (the Maya are very fond of propagation by cuttings).

Many tried the introduced Hawaiian fruit noni (*Morinda citrifolia*); it was widely sold as a cure for diabetes and other conditions, but with imperfect and inconsistent results, according to my Maya friends. I watched over the years as this plant was enthusiastically adopted and propagated, integrated into the home and commercial orchards, and then somewhat neglected as it proved to be useful but no miracle cure. Such experimentation is typical of Maya medicine and agriculture.

Ordinary illnesses are treated by herbal remedies known to alleviate the actual symptoms presenting. A very different kind of curing is necessary for witchcraft and evil winds. These respond to ceremonies and rituals involving religious chants and prayers and to various patent medicines and similar preparations.

Even here, though, pragmatism is important. The favorite indigenous plant for such rituals is siipche', which, as noted, has a strong antibiotic in its leaves and twigs (Ankli 2000). It was probably first taken into sacred practice because of its obvious practical value. The introduced equivalent is rue, widely used in rituals (it can, among other things, substitute for siipche' in Maya healing) and similarly effective medically as a well-known stomach treatment. All the *hmeen* I know (the two noted above and several others) use herbal remedies as well as charms, prayers, rituals, candle-burning, and physical therapies. The herbal remedies always worked for me, and I gather for most customers.

Possibly less empirical is the value of *ya'axhalalche'*, “green reed tree” (*Pedilanthus* spp., pencil tree). This leafless tree, planted around a house, keeps away *k'as ik'*. Its strange, leafless, reedy appearance seems to make it a charm plant. More ambiguous is *chaya* (*Cnidoscolus chayamansa*; see Ross-Ibarra and Molina-Cruz 2002; Ross was my student and did some of this work under my direction). *Chaya* is a known and potent diuretic, a highly nutritious green, and also a slightly uncanny plant, associated with witches. The reason for this association are unclear, but the link is well known, and has somewhat inhibited the efforts to spread the use of this plant for its nutritious values.

The *ya'axche'* (“green tree,” *Ceiba pentandra*) is the sacred tree of the Maya and has been for thousands of years, as shown in Classic art, but it too has some association with witches, especially the *Xtabai* or witch-woman. It continues to be highly regarded but sometimes slightly feared. Indeed, any large tree, and certainly the forest itself, can have protective *yumilk'aax*, Lords of the Forest, spirit beings who guard the forest from damage, just as the *yumilkool*, Lords of the Fields, guard the milpas.

Also, the *ha'abin*, probably the commonest tree in the Chunhuhub area, is sacred and medicinal. Since it flowers spectacularly at the end of the dry season and then leafs out with lush green leaves, it is a “natural symbol” for the coming of the rains. Its large green leaves decorate the sacred altars of rituals, especially the *ch'achaak* that calls the rain at the end of the dry season. Its roots are poisonous—not used in Yucatan (they are used in the Caribbean as fish poison, hence the scientific name). As noted above, its bark is antiseptic and tannin-rich enough to be used, ground, on wounds.

There is thus a sense that spiritual and ritual power are associated with strong physical effects. This is clear, for instance, in the use of the *siipche'* for ritual cleansing (brushdowns and similar small healing rituals). “*Siipche'*” means “tree of the god *Siip*,” the old Maya god of deer and similar forest animals (rather charmingly called “*Zip*” in older literature). The strong antibiotic value of *siipche'* made it a healing and cleansing plant, used internally and externally. Its healing power presumably caused it to be considered a divine tree. It is possible that the ancient Maya considered any actual healing benefit to be proof of spiritual power, and regarded plants accordingly. Another such case may be *k'u che'*, which literally means “divine tree” (cedro, *Cedrela odorata*). This tree’s leaves, wood (rasped up), and roots are all used for medicinal teas for internal or external use. Mild tannins are apparently the biomedically effective components, as is true for other plants used for external washes. The name of the tree indicates a now-lost (at least in Chunhuhub) spiritual interpretation of its effects.

It seems reasonably clear that the original medical theory was based on inherent spirits or spiritual powers in plants and other medicinal substances (including several animal species). The eminently pragmatic and hard-headed Maya of west-central Quintana Roo now downplay religious and cosmological sides of medicine, but those aspects seem to persist farther east and north, judging from my limited experience. The erosion of spirit-based interpretations of plant medicines and of much of the theory of causation has left Maya medicine appear divided, rather like