

This series of essays explores lessons and observations from fieldwork that might be of interest to the integrative medical community. In this context, the authors discuss “new” or less celebrated botanical medicines and unique healing practices that may contribute to the further development of contemporary integrative medical practices. Perhaps this column can facilitate an appreciation for our own roots and those of other cultures, before such ancient wisdom disappears forever.

## CHOCOLATE: HEALING ‘FOOD OF THE GODS’?

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We were lying in our woven cotton hammocks in the early dawn, the mist still hanging heavily in the air. For some reason, no one wanted to be the first to slip out of these portable field beds. Several species of Belizean rain forest birds had just begun their morning conversations, and almost immediately were joined by the roosters in this modest homestead. The acrid smoke from the cooking fire filled our small palm-thatched house, and the ethnomedical team that had come to southern Belize to learn about traditional treatments for diabetes slowly began to awaken, remembering why they were in this remote but intriguing place. The first ritual of the day was a bath in a clear stream, and then, once we took a seat around the fire, breakfast was served. The meal—whether breakfast, lunch, or dinner—was the same every day: black beans, corn tortillas, rice, and an occasional piece of chicken or pork—the mainstay of the diet in this region.

An ancient tin pot was bubbling on the fire. Although dented from decades of daily use, it was still a tightly prized culinary tool. A steaming brown liquid filled the pot, and our Kekchi Maya hostess confidently whipped it into a foamy head with a small, white stick cut from a tree used specifically for that purpose. Yesterday she had toasted a few pounds of cacao beans (*Theobroma cacao*) on a flat clay plate over the same cooking fire, making sure that all of the moisture they contained was driven off. Her young daughter sat at her side, learning how to move the beans around on the plate, heating each evenly to perfection. This morning, before sunrise, she ground them into a fine powder in her *metate*—her stone mortar and pestle. Next she poured the pulverized cacao into water, placing it on the fire and adding a small piece of vanilla bean (*Vanilla planifolia*), its pod bursting with tiny seeds gathered from one of the native

orchids in the region. Finally, she threw in a dried chili pepper (*Capsicum annuum*) to give this beverage its distinctive taste. Other spices, such as black pepper (*Piper nigrum*), are often added as flavorings. Each morning the family drinks this libation, as their forebearers have done for centuries. This is the beverage of life, of health, for family and friends. Putting it to one’s lips, it seems bitter but fragrant, piquant, and very different from the “hot chocolate” we start our day with in New York. The sense of this brew is stronger, as the chili and spices coat the throat. The vanilla enhances the richness of the cacao, and there is no sugar to mask the natural flavors. Locally, medicinal properties are ascribed to this beverage.

The original recipe for the chocolate drink contained not only chili, but also cornmeal, and possibly plantains in addition to the vanilla. It was not until this drink arrived on the shores of Spain in 1528 that sugar was added to the recipe,<sup>1</sup> transforming a spicy and bitter potion into a sweet beverage. This mix was kept a secret for many years, giving the Spanish a monopoly on cacao. By 1650, a chocolate beverage, unrecognizable from the indigenous brew, was being consumed throughout Europe, served in the same manner as coffee and tea.

To us, the simple local meal tastes better when accompanied by this traditional beverage. In addition to the Maya in this region, the Aztecs also valued this plant for making the drink they called *chocolatl* with similar ingredients. In Aztec culture, cacao was a common offering to the gods, consumed by royalty and priests. In recognition of this, Linnaeus, the father of botanical nomenclature, named the genus *Theobroma*—literally, “food of the gods.”

In fact, “all subjects in service to the Aztec Emperor” were required on a yearly basis to bring several bags of cacao in tribute. Among the lower classes the beans were used as currency in trade.<sup>2</sup> In their classic work *Mushrooms, Russia and History*, the great ethnomycologists Valentina and Gordon Wasson discuss enthenogenic (psychoactive) mushroom use by the Aztecs. In their religious ceremony the cacao bean was considered a sacred object by the healers.<sup>3</sup> In other historical overviews, the cacao drink was an essential beverage required as the sacred mushrooms were ingested.<sup>4</sup> In traditional Aztec medical practice, dozens of medicinal plants were linked with the use of the cacao beverage. Cacao-based potions and “cacao syrup” were used as a

flavoring for certain medicines, especially the compounds prescribed for children.<sup>4</sup> In manuscripts dating from the 16th to the early 20th century, from Europe to New Spain, more than 100 medicinal uses of cacao were reported. The most common medical ailments treated by cacao included stimulation of weight gain; invigoration of the nervous system of the apathetic, exhausted, or weak patient; improvement of digestion and bowel function; and stimulation of the kidneys. In addition to the beans, the leaves, flowers, bark, and oil (cacao butter) were used to treat burns, cuts, and skin irritations.<sup>5</sup>

The Aztec notion of cacao as a medicinal plant is not so far fetched. Today in science we are rediscovering the powerful nature of fruits, vegetables, and our cacao bean. These foods have been found to contain a rich source of vitamins, minerals, and antioxidants called polyphenols. Polyphenols and other forms of antioxidants subdue oxidation, a process of damage to the body caused by oxygen free radicals. Oxidation has been linked to many degenerative conditions including aging, and possibly aids in the formation of some cancers. The cacao bean, among all these foods, has the highest antioxidant content. If one looks at food sources that contain polyphenol antioxidants, dark chocolate, by order of magnitude, has the most oxygen radical absorbance capacity (ORAC) units per 100 grams.

ORAC units are the measurements used to gauge the ability of a food to subdue oxidation, hence the higher the ORAC units, the more protection against harm from the oxygen radicals. Listed in descending order, the relative antioxidant capacity (in ORAC units) of some of our most common foods are as follows: dark chocolate, 13120; milk chocolate, 6740; blueberries, 2400; kale, 1700; spinach, 1260; broccoli florets, 890; oranges, 750; red grapes, 739; and onion, 450.<sup>6</sup>

Different types of chocolate contain varying antioxidant content. In finished products the amount of cacao ranges from 7% to 35% in milk chocolate to 30% to 80% in dark chocolate. Consequently, the polyphenol content varies. One recent study done at the University of Scranton found that 40 g of milk chocolate contained 300 mg of polyphenols<sup>7</sup>—equivalent to 5 servings of fruits and vegetables (children take note!). In another study, a 40-g serving of milk chocolate was found to have the same polyphenol content as a 5-oz glass of red wine.<sup>8</sup> That same candy bar—if it had been dark chocolate at the same weight—would have approximately twice the amount of antioxidants. In contrast, instant cocoa mix is very low in antioxidant content.<sup>6</sup>

Another recent study at the University of California at Davis evaluated the effects of polyphenols from chocolate on platelet function. Cocoa consumption was found to have the same effect as aspirin: it reduced platelet aggregation. The authors speculated that this phenomenon could be cardioprotective.<sup>8</sup>

We all know people who crave chocolate. One reason may be its effect on the central nervous system. Of the 300 compounds in chocolate, several are brain-altering chemicals with the ability to reduce depression in some people and in others create a sense of euphoria. Two compounds responsible for these effects are phenylethylamine and anandamide.

Phenylethylamine is a key ingredient in chocolate. It is very similar to amphetamine; both are brain stimulants. Usually the majority of the phenylethylamine taken by mouth is metabolized or rendered inactive before it reaches the central nervous system. However, some people are highly sensitive to even small amounts of this chemical. Phenylethylamine is naturally present in our brains. It is a trace amine that releases mesolimbic dopamine into the pleasure centers. If taken in unusually high doses, phenylethylamine may cause the same effect as amphetamines (exhilaration, lowered fatigue, and a general sense of well-being).<sup>9</sup>

But the story of chocolate's ability to create a state of increased alertness (and maybe well-being) is not so simple. Chocolate also has a variety of compounds called methylxanthines, better known as caffeine, theobromine, and theophylline. All 3 of these stimulants are found in the cocoa bean and account for 99% of its alkaloid content.<sup>10</sup> Of the 3 methylxanthines, the theobromine content is the highest (1 oz of bitter-sweet chocolate contains 117 mg),

whereas caffeine and theophylline are present in much smaller quantities. A 1-oz piece of bittersweet chocolate contains 5 to 10 mg of caffeine, while the same amount of milk chocolate has 5 mg of caffeine—compare this to an 8-oz cup of coffee, which has approximately 150 mg of caffeine. Theophylline content is significantly less than that of caffeine. All of these stimulants increase neurotransmitter or brain chemical activity, making us feel a quick jolt of energy when eating chocolate.

In addition, chocolate contains substances that bring on a sense of euphoria. Anandamide (*N*-arachidonylethanolamine) is a chemical messenger in the brain that binds to the same cell membrane receptors (CB1 receptors) that are activated by tetrahydrocannabinol (THC), the active component found in marijuana. The pharmacological effects of anandamide have



**Toasting cacao seeds on a hot iron plate over a wood cooking fire, southern Belize. Photo ©2001 M. Balick.**

been linked to the control of cognition, mood, memory, and pain.<sup>11</sup> In a study done by Emmanuelle di Tomaso, Massimiliano Beltramo, and Daniele Piomelli at the Neurosciences Institute in San Diego,<sup>12</sup> anandamide-like compounds were discovered in chocolate. These compounds block the enzymes that are supposed to destroy the brain's own anandamide. The end result is a sort of buildup in the brain of natural anandamide. In a fascinating interview on the Web (<http://www.learnlink.emory.edu/~nstratt/page4.html>), Piomelli suggests that those who eat chocolate prolong the activity of anandamide and create the sensation of mild euphoria. However, he also points out that the anandamide-like compounds will not induce a "high" because they do not directly bind and flood the THC receptors (CB1) in significant amounts like THC.

If health professionals can challenge the benefits of chocolate, it is on the basis of its fat and calorie content. More than half of the calories in bittersweet, semisweet, and milk chocolate come from fat. Furthermore, the fat found in chocolate bars is saturated—the "bad" fat implicated in causing high lipid levels in humans. Still, the majority of fat in our diet does not come from candy, even though the annual US per capita consumption of chocolate is 12 pounds per person.<sup>13</sup> It is estimated that 1% of the average North American's daily fat intake comes from candy.<sup>14</sup> Still, for those struggling to reduce their caloric consumption, judicious use of this confection is advised. Carbohydrates, recently under scrutiny in the American diet, also are present in significant amounts in our

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beloved chocolate bar. A milk chocolate bar is about 57% carbohydrate, 32% fat, and 8% protein.<sup>1</sup>

As with any therapeutic agent there are indications, contraindications, and side effects. In the case of chocolate, I (R. L.) recommend it to my patients as a natural treat for a job well done—not in large quantities, but in small doses. The key to this therapeutic maneuver is the appropriate patient and quantity of use. The strategy is to suggest procuring the finest quality dark chocolate and to eat a 10-oz (instead of a 40-oz) bar. Naturally, I would not encourage my diabetic, overweight, anxious, hyperlipidemic, migraine-plagued, or ulcer-prone patients to eat chocolate. But for the rest, it seems reasonable to recommend that an occasional dark chocolate confection could do more good than harm. Of course, copious fresh fruits and vegetables are given first place in my prescription for sources of vitamins and antioxidants. Obviously, more research is needed to gain a clearer perspective on this matter (let me know where—I may sign up as part of the study).

Finally, patients initially surprised to hear a physician express positive information on this ancient bean report back that they feel good after eating the dark chocolate. More importantly, they have abandoned the sense of guilt that consumption of this confection sometimes brings. And so, as more and more scientific evidence is uncovered to explain why people love chocolate and how they benefit from it, it is becoming evident why the native people of Mesoamerica gave such respect to this plant that they called it "the food of the gods."

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