



- Login if you're not - Register Your Free Account (Required) - Help - Don't forget the shoutbox down below !!

TTZ LIBRARY > The Legacy > Cures of the Copper Canyon: Medicinal Plants of the Tarahumara with Potential Toxicity.

RSS Email

SEARCH TOPIC

Forum Jump

[New Topic](#) [Reply](#)

<< [Previous](#)

[Next Topic](#) >>

Cures of the Copper Canyon: Medicinal Plants of the Tarahumara with Potential Toxicity.

Author	Comment	Lead	[-]
<p><a href="#">Abramelinn</a></p>  <p>Posts: 385 Dec 20 07 1:21 AM administrator</p>	<p><b>Cures of the Copper Canyon: Medicinal Plants of the Tarahumara with Potential Toxicity.</b></p> <p><b>HerbalGram</b> The Journal of the American Botanical Council Issue: 34 Page: 44-55</p> <p><b>Cures of the Copper Canyon: Medicinal Plants of the Tarahumara with Potential Toxicity.</b></p> <p><i>HerbalGram</i>. 1995;34:44-55 American Botanical Council</p> <p>Sumatí okalivéá seaevá rakó cheeneserová. Waminámela ke usugítíami. Cheeotshéloya. Cheelivéva tesola chapimélava otshéloa rimivélava. Matetravá seaxóá wiliróva.</p> <p>Beautiful lily, in bloom this morning, guard me. Drive away sorcery. Make me grow old. Let me reach the age at which I have to take up a walking stick. I thank thee for exhaling thy fragrance there, where thou art standing.</p> <p>-- A Tarahumara Prayer</p> <p><i>The prayer demonstrates the Tarahumara's reverence for plants that heal. Not only lilies, but many species of plants the Tarahumara consider sacred or powerful require such prayers or songs prior to their use or harvest. This practice survives since many plants are thought to contain spirits which, unless otherwise placated, will injure the party that unceremoniously picked the plant.</i></p> <p><i>Tarahumara herbalism utilizes approximately 300 plant species (Bye, 1985:81). Many of these are known by the scientific community to contain toxic compounds harmful to humans or to at least exhibit psychotropic effects. From a review of the ethnobotanical and pharmacological literature this study will identify a few plants considered poisonous by Western biomedicine. The pharmacological characteristics of the plants will be revealed including those constituents considered harmful as well as beneficial to humans. Although all the plants in this study are considered poisonous, as the title suggests, that term is relative. One man's poison may be a Tarahumara's panacea. [Caution: Readers should not consume any of these toxic plants, in spite of the noted folkloric use. - Editor]</i></p> <p><b>The Tarahumara: People and Place</b></p> <p>The historical and archeological record of pre-contact Tarahumara of northern Mexico is scant. It does suggest, however, that they are descendants of the Southwestern Basket Making cultures dating from 1,000 B.C. Several stone dwellings and storage houses have been found containing "blankets of agave fiber, woven mats, pottery, metates and manos for grinding, and extensive use of cultivated gourds" dating back to this period (Pennington, 1963). The Tarahumara speak a Uto-Aztecan language, a fact which supports this theory and implies that they arrived to their region of Mexico with a wave of others of the same language stock, which includes the Papago and Huichol at an early date (Jenkins, 1972:57; Kennedy, 1978:11-12).</p>		

The land of the Tarahumara rests within the Mexican states of Chihuahua, southeastern Sonora, and northeastern Sinaloa (Salmón, R., 1977:379). The Tarahumara people prefer to live in small scattered agricultural settlements called *rancherías* (Salmón, R., 1977:380). The *rancherías* are generally dispersed along the drainages of the western Sierra Madre which extends south from Arizona into Mexico running parallel with the Sea of Cortés. These mountains are characterized by their deep and narrow *barrancas* (canyons) that were cut and gouged by the many rivers that drain the area. These rivers include the Río Fuerte, Río Yaqui, Río Mayo, Río Urique, and the Río Verde which all, after several junctions, confluences, and course changes, eventually empty into the Gulf of California (Bennett & Zingg, 1935:6-8).

The mountains are constructed of Tertiary volcanic tufa that developed into the formidable *barrancas* which make life and travel difficult for the Tarahumara. Some *barrancas* descend as deep as 3,000 feet, often providing two distinct ecological regions for the Tarahumara to inhabit: the habitats of the highlands and that of the gorges. In the woods of the cool highlands stand several varieties of hard and softwood trees, the most numerous consisting of pines and oaks. The most common species of pine is *Pinus ayacahuite*, which reaches a height of 60 feet and is valued for its straight grain, and the Douglas fir (*Pseudotsuga* spp.). Other smaller pines exist here including the stunted cedar (*Juniperus* spp.). The two most common oaks are (*Quercus* spp.) and the black oak (*Q. incarnata*), which add color to the highlands during the autumnal change. The highlands are understoried by many species of plants, shrubs, and cacti. Ball cacti (*Coryphantha* spp.) are abundant and also *nopal* (*Opuntia* spp.), prized for its fruit, the *tuna*, which is carefully freed of its spines then cooked and eaten by the Tarahumara. On the hillsides stand yucca (*Yucca* spp.) and sotol (*Dasylirion* spp.), both used for their fibrous leaves, two types of agave (*Agave schottii* and *A. patonii*), and *manzanita* (*Arctostaphylos pungens*). Along the high streams and rivers stand pussy willow (*Salix* spp.) and choke cherry (*Prunus* spp.) (Bennett & Zingg, 1935:4-5).

In the winter, the Tarahumara migrate to their caves located in the walls of the deep *barrancas* to escape the cold highlands. The gorges are so deep that a distinct change from alpine to tropical flora is noticed as one descends. The giant agave, sotol, and cacti still exist on the canyon walls but deeper are found different species of trees and shrubs. The fragrant laurel tree (*Litsea glaucescens*) can be found and also the Brazilwood tree (*Haematoxylum brasiletto*), valued for its hardness. The several shrubs common to the gorges include physic nut (*Jatropha curcas*) used as a Mexican folk remedy, cotton plant (*Gossypium mexicanum*), tree tobacco (*Nicotiana glauca*), and indigo (*Indigofera suffruticosa*) (Bennett & Zingg, 1935:6).

Historically the name *Tarahumara* is a "Spanish corruption of *Raramuri*" (Balke & Snow, 1965:295) the word the people use to refer to themselves, but this paper will continue to use the common vernacular term Tarahumara. Both terms literally mean "Fleet Foot" or "Foot Runners" (Balke & Snow, 1965:295; Kennedy, 1978:10). Because of the unforgiving landscape, which is even difficult for animals and vehicles to traverse, the Tarahumara prefer to run when traveling from one point to another.

Running has become a trademark of Tarahumara culture, further characterized by the dramatic long distance kickball races called *Rarajipari* in which they periodically compete. During the races runners, while kicking a baseball-sized wooden ball, may cover distances between 50 to 100 miles. One race was reported by a Chihuahuan historian, Francisco R. Almada, to have covered 435 miles (Irigoyen & Batista, 1985:79). The author once happened upon two teams of runners near the remote *rancheria* of Nararachi. When asked how far they planned to run they said that they were training for a competition so they would only be running a short distance of about 20 miles. Because of the distance, the races often continue into the darkness of night requiring the runners to carry torches of *Chopeke*, a resinous pinewood, to illuminate their track (Irigoyen & Batista, 1985:90). The duration of the races accentuates the "slow rhythm" of all aspects of Tarahumara life, which as Irigoyen describes, "seems as though it will never begin, and once begun, it seems as though it will never end" (Irigoyen & Batista, 1985:80).

Tarahumara religion is monotheistic "with the exception of a few minor gods" (Irigoyen & Batista, 1985:81). They worship *Onoruame*, "the one who made all things." Onoruame's description changes from God the father, similar to the Catholic figure among the more acculturated Tarahumara, to *Kejenari*, meaning the sun, among the more traditional people (Irigoyen & Batista, 1985:81). Tarahumara traditional religion is difficult to access because of the assimilation of Christian dogma and the variants that occur among the separate hands. In general, however, Onoruame lives on a level higher than that of the people, which is above the underworld, where he is accompanied by spirits and *Bisa Riwigachi*, Onoruame's wife, the mother. From there, Onoruame and *Bisa Riwigachi* watch over the people and their cultivated fields (Merrill, 1988:72). Onoruame will sometimes ask for ceremonies and ritual sacrifices of animals because he may become hungry. He sometimes causes the death of a person if he gets lonely (Kennedy, 1978:128,130).

Today the Tarahumara number between 40,000 to 60,000 people in the state of Chihuahua, Mexico (Kennedy, 1978:26; Irigoyen & Batista, 1988:80). They subsist on an agricultural economy, growing maize, wheat, squash, beans, potatoes, and chile (Pennington, 1963:39). They also gather wild plants for food, seasonings, medicine, and ceremonies (Jenkinson, 1972:58). Their society and culture are basically the same as it was in the sixteenth century. Merrill states, "the Raramuri of the sixteenth century would have little difficulty recognizing their descendants of the twentieth." Unfortunately, mining and lumber roads have encroached into the Tarahumara region, bringing Mestizo language, values, and technological innovation. Domesticated animals have been introduced to some Tarahumara living closer to the Mestizo settlements as well as more Christian theology (Merrill, 1988:44). These introductions have not altered Tarahumara culture very much, however. Technological innovations in the form of metal axes and plows have only allowed the Tarahumara to clear more land for growing and to produce a higher yield of crops. The domesticated animals have made some Tarahumara more seasonally mobile, following their animals into the lower *barrancas* to escape the winter bite (Merrill, 1988:44-45).

#### The Relativity of Toxicity

That the Tarahumara employ approximately 300 different plants for medicinal use may seem an exaggeration. This researcher once was told by a healer from the isolated area of Nararachi that he used about 250 plants for healing. To make the story even more remarkable, he revealed his age to be only 32 years. When asked how such a young person could learn so much about plants, he said that he began learning his trade at age three. It was, he said, "the Father above" who taught him through dreams.

Western biomedicine employs well over 300 chemical compounds for healing. To ask a physician to identify and demonstrate the use and preparation of 250 of these compounds reveals the remarkable education one must receive to become a native healer. The physician at least has the aid of pharmacopoeias. There are those who would say that the native healer's techniques and beliefs are mere "hocus-pocus." But the beliefs and knowledge of the healer from Nararachi cannot be ignored. Anthropological studies of native healing methods reveal "strong empirical underpinnings [of traditional knowledge] which has not received the attention it merits (Schultes & Swain, 1976:147)."

Due to variations among toxins it is difficult to define exactly when a constituent becomes a poison. One possible definition suggests, "Plants and parts of plants that contain potentially harmful substances in high enough concentrations to cause chemical injury if touched or swallowed are known as poisonous" (Turner & Szczawinski, 1991:1). This definition is too rigid. Salt (sodium chloride) when ingested in large doses can cause vomiting in adults. There have been cases of infant fatalities when excessive amounts of sodium were mistakenly fed to children. To the average person salt is not a toxin. It is used every day by millions of consumers. Pharmacologically, it can be a toxin, depending on levels ingested. The same does not hold when salt is poured on a snail. Some toxins are obviously more harmful than others.

Toxicity depends not only on the chemical nature of the substance but the individual ingesting it. Among species, individuals respond differently to the same substance. For example, a normal human can ingest sugar without ill effects but to a diabetic a dose of sugar could be toxic (Hill, 1988:565). Poisons also react differently when taken in various ways. Nicotine, when administered intravenously, is 50 times more toxic than when smoked. Water can be toxic when inhaled in large quantities (Hill, 1988:565).

Some authors suggest that some chemicals are actually not very harmful and that some constituents in plants are present in insufficient quantities to cause any harm. Because of this many people seeking alternative healing may run the risk of causing irreparable damage to their bodies. Plants are often considered natural and organic and therefore must be benign and beneficial. However, "natural" and "organic" must not be mistaken for always meaning "safe" and "wholesome." Many of the most insidious substances have been derived from natural products (Turner & Szczawinski, 1991:1; Blackwell, 1990:xii; Mann, 1992:2). These substances can affect the human body's digestive, circulatory, respiratory, and nervous systems. They may also cause damage to the liver and kidneys, lower blood sugar levels, interfere with blood clotting factors, prevent normal cell division, or lower the function of the immune system. Some toxins can cause external swellings, pain, redness and blisters on the skin, or damage to the eyes (Turner & Szczawinski, 1991:1).

This discussion of toxic plant chemicals in this paper calls attention to the conflict in the suggestion that poisonous plants are used for healing. Perhaps some plants are not actually toxic or, although the chemicals may be toxic, their toxicity is relative. It is often the case that only certain parts of a plant are used for medicinal purposes. This suggests that although toxins are present in the plants they are not present throughout the entire plant. Chemicals occur in varying concentrations determined by the growth stage of the plant affected by variable factors, including light, temperature, moisture, external biotic influences, and inherited factors (Tortora *et al.*, 1970:291).

Plant lectins are a good example of the temporal characteristics of plant chemicals. Lectins are proteins or sometimes glycoproteins that can agglutinate cells (stimulate antibodies) but also act to precipitate polysaccharides or glycoconjugates. They are usually benevolent compounds but may exist as poorly agglutinating toxins. They are compounds present in several of the plants discussed in this paper, including the Solanaceae and *Euphorbia* spp. (Puzstai, 1991:2). Lectins act as defensive and recognition agents, growth regulators, and carbohydrate transporters. Their presence in many plants is temporal, increasing or decreasing with the plant's age. They are most highly concentrated in the seeds of plants, especially the Gramineae and Leguminosae (Puzstai, 1991:39). Their presence has also been determined to a lesser strength in the roots, bulbs, barks, and leaves of other plants (Puzstai, 1991:43). Their temporal character is illustrated in the growth stages of the kidney bean, *Phaseolus vulgaris*. Although all parts of the plant contain lectins, they are less present in the early weeks of growth, decreasing in the leaf stage, then increasing consistently in the following stages of growth (Puzstai, 1991:47).

From years of tribally accumulated experience with plants, traditional healers understand what parts of, or when, during their growth, plants are non-toxic. It is often the case that the toxins in plants are negligible enough to cause no harm; as with lectins that are present to a lesser degree in the non-seed parts of the plants. Relativity of toxicity may be a result of the influence of shamanistic ritual and group-supported ceremony. Besides the administration of herbal remedies much of the healing practiced by traditional healers works on the level of culturally supported and determined psychotherapy. Taussig suggests in *The Nervous System* that, cross-culturally and even in modern Western cultures, the patient's body is a microcosm of its culture's values and that the doctor-patient relationship is more than a "technical one"...but... "is very much a social interaction which can reinforce the culture's basic premises in a most powerful manner" (Taussig, 1992:86). He also suggests that symptoms of disease act like symbols which "the diagnostician perceives" and "interprets...with an eye trained by the social determinants of perception" (Taussig, 1992:87).

Studies in stress management and the influences of stress-related illness have determined that the body releases chemicals in reaction to stress or relaxation. The scientific community now recognizes 50 different neuropeptides, chemicals that mediate the brain's responses to stimuli that capacitate self-repair (Hurley, 1991:31). The adrenal gland pumps the neuropeptide epinephrine, a hormone that boosts the heart rate and constricts blood flow, as a reaction to stress. Research has shown, however, that the human body counters the effects of epinephrine by increasing production of a natural nitroglycerine-like substance called endothelium derived relaxing factor (EDRF). The endothelial cells which line interior blood vessels secrete EDRF which elicits blood vessel relaxation (Snyder, 1992:494). It has recently been demonstrated to be actually a simple gas called nitric oxide (NO). NO has been shown to "act as a messenger whereby macrophages exert their tumoricidal and bactericidal effects" (Snyder, 1992:494). Perhaps the optimism induced by the healer-patient relationship induces such factors to occur in the body. Ron Wallace suggests that "neutrophils contain endogenous enzymes and antibodies." He also suggests that "neutrophils are important in the body's defense against infection."

suggest that opiumish conjures endorphins, enzymes, antibodies. He also suggests that curative ceremonies summon it (the chemicals) up to the forehead (Wallace, 1991:103).

Additionally, the preparation of a particular plant species prior to administration may alter the chemical composition of the plant's active ingredients. It is often the case that plants are boiled, cold infused, smoked, and alcohol tinctured. Perhaps some toxic chemicals are made inert by one of these preparations. The saponins present in the skins of wild potatoes (*Solanum* spp.) are rendered practically inert after boiling. The same occurs with the toxins found in manioc (from cassava root, *Manihot* spp.). Their toxins are virtually strained and leached into virtual nonexistence by Amazonian tribal preparations (Johns, 1990:73; Dole, 1978:219).

The implication of the above is that the Tarahumara recognize that some plants are harmful to humans. They recognize the concept of toxicity but not with the same conceptualization that western biomedicine does. The Western concept of plants is generally one-dimensional. Plants are either harmful or beneficial. A weed is a weed and has no uses. Western categorization of plants is rigid. This is the result of a language that speaks only to reducible substances and objectivism. To the Tarahumara categorization of plants is flexible since the language allows the speaker to envision relationships. To say "red" in English is only that, red. By itself it speaks only to a color, a wavelength on the light spectrum. To say red in Tarahumara, *sitakame*, automatically speaks to hues of corn, flowers that span the hues of red, and natural dyes. Many plants in the Tarahumara language include the term *sita* in them. Since language influences thought, the Tarahumara language automatically conjures up relationships with their environment.

An important aspect to this train of thought is that the Tarahumara language maintains no term for poison, therefore there is no room in thought to envision a plant that is solely harmful. To the Tarahumara every plant maintains a beneficial quality. This is so because of their cultural view of the universe. All living things derive their inherent beingness, life, from one of three levels. In the upper level exist the Creator and the other beneficial spirits. This is also the level to where human souls go after death. The middle level is the one in which all mortal living beings exist. In the lower level exists the evilness of the universe. Here live *Diablo* and his malevolent allies, including several species of plants. Although there is a level of the universe that contains malevolent beings, evilness to the Tarahumara is not absolute. Some plants from this level can be beneficial if tapped of their usefulness by knowledgeable healers. The plants from this lower level are inherently harmful but hold within them an ability to heal if correctly prepared and administered.

#### **Tarahumara Ethnopharmacology**

What follows are summaries that describe and identify the toxic plants used for medicines by the Tarahumara. Each section identifies the plant by its scientific Latin nomenclature, common name in English and sometimes in Spanish, and its Tarahumara name. The medicinally active biochemicals of the plant are described, followed by the pharmacological effects the chemicals elicit in humans. This is followed by a description of the traditional uses of the plants by the Tarahumara as medicines. Individual plant descriptions are limited to the studies that have been performed on them. Of the 300 Tarahumara plants about 30-40 are known to contain chemical compounds toxic to humans or to exhibit psychotropic effects on humans. These plants represent several families. This study could analyze all of the plants known to contain toxins but has chosen to omit those that have not been studied by phytopharmacologists to a degree that reveals sufficient data. Omitted also are those plants which contain degrees of toxicity insufficient to cause harm to humans unless ingested in mass quantities or regularly over time. The result is that some of the more interesting and potentially economically useful plants such as *Datura* and *Nicotiana* will, of course, contain more data than the less studied ones.



#### ***Croton fragilis*; Euphorbiaceae; Croton, Hogwort; Cascarilla; "Sanil"**

The seeds, leaves, and stems of this species contain croton oil. Croton oil consists of glycerides, and a mixture of terpenoid principles known as phorbols (Turner & Szczawinski, 1991:227). The oil is also a very strong purgative that is irritating to the skin and can be lethal if ingested in doses of only 20 drops (Frohne & Pfänder, 1983:113; Turner & Szczawinski, 1991:227). Croton oil is also known to act as a secondary cancer-causing agent or carcinogen (Turner & Szczawinski, 1991:227). The foliage contains tannins and saponins. The tannins and saponins act as expectorants to liquefy bronchial secretions (Bye, 1976).

The Tarahumara utilize *C. fragilis* for toothaches and sore gums. It is masticated and applied to the sore areas. It is also taken as a tea to treat coughs and sore throats. *C. niveus* is crushed and boiled into a tea to treat urinary and bladder ailments. The croton species is often drunk to treat internal pains (Bye, 1985:88).

#### ***Datura innoxia*; Solanaceae; Jimson Weed, Trumpet Flower; Toloache; "Uchiri"**

This species contains the alkaloids atropine, hyoscyamine, and scopolamine, with a total alkaloid content of .25-0.7%. The genus also contains hydrocyanic acid, isobutyraldehyde, and malic acid (Duke, 1985:159; Bye, Mata & Vazquez, 1991; Turner & Szczawinski, 1991:118; Der Marderosian & Liberti, 1988:173).

Atropine is an anticholinergic agent, with effects related primarily to antagonism of acetylcholine at neuroreceptor sites. The heart, brain, smooth muscle, and most exocrine glands are affected. *Datura* leaves have had some use in the treatment of asthma. Atropine paralysis of vagus nerves in the pulmonary branch relieves bronchospasms. Four to five grams of the leaf approach fatal doses for children. Ingestions have been known to be fatal (Malseed, 1990:67). Hyoscyamine is an analgesic, anticholinergic, antispasmodic, antivenous [opposing the influence of wine], bronchodilator, mydriatic, psychoactive, and sedative. Scopolamine, the main psychoactive component, is also an analgesic, anticholinergic, antiinflammatory, antispasmodic, bronchodilator, psychoactive, and sedative (Duke, 1985:159).

To the Tarahumara *Datura* is a general medicine (Bye, 1985:88). It is used for several medicinal applications. It has been used for non-medicinal applications as well. The seeds, leaves, and roots of *D. discolor* are sometimes added to *suwi-kio* (corn beer) as a catalyst and to induce a good feeling and visions. In the *Barranca de Batopilas*, these plants are considered powerful and can be handled only by someone of authority (Bye, 1979:36-7). Bye also mentions that when collecting these plants, he was often warned that he would go crazy and die because he was mistreating the plant. Some Tarahumara would not talk to him for several days after he picked the plant (Bye, pers. com., 1992). The Tarahumara use *D. innoxia* in a poultice for inflammations, headaches, and sprains. The leaves are also used in a decoction for diarrhea (Pennington, 1963:189). In addition, the plant is used as a wash for ulcers and smoked for asthma (Bye, 1985:88). The Tarahumara foster a fear of insanity about this plant. The botanist, Barclay, in 1959 recorded the following taxa of *Datura* in southwestern Chihuahua: *D. stramonium*, *quercifolia*, *innoxia*, *lanosa*, *discolor*, and *ceratocaula*. Bye mentions that *D. ceratocaula* "is known to have been an important psychotomimetic in southern Mexico and its presence in northern Mexico may represent its purposeful introduction in the past." He adds, however, "The Tarahumara...do not distinguish among the various species recognized in the recent biosystemic treatment." (Bye, 1979:36-7)

#### ***Equisetum hyemale*; Equisetaceae; Horsetail; Cola de Caballo; "Pakuchara"**

The main toxin in horsetail is a thiaminase-like compound. Thiaminase destroys thiamine in the body which may lead to vitamin B1 deficiency illnesses such as beri beri (Blackwell, 1990:67). The plants also contain saponins, several flavone glycosides, and silica (Der Marderosian & Liberti, 1988:312). *E. hyemale* contains polyphenolic flavonoids with bactericidal activity. It is used for cancer and carcinomatous ulcers in Austria and Germany (Duke & Ayensu, 1985:295). *E. arvense* is known to contain isouquercitin, beta-sitosterol, and kaempferol. Together these three chemicals place *Equisetum* on the list of possible natural remedies towards treating diabetes. Isoquercitin is a diuretic. Beta-sitosterol is an antihypercholesterolemic [lowers cholesterol]. Kaempferol is also a diuretic and a natriuretic [causes sodium loss], increasing urine secretions and the functioning of the kidney cells, increasing, in turn, their permeability and circulation. The general result is that kidney function improves which helps the body to positively react to water retention and excessive blood glucose levels, both of which are secondary symptoms of diabetes (Winkelman, 1991:2).

The Tarahumara use *E. laevigatum* as a wash for wounds, cuts, scratches, and surface infections. It is also used in a tea for chest congestion, bronchial inflammation, and chest pains. *E. hyemale* is used as a tea for urinary ailments and to stimulate urination (Bye, 1985:89).

#### ***Eupatorium* spp.; Asteraceae; Snakeroot, Thoroughwort; "Dulubúctci"**

This species contains tremetol and certain glycosides (Schmutz & Hamilton, 1979:73). Tremetol is a higher alcohol. The glycosides, along with the tremetol, accumulate in the milk of cows feeding on the plants. Ingestion of the plant or milk can induce poisoning with symptoms that include weakness, nausea, loss of appetite, severe vomiting, tremors, liver damage, labored breathing, jaundice, constipation, prostration, dizziness, delirium, convulsions, coma, and death (Schmutz & Hamilton, 1979:73). The plant also contains sesquiterpene lactones which act as laxatives. The Tarahumara use this plant as a purgative, laxative, and cathartic (Bye, 1985:93).

#### ***Lantana camara*; Verbenaceae; Red Sage; Confituria; "Peonia"**

*L. camara* is known to contain an atropine-like alkaloid, lantannin, and a phototoxic triterpene derivative, lantadene-A. The green unripe fruits are the most dangerous. The ripe fruits are apparently not harmful but leaves are known to be fatal to small animals even in small amounts and induce photosensitivity in livestock when ingested. Recent studies have demonstrated that the species contains a compound called umhengerin which acts as an antibacterial, antifungal, and antiinflammatory (Claeys *et al.*, 1988:966). The species also contains a "quinine-like alkaloid called lantanine which acts as an antipyretic (Sharma *et al.*, 1999:975).

The Tarahumara crush this species and make an ointment to treat lung and pulmonary ailments as well as a general and preventive "curing" plant. It is crushed again and made into a tea to treat gastrointestinal ailments, stomach aches, indigestion, gas, and to help childbirth (Bye, 1985:88). One herbalist mentioned to the author that the crushed root can be thrown into a pool to stupefy fish. (Personal communication, Felicitas Cruz, July 1993.)

#### ***Nicotiana trigonophylla*; Solanaceae; Wild Tobacco; "Wipaka" (*N. glauca*), "Wipá" (*N. rustica*), "Machuki" (*N. tabacum*)**

This genus contains many compounds, including acetaldehyde, ammonia, anabasine, citric acid, ergosterol, ethyl alcohol, eugenol, formic acid, guaiaol, hydrocyanic acid, isobutyraldehyde, isovaleric acid, limonene, malic acid, methylamine, nicotine, norcotine, oxalic acid, phenol, piperidine, pirrolidine, quercitine, quinic acid, rutin, salicylaldehyde, saponin, trimethylamine, and tryptophane (Duke, 1985:328-334). The medicinally active compounds are eugenol, quercitrin, guaicol and rutin. Eugenol is an analgesic, antiseptic, anesthetic, fungicide, and larvicide. Guaiaol is an antitubercular and expectorant. Quercitrin is an antispasmodic, diuretic, vasopressor, and viricide. Rutin is an antiatherogenic, antiedemic, antiinflammatory, antithrombogenic, hypotensive, spasmolytic, and vasopressor (Duke, 1985:328-334).

Studies among the Huichol suggest that when mixed with *Tagetes*, the mixture may produce hallucinogenic effects. The Tarahumara use *Nicotiana* alone for smoking and for treatment of headaches and animal bites. Bye mentions that:

"The cultivated tobacco, *N. tabacum* ... grows as an escaped plant along the trails of the western barrancas and is cultivated occasionally." It is known to the Tarahumara as "wipaka" and "makuchi." "The Indian tobacco, *N. rustica*...was cultivated in pre-Columbian Mexico and is the tobacco commonly cultivated today by the Tarahumara....The dried leaves are especially valued for smoking during evening ceremonies. Traditional Tarahumara prefer to smoke cigarettes made with dried leaves of *N. rustica*. On one occasion an elderly Tarahumara was smoking tobacco in a wooden pipe which he claimed was a traditional smoking implement." (Bye, 1979:40-41)

Tobacco is considered an important element of ceremonies usually restricted to the night. The plant is considered to have magical properties and is used to purify people, fields, and animals. Tobacco is considered by many Tarahumara to be next in importance to hikuri (peyote cactus, *Lophophora williamsii*) and more powerful than uchiri (*Datura*) (Bye, 1979:40-41).

#### ***Pachycereus pecten-aboriginum*; Cactaceae; Cardón; "Wichowaka"**

This large cactus contains the alkaloid, carnegine. Also identified as an alkaloid was 3-hydroxy-4-methoxyphenethylamine (Bye, 1979:35). From this genus were found the chemicals tetrahydroisoquinoline and the alkaloids tehuanine, pilocereidine, and pilocereine (Gibson & Nobel, 1986:193).

The Tarahumara use the juice from the stems of this columnar cactus to induce visions. The sap may be added to *suwi-ki* (corn-beer) (Bye, 1979:35) It is also used as a tea to treat general aches and pains and as a purgative, laxative, and cathartic (Bye, 1985:92).

#### ***Phytolacca* spp.; Phytolaccaceae; Pokeweed; "Láριο"**

This species contains a bitter glycoside saponin and a glycoprotein (Schmutz & Hamilton, 1979:175). It also contains a resin, phytolaccatoxin, as well as phytolaccigenin, water soluble triterpene saponins, and phytolaccine, a toxic alkaloid (Fuller & McClintock, 1986:205). The species is known to contain a type of protein lectin mitogen that can cause serious and wide-ranging blood cell abnormalities (Blackwell, 1990:45). The mitogen affects the division of human white blood cells and induces the proliferation of B and T lymphocytes. The mitogens may also damage the red blood cells, although this remains under further investigation (Fuller & McClintock, 1986:132; Blackwell, 1990:243). It is mostly the rootstock and the seeds that contain the highest concentration of the toxins although the toxins can be found in small amounts in the stem and leaves.

The Tarahumara take this plant as a tea to purify the blood. It is also used as a poultice for poisonous bites (Bye, 1985:88). The root has been used by other North American people as an antirheumatic (Frohme & Pfänder, 1983:166).

#### ***Ricinus communis*; Euphorbiaceae; Castor Bean; Higuera; "Oliarka"**

This plant contains a toxalbumin lectin called ricin. Ricin is reputed to be one of the most toxic naturally occurring substances. It inhibits protein synthesis in the intestinal wall (Der Marderosian & Liberti, 1988:268). Another lectin called ricin-agglutinin is known to coagulate and break down red blood cells (Pusztai, 1991:19).

The Tarahumara have many uses for this plant. It is made into a poultice to treat swellings, bruises, inflammations, headaches, and boils. It can be eaten raw for gastrointestinal ailments. The plant is made into an ointment for sores and cankers (Bye, 1985:88).

#### ***Senecio* spp.; Compositae; Ragwort, Groundsel; Chachacoma, Yerba Cana; "Tchukúa"**

This species contains several pyrrolizidine alkaloids. These alkaloids include senecionine, senecionine N-oxide, senkirkinine, neosenkirkinine, integerrimine, retrorsine, hydroxyneosenkirkinine, and anonamine (Zalkow *et al.*, 1988:690; Tu *et al.*, 1988:461). Pyrrolizidine alkaloids cause liver injury through the functional death of the liver cells and obstruction of the veins that supply blood to the liver. Death of humans in underdeveloped countries has resulted from eating bread contaminated with seeds or leaves of senecio (Clark, 1982:102; Schmutz & Hamilton, 1979:197). The most toxic alkaloids, cyclic diesters, are metabolized in the liver to bound pyrrole derivatives, both soluble and insoluble. The leaves are known to contain tannins (Bye, 1976:138). The plant can also cause swelling of the abdomen, cirrhosis of the liver, and lung damage (Blackwell, 1990:253). The stomach-irritating effects of the alkaloids act as a medicinal laxative (Bye, 1976:138). The tannins act as a binding protein-tannate film.

The Tarahumara use *S. candidissimus* as a wash, lotion, or poultice to treat sores, cankers, and venereal diseases. It is also used to alleviate toothaches and sore gums. A small piece of the root is placed in a dental cavity to relieve pain. It is also used as a tea for bladder and kidney ailments. Some make it into a poultice or ointment to treat boils and swellings. *S. chapalensis* is applied as a topical antelmintic and also for wounds, cuts, scratches, and surface infections. *S. hartwegii* is used in a tea as a purgative, laxative, or cathartic. It is also crushed into a powder and applied as an insecticide (Bye, 1985:88).

#### ***Tagetes lucida*; Asteraceae; Sweet Marigold; Yerbanis, Pericón; "Basigo"**

This species contains thiophene compounds that are phototoxic and antibacterial. It also contains lactones (sesquiterpenes) (Lewis & Elvin-Lewis, 1977:84), resin acids, essential oil, tannin, and an alkaloid found in the fruits. The essential oils are located in the "distinctive dots on the leaves." These oils contain tannin, resin acids, and a volatile oil that contains alpha-terthienyl (Bye, 1976:143-45). Thiophene is a phototoxin that can cause photodermatitis (Rampone *et al.*, 1986:354). Thiophenes also have demonstrated their bactericidal effects on several laboratory bacteria (Caceres *et al.*, 1991). The essential oil can be used as a carminative, antispasmodic, and antibiotic (Bye, 1976:144-5). Gastrointestinal ailments due to worms may be treated by the action of alpha-terthienyl. It also shows hypotensive, bronchodilatory, and antiinflammatory properties (Bye, 1976:144-5).

It is "a common medicinal plant of the Sierra where it is taken as a tea to alleviate headaches, chest pains, and stomach ailments." (Bye, 1979:41) The author was informed that a weak tea of the plant would help alleviate colic. (Personal communication, Jesusitas Navarres, August 1993.) It is a popular market herb in the Chihuahua cities as well as throughout Mexico. The plant is also taken as a tea or in an alcohol infusion for pneumonia, gastrointestinal ailments, indigestion, pain, stomach aches, and gas (Bye, 1985:88).

#### ***Tillandsia* spp.; Bromeliaceae; Peyote Companion; Soluchil; "Dowáka" (*T. bentamiana*); "Rereshíwasa" (*T. karwinskysna*); "Waráruwi" (*T. mooreana*).**

This genus contains raphids and proteolytic enzymes. Raphids are tiny needlelike crystals of calcium oxalate; they are skin irritants that are strengthened by the proteolytic enzymes (Raven & Curtis, 1970:540; Frohne & Pfänder, 1983:52). The species has been shown to contain the flavonoids retusin and artemetin which may act as antiinflammatories and analgesics (Costa *et al.*, 1989:25-33; Arslanian *et al.*, 1986). The Tarahumara drink a tea of *T. bentamiana* to act as a purgative, laxative, and cathartic. *T. karwinskysna* is used in a tea to treat constipation. The author was told by one female herbalist that this plant would help with urinary problems. (Personal communication, Felicitas Cruz, July 1993.) The genus is used as a wash to treat rheumatism (Bye, 1985:90). The shamans consider it a companion plant of peyote (*Lophophora williamsii*) although it does not grow in the same habitat (Bye, 1976:209). The companionship must, therefore, be a spiritual one.

#### **CONCLUSION**

The Tarahumara pharmacopeia is respectable. The above is only a small sample of the plants incorporated into this natural pharmacy. Their relationship to natural medicines differs from that of Westerners. They recognize the concept of psychotomimetics; such plants are considered sacred or powerful and therefore must be treated with respect. This was evident with the discussion of some of the hallucinogenic plants such as *Datura* and *Tillandsia*. The result is that the biodiversity of the Tarahumara environment enriches and determines, to an extent, their social, personal, and cultural behavior. This is especially evident when the use of the plants is interrelated with the Tarahumara concepts of disease and healing.

Because of their toxic contents, many of the plants of this study should be feared and respected. But toxicity is a Western concept. Degree of toxicity is relative. The Tarahumara cultural model of plants understands that some plants contain powerful spirits, some are potentially deadly, but the same can heal. The model demands that all medicinal plants are treated with respect.

Further studies of natural products will reveal more about possible medicinal uses of these products. As more plants are gathered, more information of their medicinal roles and properties will be useful in directing modern medical science towards possible remedies of Western ills. It is to the mutual benefit of both Westerners and indigenous peoples to continue studies in the field of natural products and their possible therapeutic effects. This type of attention can serve to maintain quickly fading traditional knowledge while helping to increase the knowledge of the scientific community.

#### **Bibliography**

- Arslanian, Robert L., Frank R. Stermitz & Luis Castedo. 1986. 3-Methoxy-5-Hydroxyflavonols from *Tillandsia purpurea*, *Journal of Natural Products*, 49(6):1177-1179.
- Bennett, Wendell & Robert Zingg. 1935. *The Tarahumara: An Indian Tribe of Northern Mexico*. Chicago: University of Chicago Press.
- Blackwell, Will H. 1990. *Poisonous and Medicinal Plants*. Englewood Cliffs, New Jersey: Prentice Hall.
- Bye, Robert A. 1976. *The Ethnobotany of the Tarahumara of Chihuahua, Mexico*. Ph.D. Thesis, Department of Biology, Harvard University Press.
- 1979. Hallucinogenic Plants of the Tarahumara, *Journal of Ethnopharmacology*, 1:23-48.
- 1985. Medicinal Plants of the Tarahumara Indians of Chihuahua, Mexico, in Tyson, Rose & Daniel Elerick, eds., *Two Mummies From Chihuahua, Mexico*, pp. 77-104, San Diego Museum Paper No. 19, San Diego: San Diego Museum of Man.
- 1992. Personal Interview, Arizona State University, Tempe, Arizona.
- Bye, Robert A, R. Mata & J. E. Pinintel Vazquez. 1991. Botany, ethnobotany and chemistry of *Datura lanais* (Solanaceae) in México. *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Séria Notánica* 62(1):21-42.
- Caceres, Armando, Alma V. Alvarez, Ana E. Ovando, & Blanca E. Samayoa. 1991. Plants Used in Guatemala for the Treatment of Respiratory Diseases 1. Screening of 68 Plants Against Gram-Positive Bacteria. *Journal of Ethnopharmacology*, 31(1991)193-208.
- Claeys, M., L. Pieters, J. Corthout, D. A. VandenBerghe & A. J. Vlietinck. 1988. Umuhengerin, A New Antimicrobially Active Flavonoid From *Lantana Trifolia*. *Journal of Natural Products*, 51(5):966-968.
- Clark, A. M. Endogenous Mutagens in Green Plants, pp. 99-132, in Klekowski, Edward, ed. 1982. *Environmental Mutagenesis, Carcinogenesis and Plant Biology*, Vol. 1. New York: Paeger Scientific.
- Costa, Mirtes, I. C. Distasi, M. Kirizawa, S. I. J. Mendacelli, C. Gomes and G. Trolin. 1980. Senecionine in Mice of Some Medicinal Plants Used for Analgesic

Purposes in the State of São Paulo. Part II. *Journal of Ethnopharmacology*, 27(1989):25-33.

Cruz, Felicitas. Personal communication. July 1993.

Der Marderosian, A. D. & L. Liberti. 1988. *Natural Product Medicine: A Scientific Guide to Foods, Drugs, Cosmetics*. Philadelphia: George F. Stickley Co.

Dole, Gertrude E. 1978. The Use of Manioc Among the Kuikuru: Some Interpretations, in Ford, Richard I. ed., *The Nature And Status of Ethnobotany*, pp. 217-247. Anthropological Papers, Museum of Anthropology, University of Michigan, p. 67.

Duke, James A. 1985. *Handbook Of Medicinal Herbs*. Boca Raton: CRC Press Inc.

Duke, James A. & Edward Ayensu. 1985. *Medicinal Plants of China*. Vol. 1. Algonac, Michigan: Reference Publications, Inc.

Frohne, Dietrich & Hans Jürgen Pfänder. 1983. *A Colour Atlas of Poisonous Plants*. Stuttgart, Germany: Wolfe Publishing Company.

Fuller, Thomas C. & Elizabeth McClintock. 1986. *Poisonous Plants of California*. Berkeley: University of California Press.

Gibson, Arthur C. & Park S. Nobel. 1986. *The Cactus Primer*. Cambridge: Harvard University Press.

Hill, John W. 1988. *Chemistry For Changing Times*. New York: Macmillan Publishing Co.

Hurley, Thomas J. 1991. Placebos and Healing: A New Look at the Sugar Pill. *The Noetic Sciences Collection*, 1980-1990. Sausalito: The Noetic Sciences Institute.

Irigoyen, Fructuoso Rascon & Jesus Manuel Palma Batista. 1985. Rarajipari: The Kick-ball Race of the Tarahumara Indians. *Annals of Sports Medicine*, 2(2):79-94.

Jenkinson, Michael. 1972. The Glory of the Long Distance Runner. *Natural History*, 81(1):55-65.

Johns, Timothy. 1990. *With Bitter Herbs They Shall Eat It: Chemical Ecology and the Origins of Human Diet and Medicine*. Tucson: University of Arizona Press.

Kennedy, John G. 1978. *Tarahumara of the Sierra Madre: Beer, Ecology, and Social Organization*. Arlington Heights: AHM Publishing Corporation.

Lewis, Walter H. & Memory P. F. Elvin-Lewis. 1977. *Medical Botany: Plants Affecting Man's Health*. New York: John Wiley & Sons.

Malseed, Roger T. 1990. *Pharmacology: Drug Therapy and Nursing Considerations*. Philadelphia: J. B. Lippincott Company.

Mann, John. 1992. *Murder, Magic, and Medicine*. New York: Oxford University Press.

Merrill, William L. 1988. *Karamuri Souls: Knowledge and Social Process in Northern Mexico*. Washington, D.C.: Smithsonian Institution Press.

Navarres, Jesusitas. Personal communication. August 1993.

Pennington, Campbell W. 1963. *The Tarahumara of Mexico: Their Environment and Material Culture*. Salt Lake City: University of Utah Press.

Pusztai, A. 1991. *Plant Lectins*. Cambridge: Cambridge University Press.

Raven, Peter H. & Helena Curtis. 1970. *Biology of Plants*. New York: Worth Publishers, Inc.

Rampono, W. M., J. L. McCullough, G. D. Weinstein, G. H. Towers, M. W. Berns & B. Abeysekera. 1986. Characterization of Cutaneous Phototoxicity Induced by Topical Alpha-terthienyl and Ultraviolet A Radiation. *Journal of Investigative Dermatology*, 87(3):354-7.

Salmón, Enrique. 1990. Theories of Disease and the Role of the Healer in Tarahumara, Navajo, and Indo-Hispanic Cultures: A Cross Cultural Comparison. Unpublished Master's Research Paper, Colorado College, Colorado Springs, Colorado.

Salmón, Roberto M. 1977. Tarahumara Resistance to Mission Congregation in Northern New Spain. *Ethnohistory*, 24(4):379-393.

Schmutz, Ervin M. & Lucretia B. Hamilton. 1979. *Plants That Poison*. Flagstaff: Northland Publishing.

Shultes, Richard E. & Tony Swain. 1976. The Plant Kingdom: A Virgin Field For New Biodynamic Constituents, in Fina, Nicholas, ed., *The Recent Chemistry of Natural Products, Including Tobacco*, pp. 133-172. Proceedings of the Second Philip Morris Science Symposium, Richmond Virginia.

Sharma, Om P., Harinder, Paul S., Makkar & Rajinder K. Dawra. 1988. A Review of the Noxious Plant Lantana Camara. *Toxicon*, 26(11):987.

Snyder, Solomon. 1992. Nitric Oxide: First in a New Class of Neurotransmitters? *Science*, July, Vol. 257:494-496.

Taussig, Michael. 1992. *The Nervous System*. New York: Routledge.

Tortora, Gerard, et al. 1970. *Plant Form and Function: An Introduction to Plant Science*. London: The Macmillan Company.

Tu, Z. B., C. Konno, D. D. Soejarto, D. P. Waller, A. S. Bingel, R. J. Molyneux, J. A. Edgar, G. A. Cordell & H. H. Fong. 1988. Identification of Senecionine and Senecionine N-oxide as Antifertility Constituents in Senecio vulgaris. *Journal of Pharmacological Science*, 77(5):461-3.

Turner, Nancy J. & Adam F. Szcawinski. 1991. *Common Poisonous Plants and Mushrooms of North America*. Portland: Timber Press.

Wallace, Ron. 1991. *The Tribal Self*. Lanham: University Press of America, Inc.

Winkelman, Michael. 1991. Ethnobotanical Treatments of Diabetes in Baja California Norte. Unpublished Research Paper, Arizona State University, Tempe, Arizona.

Zalkow, L. H., C. F. Asibal, J. A. Glinski, S. J. Bonetti, L. T. Gelbaum, D. VanDerveer & G. Powis. 1988. Macrocyclic Pyrrolizidine Alkaloids From Senecio Anonymus. Separation of a Complex Alkaloid Extract Using Droplet Counter-Current Chromatography. *Journal of Natural Products*, 51(4):690-702.

American Botanical Council, 6200 Manor Rd, Austin, TX 78723  
Phone: 512-926-4900 | Fax: 512-926-2345  
Website: www.herbalgram.org | Email: American Botanical Council

The information on this site is intended for educational purposes only and is not a substitute for the advice of a qualified healthcare professional. The American Botanical Council does not endorse or test products, nor does it verify the content or claims made, either implicit or explicit. ABC does not accept responsibility for the consequences of the use of this information or its most up-to-date accuracy. ABC is a nonprofit, tax-exempt research and education organization under IRS section 501(c)(3). All text, images and content Copyright © 2005 American Botanical Council, unless otherwise noted.

Interact

[Quote](#) [Reply](#)

[<< Previous](#)

[Next Topic >>](#)

[Share This](#) [Forum Jump](#) [Reply](#)

[TTZ LIBRARY > The Legacy > Cures of the Copper Canyon: Medicinal Plants of the Tarahumara with Potential Toxicity.](#)

[Click to subscribe by RSS](#)

[Click to receive E-mail notifications of replies](#)



~ [Sustained Action](#) ~ [The Twilight Zone](#) ~ [Following the Eagle's Flight](#) ~ [Kromakhv, Master of Ravens and Crows](#)

[pagefan](#): been afraid of birds since 1960's - was about 4 or 5 years old walking home from school - queens new york when a giant bird swooped down on me to take the barette out of my hair (i hope that's all it wanted, i was pretty small) i have read reports of birds in NY state, but not in the NYC area, the mailman saw the bird, but want proof positive.. have been researching stories.. anyone have info?

[Abramelinn](#): Hello GK. And who are you then?

[Ground King](#): Please help me I am trapped in this computer and I can't get out! The only way is to help me discuss the controversy over whether or not Ajitz refuses to be baptized along with other K'iche' in the Conquest Dance!

[Ground King](#): Anyone here?

[Ground King](#): Discuss the controversy over whether or not Ajitz refuses to be baptized along with other K'iche' in the Conquest Dance.

[tracker444](#): anyone here ?

[tracker444](#): hello

[Abramelinn](#): Thanks Sven. Ah well, I am just the messenger boy.

[nevs84](#): ahe, nice site, cutting edge up to date stuff... i find myself drifting this way sometimes.

[Abramelinn](#): The name of this board had to be changed because some nasty prick complained about the name being too similar to "Sustained Reaction". The former owner of SR - Ghost Dog - could take the joke (he couldn't care less), the present owner is a crypto-nazi who likes to dominate people from his bureau chair.

[Abramelinn](#): Hmm..well...it seems not everybody is amused, Moll.

Wu is doing his best to make a mess of SR: first he kicks out Athlon because he thinks At is me, then he deletes my posts as Greg Mammalian just because Greg Mamishian can't take a joke. He already banned Ghost Dog...  
I am waiting for the moment he bans himself.



---

[Yuku forums](#) | [Forum Find](#) | [Forum Help](#) | [Legal](#)

© 2013 [Yuku](#). All rights reserved.

