Concepts of Medicinal Plants Among the Nahua of the Sierra de Zongolica, Veracruz (Mexico)*
Claudia Weimann and Michael Heinrich
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Summary
As for all Mexican peasant cultures, plants are an essential part of everyday life for the Nahua of the Sierra de Zongolica, Veracruz, Mexico. The economic basis of the Sierra is subsistence agriculture relying on foods like corn, beans, chili, and the commercial production of coffee, a large number of different fruits and vegetables, and to a lesser degree commercial exploitation of wood. Medicinal plants are an important local resource. For the Nahua, culture and nature are intimately connected. Offerings of flowers and alcohol are made to the earth at important times of the year, especially before sowing of the fields.

During 18 months of fieldwork in the Sierra, medicinal plants were collected, and the conceptual basis of plant use was elucidated. In curing, rituals and empirical plant use are closely connected. Ritual cleansing ceremonies are performed and herbal preparations are prescribed as teas, rectal and vaginal douchees, compresses and sweat baths. Indigenous criteria for plant use in treatment of illnesses are primarily based on the 'hot/cold' classification of illnesses and medicines. Oromelletic properties (bitter, sweet, aromatic, and sour) are used to recognize or characterize a plant. Bitter plants are used consistently for gastrointestinal illnesses. Decisions determining plant use are based on a complex of traditional symbolic criteria. All concepts have equal standing, but chemo-sensory properties cannot be subsumed within the 'hot/cold' classification.

Introduction
Medicinal plants are important in many parts of Mexico, including the Nahua of the Sierra de Zongolica. Lack of financial resources is an important reason for Nahua to rely on medicinal plants as a first resource. Western medicines are expensive or frequently unavailable. Plants are of particular importance in the treatment of minor injuries, skin infections, gastrointestinal disorders, and respiratory illnesses. Since many of these traditionally used plants have not been studied scientifically, it is of interest to investigate the pharmacological effects, toxic side reactions and efficacy as well as to isolate the relevant compounds (HEINRICH et al., 1992; WEIMANN and HEINRICH, 1997).

In order to better understand the traditional uses and to evaluate the plants, this research uses an interdisciplinary approach, applying concepts and methods from anthropology and pharmaceutical biology. The use of plants is integrated into a particular culture (ETIKIN, 1988; LOGAN and DIXON, 1994), therefore the ethnobotanical background is an important basis. Understanding the criteria for selection of medicinal plants for certain illnesses may also help in the search for new pharmacologically active substances (BALICK, 1990; BERLIN and BERLIN, 1996; FARNsworth, 1990).

Each medical system has its own concepts of classification. The one most often discussed for the Meso and South America is the 'hot/cold' system (Foster, 1994; LÓPEZ AUSTIN, 1980), but this concept is not the principal one in all regions. Peoples perceive their environment differently. For example, some use the plants to treat a certain illness based on their chemo-sensory properties such as smell and taste (BRITT, 1994; HEINRICH, this volume). This research draws heavily on ethnologic and cognitive concepts and methods. BERLIN (1992) for example, describes cognitive ethnomedical aspects of the Highland Maya of Chiapas and LUNA PIÑA (1988) in a village of the Sierra de Zongolica.

This paper gives an overview of the concepts used to select medicinal plants by the Nahua of the Sierra de Zongolica. Examples drawn from the Nahua's daily life, health and illnesses, as well as from plants used as food and medicine are used to illustrate the classificatory systems.

The Sierra de Zongolica in the Mexican state of Veracruz, with a high proportion of Nahua population, is part of the Sierra Madre Oriental. Its area of 1,923 km² lies south of 19° N latitude and is bordered by the Mexican states of Puebla and Oaxaca. The mountains have a very rough topography, and are shaken regularly by earthquakes. With the Pico de Orizaba (5,747 m above sea-level), the Sierra includes the highest elevation in Mexico. The mountain range generally slopes from northwest to southeast. Moisture from the Gulf of Mexico results in regular rainfall, with the exception of March through May when there is a distinct dry season. Therefore the climate is humid with frequent rain and fog. The area is divided into three major zones, depending on altitude: cold highlands (tierra fría), temperate intermediate (tierra templada), and the hot lowlands (tierra caliente). Primary vegetation in the cold highlands is predominantly composed of conifers and oak forests, while in the hot lowlands it is tropical rainforest (AGUIRRE BELTRÁN, 1992).

About 200,000 people live in the Sierra, with approximately 34,000 in the subdistrict (municipio) Zongolica, with the principal community (cabecera) having the same name (INEGI, 1990). In the formerly isolated region of the Sierra de Zongolica, as in many indigenous areas of Mexico, drastic changes have occurred, which were reinforced by the opening of a road in 1956 (BOESE SCHUMITZ et al., 1991; HÜLSEWEDDE, 1992; SOUSTELLE, 1958). In the 16th century the Spaniards passed through the Sierra de Zongolica when Cortés conquered Mexico (then called Nueva España). Village names are composed of a Spanish (ix Christian patron) and a Nahua part, for example, San Juan - Texhuacan (AGUIRRE BELTRÁN, 1992). Today, villages which are connected by paved roads have experienced the greatest changes in culture and language compared to those which can only be reached on foot.

The economic basis of the Sierra is subsistence agriculture, the most important staple foods being corn, beans, and chili. Since the 19th century there has been commercial production of coffee. A large

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1 In order to differentiate between hot and cold in the context of humoral medical concepts and thermal hot/cold concepts the former ones are put in quotation marks ("...").
number of different fruits and vegetables are also raised, and sometimes forests are exploited by woodcutters. In earlier decades tobacco was an important crop (EARLY, 1982; SÁNCHEZ Y FARIAS, 1988). Because of limited economic opportunities in the highlands, people often migrate temporarily to the lowlands to earn cash income, working in large farms and ranches characteristic of the lowlands.

The Nahua language (called Mexican by the indigenous people), belonging to the Uto-Aztecan language family, is still spoken by a large portion of the population. In the highland zone (tierra fría) more than 90%, and in the lowland (tierra caliente) approximately 70% of the population are bilingual or monolingual speakers of Nahua. Vowels and consonants are generally pronounced as in Spanish. Additionally [i] is used.

**Methods**

Ethnomedical and ethnobotanical data were collected in selected regions of the Sierra Nahua de Zongolica from September 1993 until February 1995. The differences between the various study sites are climate, geography and varying degrees of influence from the mestizo (persons of mixed European and indigenous American descent) culture. A total of approximately 15 specialists in medicinal plants and/or healers of the different regions were interviewed in detail. These specialists were indicated as being knowledgeable about medicinal plants by several other inhabitants of the community and all were practicing as healers at the time of the study. One of the authors (C.W.) accompanied the key informants to the surroundings of their residential areas to collect the plants which they used as medicines. Information about the plants' uses, parts used, preparation, dose, application, combination with other plants and the plants' properties (according to indigenous criteria) was collected. All data were recorded on ethnobotanical data sheets. Descriptions of illnesses and the forms of treatment were also obtained. Both, symbolic and empirical forms of treatment were recorded. During regular meetings of groups of traditional healers (organized by the Mexican National Indian Institute, INI) and visits to other parts of the Sierra, unstructured interviews and discussions on medicinal plants and the healer's treatment methods were conducted with numerous other inhabitants of the community.

Voucher specimens were collected and identified by comparison with authenticated specimens at the National Herbarium of Mexico (MEXU). A complete set of specimens is available at the National Herbarium of Mexico (MEXU), at the Herbarium of the "Instituto de Ecología" (XAL) in Xalapa, Veracruz, Mexico and at the "Institut für Pharmazeutische Biologie" in Freiburg, Federal Republic of Germany (CWEI 1- 324). As in all our studies all relevant permits to work in the area, to collect and transport plants and to send voucher specimens and samples overseas were obtained.

**Results**

**Illnesses**

For the Nahua of the Sierra de Zongolica an illnesses is a disequilibrium of the body. It can be caused by supernatural forces [jusco = sudden fright], mal aire (= bad air). But thermal influences also may lead to a pathological reaction of the body. If someone has to leave the house after a warm bath in winter, she or he may catch a cold. The following illnesses are described by their thermal properties: fever and infections are hot, a resfrío (= cold) is cold. Other illnesses are associated with the seasons. During the cold and humid season, many people have cough and other respiratory illnesses. During the hot summer months before the rainy season starts, there are more cases of gastrointestinal disorders because of lack of clean water. In the hot and rainy season dermatological problems with inflammation are frequent. These are believed to be due to the entering of "microbes" through the skin, for example, if one steps into puddles without shoes. Diseases, which clinically may have similar symptoms, can be classified into humorally 'hot' (botánico) and 'cold' (evélico). A cough, for example, may be caused by cold air or it may be a 'hot' cough (bronchitis). Some of the gastrointestinal diseases are classified as 'hot' (calor de la barriga = heat of the stomach) or others as 'cold' (stomachache). Diarrhea and dysentery are also classified as 'hot' or 'cold' based on their symptoms ('hot' is associated with the excretion of blood, 'cold' is diagnosed if something white is noted in the excrement).

Minor illnesses are treated at home or by a specialist of herbal medicine. For example, in case of accidents or when the healer does not know or cannot cure the patient, very sick persons are transported over the mountains to the nearest hospital. Mestizos also look for Nahua healers when they perceive western style doctors as unsuccessful in their treatments. The Nahua usually prefer their own healers because they speak their language and understand their illnesses.

**Forms of Curing**

When a person is being treated, rituals and empirical plant use are closely connected. Normally the healer begins with a ritual cleansing ceremony (limpias or purificaciones) preferably in front of the house altar, the central place for performing curing rites. The healer asks God for help and permission to cure. The limpias is done with an egg, normally one of a chicken, but some prefer duck eggs. This process is also used in the diagnosis of illness. If the cause is regarded to be supernatural (for example, mal aire) a ritual follows utilizing medicinal plants which frequently are aromatic (for example, albahaca (basi) - Ocimum basilicum L., Lamiaceae). The preferred days for this ritual are Tuesdays and Fridays, but in case of emergency they are conducted on other days.

Another important ritual is the xochiltali (= "flowers for the earth"). Offerings of flowers, three candles, alcohol and copal (a resin burned as incense) are made to the earth. In the preparation of medicines, the ritual is used to give the plants greater strength. Traditionally oriented people also conduct this ceremony at important phases of the year, for example, before sowing the milpa (fields) or building of a house, (ALVAREZ SANTIAGO, 1991).

Before starting a treatment with herbal teas or other forms of orally used preparations, the patient should make a rectal douche, in order to cleanse the body of all the "bad" which may have caused the illness. This practice also is used before a birth. When a patient is possessed by bad spirits, special forms of healing are employed. The healer prays and orders the spirit to leave that patient. Only healers with a "strong" personality can perform this ritual.

**Pregnancy, Birth Control**

Pregnancy represents a special situation in the life of a woman and is a very important part of traditional medicine. There are several rules for the pregnant mother to avoid a premature termination of the pregnancy, and for the post partum period. She should not eat cold food. "Hot" foods are preferred, but all meals have to be very well cooked. Drinking water has to be boiled until 40 days after the birth. Sweat baths, for example, using leaves of coffee (Coffee arabica L., Rubiaceae), ejepactixhuitl (= medicinal herb against mal aire) (Cestrum lanana Martens & Gal., Solanaceae), and chocolate (Theobroma cacao L., Sterculiaceae) help to warm the pregnant woman before, during, and after birth. All medicines for the post partum period are classified as 'hot'. Contraceptives and abortives are considered 'cold' substances. The child does not like a 'cold' environment, so if it gets too 'cold' inside the mother's body, it will feel uncomfortable and seek to leave the body.
Medicinal Plants

In more isolated regions of the Sierra de Zongolica, it is typical to see plants growing in tins all around the houses. Besides ornamental plants, there are also various plants for basic medical care. For example, pañalita (Lepidium virginicum L., Brassicaceae) is used for cough in children, or matayla (matatilla = plant of "blue color") Tradescantia pendula L., Commelinaceae) for urological disorders. Specialists know medicinal plants in their local environment, but additionally there is an exchange of medicinal plants of different regions in the weekly markets. Western medicine presently exerts a major influence. Some traditional healers mix their herbs with pills, for example, to treat amoebiasis, or prescribe antibiotics against infections.

Herbal preparations are prescribed in the form of teas or alcoholic infusions, rectal and vaginal douches, compresses and sweet baths (temazcal). The form of application depends on the type of illness. Skin diseases as well as diseases of the musculo-skeletal system are normally treated with external applications of compresses or washings. Gastrointestinal, urological, and respiratory disorders are treated internally with teas. As in other cultures it is necessary to equilibrate the disequilibrium of the body (Hanold and Kroeger, 1987). Therefore plants are chosen with opposite properties - a cold illness is cured with a hot plant. Urological diseases are mostly inflammations of the kidneys or bladder. Such complaints are generally regarded as hot. They are cured with teas made from humorally 'cold' plants, for example, matatilla (matatilla = of "blue color") Tradescantia pendula L., Commelinaceae), ceroxatlaucutzín (Onosmodora rosea L. Hez. ex Ait., Osnagraceae), and lengua de vaca (tongue of a cow) Runong ochiusfolius L., Polygonaceae).

Other properties are also important for various cases. The bitter plant ojpanchichie ("double bitter"). Verbesina sp., Verbenaceae), commonly known as verbenas, is used against colic and is classified as toxic (hot). Another very bitter plant [classified as yamamic (lakeurar)] marrubio (Marrubium vulgare L., Lamiaceae) is also employed against colic, vomiting, and diarrhoea. Children dislike bitter tastes, therefore sweet or mild plants are preferably used, for example, hinojo (fennel) Foeniculum vulgare Mill., Apiaceae) against empocho (stomach, frequently with painful gas), and cempoaxochitl ("twenty flowers") Togetes erecta L., Asteraceae) mixed with other herbs against diarrhoea.

In various cases bitter plants, such as the bark of venustidad also called quina (Croton pyramidalis Donn. Sm., Euphorbiaceae) are used to treat fever, which is a 'hot' illness, or against diabetes (fresno - Fraxinus udehi (Wenzig) Ling., Oleaceae). The latter plant is simultaneously classified as cecec (fresh). To cure diabetes the sick person has to take bitter medicines because the bitterness 'absorbs' the sugar from the body.

Respiratory disorders or rheumatic diseases associated with coldness are usually treated with sweet teas. It is said that the state of patients improves with warmth. Accordingly the plants employed in these baths are regarded as 'hot', but also have an aromatic smell (huエルcic = "delicious", huエル = "good"); SMÉNE, 1977). Examples are xochiusahuatl (tree which blooms), Myrica cerifera L., Myricaceae), its leaves smell like an orange, and laurel (Nectandra salsifolia) (Kunth) Nees., Lauraceae). These aromatic plants are also used for nervous patients and during convalescence. Respiratory diseases are treated with teas of, for example, gordolobo (Guapilium sp., Asteraceae) and escaipita (Eucalyptus globulus Labill., Myrtaceae); for hot cough (bronchitis) with violeta (Anoda cristata L.) (Schlecht., Malvaceae) is given. Sometimes plants of the same genus have different properties, for example, hierba buena ("good herb") is hot, menta is cold, both are members of the genus Mentha (both Mentha spp., Lamiaceae, ARGÜETA V. and ZOLLA, 1994). Some epiphytic plants change their properties depending upon which plant they are growing. If hiedra (Loranthaceae, indet.) grows on the acid leontee, it is cold, but if it lives on the coffee tree, it is hot. Some chemosensory properties are important means to recognize a plant, but have no influence on their use, for example, hierba dulce (sweet herb) Pitylla scaberrima A.L. Juss., Verbenaceae) Molderko) has a sweet (tropical) taste, and a lot of fruits are perceived as being sour (konyac). Very sour taste has to be neutralized before it is ingested, but it seems that this is due to the general perception for sweet. Consistency of use can be seen in the fact that bitter plants are generally used for stomach disorders and aromatic plants for baths, but there are plants which do not conform to the classificatory system based on humoral and taste/smell properties. Three examples illustrate this situation.

First, the fruits of hierba del guasano (= herb of the caterpillars) Phyllanthes niris L., Euphorbiaceae) have an appearance like the urtications caused by the hirsute caterpillar which hides on the lower surface of leaves of various plants. The venom of the caterpillar causes strong pain in the body, so directly after contact with this animal, someone must put the crumpled plant onto the wound to prevent the venom from entering the body.

Second, siempre-me-verás-así ("always-you-will-see-me-like-this") Lamiaeae, indet.) Is a plant red like blood and, in combination with the "dark violet guayave" (guava) Psidium guayava L., Myrtaceae), is used for dysentery.

Third, vergonzosa (= the bashful) Mimosa albiola Humb. & Bonpl., Mimosaceae), which folds up its leaves when touched, is employed as tea to speed up labour ("the child is ashamed to go out into the world"). The reactions of the body to a certain plant are carefully observed. Each body may react differently, and therefore if the plant has culturally perceived side reactions, or the illness does not improve, another medication will usually be tried.

Food

In daily life it is important to eat balanced diets to prevent illness. Especially during pregnancy and illnesses someone has to care more about food in order to support the curing. Corn and beans are generally allowed because they are basic food staples. Fruits and vegetables are divided into humorally 'hot' and 'cold'. For example, watermelon, lemon, quenelles (various potatoes) and potatoes are 'cold', while apples, pears, and the herb hierba mora (= herb colored like blueberry) Solanum nigrum L., Solanaceae) are 'hot'. It is also possible to fall ill, if someone eats a food item at a wrong time, for example, bananas, which are 'cold', if consumed at night because then cause a stomach ache. By cooking a meal carefully, it is possible to change the humoral properties or to balance them. Accordingly, cooked food is 'hot' and non-cooked food is 'cold'. The same is true, for example, for imported drinks such as lemonade or cola drinks as well as for drinking water.

Discussion

"Traditional" medicine of today in the Sierra de Zongolica is a syncretic mix of Spanish and indigenous traditions, which has developed since the conquest (AGUIRRE BÉRTRÁN, 1963). For the Nahua of the Sierra de Zongolica the hot/cold system is of greater importance than other classificatory systems. The example presented in this paper is in agreement with FOSTER (1994) and other researchers with regard to the importance of the 'hot/cold' system, but does not address the question of this system's origin. This is one example of how opposing forces of nature are used in indigenous classificatory system. Only a balanced body is healthy. This is in contrast to western societies, where nature is regarded as something that ought to be tamed and exploited (COTTON, 1996: 246). The concept of balance is one of the reasons for explaining illnesses using the 'hot/cold' classification, and consequently plants are selected based on humoral concepts. In the present classificatory system organoleptic and humoral properties are considered.
Tab. 1: Examples of plants’ classification divided into categories

<table>
<thead>
<tr>
<th>Classification</th>
<th>English</th>
<th>Indigenous name</th>
<th>Latin name</th>
<th>use(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>totonic</td>
<td>hot</td>
<td>gordolobo</td>
<td>Guaphium sp.</td>
<td>cough</td>
</tr>
<tr>
<td>cecic</td>
<td>cold</td>
<td>matale</td>
<td>Tradescantia pendula</td>
<td>urological inflammation</td>
</tr>
<tr>
<td>totonic/cevic</td>
<td>hot/aromatic</td>
<td>xochicuahuitl</td>
<td>Myrica cerifera</td>
<td>sweet baths, rheumatism</td>
</tr>
<tr>
<td>totonic/chielic</td>
<td>aromatic</td>
<td>albahaca</td>
<td>Ocimum basilicum</td>
<td>mal aire</td>
</tr>
<tr>
<td>totonic/chielic</td>
<td>hot/bitter</td>
<td>verbena</td>
<td>Verbena sp.</td>
<td>colics</td>
</tr>
<tr>
<td>yamic/chielic</td>
<td>lukewarm/bitter</td>
<td>marrubio</td>
<td>Marrubium vulgare</td>
<td>colics, venoms, diarrhoea</td>
</tr>
<tr>
<td>cecic/chielic</td>
<td>fresh/bitter</td>
<td>fresno</td>
<td>Fraxinus uhdei</td>
<td>fever</td>
</tr>
<tr>
<td>tsopac</td>
<td>sweet</td>
<td>hinojo</td>
<td>Foeniculum vulgare</td>
<td>empacho in children</td>
</tr>
<tr>
<td>xoco</td>
<td>sour</td>
<td>guayava</td>
<td>Psidium guajava</td>
<td>edible sour fruit</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td>hierba del guano</td>
<td>Phylianthus nimirri</td>
<td>bites of venomous insects</td>
</tr>
</tbody>
</table>

1 delicious, which has a good taste; “huel” = good (Stanley, 1977)
2 xoco = fruit
3 doctrine of signatures

(Messer, 1991). While the organoleptic properties are important in many cases, it could not be ascertained whether they have a close relation to the humoral classification. Chemosensory properties are especially employed to recognize or characterize a plant. The most important taste and smell properties are bitter and aromatic. These properties are used in the decision against which illness a plant may be used, for example, bitter plants for some stomach disorders, fevers, and diabetes, and aromatic ones for baths to relax or warm the body. Additionally, the healers explain the use of a certain plant based on the similarity of plant and illness (doctrine of signatures), or on visual impressions. Sometimes they cannot clearly state their reasoning. These concepts stand parallel to the ‘hot/cold’ classification. It is not possible to subsume, for example, the taste and smell properties under ‘hot/cold’ classifications. Each set of concepts is autonomous, and may be used simultaneously on one plant. This finding is different from the results of investigators who did not observe other concepts than the ‘hot/cold’ classification (Tedlock, 1987) or who include it under a basic ‘hot/cold’ classification.

Looking at classification from a linguistic point of view, Nahua is not very rich in words descriptive of plant properties, using the known systems of classification. Berlin and Kay (1991: 16) proposed a correlation between color vocabulary and general cultural complexity. For small populations with limited technology living in isolated areas the differentiation of fine shades in nature are more important than gross differences. For example, among the Nahua there are not any differences in the expression for fresh and cold (cevic) and for the colors blue and green (xocoxtic), but there exist the shade dark blue/green (matatlilin). Perhaps the Nahua concepts will change in the future because there is much influence from mestizo culture. Programs of the national health organizations for healers and midwives promote the penetration of biomedical ideas into traditional medicine. Traditions such as the use of indigenous language and the practice of native medicine are disappearing. The use of a mixture of pharmaceuticals and herbs is one instance. Some pills are also included within the ‘hot/cold’ system, for example, a commercial digestive treatment is considered to be ‘cold’. More detailed anthropological studies in other regions of the Sierra de Zongolica are needed to prove and to expand the observations made to this point. These studies preferably should be conducted in the cold zones (tierra fría), because in those areas traditional forms of treatment still exist to a greater extent.

Taste/smell properties and cultural concepts of plants in general are one criterion for the selection of plants for pharmacological and physico-chemical investigations (Heinrich, 1994). These data also help us to better understand concepts of medicinal plants within a culture (Oerrg de Montellano, 1976) and interculturally. The interdisciplinary approach of our work requires both natural science and anthropological methods. Those analyses and pharmacological studies (Bork et al., 1996) can help to explain the local division into the various classificatory concepts and properties. The combination of natural science and anthropological methods is a potentially valuable and interesting way to study classificatory systems, as well as to complement purely anthropological studies.

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Zusammenfassung

Arzneipflanzenbestand der Nahua der Sierra de Zongolica, Veracruz (Mexico)


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Address of the authors:
Dr. M. Heinrich, Institute of Pharmaceutical Biology, University of Freiburg, Schaezlerstraße 1, D-79104 Freiburg