

HERB MEDICINE OF THE AZTECS.*

BY EMILY WALCOTT EMMART.

The earliest knowledge of herb medicine among the Aztecs or Nahuas of Mexico was undoubtedly brought with them from the lands of the mystical north-west at the time of their legendary migration into the Valley of Mexico. These aggressive, vigorous people settled among the Toltecs—a Nahua speaking people of an earlier migration—and it was from them that the Aztecs received many of their cultural ideas. With the establishment of Tenóchtlan as a capital city in 1364 and the subjugation of neighboring tribes the boundaries of the Aztec Empire were extended to cover not only the arid highlands but also the rain forest and tropical regions near the coast. With this expansion herb medicine of tropical regions was added to the earlier herb lore of the Aztecs. Conquests of the Mayans to the south and the Zapotecs to the southwest brought them knowledge of tropical plants of Yucatan, Guatemala and Oaxaca. Medical practices were received from the Tarascans, directly to the west, although this latter tribe never became part of the Aztec Empire. Thus it would seem that as the Toltecs and the Zapotecs had been influenced by the older Mayan culture, so the culture of the Aztecs was stimulated and modified by the older tribes of Mexico.

At the time of the Conquest medical practices had reached a high degree of development. Among the Aztecs modes of treatment seemed to be comparatively free from charms and incantations. The rôle of the physician had become an exalted one. From those who excelled in this profession Montezuma selected a group as court physicians to administer to the nobility, to teach the use and preparations of herb medicines, and to carry on experiments with the various plants which grew in the royal gardens. The historian, Torquemada, records that the common people went rarely to these physicians not only because a fee was charged but also because the medical value of herbs was common knowledge and they could concoct remedies from the plants in their own gardens. Although history has left us practically nothing of the herb gardens of the middle classes, cultivation of small "milpas" must have been a common practice since we learn from the letters of Cortez that an entire street in the market district of Tlaltelolco was given over entirely to herb sellers. Here special houses were set aside for apothecaries where they sold medicine both for drinking and for use as ointments and salves.

Excellent descriptions, however, have come down to us of a number of spacious gardens of the nobility into which were transplanted trees and shrubs from many parts of Mexico. Extensive gardens existed at Texcotzinco, near Lake Texcoco, at Iztapalapa, at Chapultepec and lastly the famous one at Huaxtepec in the tropical valley south of the Valley of Mexico. In the garden of Huaxtepec a monastery was established after the Conquest and it was here that Sahagun, Hernandez and Ximenez obtained a knowledge of native plants.

Since Mexico did not have a written language prior to the coming of the Spaniards, medical knowledge passed verbally from person to person, and from generation to generation, gathering variations as it was transmitted from one locality to another. Extensive libraries existed, accounts of which have been left us

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by the "conquistador" and historian, Bernal Diaz. Concerning the library of Montezuma he wrote, "I remember that at that time his steward (Montezuma's) was a great Cacique to whom we gave the name of Tápia and he kept the accounts of Montezuma in his books which were made of paper they called amatl, and he had a great house full of these books." These codices folded fan-shape and of native paper were largely records of chronicles, religious customs and legal records and tribute lists. Of the fourteen Aztec pre-Columbian codices which have come down to us thus far, none deal with medicine. We must therefore turn to the writings of the sixteenth century after the Conquest for our knowledge of Aztec medicine.

The Badianus manuscript, written by two Aztecs educated in the College of Santa Cruz, Mexico City, is the earliest and only one thus far discovered which was written by the Aztecs themselves. Other sixteenth century texts of importance are the chapters dealing with native medicine from the history of Friar Bernardino de Sahagun, the Thesaurus of Francisco Hernandez and the translation of part of Hernandez's manuscript by Ximenez. A little later the works of Monardes introduced Aztec medicine into Europe.

All of the manuscripts dealing with Mayan medical treatment are of the eighteenth century and show distinct evidence of the introduction of European ideas. Barring this fact, similarities between Aztec and Mayan modes of treatment exist. The number of medicinal plants used by the Aztecs are legion; Hernandez alone refers to some twelve hundred. It will therefore be possible to point out only the extent to which native therapeutics had developed at the time of the Conquest and to give a few of the more representative remedies. Herbs of the Aztecs may be grouped according to their therapeutic uses, such as: purgatives of which there is an extensive list, laxatives of a milder nature, diuretics, hemostatics, expectorants, antipyretics, antispasmodics, as well as specific remedies for teeth, aural and oral ailments.

Plant remedies were administered in the form of infusions, decoctions or extracts, powders, plasters and ointments or oils. Certain parts of the plants were usually triturated, sometimes in spring water either hot or cold. Medicines were usually not simple but a combination of several plant extracts. Stones and earth of diverse kinds were not infrequently ground and mixed. The frequent use of the bezoar stone and the wide distribution of animals from which it was obtained is indicative of the fact that it had long been of common use before the coming of the Spaniards. Parts of animals, such as, the gall bladder, the brain, bone and blood were sometimes resorted to. Specific directions were given for the administering of the drug and for controlling the behavior of the patient.

Among the most interesting of the groups of herb remedies are the narcotics, the Aztec knowledge of which far exceeded that of Europe in the sixteenth century. The most important of these were the numerous varieties of *Datura* which grow abundantly in Mexico. The Aztec, recognizing distinct plant differences, gave them specific names as "Tlapatl" (*Datura stramonium*), "Toloatzin" (*Datura innoxia*) and "Ololiuhqui" (*Datura meteloides*). Besides numerous other *Daturas* are various closely related *Solanaceæ*, one of which should be mentioned here. This *Datura* (*Solandra hartwegii*) was described by Hernandez as a narcotic held in high esteem by the Aztecs. These plants owe their virtues to certain alkaloids principally atropine, hyoscyamine, scopolamine and solandrine.

To the names of a number of narcotic plants the Aztecs added the prefix "teo" meaning divine or sacred. These plants were either chewed or used in the preparations of decoctions which produced hallucinations regarded as part of the ceremonies of certain religious cults. The "Teonanacatl" is a black mushroom which when eaten produced a delirium during which the participant saw strange visions. The effect lasted for two or three days and sometimes produced insanity. Similarly, the small cactus fruit, the "peyote" (*Lophophora williamsii*) was eaten to produce hallucinations; a practice which was not only characteristic of Mexico but also of the Indians of our own Southwest.

A powerful narcotic was administered to the captives and slaves who were to be sacrificed in religious worship. This decoction was obtained from the bark of the tree called "Teuветli" which has been somewhat doubtfully classified as *Elaphrium bipinnatum*. This apparently tended to stupify without inhibiting muscular activity, since the victim was compelled to climb the high, steep steps of the "teocalli." The extract was also used in direct application to the wounds.

The "chicalote" (*Argemone mexicana*) which possesses the alkaloid, berberine, was used as a tonic, alterative and laxative as well as a narcotic. Martinez reports that it also possesses a substance analogous to morphine, the effect of the dose being the same as an opiate.

Among the sedative and sleep-producing compounds the extract of *Cannabis indica* was used as well as the extract of "Tlacoxiloxochitl," the *Calliandra anomala*. The sap of this tree was instilled into the nostrils to produce sleep as was also the *Argemone mexicana* and the *Senecio canicida* which was known to the Mexicans as "Itzcuimpatli." The leaves of the black night shade (*Solanum nigrum*) were used in making a decoction for sore eyes as well as certain skin diseases. Recently the leaves have been sometimes substituted for the real Belladonna.

Of the stimulants perhaps the best known is the resin of the *Guajacum officinale* which was also used as a stimulant and diaphoretic. The sarsaparilla (*Smilax mexicana*) was used as a tonic and employed in the treatment of syphilitic afflictions, fever and rheumatism. Among the numerous other stimulants known to the Aztecs are the chilli, the tobacco and the cocoa. The extract of the *Annona reticulata* called "Quauhytzapotli" was usually added to the cocoa to heighten its stimulating quality. They were acquainted with an extensive list of fermented wines, many of which still survive. Besides the use of bitter tonics and alcoholic beverages the Aztecs knew a third class of stimulants which relieved muscular fatigue, thus permitting sustained exercise.

Wounds were washed and poulticed or merely wrapped depending upon the condition of the injury. Applications to the wounds were usually extracts from plants of pain-relieving and astringent in quality. One remedy which was always at hand and in common use was the pulp leaf of the agave which was baked and pounded into a poultice. Extract of the leaves of the "copalquahuitl" (*Schinus molle*), the powdered leaves of tobacco, *Solidago montana*, chilli and the balsam of the maripenda, resin of the pine, and the root of the "nochtli" are examples of the widely diverse substances which were used in the treatment of wounds.

Treatments for the skin infections were numerous and played an important rôle in Aztec therapeutics. Eruptions were regarded as belonging to diverse ailments and required specific treatments. Descriptions of the eruptions were noted

whether recurring or not, the location of the eruption, and whether these eruptions became infected. Boils were brought to a head, cleansed and dressed with ointment. Extract of witch-hazel, resin of pine, leaves of the *Annona squamosa* are a few of the remedies in use. Oils from the seeds of *Persea* and extracts of the fruit, *Spondias mombin*, were a common cure for skin eruptions. Not infrequently the body was painted with vegetable dyes, as with the use of blood red juice of the *Rivina humilis* and the juice of the indigo plant. Of the numerous remedies used by the Aztecs, only a few have been introduced into modern medicine, namely: liquidambar, sarsaparilla (*Smilax medica*), Mexican scammony or orizaba-jalapa root (*Ipomœa orizabensis*), Guaiacum (*Guajacum officinale*), copal (*Elaphrium bipinnatum*), *E. forullense* *Lippia mexicana* and various balsams and gums.

The vast store of Aztec herbal remedies which it has not been possible to touch here should prove a fruitful field for further investigation and experimentation.

CHEMICAL STABILITY OF ANESTHETIC ETHER.*

FORMATION OF ALDEHYDES AND PEROXIDES IN ETHER STORED IN CONTAINERS NOT SEALED OR TIGHTLY CLOSED.

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The chemical stability of anesthetic ether in the sealed containers of commerce and in these same containers after having been opened is a matter of interest and importance. This is attested by the italicized portion of the U. S. P. X monograph on Ether:

"Caution—Ether to be used for anesthesia must be preserved only in small, well-closed containers, and is not to be used for this purpose if the original container has been opened longer than twenty-four hours."

The present report deals only with the changes occurring when the containers are stoppered with corks such as probably would be used if a sealed can were opened and set aside for use at some later time. The results show that, irrespective of the size or type of container, an aldehyde- and peroxide-free ether does not remain unchanged under these conditions: both aldehydes and peroxides develop. In addition to these questions of chemical purity, storage of ether in other than sealed containers raises the very practical considerations of ether evaporation and increased fire hazard.

Chemical stability can be studied only by using tests of the highest possible accuracy and sensitivity; otherwise one will not know whether impurities are or are not present initially, whether such impurities do develop and if so what quantities form. The tests used in the present work are as follows:

Aldehydes.—The fuchsin method as described by Carey, Green and Schoetzow,² further refined by controlling the temperature at 20° C. This test is accurate to 0.5 p. p. m.

Peroxides.—A special cadmium potassium iodide method,³ suitable for quantitative work, and sensitive to 0.1 p. p. m.

* Section on Practical Pharmacy and Dispensing, A. Ph. A., Portland meeting, 1935.

¹ Chemical and Pharmaceutical Laboratories, E. R. Squibb and Sons, Brooklyn, N. Y.

² JOUR. A. PH. A., 22, 1237 (1933).

³ Green and Schoetzow, *Ibid.*, 22, 412 (1933).