

THE PHARMACOLOGY OF THE ANCIENT MEXICANS*

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THE Egyptians appear to have been the first people to make a study of botany, and particularly of the medicinal virtues of plants. For many centuries the practice of the healing art among them was confined to the empirical use of remedies of vegetable origin in the treatment of those ailments that did not require surgical intervention.

The Greeks adopted the same system. In his great poem, the "Aeneid," Virgil refers to this method, a method which afterwards was handed down to the Romans and others of our later ancestors.

Similarly, as has been the case with most primitive peoples, the ancient inhabitants of Anáhuac based their therapeutics, that is, their medical treatment of disease, principally on their knowledge, empirical and scientific, of medicinal plants of which they also made a special study.

We have learned a good deal about the pharmacology of these early and highly cultured Mexicans, through the writings of various reliable historians, and particularly through those of the celebrated Hernández sent especially by the Crown of Spain to study the flora and fauna of Anáhuac. In his great work on "Natural History" Hernández speaks extensively of the pathology and the *materia medica* as developed by those extremely interesting inhabitants of the New World.

In describing the wonderful basis upon which the Mexicans built their

knowledge of botany, especially of medicinal plants, Hernández refers also to their therapeutics, bringing out the fact that the largest number of the remedies employed by those people was of vegetable origin.

The Aztecs, indeed, were great horticulturists and devoted much of their time to the study of plants, preferably of those that seemed to possess medicinal virtues.

As far as we have been able to learn, the last king of Pergamus, Attalus III, or Philometer as he was also called, who lived about 130 years before Christ, insisted that in the royal gardens, in preference to other plants, those having medicinal virtues should be extensively and carefully cultivated.

The same thing was done in the New World many centuries after, similarly through kingly influence, in the magnificent gardens of the Aztec monarch, Montezuma II; but with a difference worthy of notice: Attalus would use the poisons obtained from certain plants, to do away with his political enemies, a practice followed so extensively by later rulers. Montezuma, on the contrary, ordered the best medicinal plants discovered and cultivated in the royal gardens, to be distributed among his subjects gratuitously, that they might employ them in the treatment of their ills with the advice of the physicians furnished by the government.

On the other hand, accustomed as they were to eat those herbs that had

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a pleasant taste, the Mexicans at large, outside the royal gardens, became acquainted with medicinal plants with which they enriched their pharmacology, this being at first, as has been intimated, of a purely vegetable character.

Later, however, the Mexican healers and the regular physicians widened their knowledge in the treatment of disease by studying and employing remedies of mineral and animal origin also.

Among the former, the Aztecs used common lime (*tenexte* or *tenextli*) in the treatment of certain gastrointestinal disorders, especially enterocolitis, the use of which mineral still persists, and for the same purpose.

A substance somewhat resembling Liquidambar, called by the ancient Mexicans *cozticpecpatl*, was used in heart troubles. Sulphur (*tlequiquiztlali*), alum (*tececec*) and common salt (*yztlatl*) were similarly employed in various affections.

In the form of realgar or red sulphide of arsenic (*micuanpatli*), and in that of the yellow oxide of arsenic (*teteyetli*), that mineral drug was used extensively by the ancient Mexicans in the treatment of skin diseases, just as we now employ it in exactly the same affections. This practice has hardly suffered any change in modern times.

It is justifiably believed that a large number of cutaneous eruptions are due to syphilitic infection; and no better remedy, with the exception of mercury, perhaps, has been offered to combat such eruptions than arsenic. Arsenic, therefore (it may be said in passing), cannot be looked upon as a new remedy in the treatment of syphilis, as has been claimed, even if that drug appear in the commercial

form of 606 or salvarsan, or with the scientific name of *dioxydiamidoarsenobenzol* or *diaminodihydroxyarsenobenzene hydrochloride*, or, more simply, *arsphenamine*. As in many other instances, we can here exclaim: *Nibil sub sole novum*: there is nothing new under the sun.

Remedies obtained from the animal kingdom are also as old as the practice of medicine, and among all peoples.

Pliny severely arraigned the Greeks for using the human flesh in the treatment of certain diseases. In Rome, Musa was the first to use the meat of snakes for similar purposes.

During the 13th century, Gilbert, of England, employed the meat of the lion against apoplexy with alleged good results.

Some of the Mexican tribes used the warm blood of the deer in epilepsy, and later that of other animals for the same purpose, a custom that still prevails among the natives.

In the treatment of other ailments, the ancient Mexicans employed largely the following substances: tiger's meat against nervous troubles, and the excrement of the same animal to combat insanity particularly; the meat of the *tlepatli*, the iguana, and that of other species of the lizard family; that of *quatapalcatl*, the chameleon, and others.

The Mexicans attributed medicinal virtues to several species of the black beetle, and some of these remedies are still in use in the therapeutics of today.

For instance, we moderns have retained as therapeutic agents of some value the cockroach and the Spanish fly, in diverse forms, in the treatment of certain disorders. The Spanish fly, by the way, is not a fly but a beetle, and is known technically as can-

tharides, or, better still, as *Cantbaris vesicatoria*. The cockroach or *Blatta orientalis* is still employed, particularly in Russia, in the treatment of dropsical diseases.

Nowadays some of us are likely to be considered fossil practitioners if we fail to employ the endocrine products so named, for which unusual claims are made as curative remedies, despite the fact that we are yet largely ignorant of the physiology and pathology of the various ductless glands from which such products are obtained. But what about the substances contained in certain glands of the musk-deer, *Moschus moschiferus*, and in the preputial follicles of the common beaver, *Castor fiber*, substances which we have for a long time been using as good antispasmodics?

Be all this as it may, the primitive Mexicans, as is the case with most peoples and at all epochs of civilization, obtained the large majority of their remedies from the vegetable kingdom.

We know that in Anáhuac all classes of people, men, women and children, educated and non-educated, became intimately acquainted with many remedial herbs which they gathered at certain times of the year, in the fields at large or in the cultivated gardens, and in various crude or pharmaceutical forms employed them in the treatment of disease.

Betancourt and Sahagun refer in their works to how they were taught the properties, true or imaginary, of many plants, specimens of which were carefully preserved in the herbariums established by the natives of Tlalteolco. A large number of these medicinal plants are at present in use by the modern Mexicans. The knowledge about many of these plants was

transmitted to the Europeans by Hernández.

Among those vegetable remedies, of real therapeutic value, that the Mexicans taught the Europeans, and which have come down to us, may be mentioned the following: sarsaparilla, jalap, the castor oil plant, stramonium, cassia fistula, the cacao bean from which theobromine is obtained, Indian hemp, the various species of capsicum, chenopodium, tobacco, a species of poppy, and others. Some of them have been discarded or forgotten, as, for instance, the oil extracted from the rubber tree, a plant technically known to us as the *Castilla elastica*, and which oil was employed in the treatment of bronchial affections and against hemorrhages.

In their pharmacotherapy the Mexicans used not only the simple plants themselves in diverse forms, but also official preparations, combinations or formulas made up of various ingredients, since they had formed their own pharmacopeias.

In their therapeutic classifications were included some original groups of vegetable drugs exhibiting similar properties, just precisely as is done at present. And so they had their astringents, purgatives, laxatives and drastics, emetics, diuretics, diaphoretics, antipyretics, tonics, expectorants, emollients, emmenagogues, narcotics, hemostatics, alteratives, anthelmintics, and others.

To some remedies, singly or in combination, the Mexicans attributed imaginary virtues to conform with the superstitions and commercialism of the times. Some of the remedial agents were administered, accompanied with supplications to this or that divinity, so that the effect desired might be produced; and likewise in the preven-

tion of disease, especially during their theosophic ceremonies or religious rites. Often they relied solely on the efficacy of prayer.

So, then, we observe that quackery and superstition, in this regard, were as common among the ancient Mexicans as among other peoples at all times and at all grades of civilization.

Mesmerism, hypnotism and suggestion (all three may be included in the single word psychotherapy), homeopathy, osteopathy, chiropractic, Christian Science, and other superstitious therapeutic cults are being practiced today in spite of the alleged progress of scientific medicine.

Are we moderns, then, better prepared than our ancestors to prevent or combat disease by employing what we call rational scientific methods? For even the latter are not entirely devoid of a certain amount of charlatanism and commercialism.

The Nahoas, it is true, employed what we now consider as erroneous methods of treatment; but they did so in conformity with the predominant astrological theories of the times.

The Mexicans of old looked upon the organs of the body and some of its parts in such a way as to have them represent either the twenty signs or figures used by them in their mathematical system, or the twenty days of which their month was composed or, again, twenty of the then known heavenly planets. The latter two suppositions are the most commonly accepted; for we find, for instance, that, according to Humboldt, these signs constituted their zodiac. And both, the German scientist, and Chavero, the Mexican historian and archeologist and one of the greatest authorities on ancient Mexican hieroglyphics, believed that

these signs had an astronomical significance.

To obtain a better idea about this phase of the peculiar therapeutic system of the ancient Mexicans, I will have to refer briefly to their chronology and their astronomy, as I have had occasion to do before.

The Nahoas divided the time into periods or ages, each one of which was made up of two centuries; each century was composed of fifty-two years; each year of eighteen lunar months; each month of twenty days, or four weeks, and each one of the latter of five days. The day was divided into a certain number of periods of equal length, corresponding to our hours, and were determined by the course or movements of the sun and other heavenly bodies.

The twenty days of each month were related to twenty planets, and each one of these was made to represent an organ or part of the human body, as follows:

Cipactli, the sun, was related to the liver; *Ehecatl*, the wind, to the lungs, or the respiration; *Calli*, the house, to the right eye; *Cuetzpalin*, the lizard, to the buttocks; *Coatl*, the serpent or snake, to the reproductive organs; *Miquiztli*, grim death, to the head; *Mazatl*, the deer, to the right leg; *Tochtli*, the rabbit, to the left ear; *Atl*, the water, to the hair; *Itzquintli*, the common dog, to the nose; *Ozomatli*, the monkey, to the left arm; *Malinalli*, an herb (classification unknown), to the intestines; *Acatl*, the arrow, to the stomach; *Ocelotl*, the tiger, to the left leg; *Cuaubtli*, the eagle, to the right arm, *Cozcacuaubtli*, the vulture, to the right ear; *Ollintonatiub*, the earthquake, or the four movements of the sun, to the tongue; *Tecpatl*, the arrow-head, to the

teeth; *Quiabuitl*, the rain, to the left eye; and *Xochbil*, the flower, to the breasts.

As may be observed, we have here the zodiac of the ancient Mexicans, some of which signs (five of them) were, singularly enough, exactly the same as those of the Chinese zodiac, to wit: the rabbit, the monkey, the dog, the serpent and the tiger; and two of them, that is, the lizard and the eagle of the Mexicans, correspond to the crocodile and the hen of the Chinese. Can this be a mere coincidence, or could it be considered as an evidence that there was some sort of intercommunication of these two peoples in prehistoric times?

Be this as it may, the inhabitants of Anáhuac laid a good deal of stress upon the order of the figures mentioned, as well as upon the hour during which an individual became sick; and if the illness corresponded to the prevailing sign of the zodiac, then they would make use of the remedial measures or medicines supposed to be the most proper, according to the case.

Such practice was similar to, in fact, not much different from, the methods employed in the 16th century, as followed and recommended by Paracelsus, one of the most distinguished physicians of the Old World.

Paracelsus sought and believed he had found a certain harmony between the different parts or organs of the human body, and the planets, satellites and constellations of the heavens. He thus, for example, held that there was some relation between the heart and the sun; between the brain and Diana, or the moon (the word *lunacy* sufficiently explains itself); and between certain other organs and Mars, Saturn, Mercury, etc., represented in his therapeutics by gold,

silver, iron, lead, mercury, etc., respectively, with which mineral remedies he pretended to combat the diseases depending on the actions of these planets.

Having utterly discarded nearly the whole of the dogmatic medicine of most of his predecessors, Paracelsus offered what? And some one has answered:

Certainly not pure empiricism, or habits of objective observation. He had a dogma of his own—one founded, according to his German expositors, on the views of the Neo-platonists, of which a few disjointed specimens must here suffice.

The human body was a *microcosm* which corresponded to the macrocosm, and contained in itself all parts of visible nature: sun, moon, stars, and the poles of heaven. To know the nature of man and how to deal with it, the physician should study, not anatomy, which Paracelsus utterly rejected, but all parts of external nature. Life was a perpetual germinative process controlled by the in-dwelling spirit or Archeus; and diseases, according to the mystical conception of Paracelsus, were not natural, but spiritual. Nature was sufficient for the cure of most diseases; art had only to interfere when the internal physician, the man himself, was tired or incapable. Then some remedy had to be introduced which should be antagonistic, not to the disease in a physical sense, but to the spiritual seed of the disease.

These remedies were arcana—a word corresponding partly to what we now call specific remedies, but implying a mysterious connection between the remedy and the *essence* of the disease. Arcana were often shown to be such by their physical properties, not only by such as heat, cold, etc., but by fortuitous resemblances to certain parts of the body; thus arose the famous doctrine of signatures, or signs indicating the virtues of natural objects, which afterwards

developed into great complexity. Great importance was also attached to chemically prepared remedies as containing the essence or spiritual quality of the material form from which they were derived. The actual therapeutic resources of Paracelsus included a large number of metallic preparations (as has been already mentioned, such as gold, silver, iron, lead and mercury) in the introduction of some of which he did good service, and, among vegetable preparations, the tincture of opium, still known by the name he gave it, laudanum. In this doubtless he derived much advantage from his knowledge of chemistry, though the science was as yet not disentangled from the secret traditions of alchemy, and was often mixed up with imposture.

Of the followers of Paracelsus some became mere mystical quacks and impostors. Others, of more learning and better repute, were distinguished from the regular physicians chiefly by their use of chemical remedies. In France the introduction of antimony gave rise to a bitter controversy which lasted into the 17th century, and led to the expulsion of some men of mark from the Paris faculty. In England *chemical medicine* is first heard of during the reign of Elizabeth, and was in like manner contemned and assailed by the College of Physicians and the Society of Apothecaries.

I may be pardoned for the foregoing digression; but I have endeavored to show that the original Mexican medicine, partly superstitious, it is true, was imitated and obtained a large following in Europe during the 16th century, which, in some way or other, was probably derived from the practice of the Nahoas, the Toltecs and the Aztecs, through the Spaniards who carried it over there.

The pharmacotherapy of the Mexicans, impartially and carefully examined, rational and scientific in many instances, was at first empirical,

tinged with superstition, as was that of Eastern origin. In many respects it was essentially different. For example, in the healing art of the East blood-letting was absolutely proscribed; in Anáhuac, on the contrary, it was extensively employed, and later the same method became quite popular in Europe.

To conclude this imperfect exposition of ancient Mexican pharmacology, I will refer partly and briefly to a therapeutic arsenal that was based largely on observation and actual experimentation. As intimated before, some of the original Mexican remedies are still in use in modern therapeutics.

Among the antispasmodics we recognize the *Artemisia mexicana*, called by the Mexicans *iztauhyatl*, and the rosemary, the *Rosmarinus officinalis*.

Expectorants: *chian*, a species of common sage, the *Salvia hispanica* and a resin obtained from a species of pine, the *Pinus teocote*.

Cathartics: *cuitapatli*, the *Valeriana mexicana*, not to be confounded with *Valeriana officinalis* which is an antispasmodic; *tlapatli*, or common castor oil plant, the *Ricinus communis*; *nabuiteputz*, or the *Biddens crocata*; *tlacopatli*, or the *Aristolochia mexicana*; *temecatli*, or the *Cissus tiliacea*; *cuauhtzahuatl*, or *Convolvulus arborescens*; *tepetomatli*, or the *Arctostaphylos tomentosa*.

Laxatives: *boaxin* or *cuaubnacaztli*, a species of tamarind and the purging cassia or the *Cassia fistula*.

Drastics: *tlanquiloni* and *tlalan-tlacuitlapilli*, two species of jalap, the *Exogonium purga*, jalap proper, and the *Batatas jalapa*, respectively; *cuauhmecatli*, or the *Serjania mexicana*.

Diuretics: *boitziloxitl*, a balsam obtained from the *Myroilum sonsana-*

tense; *ulquabuitl*, the bark of the rubber plant or *Castilla elastica*; the seeds of *xocoxochitl*, the *Myrtus pimenta*; *jaltomatl*, the root of *Saracha jaltomata* or *Atropa dentata*; *yoloxochitl*, the *Magnolia glauca*.

Antipyretics: *achiotl*, the *Biza orelana*; *chibicaquibuitl*, the *Sonchus oleraceus*; *quetzalbuexotl*, the *Salix pentandra*; *tonalxochitl*, the *Blatta coccinea*; *totonquixibuitl* or *etzpatli*, the *Calamus draco*; *cacacoatl*, the *Theobroma cacao*.

Antiperiodics: *chicalotl*, the *Argemone mexicana*; *cempoalxochitl*, the *Tagetes erecta*; *epaxibuitl*, the *Croton vulpinum*; *tlacebuiloni*, the *Geranium bernandezzi*. Some of these were employed in the treatment of the quotidian, and others in that of the tertian and the quartan types of malarial fever, showing that the Mexicans of old were perfectly familiar with the various forms of the disease. It may be said, in passing, that the inhabitants of Anáhuac did not know, it seems, the virtues of the cinchona bark commonly used by the Incas of Peru in the treatment of malaria.

Emmenagogues and oxytoccics: *tlatlancuaye*, a species of *Piper longum*; *tlalquequetzal*, the *Adiantum trap-eciforme*; *tlilxochitl*, the *Epidendrum vanilla*; *cocomecaxibuitl*, the *Smilax rotundifolia*; *yoloxochitl*, the *Magnolia glauca*; *cibuapatli*, the *Montanoa tomentosa*, to which the Spaniards gave the name of uterine herb (*yerba uterina*) on account of its remarkable effects upon the womb.

Among the anthelmintics the one most commonly used by the Mexicans, was the *epazotl*, the *Chenopodium ambrosioides*, probably the same as the one we now know under the name of *Chenopodium antbelminticum*, em-

ployed at present and everywhere for the same purpose.

I could mention a large number of astringents, hemostatics, emollients, insecticides, tonics, alteratives, and other well-classified remedies used by the ancient Mexicans in the treatment of disease; but such a course, though highly interesting, would be quite tedious.

However, I must recall a few of their narcotics, sedatives and anesthetics, agents employed to relieve pain, agents which have always been especially studied and investigated from time immemorial by medical men.

Dioscorides, the Greek physician, mentions in his materia medica, the extract of mandragora as the chief narcotic and hypnotic used in his times, and it seems that the same plant, which belongs to the nightshade family, was also known to the Aztecs under the name of *tepillalilonipatl*. These people were likewise familiar with a species of poppy (classification unknown), which they called *ololiubqui*.

Besides these two plants, the ancient Mexicans made use of the following: *maribuana*, or Indian hemp, or hashish, the *Cannabis indica*; *tlapatl*, or Jamestown weed, the *Datura stramonium*; *tetlatia*, the *Rhus radicans*; *tomatl*, the *Physalis angulata*; *yoyotli*, the *Thevetia yccotli*; *tobonechichi*, the *Solanum nigrum*; *boitziloxitl*, the *Myrospermum pereiræ*; *coaptli*, the *Come-lina tuberosa*; *picietl*, or common tobacco, the *Nicotina tabacum*; *xumetl*, a species of honeysuckle, the *Sambucus mexicana*; *chicalotl*, the *Argemone mexicana*.

It appears that the most important of these narcotic and sedative drugs, and the one most commonly used, was the *Ololiubqui*.

Those who have read ancient Mexican history will remember that the Toltecs and the Aztecs, in their ceremonial religious rites, practiced human sacrifices for which prisoners of war were especially used.

The assigned victim was placed upon the sacrificial stone, and the priest would then open the breast with the obsidian knife, dexterously taking out the palpitating bleeding

heart which would be offered to *Huitzilipochtli*, the god of war.

This might be considered as a horrible, extremely cruel procedure. It was not so, however, for according to express judicial mandate the Mexican convict about to be sacrificed was previously narcotized that he might not suffer physical pain. The drug employed in such cases was precisely the species of poppy referred to: the *Ololiubqui*.

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