

# Pre-hispanic medicine

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**P**re-Hispanic America, isolated from the rest of the world, endured its own maladies and adversities. Its people had to fight hunger resulting from unexpected climatic changes, the physical and emotional sequelae of wars, and the short and long term consequences of different infectious processes. *Curanderos* or medicine men took care of their people in order to alleviate their suffering and prolong their lives.

Like in the rest of the world, there were very high infant and maternal mortality rates. To compensate for these as well as for the mortality caused by famine and wars, the birth rate was also very high. The more developed civilizations of pre-Hispanic America such as the Incas and the Aztecs counted with the methods required to secure the nutritional needs of their people.

In order to fight different diseases, *curanderos* coupled a magic-religious approach with the empirical knowledge of the curative properties of many indigenous plants, which were found in abundance in America, to practice their skills.

It is not possible to refer to one single pre-Hispanic or pre-Columbian medicine; in reality, there were as many practices' types as the number of civilizations which existed throughout the years in this part of the world. Therefore, when referring to pre-Hispanic medicine, it is necessary to be specific and to go to the sources to properly describe the practice of medicine in America prior to the arrival of Columbus. Of course there were some practices which were either the same or similar to many groups.

## STUDY SOURCES

With the exception of the Maya codes and the Inca «*quipus*» (an accounting system), there is limited written information about medical practices as described by the natives to the American continent. The information comes instead from the chroniclers; these were Spaniards, for the most part, of different education and professional backgrounds –soldiers, priests and men of letters- who described what they saw or heard about in the New continent during the XVI and XVII centuries.

These chroniclers, however, wrote about events that may had occurred many years before and, oftentimes, based only on second-hand information without having even been to America. The chroniclers described primarily what had occurred in the major civilizations such as the Inca; thus the information may pertain only to this and not to others since, for the most part, the different groups inhabiting the continent lived quite far from each other and lacked any effective communication system.

There were many civilizations throughout the years; they typically rised, achieved their pinnacle and then fell. That was the case for the Chavín and Cupisnique civilizations from the Early Horizon Period (1500-200 bc), the Moche and Nasca

from the Intermediate Period (100-700 ac), the Wari and Tiahuanaco from the Mid-Horizon Period (700-1200 ac), the Chimú from the Late-Intermediate Period (1200-1460 ac) and the Incas from the Very Late Horizon period (1460-1532 ac).

The study material left behind by the Native Americans may give us a good idea of the different diseases which may have affected them. Such material includes coprolites, skeletal remains and mummies but also ceramics in which some of the individuals and facts of the time have been represented; the later is almost exclusive of the Moche civilization.

### **Coprolites**

Properly treated, dry, condensed and indurated feces can provide information about the intestinal parasites of the individuals from whom they originated. Several different parasites have been found in coprolites from pre-Hispanic outhouses; some are very old like those from *Los Gavilanes* (Ancash, Perú) (2850-2700 BC) from the Late Archaic Period where *Diphyllobotrium pacificum* ova were found. Coprolites from the Chiribaya civilization in Southern Perú have yield also *Trichuira trichuris* ova (1-3).

In other places, and from more recent dates, *Enterobius vermicularis*, *Ascaris lumbricoides*, *Trichiura trichuris*, *Giardia lamblia*, etc have been found.

These findings indicate that these intestinal parasites have shared the American continent with their human inhabitants ever since they migrated from Asia more than 15,000 years ago.

### **Skeletal Remains**

The study of skeletal remains usually reveals the presence of specific maladies among the inhabitants of the area where these remains are found (4-7). We have:

- The Harris lines, or horizontal lines present in the diaphysis of long bones; they indicate growth arrest as a consequence of severe stress, disease or malnutrition and have been found in 15% of skeletal remains from the Nasca, Paracas, Tiahuanaco, Ica and Inca civilizations.
- The osteoma of the auditory canal, a bony excrescence which develops as a result of infections and which is common in fishermen diving to collect shellfish from deep littoral waters, has been found almost exclusively in male skeletal remains from coastal civilizations or from those around large lakes. This lesion has been also described in coastal populations from other continents.
- Between 3% and 13% of skulls from the coastal areas have lesions known as porotic hyperostosis or spongioperostosis; this is an enlargement of the spongy area of the skull bones, primarily present in the parietal and frontal bones and suggestive of bone marrow hyperplasia, such as seen in severe chronic anemia, which occurs in childhood.
- Cases of rickets and scurvy have been rarely documented in skeletal remains studied.
- Cases of osseous tuberculosis, particular of the spine (Pott's disease) have been variable documented in pre-Inca and Inca mummies; these cases have been examined radiographically and in some, bacteriological confirmation has been obtained by the polymerase chain reaction (PCR).
- Cases typical of spondyloarthropaties have been documented in some skeletal remains.
- Congenital malformations such as *coxa vara*, congenital dislocation of the hip and scoliosis have also been documented.

- Ancient skulls of the inhabitants of the American continent were mesocephalic; those that were dolicocephalic and brachicephalic had been made such by manipulation.
- Contrary to what it was thought of in the past, the so-called *epactal* bone or «Inca bone», which is a wormian bone located on the posterior borders of the parietal and superior borders of the occipital bones – and the so-called «Aymara bone»- or a small depression on the endocraneal aspect of the occipital bones between the ridges that separate the cerebellar cavities, are but two variants that are found with comparable frequencies in skulls from other human groups.
- In addition to the trepanations (see below), there is evidence that bone cauterizations also took place in pre-Hispanic America.
- Cranial deformations of variable degree were practiced within the pre-Inca and Inca civilizations, both on the coastal and Andean areas, apparently as a sign of social distinction. These cranial deformities started in infancy by the application of compressive splints to the skulls early in life while the infants were in the crib, or of bands or *llautu*. Studies of these deformed skulls have shown that the cranial cavity size remained unaltered in these individuals.
- There is also evidence from the study of skeletal remains, that there was syphilis in the American continent by the time Columbus arrived; from here it was taken to the Old continent.
- Rheumatoid arthritis has been described in skeletal remains of the New continent dating back to 4000 bc, while at the same time that has not been the case in European remains prior to the XVIII century and in Africa prior to the XX century.

### Trepanations

A lot has been said and speculated about trepanations of skulls prior to the arrival of Columbus into America, both within the pre-Inca and Inca civilizations. The interest for the study of trepanations started during the last few decades of the XIX century when such skulls were made available to Squier, Nelaton and Broca. What called their attention the most, was that there was true bone regeneration at the borders of the original trepanation holes which suggested to them that these procedures had been performed in living individuals.

Such practice has been performed in the past among many civilizations around the world and obeyed to magic-religious beliefs being the purpose the elimination of strange or malefic spirits which had taken over the ill person. This practice was performed on a trial and error basis given that those who performed these procedures had no anatomical knowledge; furthermore, given that they lacked antiseptic and aseptic practices, they had to be done rather quickly. It is possible that some individuals survived days or even longer after these procedures.

We have had several physicians dedicated to the study of trepanations including Lorena, Muñiz, Lavarorería, Tello, Bello, Quevedo, Mongrut Steane, Fernández, Trelles and, foremost, Weiss <sup>(4-6, 8)</sup>.

Several techniques were used including the scrapping and opening of circular holes (specially in deformed Paracas skulls and non-deformed Inca skulls). Other holes were fusiform; yet others were conic cylinders. Several different instruments similar to the surgical instruments available for trepanations nowadays, have been found in tombs suggesting that they were used for that purpose back then.

### **Mummies and Pre-Hispanic Maladies**

There is evidence from the visual inspection, and then the radiological studies of Inca mummies, that there was Pott's disease in pre-Hispanic America; this has been later confirmed by PCR (for polymerase chain reaction) by the presence of *Mycobacterium tuberculosis* DNA (9). In the study of a male mummy, of approximately 50 years of age, from the Nasca's civilization around 900 A. D., pleuropulmonary and osteovertebral involvements, with anatomopathological, radiographic and bacteriological confirmation (electron microscopy and PCR), was found (10).

With PCR, it has also been possible to identify the presence of *Trypanosoma cruzi*, the agent of Chagas' disease in pre-Inca and Inca mummies (10-13). Likewise, the identification of genetic material from the human T cell lymphoma virus (HTLV-1) in pre-Inca mummies, very similar to isolates from Asia, supports the theory that the inhabitants of this continent arrived from Asia via the Bering Strait (14). The study of coprolites from these mummies provides better information than the ones recovered from the outhouses. As to the ectoparasites, lice have been recovered from Chinchorro's mummies.

The radiological study of 188 mummies from Leymebamba (Chachapoyas civilization, Late Intermediate Period, 500-1500 AC) has revealed 22 (12%) cases of vertebral osteoarthritis, 12 (6%) cases of probable tuberculosis of the spine and 9 (5%) cases of osteomalacia (15).

### **Diseases Represented in the Mochica Ceramic**

The Moche civilization in the Northern coast of Perú spanned in what today are the departments of Piura, Lambayeque and La Libertad between the years 100 and 750 ac. The Mochicas reached a high level of political, social and economic development within a theocratic-military government. One of its most developed crafts was that of the ceramic; throughout its study information about health and disease can be obtained.

In addition to the ceramics which portray these people, there are diverse pieces of ceramic which demonstrate different congenital malformations (cleft palate, prognathism, dwarfism, «club foot», mongolism and polydactyly) and diseases (blindness, Bell's palsy, tumors, cutaneous leishmaniasis or *uta*, exophthalmos, kyphosis probably secondary to Pott's disease, amputations, use of prosthesis, edema, cutaneous lesions, etc). In the Moche ceramics, but also in those from Chimú, Chancay and some monoliths from Recuay, individuals with various, difficult to characterize, cutaneous lesions are represented; it has been speculated that they could be cases of syphilis, pian, warts or others.

The Moches also left behind ceramics representing different aspects of sexual life, probably related to their magic-religious beliefs about it.

### **Inca Medicine as Seen by the Chroniclers**

To have an idea of Inca medicine we rely in the written testimony from the so-called chroniclers. The most important ones were from those who were present during or immediately after the Conquest given that once the information is second or third hand, it tends to be less accurate.

Medicine during the Inca Empire was a mix of magic-religious practices and the empirical knowledge of the available medicinal plants and other medicines available from civilizations which preceded or occurred at the same time in the American continent.

There were some regional variations in the manner in which medicine men or *curanderos* practiced. The ones called *Camascas* were described by Polo de Ondegardo, Molina and Cobo.

Polo de Ondegardo wrote <sup>(16)</sup>:

«There are male and female Indians that heal diseases; they are called *camascas* or *soncoyocs*; they do not heal without offering sacrifices and charms. They say that they acquired their healing powers while, in their dreams, a sick person appeared and empowered them. Thus, every time they heal they offer sacrifices to the person who appeared on their dreams and gave them their healing powers and how to use them».

Molina wrote <sup>(17)</sup>:

«There were the so-called *camascas* who said that they had received their grace and virtue from the thunder; after the lightning strikes, and the person recovers from being afraid, they said that the thunder had given them the art of either healing with plants or of being able to answer questions being asked. Likewise, when somebody was able to escape from a very large river or danger, the demon would appear to show them the way to heal with herbs; these are also called Herbalist Indians».

One of the most detailed descriptions was from the Priest Cobo, who came to Perú in 1559, lived here for 48 years, dying in Lima in 1657. In his publication dating to 1653 he also talks about the *camascas* and *soncoyocs*, or the medicine men who healed with herbs and rituals and that <sup>(18)</sup>:

«Never used complex compounds; their healing was always with simple herbs. Among them there were big herbalists; from them we have come to know the medicinal properties of many plants which we are now using for curative purposes. Also their perfumes and liniments were simple and they applied them to areas that were painful or warm.

They also got to know the beneficial effect of bleedings and purges; however, they did not know about the pulse, or how to look at the urine, or much less to apply their medicines in an individual manner or to understand where diseases came from; that is because they had no idea of the four humours, their nature and their properties»

The mestizo Inca Garcilaso de la Vega wrote <sup>(19)</sup>:

«That is how for cleansing they decided that it was beneficial and even necessary to use bleeds and purges; therefore, they bled themselves from the arms and legs, without much knowledge of the anatomy of the veins for one disease or the other, rather they cut themselves at the places closest to the pain they were experiencing. When they had a severe headache, they cut themselves on the eyebrows, above their noses. For these cuts they used a stick to which they had tied a very sharp and punctiform stone which they applied to the skin overlying the vein and pushed it with a *papirote*. This method was more effective than others. To apply the purges they did not know of the *humours* such as the urine, phlegm and melancholy.

These purges and bleeds were performed by experienced individuals, usually old women (like the midwives here), and big herbalists, of whom there were many during the Inca times. They knew the virtues of many herbs, which passed to their children, and those were taken as physicians, not to cure all people but those from the Royal family and those of their blood and the *curacas* and their relatives. The common people healed each other since they had learned how to use these medications».

The Indian chronicler Guamán Poma de Ayala distinguished many types of witchdoctors. He described some of the sucker witchcrafts writing <sup>(20)</sup>:

«These witchdoctor spoke with the demons and said that by sucking they were able to extract diseases from the body; they extracted silver, stones, little sticks, worms, frogs, straw or maize which could have been in the bodies of men and women. Those were fake witchdoctor who lived misleading people and the demons in order to become rich out of the Indians who were made to believe in non-existent diseases such as *Taqui* or the disease caused by parties and entertainment; *Oncuychirapa*, a disease produced by the rainbow; *Oncuyucyo*, or disease of the water falls; *Uncuy pachamascasca*, or disease of the soil and earth; *Capac Uncuyuacamascasca*, or disease of the *Huacas*; *Pucyotap Yascansara*, or disease of the maize or smallpox; and *Papa Scoya Ormachiscan Oncuycona* or disease caused by falls. All these diseases gave rise to witchcrafting since the Incas taught the witchdoctors to adore the idols».

During the month of September took place the parades of *Coya Raymi* aimed at keeping diseases at bay <sup>(21)</sup>:

«During the month, and for orders of the Inca, they used to launch all diseases and pestilences from the empire. To this end, all men dressed with their army uniforms and wearing their war paraphernalia, just like if they were going to war, sent into the sky, either with arrows or with their bared hands, lighted missiles, shouting: diseases and pestilences leave from this town and leave its occupants in peace. At the same time they threw water into houses and streets, performing in that manner a general cleansing».

Just like Garcilazo, Guamán Poma also mentions that certain Indian witchcrafts performed bleeds and purges without knowing of the *humours*. It is likely that these practices had not been purely Indian but they were rapidly copied from the Spaniard surgeons and barbers and incorporated into their practice. The reason for this statement relies on the fact that bleeds and purges obey to a humoral conceptualization of disease, which was totally unknown to the Indian medicine men who practiced medicine rather on an empiric and magic-religious conceptualization of disease <sup>(22)</sup>:

«The Indian surgeons, barbers that cure by bleeding and known of diseases and ulcers, know the curative herbs, the medicines and purges that should be used to heal the sick. They heal also like a Bachelor or Doctor of Medicine with medications; they state that in humans, diseases come from two sources, either cold or hot, regardless of which disease is. Midwife and pious women, heal and help pregnant women deliver; some also tend to those who suffer dislocations and other diseases».

### **On syphilis in the New World**

Although the true origin of treponematosi is unknown, it is thought to have originated in Africa, moving from there to Asia and then to America. *Pinta* (*Treponema carateum*) is the oldest of them; in Africa, this microorganism mutated to give rise to *pian*

(*Treponema pertenue*) or the endemic form of syphilis (*bejel*) which disseminated in Europe and Asia. More recently, in the New continent, *pinta* gave rise to venereal syphilis which will only arrived in Europe when Columbus returned from America<sup>(23)</sup>. Of course many of the clinical manifestations attributed to syphilis are not so, which can be appreciated by paying particular attention to their clinical description. At that time, however, the distinction between different diseases was not apparent, diagnoses were confused, and many disorders may have been included within one. For example, the term *bubas*, referred to the enlargement of lymph nodes, regardless of its cause, and leprosy encompassed a number of different and unrelated cutaneous disorders; the same was the case with terms such as smallpox and warts. What contributed to the widespreading of syphilis, was the movement of large contingents of individuals, being for commerce, armed conflicts or colonization, acting in concert with more liberal sexual practices than in the medieval times from which Europe was just emerging.

### **AMERICA: THE WORLD'S PANTRY**

If we had to summarize the contribution of the New continent to world medicine, or better yet, to world health, we can state with certainty that they were two: medicinal plants and edible plants and fruits.

Over the course of the years, the natives of this continent were able to tame some plants for their own benefit. That entailed the ability to properly distribute water and the availability of land adequate for their growth. We know, for example, that during the Inca Empire, the agrarian output was adequate to cover the nutritional needs of its population<sup>(23)</sup>. In some cases, probably among those less developed civilizations, famines occurred either because of dwindling supplies or natural disasters.

The Spaniards took some time to acknowledge the nutritional value of the different plants, fruits and roots from this part of the world that were well-known and used by the natives. The reason for this delay probably relates to the Spaniard's general sense of mistrust; however once they recognized the value of a given product, they rapidly exported it to Europe, Asia and Africa developing an intense commerce with it.

Some of the products native to the American continent<sup>(24)</sup> include: potatoes, sweet potatoes, *achira*, *maca*, *arracacha*, *jimaca*, *masha*, *oca*, *olluco*, *yacon*, peanuts, yucca, avocado, *caigua*, pumpkin, squash, *guayaba*, *pacae*, pineapple, papaya, cucumber, passion fruits (*granadilla*, *maracuya* and *tumbo*), *chirimoya*, *cocona*, *lucuma*, *tuna*, *quinua*, *kañiwa*, *kiwicha*, maize, sunflower, hot pepper, *rocoto*, *molle*, vanilla, *achiote*, *huacatay*, *paico*, *muña*, beans, kidney beans, *tarwi*, cotton, and coca leaves. Some of the plants from the new continent such as potatoes, yucca and tomatoes, to cite but a few, served to calm the famines that were plaguing Europe, Africa and Asia.

At the present time there are over 25,000 plants in Perú; of them, about 30% are indigenous; over 4,400 plants are either edible, medicinal or source of lumber, dyes and resins. One hundred eighty-two are tamed plants. The rubber tree or *Hevea brasiliensis* was taken to Europe as a curiosity and it was only during the XIX century that its industrial use took place. Cotton, the South American species (*G. barbadense*) has been found in textiles from the Peruvian coast dating to 2500 years BC.

The animal source of protein came from fish and related products from the ocean, rivers and lakes. They included a variety of fish, shellfish, mollusks, crustaceans, etc. Other sources included the guinea pig, duck, turkey, camelids such as llama and alpaca and vicuña, *huangana*, *aguti* and *sajino* and land snails of the *Scutalus* genre.

## THE MEDICINAL PLANTS

There are over 1400 species of plants with medicinal properties in Perú. Many of them are being exploited in a massive manner. The medicinal properties of these plants were discovered on a trial and error basis by the old medicine men, knowledge about them is transmitted orally. As times goes, and the information passes from generation to generation, it changes. This can be corroborated when examining information from different times and realizing that the mode of preparation of a given medicinal plant or the indications for its use are different of how they are prepared or indicated for today. There is no evidence that the pre-Hispanic medicine men used any kind of weights and measures to determine the posology of these preparations either as drinks or infusions.

The practice of curing or of causing danger with plants was an attribute of the medicine men specialized on them; it was always accompanied by certain degree of magic.

The current folkloric medicine is the repository of the knowledge from the pre-Hispanic times. However, because it is orally transmitted, there is quite a bit of variation in the manner in which medications are prepared or indicated for, depending to a great extent on the region, and having foreign elements –of Spanish origin– been included from Colonial times to the present. It is estimated that folkloric medicine utilizes over 30% of the plants used by the *curanderos* of the Inca Empire, as describe by the Spaniard chroniclers.

Within the medicinal plants of greatest impact, we have the *quina*, which initially was used to quench fever in a nonspecific manner but that was later defined by its antimalarial properties; coca, which main alkaloid, cocaine gave birth to the local anesthetics; and the *ipecacuana*, emetic quite useful in the treatment of intestinal amebiasis.

There are medicinal plants described by the chroniclers with clear-cut pharmacological properties which are not used nowadays. That is the case of Balsam of Perú, Balsam of Tolú, *asipa*, *apincoya*, *ayrampo*, *capuli*, *chucho*, *huayruru*, *layan*, *llampa-quisa*, *lucetmesque*, *maju*, *mancapaqui*, *mayte*, *rejalgarillo*, *sachasoliman*, *sackara*, *thoupa*, trinity herb, etc. There are many others whose pharmacological properties have not been corroborated <sup>(25)</sup>.

The curare (*Chondrodendron tomentosum*) whose stalk's extract was used by the Amazonian Indians to poison the tip of their arrows and darts, was known in Europe during the XVI century. Its main alkaloid, the d-tubocurarine, has a potent paralyzing effect on the musculature, which is the reason why since 1942 was used as a muscle relaxant during general anesthesia.

The shamanism of our folkloric medicine has rescued the use of hallucinogenic plants from the ancient *curanderos* for diagnostic and treatment purposes. The *Trichocereus pachanoi* is a cactus known as *San Pedro* and contains the alkaloid



mescaline, of use primarily in the Northern coastal area of Perú; the *liana* also known as *ayahuasca* (*Banisteriopsis caapi*) from which an alkaloid known as harmine is extracted, used mainly in the jungle, is generally combined with *chacruna* (*Psychotria viridiris*).

Plants like coca and tobacco (*Nicotina tabacum*) were used in rituals in the pre-Hispanic times. Unfortunately, these plants' products have given rise to their exaggerated use as a hedonic characteristic of Western world, and with deleterious health consequences for its users.

## COCA

The references that can be found relative to the growth and use of coca (*Erythroxylon coca*) for eating, rituals and other activities of the pre-Inca civilizations are scanty. Coca leaves have been found in pre-Inca tombs corresponding to 500 AC.

During the Inca period, the chroniclers had stated that coca grew, but its use was limited to the nobly and the priests who used them in ritual acts; coca leaves grew and were stored in areas of temperate climate, where the Indians taken care of them usually died of diseases than left them with destroyed lips or nose (probably mucocutaneous leishmaniasis). Other chroniclers have indicated that, after the Conquest, coca use became widespread<sup>(26, 27)</sup>. It seems that coca functioned as a commodity whereby there was no actual monetary system or rules governing the transfer of goods and services.

From the first incursions of the Spaniards into the area of Tahuantinsuyo, they learned about coca and the areas where it grew; the chroniclers and visitors started to ask about its characteristics and uses. Very soon a debate ensued over whether Indians should be allowed to continue growing and using coca. The clergy opined that both should be prohibited and called it «devil's leave» because of its relationship with magic-religious practices, as an element to finish with all types of idolatries.

Once coca made into Europe along with other medicinal plants, we found references about it in medical textbooks from the XVII century.

The Indians chewed coca leaves mixed with saliva during their breaks while working on the fields, to obtain a sensation of well-being and be able to tolerate fatigue, hunger and thirst. El *acullico* (chewing coca leaves) which started as a sacred act among the Incas, was generalized during the colonial times and was used by the Spaniards to have the Indians doing hard labor under the encomenderos and in the mines (where they had to comply with the *mita* or work in the depth of the mines).

## QUINA

There is no evidence that the antipiretic properties of the *quina* tree were known to the Incas or before. The concrete fact is that since the early years of the XVII century it was used to quench fever and as treatment for malaria by the *curanderos* of the Province of Loja, in what it is now Ecuador. Known this to the Spaniards, they immediately started to use it. The legend goes that around 1629, the wife of Peruvian Viceroy Chinchón came down with high malarial fevers, and she was healed with powders extracted from the *quina* tree. This information was obtained by the Jesuits from the Loja Indians<sup>(28)</sup>.

It was Father Antonio de la Calancha, the first chronicler which referred to the *quina* as fever quencher in its 1638 works. The «chinchona» cortex, dried and converted into a powder was known as the «Jesuits' powder» or the «Countess' powder» and between the years of 1640 and 1669 its use spreaded to Spain, Italy, France and England. In this last country, it was used to combat malaria by the famous physician, Thomas Sydeham (1624-1689), known as the «English Hippocrates». Its antipyretic properties were put into question until Richard Morton (1635-1698) observed that the cortex from the *quina* tree allowed him to distinguish malarial fevers from other fevers. Linneo in 1753, classified the *quina* tree as *Chinchona officinalis*.

The introduction of *quina* to the world was a great contribution of the Native Americans, which was possible due the knowledge some of them had about its medicinal properties.

### **SUMMARY**

In summary, medicine in the prehispanic civilizations was empiric and had marked magic-religious characteristics, just as was the case in many other ancient civilizations. Perhaps its main strength was in the large number of medicinal plants native to the American continent. The great variety of edible plants is another fact we must emphasize, as later on the New World would become the food basket of the rest of the world. Potatoes, corn, cassava and tomatoes, to cite but a few, attest to this.

In the prehispanic world, life was not easy; it was necessary to constantly fight against famine, war and diseases. One way of doing it was by having relatively high birth rates; however, that was not always sufficient given that successive civilizations became extinct even after having reached a high degree of political, economical and social development.

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