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Sacred Herbs and Ancient Healers: Decolonizing Traditional Mexican Medicinal Practices

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SACRED HERBS AND ANCIENT HEALERS: DECOLONIZING TRADITIONAL MEXICAN MEDICINAL PRACTICES

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Julio Carmona Rosales

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To: Dean John F. Stack
Steven J. Green School of International and Public Affairs

This thesis, written by Julio Carmona Rosales, and entitled Sacred Herbs and Ancient Healers: Decolonizing Traditional Mexican Medicinal Practices, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this thesis and recommend that it be approved.

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Florida International University, 2021

DEDICATION:

I want to dedicate this thesis to my mother, Maria de la Luz Rosales Castañeda, for always looking out for me, supporting me in everything I propose, still being by my side, and always wanting the best for me. I also want to dedicate this work to my grandmother Carmen Castañeda Millan, who always loved me and takes care of my mother and me from heaven.

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ABSTRACT OF THE THESIS

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by

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Florida International University, 2021

Miami, Florida

Professor Ana Maria Bidegain, Major Professor

Traditional Mexican medicine is not only the use of plants and herbs but rests on an understanding of the harmonious balance between man and nature. For the Aztecs, maintaining that balance was imperative for a sustainable diet and a good relationship with the ecosystems that surrounded them. Unfortunately, the synchronicity of the "microcosm" and the environment is now extinct from Mesoamerican medical thought. Due to inferiority thinking about pre-Hispanic knowledge, Europeans' stereotypes attack pre-Hispanic medicine and deactivate the opportunity to contribute new scientific and ethical thinking methods to 'modern' medicine. The Aztec diet was rich in nutrients, vitamins, and amino acids. One of the essential Mesoamerican medicine manuscripts is the Badiano-Codex, which catalogued more than 150 plants. Phytochemical studies have shown that secondary metabolites of the plants used by the Aztecs and now the Nahuas have biological activity that can help cure illnesses. This work is not an introduction to pre-Hispanic medicine but an introduction to Mesoamerican medical thought. This work opens new doors to ethnobotanical hypotheses, which phytochemical and pharmacological studies can corroborate.

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ABBREVIATIONS AND ACRONYMS

CONABIO	Comisión Nacional para el Conocimiento y Uso de la Biodiversidad
CO_2	Carbon dioxide
EtOh	Ethyl Alcohol
INAH	Instituto Nacional de Antropologia e Historia
INPI	Instituto Nacional de los Pueblos Indígenas
T20YOA	Theoretical 20-year-old Athlete
UNAM	Universidad Nacional Autonoma de Mexico
USDA	United States Department of Agriculture
WHO	World Health Organization
20Y0AT	20-year-old Aztec Teyaochihuani

Introduction

Apart from the Aztecs' surgical medical advances, pharmacological research has demonstrated Mesoamerican ethnobotany's clinical effectiveness. The secondary metabolites of plants have shown that medical practitioners can use plants' biological activity to treat medical conditions. Having said those mentioned above, why doesn't pre-Hispanic medicine have the recognition it deserves? The "problem" with indigenous medicine has to do with scientific and cultural colonization on the part of European and Anglo-Saxon cultures. Much of the published studies on the biological and chemical aspects of medicine contain indigenous foundations, which provide a blueprint through methodological observations of the natural world. Stereotypes and male-oriented theories cloud the scientific rhetoric, as I discuss below. I do not have the moral or sacred authority, or even the wisdom to validate traditional Mexican medicine. However, I do have the right, and above all, the obligation to defend the very little but very important knowledge that survived the European holocaust of Indigenous wisdom.

I am arguing that traditional Mexican medicine is effective in treating and preventing diseases. The *World Health Organization* defines traditional medicine as:

> The total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness.[1]

Complementary and herbal medicine are other terms defined by the *WHO* as:

[1]. "WHO | About Us." *WHO*. Accessed March 27, 2021. http://www.who.int/traditional-complementary-integrative-medicine/about/en/.

> The terms ‘complementary medicine’ or ‘alternative medicine’ refer to a broad set of health care practices that are not part of that country’s own tradition or conventional medicine and are not fully integrated into the dominant health-care system. They are used interchangeably with traditional medicine in some countries.[2]

Yet, in Mesoamerican medicine, both herbal and complementary medicine make up traditional medicine; herbal medicine cannot be separated from complementary medicine. Herbal medicine is the proper use of medicinal plants to treat medical conditions. In contrast, complementary medicine is the acts that promote human health through nutrition and ethical relationship with the environment.

Mesoamerican medicine is a mixture of Nahua, Maya, Purepecha, Otomi, Tarahumara, Huasteca, Mixteca, Tlapaneca, Totonaca, Yaqui, Guajira, and Zapoteca medicine, amongst others. The contribution to Mesoamerican medicine through each indigenous group's diversity and individuality is significant and essential; nevertheless, I will focus on Nahua medicine in this thesis. I define Indigenous medicine as treating illnesses through medicinal plants, maintaining environmental equilibrium through an ethical symbiotic relationship, and a healthy diet.

In the last decades, among some Latin American thinkers, there has been an attempt to decolonize the devastating cultural impacts resulting from the invasion of the Americas by European forces. In line with this, I focus this study on Mexico's Spanish presence and the decolonization of traditional Mexican medicine, and the linkage of science and religion for an ethical approach to environmental science. It began having a great impact in the ethos of Mexico’s ancient civilizations in the early 16th century. A

[2] Ibid.,

rethinking of time and space assisted the colonization process. The notions of a *tabula rasa* mindset were imposed on the indigenous peoples of the Western world, along with a *terra nillius* approach to the land mass that encompasses Mexico and Central America. When the Spanish invaders encountered this allegedly unchartered part of the world, they called it "new," claiming not only proprietorship over the region, but also imposing ownership ideas on nations of peoples who had migrated to the hemisphere during the last Ice Age, nearly 10,000 years before the arrival of the conquistadors. For the colonizers, the peoples were in need of civilization (as tabula rasa) and the land was in need of cultivation (as terra nullius). The attempt to erase the voluminous traditions seen in the cultures of the Inca, Maya, Aztec, and Teotihuacan, that had for centuries set deep roots in the Americas is a lived example of the ravages of the Eurocentrism that fueled the metropoles in the Americas. Along with the near total annihilation of the beliefs, values, and folklore of the indigenous peoples, the ancient medicinal practices were designated as witchcraft and devil worship and engaging in these rituals was a crime punishable by death.

More than 200 years after Mexico's Independence from Spain, marginalized Mexican medicine has eventually seen a low but very well-deserved sign of recovery and recognition. The pre-conquest era of Mexican medicine is another subject of interest in this thesis. More than 65 indigenous groups live and contribute to Mexican medicinal diversity. Through this thesis, I will be referring to the wisdom and medicinal plant usage is the Nahua community, the community to which my grandmother and I belong.

The recognition of pre-Hispanic remedies in current medicine returns to Mexico's original people's scientific authority and historical identity. It brings autonomy to healers,

midwives, shamans, bonesetters, and plant workers since these doctors share the secret and knowledge of herbs to heal others. The looting of plant's chemical components and indigenous medicinal knowledge on the part of Modern western science is immoral and unethical.

In this thesis, I challenge the derisive colonial gaze on the universe of traditional Mexican herbalism and its medicinal properties through the lens of the sacred beliefs and knowledge inherited from the Aztec peoples and their plants, rituals and healers, in order to promote the legitimization of Indigenous medicine. As such, one of my main arguments is that the colonial separation of "science" and "religion," undermines the structure of these indigenous cultures. These indigenous cultures do not separate out "science" and "religion," but rather hold them together. Rather than imposing the colonial concepts of a separated science and religion, this thesis suggests that the value of "traditional" medicines can only come to light when we think science and religion back together again. Science gives us technological advances to facilitate our lifestyles, but these advances must be sustainable without affecting future generations; religion gives us ethical theories that science ignores.

Aztec Plant Knowledge: Thinking Beyond Religion and Science

The Aztecs were an indigenous nation that cultivated central Mexico from approximately the 14th to 16th centuries. Scientific research has shown that the toxins of the plants used by the Aztecs, and their positive biological and chemical interactions, make them as valuable and efficient as modern medicine. Plants are the chemical factories of nature. The chemicals in plants are mostly alkaloids used as a poison for the plant's defense—the toxins produced to interfere with physiological or biochemical

processes in other organisms. These alkaloids are typically extracted from tomatoes, potatoes, chocolate, the atropine from toloache, or the peyote plant's mescaline. These secondary metabolites are diverse and have an even more varied range of biological activity.

Biotechnology Innovation Organization defines biotechnology as:

> At its simplest, biotechnology is technology based on biology - biotechnology harnesses cellular and biomolecular processes to develop technologies and products that help improve our lives and the health of our planet. We have used the biological processes of microorganisms for more than 6,000 years to make useful food products, such as bread and cheese, and to preserve dairy products.[3]

According to this definition, many corporate interests damage biotechnology's essence. For example, Monsanto sells itself as a biotechnology and agrochemical company, yet its continuous effort to persuade the Mexican government overturn the banning of cancer-linked glyphosate pesticides means that it does not have the "lives and health of our planet" in mind.[4] Indigenous Mexican communities rely on endangering Aztec medicinal practices; private, state, educational, economic, and religious institutions contribute to the extinction of Mesoamerican healing practices through personal, institutional, or reputational greed. In this context, the importance of studying and researching Mesoamerican medicine, in this case Nahua medicine, is of utmost importance because it

[3]. "What Is Biotechnology? | BIO," accessed February 24, 2021, https://www.bio.org/what-biotechnology.

[4]. "Revealed: Monsanto Owner and US Officials Pressured Mexico to Drop Glyphosate Ban," *The Guardian*, last modified February 16, 2021, accessed February 24, 2021, http://www.theguardian.com/business/2021/feb/16/revealed-monsanto-mexico-us-glyphosate-ban.

preserves diversity and the continuous existence of ideas for which we can formulate new theories for a better method of providing healthcare. It has the potential to provide better for the “lives and health of our planet” than do corporate interests couched in the modern western scientific worldview. Perhaps, this is because Mesoamerican medicine is couched in a worldview that values the entirety of nature and not just the human.

In "*The Golden Bough*,” James George Frazer delivers his approach on the evolution of religion and science, where Frazer labels magic's attempt to control the natural world through natural phenomena as primitive and science as a better understanding of the natural world. I would disagree with some of Frazer's points. Still, as my professor, Whitney A. Bauman, taught me in *Religion and ecology* class, "Religion teaches us how to be humans, whereas science does not." Understanding Indigenous science's religious worldview can teach us how to be humans within nature and treat it with respect.

Indigenous healers and midwives couch healing within the wisdom of the more than human natural world. Humans are, from this perspective, only possible to be thought of within the wider context of the ecosystems of which they are a part. Through centuries we have been losing this essence of Indigenous medicine. Today the effort to use ancient medicine as a tool for making a profit is a profanity against all Indigenous traditions. Instead, we should support the creation of an institution to promote the knowledge of the Indigenous wisdom, and cultural richness, including indigenous medicine, and their environmental awareness. Toward these ends, this thesis will address the following research questions:

1.) What are the sociocultural, scientific, and ritual intersections within ancient Aztec beliefs of health, healing, and herbalism?
2.) What role does animism play in Aztec healing practices and how does this challenge Modern western notions of "religion" and "science"?
3.) How might modern medicine engage with the mystical healing science of ancient Aztec herbalism in treating health and medical disparities?

Methodology

A descriptive-comparative research design is most applicable to this thesis proposal. Much of the information and data collected on Aztec medicine and religion does not fully complement one another. There is a plethora of research from several scholars and researchers on medicine, religion, and plants. Still, very few of them talk about all three of these topics combined. Some works ignore the biology behind the plants, while others overlook the Aztec mythology and beliefs behind the science entirely. My work here is to look at all of these components and study how one shapes the other. My approach to descriptive-comparative research is to understand Aztec medicine through their beliefs and their accuracy in treating health conditions.

Due to the *COVID19* pandemic lockdown, and the significant health risk of doing fieldwork, my research will be supported mostly by digital sources. The majority of the empirical data collected will come from the library of the Mexican Government Bureau, *Instituto Nacional de Antropología e Historia* (INAH), and online libraries from universities such as but not limited to, *Universidad Nacional Autónoma de México* (UNAM).

Through matrilineal connections to the people of Nezahualcoyotl region of Mexico, I have the privilege of being of Nahua heritage, and am honored to have access to membership in several groups on social media run by the Nahua community members that share books about Aztec medicine and religion. I will also be conducting archival work as I plan to have most of my research come from digital printed-books and scholarly journals. I will also introduce innovative ethnography based on my historicity with my maternal grandmother, transmitting her personal experiences and knowledge as she shared them with me. I will explain the importance of Mexican medicinal plants and diet by first introducing the Aztecs' history, who they were, their culture, and their religious beliefs. As mentioned earlier, before we can understand medicinal practices, we have to understand the "care" in healthcare. Medicine is treating the sick and staying healthy; one stays healthy if the environment is healthy. The environment is the natural elements and living organisms with which we interact every day. Later in the following chapters, I introduce once again the problem, but this time with modern solutions, which we can adapt in order to contribute to science, the environment, and cultural identity.

In chapter one, I discuss the sociocultural, and ritual intersections of Aztec beliefs, I also provide a brief history of the Aztecs. In chapter two I discuss some components of the animistic view of the human body, the *Ihiyotl*, *Tonally*, and *Teoyalia*, as well as the science of Mesoamerican farming methods, such as the Chinampa and Milpa. Chapter three then introduces the Nahua community, as well as research made by the National Autonomous University of Mexico. Finally, chapter four introduces the problems with Mesoamerican medicine, such as biopiracy, and pollution.

Relevant Literature Review

The *Codex de la Cruz Badiano* is an Aztec herbal volume dictated by Martin de la Cruz, an indigenous *Ticitl* (medical doctor). The codex provides the Aztec adaptation of a European manuscript with indigenous knowledge. The book lacks mention of the *Ihiyotl, Tonalli,* and *Teyolia* the three energy forces. Not because they weren't necessary, but probably because the authors were afraid of being called idolaters.

The manuscript is the only surviving document by a *ticitl*. The *Badiano Codex* was written into Latin by Juan Badiano, from which several books got adapted and translated into other languages. Adaptations from this book will be useful for my research, such as the book, *Quetzalcoatl's Medicine; Traditional Medicine, Aztec Plants and Modern Science* by the two authors, Dagmar Daniel and René Daniel and the adaptation in English by William Gates, *An Aztec Herbal; The Classic Codex of 1552.*

Another book useful to my thesis is Carlos T. Viesca's *Medicina Prehispanica de México*. This particular work contributes and supplements the aforementioned reading and, more importantly, complements the *Badiano Codex*. This work talks about the Aztec's worldview, the soul entities, and their conception of disease. In the Cruz-Badiano codex, various plants are illustrated with insects or reptiles such as ants and snakes. The Aztecs understood the symbiotic relationships between the plant, mineral, and animal worlds. Everything surrounding us has its own identity; for example, the human body is composed of Nitrogen, Carbon, Oxygen, and hydrogen; these elements make up our body, which returns to earth when we die and are used to give life again. Viesca does an

excellent job talking about medicinal plants' philosophical and biological side, although the latter is not very elaborate and lacks foundation.

The work of Bernard R. Ortiz de Montellano, *Aztec Medicine, Health, and Nutrition* also lends essential contributions to my research. It provides information on the duality of the cosmos and its mystical constituents in Aztec cosmology. This book offers a more detailed discussion of the *Tonalli*, the *Teyolia*, and the *Ihiyotl*, the three crucial animistic forces of the Aztec religiosphere, representing the soul, the heart, and breath. The *National Autonomous University of Mexico* conducted an ethnographical study on the Nahua community, despites its flaws, I will use it on chapter four, as its one of the most recent studies on Nahua medicine.

In Sandra Harding's edited volume, *The Postcolonial Science and Technology Studies Reader*, Michael Warren writes prolifically about the aforementioned mystical trilogy in Aztec herbalism cosmology. Warren discusses how the natives conserved and transmitted data orally, which is how my grandmother conveyed her knowledge. Accordingly, introducing oral history to my research is essential in understanding how indigenous peoples used the untext to pass down their sacred knowledge and argue with Latin (the language of science) as the main lexicon for these ancient teachings. A collection of memories, oral histories, and lived experiences I witnessed seeing my maternal grandmother Carmen Casteñeda Millan share. Her rare and transcendent mystical expertise over herbs, roots, and barks when health and healing were issues of concern within my family, and her knowledge directly connected to ancient Aztec herbalism as passed down via a matriarchal chain of inheritors, are avital contribution of my work. Reaffirming the spiritual connectedness to the scientific perceptions and

insights of how the worlds of the seen and unseen, the mystical and the practical are closer than we wish to understand will help validate what the ancient Aztec knew all along – we are all integral elements of the universe we are members of.

AMOXXEXELOLIZTLI CE
CHAPTER 1

As mentioned in the introduction, Aztec medicine is more than just the study of herbs, rather it is an understanding of the human body and its interactions with ecosystems. In this chapter, I introduce the history of the Aztecs and their natural world's cosmovision. The chapter continues with the Aztec's relation with nature, as I discuss the cosmic forces that govern planetary laws and the importance of duality. To make the reading more fluid, at the beginning of the section "Understanding the Universe, Life, and Death," I added definitions of important Nahuatl terms.

David Esparza Hidalgo's *Computo Azteca* provides an extensive explanation of the importance of duality and the human-cosmos relationship. David Esparza's work is essential, as his work is the first to talk about the decolonization of Aztec mathematics and its pioneer work on the *nepohualtzintzin*. I later supplemented Esparza's work with other sources and my interpretation of equilibrium of the human body, illnesses, and the environment.

The *Ticitl* (Mesoamerican doctors) used the *Tonalli* and animistic forces theory to explain the concept of disease that was prominent in Mesoamerican diagnostics of illnesses. The theory of animistic entities provides us with more than a window to the Nahuas' medical understanding. It helps us understand that plants and the elements surrounding the "microcosm" have also personified energetic forces such as the Artemisia, which I discuss in chapter three.

Introduction to the Aztec's History

The wealth of traditional Mexican medicine is due to the fusion of various cultures and ideas from the peoples who inhabited Mesoamerica before the Europeans arrived. Thus, I prefer to write about pre-Hispanic Mexican treatment instead of Aztec medicine. Having said that, most of the documented sources on medicine come from the Aztec culture, including the *Badiano Codex* and information collected by Francisco Hernandez, entitled "*Historia de las plants de Nueva España*."

To fully understand the Aztecs' ethnobotanical and religious thought, it is essential to know a bit of their history. For that, the more than 20 pages of *Codex Boturini* will guide us with their pictographic stories. The *Boturini codex*'s pictograms document the Aztecs' great pilgrimage on their Aztlan departure. This valuable document shows us the remarkable journey the Mexica had to endure from the time they left the Chicomoztoc cave until the arrival and foundation of Mexico-Tenochtitlan.[5]

During their trip, the Aztecs took significant obstacles, natural and spiritual, with great care not to be victims of the *Tlacatecolotl* or Owl men who, through the current of energy from their victims, could cause illness and discomfort. During their pilgrimage, they passed through Culhuacan, where they were joined by several groups, these were the Chalcas, the Chichimecas, the Cuitlahuacas, the Huexotzincas, the Malinacas, the Matlatzincas, the Tepanecas, and the Xochimilcas.[6]

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[5]. "Códice Boturini," Govierno de México, *Mediateca - Instituto Nacional de Antropología e Historia*, https://mediateca.inah.gob.mx/repositorio/islandora/object/codice%3A605.

[6]. Noemí Quezada, *Los matlatzincas, época prehispánica y época colonial hasta 1650* (UNAM, 1972), 38.

The *Teomamaque*, carrying the sacks with figures of their god *Huitzilopochtli*, led the way until they finally reached an ahuehuete tree of immense proportions where they could finally rest and make a small shrine for their god. Enchanted by the extraordinary beauty of that tree, the Aztecs spread their mat to eat when it was interrupted by a great thunder that broke the tree in half. The Aztecs interpreted this last event as a sign sent by natural forces, whose interpretation was to let go of the eight groups that had joined them. This interpretation shows us the great importance that the Aztecs had for natural events and nature.[7]

After the separation, the Aztecs remained in the broken tree's remains for a long time before continuing their journey. The Aztecs continued their way and adopted the name *Mexica*. In 1325 the city of Mexico-Tenochtitlan was founded on Lake Texcoco, the teocallis rose, years later, Nezahualcoyotl built the aqueduct that separated freshwater from saltwater. The now Mexicas formed alliances with Tlacopan and Texcoco. This alliance helped defeat the Tepanecas of Acopan and is known as the triple alliance.[8]

Table 1 below describes the Aztec's timeline from the Aztlan departure to their destruction.

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[7]. The ahuehuete-*Taxodium mucronatum*-is the national tree of Mexico, its name, interpreted into English, means "Old water tree." The Teomamaques are the ones that carry the wooden figures of the deities.

[8]. Marco Antonio Cervera Obregón, "Los orígenes del Imperio Mexica y la Batalla de Azcapotzalco," accessed February 25, 2021, http://www.noticonquista.unam.mx/amoxtli/1012/961.

YEAR	EVENT
A.D. 1111[9]	Aztec's departure Aztlan to the promise land.
1267[10]	Aztecs build their first Teocalli in Xapultepec.
1299	Aztecs are expelled from Xapultepec. Tenoch is born.
1325	Tenoch becomes the first Tlatoani Tenoch funds Mexico-Tenochtitlan in the middle of Lake Texcoco. The City is divided into four subsections. The Temple Mayor is built under Tenoch's ruling
1355	Acamapichitli is born
1363	Tenoch dies
1367[11] or 1375 Exact date is undetermined.	Acamapichitli becomes the second Tlatoani
1428	Triple Alliance formed by Mexico-Tenochtitlan, Tlacopan, and Texcoco
1440[12]	Moctezuma I, becomes Tlatoani of Tenochtitlan
1440	The Great Mexican architect, poet, astrologist, astronomist, engineer, botanist, Netzahualcoyotl built an aqueduct to separate fresh water, from salt water in late Texcoco.
1486	Ahuizotl becomes Tlatoani and expands the borders of nation.
1502[13]	Moctezuma II becomes Tlatoani; he is the second to last Tlatoani

[9]. "History of Mexico - The Aztec Empire," accessed February 24, 2021, http://www.houstonculture.org/mexico/aztecs.html.

[10]. "La historia del Bosque de Chapultepec: de paraíso acuático a fábrica de pólvora a parque favorito de todos," *local.mx*, May 21, 2020, accessed February 24, 2021, https://local.mx/ciudad-de-mexico/cronica-ciudad/bosque-de-chapultepec-historia/.

[11]. "Tlatoanis - México y Su Historia," accessed February 24, 2021, https://sites.google.com/site/mexicohist/gobernantes/prehispanico/tlatoanis.

[12]. "Moctezuma I," *Google Arts & Culture*, accessed February 24, 2021, https://artsandculture.google.com/entity/moctezuma-i/m056s7.

[13]. "Montezuma II | Biography, Accomplishments, Death, Importance, & Facts," *Encyclopedia Britannica*, accessed February 24, 2021, https://www.britannica.com/biography/Montezuma-II.

1519 on a sad November 8th	The European invaders, looters, rapist, and murderers enter the clean, and peaceful city of Mexico-Tenochtitlan, they are greeted by Moctezuma II. The Aztecs gave Cortez presents, and they surround him with copal incense, because the Europeans smelled bad, as showering was not very popular in Europe at that time. Cortez thought the Aztecs were treating him like a God. The Aztecs called the Europeans "Pinacate" which is a beetle that emits an awful smell. Moctezuma hosts the Europeans with food, shelter, chocolate, and the most beautiful palace he had, to honor his guest. Europeans thank Moctezuma for the hospitality, and think Moctezuma is a great man. The Europeans discover a large room with gold, and all of the sudden the Aztecs, are blood thirsty people, that need to be converted to Catholicism immediately. Few days after the discovery of the gold Moctezuma II is captured and killed.
1520[14]	The great Cuitlahuac defeats the Spanish. Amongst the Spanish there were a few Africans from Pánfilo de Narváez expedition. The Africans were forced to bath and shower in the small dwell where the Aztecs used the water to make food. Cuitlahuac defeats the Europeans out of the city. Cortez starts crying, and names the event "Noche Triste" or "Sad Night." Due to the water contamination Cuitlahuac, and more than 90% of the Aztecs were exterminated from smallpox, and measles. Not due to superior weaponry, not war tactic skills. The Aztecs believed the guns of the Europeans were not very useful given you only can shoot straight, reload, and not very ineffective during the rain. The Spanish won due to a biological weapon they brought.

Table 1: Aztec timeline from the Aztlan departure to their genocide by the civilized European.

[14]. Cristina Torales Pacheco, "CULTURA Epidemias en el siglo XVI, una 'catástrofe demográfica' en México," *IBERO*, last modified April 16, 2020, accessed February 24, 2021, href.

Understanding the Universe, Life, and Death

It's important to acknowledge the Aztec's relationship with and understanding of nature. Aztecs believe the Human body is a "micro-cosmos," and any damage to the environment damages us. The micro-cosmos concept is essential. When I was in third, fourth, and fifth grade, for instance, my elementary school teachers made us plant trees each year. I'm responsible for 50 trees planted in El Paso de Cortes. Middle school teachers have abandoned this tradition as globalization has taken over: now teachers hide eggs in the field and students have to find them during Easter or dress up during Halloween and hold a costume contest.

These Easter and Halloween rituals may seem harmless, but they make little sense in the Aztec worldview. They are further evidence that the everyday life of these peoples are pierced with western traditions. Though some mixing of cultures is inevitable in an era of globalization, it is also important to preserve these traditional worldviews, for they house important information that might help us gain better insights into human-earth relations that are healing rather than destructive. Here, I want to describe several elements of the Aztec cosmology as these will help us understand human health. The diversity of ideas is crucial, but these should not obscure or extinguish their own identity, promoting a healthy neighborhood with the environment through medicine. The diversity of ideas is crucial, but these should not obscure or extinguish our cultural ideologies, which promote a healthy neighborhood with the environment through medicine.

The cosmic force that governs planetary laws is termed *Teotl*, which is Nahuatl for energy or, as I call it (potential energy). The *INAH* and other anthropologists erroneously attribute *teotl* as "god." Even if suggesting to a godlike entity, we shouldn't

associate *teotl* as a body with moods and will, but an unseen force with conscious command over natural phenomena,[15] for example rain, or earthquakes.

Ometeotl- Just like the existence of water, there is fire, north and south, up and down, sun, and moon. *Ometeotl* is duality, the male force of creation-*Ometecuhtli*, and the female force counterpart *Omecihuatl*.[16] Ome (two, or dual) Teotl (energy); Ometetol Dual-energy. Ometeotl does not mean god, this was a translation by the European religious fanatics.

The 13th dimension-the *Omeyocan*-is, where duality and creation abounds; *Ometeotl* derives from this dimension. The human body is considered a universe, the diaphragm is the central component of the universe, and the diaphragm's upper body parts are the *Ilhuicatl* (sky). The diaphragm's lower body parts are the *Tlalli* (below the sky). The *Tlalli* is the opposite of the *ilhuicatl*, where no light reflection occurs, and entropy is absent.

Ometeotl has four sons *Tezcatlipoca*, *Huitzilopochtli*, *Xipe-Totec*, and *Quetzalcoatl*, representing the north, south, east, and west, respectively.[17] Ridiculously enough, I think of *Tezcatlipoca* and *Quetzalcoatl* as dynamic equilibrium, as described in *Le Chatelier's principle*.

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[15]. David Esparza Hidalgo, *Cómputo azteca* (Editorial Diana, 1975), 29.

[16]. Francisco Javier Torres Vaca et al., "La salud pública en el México prehispánico Una visión desde la salud pública actual," *Vertientes. Revista Especializada en Ciencias de la Salud* 17, no. 1 (August 18, 2015): 52.

[17]. Ibid.,

In my metaphor, I think of them as gas species in a continuous war to maintain stability. A change in pressure and volume would cause the equilibrium position to shift opposite sides depending on the external force. *Quetzalcoatl* is the product, and *Tezcatlipoca* is the reagent and vice-versa a non-ending tag of war; a new sun arises every time the positions change; we are in the fifth sun currently.

By inciting the female energy of the water-*Chalchiuhtlicue- Tezcatlipoca* destroyed the fourth sun made by his brother *Quetzalcoatl*. As a result, *Quetzalcoatl* traveled to the *Mictlan*-Underworld's ninth floor-where the non-life masculine energy-*Mictalntecuhtli*-and the dual feminine energy-*Mictlancihuatl*- anticipated him with the bones of the humans from the fourth creation, as the humans from the fourth sun drowned and their descendants evolved as *michin* (fish).

New humans arose from environmental carbon, nitrogen, and pulverized bones collected by *Quetzalcoatl*, and the fifth sun got created. *Quetzalcoatl* represents the morning white star-Venus-located in the west, and *Xolotl* (energy of fire, and thunder), the dark twin of *Quetzalcoatl*, the white evening star.[18]

In the Nahua community, we tend to put a paper of various colors to represent the air element, candles to represent fire, aqueous compounds to represent water, corn seeds to represent earth during the day of death altar.

[18]. Mark Cartwright, "Tlahuizcalpantecuhtli," *Ancient History Encyclopedia*, last modified March 22, 2017, accessed February 25, 2021, https://www.ancient.eu/Tlahuizcalpantecuhtli/.

The *Cempasuchil* flower guides the human soul to the offering where the fruits and food await the soul. Fruits are essential on the day of the death offerings. The plant's ovaries are full of potential life, representing the human spirit's duality and the altar's energy. Unfortunately, in my house in Mexico, we don't correctly label the four cardinal points with the corresponding colors (shown in *Table 2*), as it can be a little expensive, but we try our best.

It is common to add Catholic symbols to the altar. The adoption of putting Christian symbols on the altar to save the tradition by the Aztecs was efficient, as the tradition survived the Spanish invasion (illustrated in *Figure 1*). For example, the day of the death was on a different date, but it was merged with the Christian all saint's day November.

Tezcatlipoca	Black	North
Quetzalcoatl	White	West
Tlaloc	Blue	South
Xipe-Totec	Red	East

Table 2: *The four Tezcatlipoca, their color, and its pertinent orientation*. *Tlaloc* replaces *Huitzilopochtli,* as the South position, with the color blue. *Tlaloc* is the male force of water.

Figure 1: *Day of the death Altar in my house in Mexico.* It's not much, but we try.

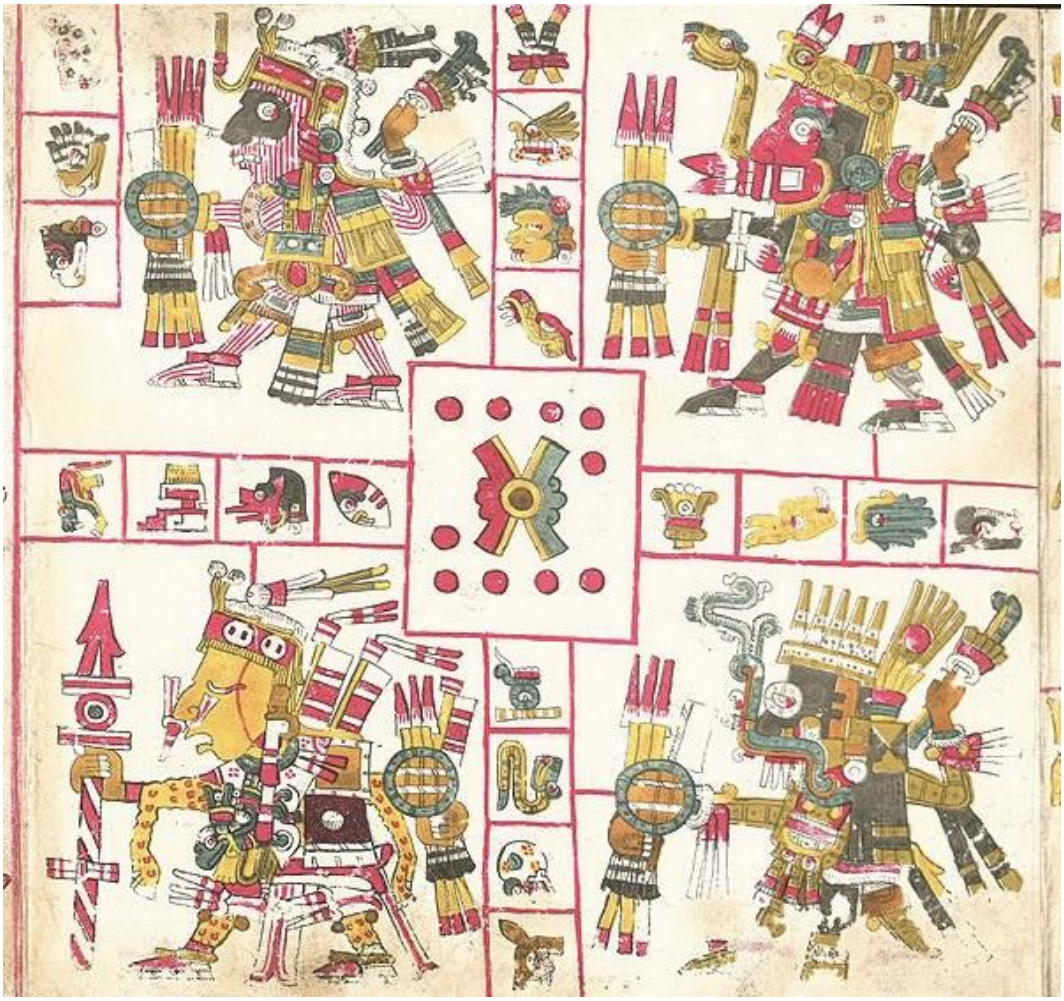

Figure 2: Codex *Borgia*. *The Four Tezcalipocas*.[19] Public Domain Image.

In Figure two, we can see *Tezacatlipoca* in the top left corner, wearing black paint. *Tezcatlipoca* usually has a broken foot made out of obsidian, so I find it interesting that *Tezcatlipoca* has both feet on this codex.

Quetzalcoatl is on the top right corner. *Quetzalcoatl* can be identified based on the red mask he is wearing and the snakes around the head.

[19]. "Codex Borgia," *Wikipedia*, February 18, 2021, 25, accessed February 25, 2021, https://en.wikipedia.org/w/index.php?title=Codex_Borgia&oldid=1007465586.

Xipe-Totec is in the bottom left corner; I can determine *Xipe-Totec* based on his dismembered body. *Tlaloc* is on the bottom right side of the drawing. *Tlaloc* is wearing his glasses and mask as he usually does.

The diaphragm, heart, and liver

The diaphragm, the liver, and the heart have played essential roles in understanding Aztec medicine. Carlos Viesca T. defines it like this:

> In such a way, two large compartments are differentiated: the celestial and that of the underworld, separated from each other by the diaphragm, which would be equivalent to the earth's surface with its two faces, one facing upwards and the other downwards. The head……...the vertex of the head, with the swirl of hair that exists there, the union of the occipitoparietal sutures, and the site where the bregmatic fontanelle, the meninges, and the underlying brain tissue were……the point of contact with the celestial layers and it was there where the dwelling place and the point of entry and exit of the tonally were located……...[20]

The diaphragm, the liver, and the heart have played essential roles in understanding Aztec medicine. Since the diaphragm is in the center of the human body, it is one of the most important organs.

Today's healers put red blankets in the solar plexus with tobacco leaves, to protect themselves from energy thieves. Forces beyond our control could cause illnesses, such as evil eye, or imbalances in our body could cause fever or headaches. The diaphragm is the center of the "mini cosmos," where the head is the sky, the heart is the sun, and the liver the moon.

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[20]. Carlos Viesca Treviño and Andrés Aranda Cruzalta, “Las Enfermedades Reumáticas Entre Los Nahuas Prehispánicos,” *Estudios de cultura náhuatl* 27 (1997): 313.

The Tonalli, Ihiyotl, Teyolia, Liver, and Heart the energy house of the environment, and our souls.

Bernard Ortiz de Montellano, a pioneer of ancient Mexican culture describes the animistic forces as:

> The Aztecs believed that the human body had several animistic forces (souls), each with specific functions for the body's growth, development, physiology, and even its fate after death. The three principal animistic forces were: *Tonalli*, located in the head; *Teyolia*, in the heart; and *Ihiyotl* in the liver. The health of the individual depended on the relative amounts of each soul at a given time and on the maintenance of a balance among them.[21]

The *Teyolia* was conceived from the womb; this force was the person's personality, which lived in the heart.[22] The *teyolia* is the soul that crosses the *Mictlan*. The soul has to go through all the floors of the underworld to arrive with *Mictlantecuhtli* and *Mictlantecihuatl*.

The *Ihiyotl* changed based on a person's mood. An angry person will have a swollen liver and experience abdominal pain.[23] If he/she continues with angry thoughts and resentments, the liver could stop functioning correctly. The person with low *Ihiyotl* was probably miserable, always mad, and getting into constant fights. Studying Freud's theories, I thoguht of *Ihiyotl* as the Id, the *Tonally* as the superego, and the *Teyolia* the ego.

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[21]. Bernard Ortiz de Montellano, *Aztec Medicine, Health, and Nutrition* (Rutgers University Press, 1990), 55.

[22]. Alfredo Lopez Austin, *Cuerpo humano e ideologia: Las concepciones de los antiguos nahuas II*, 1st edition. (México: Universidad Nacional Autonoma de Mexico, Instituto de Investigaciones Antropologicas, 1980), 254.

[23]. Ibid., No. 20 pp. 63.

The ancient *ticitl* believed that the *Elli* (liver) has to do with anger and bad humor. People who get very angry produced more bile. My grandmother said that furious people should eat bread so that the bile is absorbed, and avocado, and pork meat should be avoided after getting angry. The liver and heart were complementary opposites; the sun represented the heart- above the diaphragm- and the liver, the moon- below the diaphragm.

In modern times, native healers have lost the microcosmos concept and jump to conclusions prescribing remedial plants- which they work- and have completely forgotten the plants' individuality. The materialistic world has blinded the notion of plants, animals, and humans. The aforementioned is due to the globalized thinking of commercializing the plants for economic benefit, instead of treating the patient, and the plant ethically.

The tonally is the vital "heat" that powers human activity; if one loses the *tonally*, he/she must bathe in a temazcal to regain the heat. As mentioned in the previous chapter, the duality of the human body is a theoretical theme in traditional medical thought. If a person loses the hot energy of the *tonally*, the upper part of the head must be compensated with temazcal baths, or with hot treatments to compensate for the loss of this vital energy.

In many of the codices, the *Tlacochcalcatl* are shown to hold captives from the hair, this is if they get away, they can still manipulate their energy through the small traces of tonally found in the hair. The tonally is more like traces of human radiation, as it is not heat that dissipates, but more like "human radiation" that stays in your hair or any surface that touches the vertex of the head.

The *tonally* has a half-life independent of the human body. If the *tonally* leaves the human body, the body can die. If the *tonally* is lost from a traumatic event, the human body can become psychologically ill; Thus, the person becomes crazy. Carlos Viesca T. Describes the tonally as:

> Tonally, a noun that denotes irradiation of, solar heat, day, destiny determined by the day of birth. He was sent from the heavens to the child before his birth, ……the limit between the superiors and the inferiors, and later reinforced by means of the ritual that he transmitted to him, a few days after being born, the tonally of the day of his birth.[24]

The other two forces *Ihiyotl* and *Teyolia,* shown in *Figure 3* (*Codex Laud*, folio 44) are found in the liver and heart.

The *Ihiyotl* is on the liver, where it reacts depending on human emotion; one can lose or gain more *Ihiyotl* depending on the reflected emotions; for example, a continually getting angry person should expect to suffer low *Ihiyotl* and produce excess bile. The energy of the *Ihiyotl* can be very dangerous, since it can harm living beings that are in the perimeter of the person with little *Ihiyotl*. The *Ihiyotl* can cause heartbreaking events for the person who has lost the *Ihiyotl*, as it can cause anger, fights, conflicts, or very large outbursts of anger. The location of the *Teyolía* is the heart. The *Teyolía* is the force that follows the human body for eternity, and it's the energy that must cross the underworld to reach the *Mictlan*, as discussed above.

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[24]. Carlos Viesca Treviño, *Medicina prehispánica de México: el conocimiento médico de los nahuas* (Panorama Editorial, 1986), 65.

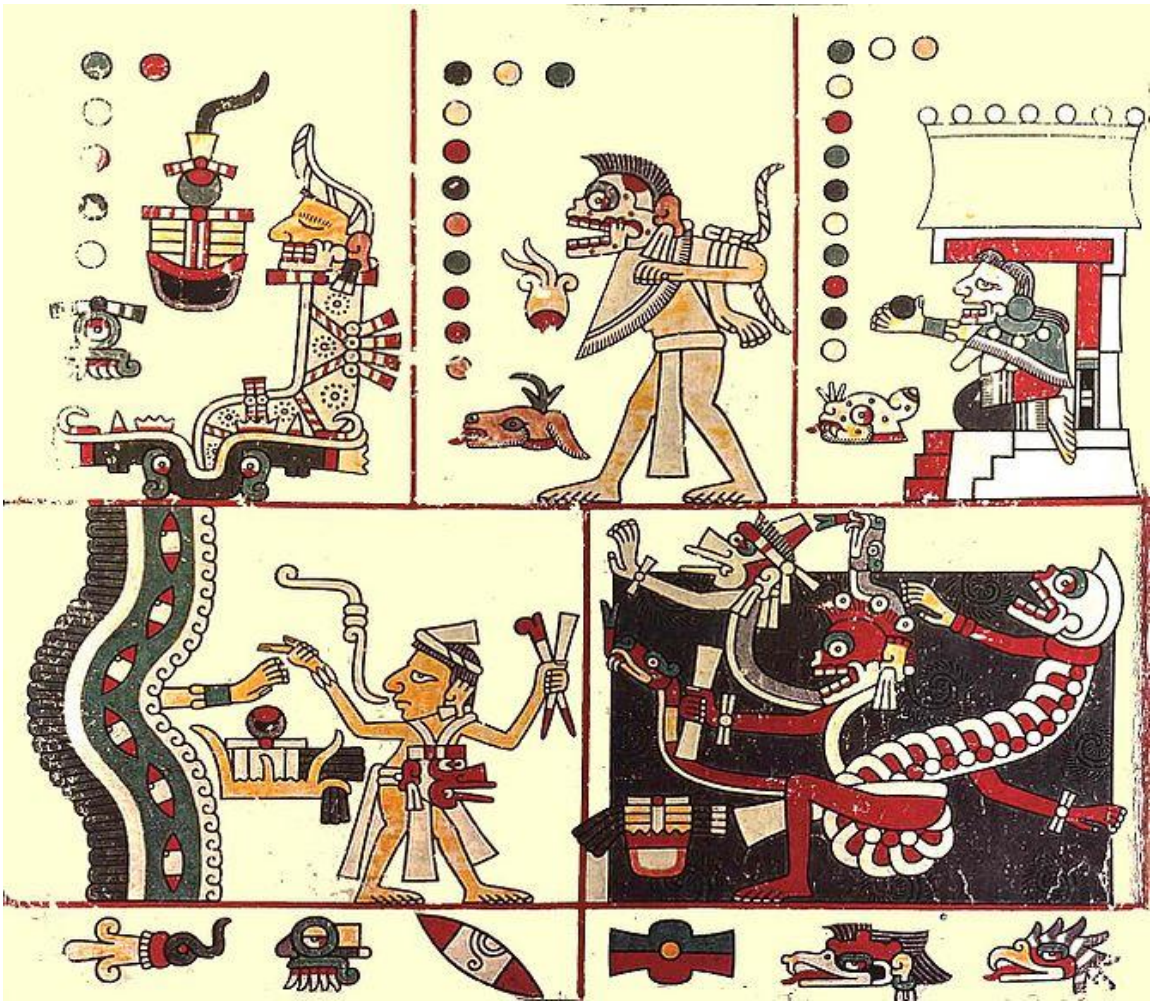

Figure 3: Codex *Laud.* The three animistic spirits *Ihiyotl*, *Teoyalia*, and *Tonally*. Public Domain Image.

Tlatzonquixtiliztli
Conclusion

The argument of this thesis is that traditional Mexican medicine is indispensable, necessary, and valuable in combating today's medical and environmental problems. A healthy diet, the proper use of herbal medicine, and the balance between the human "microcosm" and nature create a healthier body and a healthier ecosystem.

This chapter has described the central idea of the "human microcosm," in relationship to our planet and its cardinal points: *Tezcatlipoca* representing the North, *Quetzalcoatl* the West, *Tlaloc* the South, and *Xipe-Totec* the East. It's evident that the human body belongs to planet earth, as depicted with the respective colors in the "Dia de Los Muertos" offerings, the heart, liver, and diaphragm connection with the universe, sun, and underworld, respectively.

This chapter has also described how the Aztecs, through understanding of animistic forces, understand the human body. If a person suffers from abdominal pain, it can be attributed to liver problems, and a remedy, apart from its respective herbal treatment, was to be happy, since the opposite of anger is happiness. In Mesoamerican medicine, anger thoughts and feelings originate in the liver, which increases bile formation, happiness and laughter is associated with harmony of the heart, diaphragm, liver, and heart. If a person suffers from headache of fever, he or she must abstain from showering with warm water, or showering at all, as this could increase body heat. My grandmother told me, if I ever get angry, to not eat pork or avocado, I still don’t know the scientific study behind this, but it’s something my grandmother told my mom, and me.

There is a duality of the body: we have two arms, two legs, two eyes, two sides of our brain, two sides of our heart, two sides of the universe, one above the diaphragm, and one below. According to the Nepohualtzintzin, and the work done by David Esparza Hidalgo, the world is divided into four cardinal points, our body has four extremities (two arms and two legs [4 total]), in the tonalpohualli we have seven censes (sight, hearing, touch, sex, speech, taste, and smell), along with the 13 major joints (hands (2), arms (2), shoulders (2), neck (1), hips (2), knees (2), and feet (2)) giving us number 91. Now again there are four seasons in the world, of 91 days each. After 91 months 7 years have occurred, each of 364 days, to give us 2548 days. 91 years, gives us 33124 Mesoamerican days, from here 91 cycles of 4 years gives us 364 X 364 (132496 days).

Using our body as the center of the universe (number 7 and 13) we can use the sun, and our reflection to make calculations, and determine the distance from example the moon and planet earth or determine the volume of a piece of matter miles away. Many ancient European civilizations are believed to be the center of knowledge, which they were, but many of their discoveries were a little mathematically behind than the ones in Mesoamerica. We know much of this information based on the works done on ancient clothing, and symbols in the architecture, much of the data was lost, when the Europeans burned our codices.

As I have already mentioned, the cosmos and the body are the same. The basis for the Aztec medical theory and treatments is the ethical relationship with nature. Everything in nature was based on the human body, and everything in the human body is based on nature. You cannot take nature away from the human body, and you cannot take the human body from nature. They are both together, the synchronization makes one 1

(364, one year). It is clear from the above data & arguments that the human body's absolute dependency on the ecosystem and the force of duality a central idea, and medicinal theory of Aztec medicine.

AMOXXEXELOLIZTLI OME
CHAPTER 2

In the previous chapter, I provided information about the Aztec's view of the human body. From that understanding, the human body is in equilibrium with the rest of the natural world and must maintain that equilibrium to stay healthy. Aztec medicinal knowledge provided advanced care to the human body, but nutrition also played a significant role.

This section examines how the Aztecs maintained equilibrium in the body through their diet and herbal knowledge. I also introduce the concept of the Plant's individuality, as each plant is related to a certain cosmological force, such as Tlaloc with *Artemisia mexicana*. *Chapter 3* then briefly discuss problems with the necessary technology needed for the implementation of the information provided in this chapter.

To prevent diseases from occurring in our bodies, we must adhere to an aseptic lifestyle. Parasites such as *Fasciola hepatica* or gastrointestinal bacteria such as *Salmonella* can negatively impact our body. A good diet is necessary to prevent diseases, this is also known as secondary prevention. The implementation of secondary prevention to significantly reduce the effects of an illness and prevent further harm to the body is of utmost importance to health care providers. Some people refer to preventative medicine as the best medicine.

Primary prevention aids a person's health before disease or illness has even occurred. *OSHA* regulates many workplaces as part of primary prevention and these regulations have reduced health insurance and promoted a safe workplace environment.

Nevertheless, primary prevention also includes our eating habits. The *World Health Organization* states:

> Primary prevention refers to actions aimed at avoiding the manifestation of a disease (this may include actions to improve health through changing the impact of social and economic determinants on health; the provision of information on behavioral and medical health risks, alongside consultation and measures to decrease them at the personal and community level; nutritional and food supplementation; oral and dental hygiene education; and clinical preventive services such as immunization and vaccination of children, adults and the elderly, as well as vaccination or post-exposure prophylaxis for people exposed to a communicable disease).[25]

The Mesoamerican peoples had a very balanced diet; most of them were vegetarian, but they also consumed meat such as venison, turkey, ducks, quail, and fish. Apart from their diet, Aztecs were very hygienic in their daily practices, as they showered three times a day and cleaned their teeth with tortilla ashes, whereas Europeans cleaned their teeth with urine. Part of Aztec showers was in the Temazcal to release the body of impurities. The *Xiuhamolli* plant, which I talk about in the next chapter, was used as soap to wash the body and wounds. The Aztecs used penicillin from Huitlacoche as antibiotic treatment, and Nezahualcoyotl built aqueducts to bring clean water to the city. The cleanliness of the Aztecs was their downfall during the conquest, as I described in the timeline in the previous chapter.

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[25]. "WHO EMRO | Health Promotion and Disease Prevention through Population-Based Interventions, Including Action to Address Social Determinants and Health Inequity | Public Health Functions | About WHO," accessed February 25, 2021, http://www.emro.who.int/about-who/public-health-functions/health-promotion-disease-prevention.html.

This part of my thesis will discuss Aztec farming methods, nutrition, crops, and plants. I briefly discuss Chinampas and milpas—two farming methods—to better understand crop yield capacity. I then compare an Aztec warrior's diet to that of a college athlete and demonstrate that the Aztec diet is nutritionally beneficial and promotes healthy eating habits.

Sociocultural, scientific, and ritual intersections within ancient Aztec beliefs of health, healing, and herbalism are tied up together in the health of the soul and the body. According to the Aztec vision of the body, the diaphragm is at the body's center, with the liver below and the heart and head above. The head, heart, diaphragm, and liver represent the universe, sun, earth, and underworld, respectively. The argument of health and nutrition based on an Aztec view of the human body demonstrates the sociocultural intersections of ancient Aztec beliefs, healing practices, and herbalism.

Nutrition & Health

Before addressing Aztec medicinal remedies, it's crucial to understand their nutrition. The Aztecs cultivated their food in chinampas, a cultivation technique employed to this day. Corn, squash, chili, beans, tomatoes, tomatillos, quelites, and chili peppers were the Mesoamerican food base, and these were grown in milpas. These eight crops continue to be the root of Mexican food, especially corn for tortillas and chili. Lamentably, the quelites are in jeopardy, considering many people nowadays do not appreciate these herbal benefits.

As I stated earlier, milpas and chinampas were two farming techniques that fed a city of 45,000 people. I have had the great fortune of eating most of the Aztec's crops, but many of them are not sold in the US. Ever since I was a child, my grandmother

instructed me to eat these herbs and told me, "never lack quelites in your kitchen, and when you are sick, eat, even if you are not hungry, you eat."

It is popular to eat *romeritos* during Christmas. The most common quelites are the *romeritos*, popular with shrimp during Christmas. The *papalo*, the mafafa, the *pumpkin flower*, the *huazontle* (my favorite *quelite*), among other types of quelites, that are eaten in different Mexican dishes. Quelites are losing Prescence in Mexican cuisine due to poor eating habits.

The first ruler of Xochimilco, Anatocalli, implemented the Chinampa's cultivation method. Chinampas are floating gardens made of dirt, clay, and wooden sticks; the chinampas yield more product than milpas. Chinampas are not popular as before, given the drainage of Lake Texcoco-the location of the original Chinampas. The lake's drainage has caused enough environmental damage to make the Axolotl salamander that lives in the lake an endangered species. Bernard Ortiz de Montellano describes Chinampas methods. He writes,

> Chinampa cultivation was another sophisticated Agricultural technique. Chinampa planting surfaces are created by lifting masses of soil and aquatic vegetation and consolidating them high enough above the water of a shallow lake so that seeds can germinate properly. The result, typically is a long ridge field, two to four meters wide and twenty to forty meters long, surrounded by ditches navigable by canoe.[26]

The milpa is the space where the three main crops—beans, corn, and pumpkins—are cultivated in a symbiotic relationship. The bean plant fixes the nitrogen in the soil for the

[26]. Ibid., No. 20 pp. 96.

corn; the corn supports the bean plant, and the squash produces terpenoids that repel insects and herbivores. Many insects that have chitin also produce terpenoids.[27]

My grandmother watered plants with chili water to prevent lizards and ants from eating them. It is interesting to note how we have shifted to using chili water instead of pumpkins to protect plants. Does chili water affect plant growth by fixing the soil and repelling the insects? Or does it just target plant predators? How has this knowledge diverged from pumpkin terpenoids' original use? These are topics for further research. Mesoamerican farmers planted beans, corn, and squash together, as each crop aids one another. Today, many people use mycorrhizal fungi when planting certain plants, as fungi breaks down soil nutrients, which aid in plant growth, and development. Farming was very important in Mesoamerican culture, that even during times of conflict, trading foods amongst cities was crucial.

Unlike popular belief that Aztecs were a warrior nation that invaded neighboring cities, they practiced "Flower wars." Flower-wars in the Aztec world are a matter of pride and are used to solve disputes and territorial expansion between towns. Both parties determined the war dates, and each one of them had to bring food to the other. The day of the battle, the best fighters were to duel with each other, and the last standing warrior alive was the winner for that particular city. Food and flowers were to be exchanged before the war to avoid misconceptions of the war not being fair. Even during conflict, then, respect for crops, flowers, and nature was more important than the competition between rival cities. Such care for the rest of the natural world and each other gave

[27]. Ibid., No. 20 pp. 95

Europeans a significant advantage during the murdering and killing that accompanied colonization.

Pumpkin, corn, and tomato were the most domesticated and most marketable crops in the markets of Tlatelolco. Today there are more than 60 types of domestic corn in Mesoamerica. Corn was and continues to be the basis of Mexican gastronomy. These crops provide nutritional properties that we can use to combat malnutrition problems in Latin America.

***Elotl*, Tomatl, & Ayotli**
Corn, Tomato, & Pumpkin

Teosinte is the wild plant from which corn is domesticated. Corn is an endemic plant of Mexico, prominent throughout Central and South America. Corn's versatile usage provides different ways to eat other dishes; one of the most popular corn uses apart from the tortilla is the *esquites*.

There are different types of corn plants in Mexico, which are sown from April to May, and harvested in October.[28] Corn grew very quickly in Mexico due to its biological structure, it did not matter if the Aztecs planted corn in the milpa or the chinampas, as described by Ortiz de Montellano:

> The high productivity of corn (and a second staple, amaranth) is due to inherent biological characteristics not special agricultural techniques. These plants are intrinsically superior in thermodynamic efficiency, defined as the ratio of food energy output to solar energy input.

[28]. Enrique Vela, "EL MAÍZ," *Arqueología Mexicana* Cultivos mesoamericanos. Las especies que México dio al mundo, no. 84 (February 4, 2016), accessed February 25, 2021, https://arqueologiamexicana.mx/ediciones-especiales/e84-cultivos-mesoamericanos-las-especies-que-mexico-dio-al-mundo.

> The underlying biochemical processes is the photosynthetic conversion of carbon dioxide and water into glucose and oxygen, energized by the absorption of photons of light.[29]

Once the Spaniards' arrived, corn cultivation was interrupted since Europeans were indifferent to it during the conquest, unlike cocoa, which the Spaniards sent to the old continent.

Today in Mexico, more than 60 types of corn are grown in the different Mexican States. In *Table 3*, adapted from the data provided by the Mexican Government's office *CONABIO*, I highlight some of the types of corn in Mexico. This table provides us with an overview of the variety of corn eaten by different civilizations across Mesoamerica, and the high productivity of the chinampas and milpas farming methods.

Conico	**Arrocillo** **Cacahuacintle** **Chalqueño** **Cónico** **Cónico norteño** **Dulce** **Elotes Cónicos** **Mixteco** **Mushito** **Mushito de Michoacan** **Negrito** **Palomero de Chihuahua** **Palomero de Jalisco** **Palomero Toluqueño** **Uruapeño**
Sierra de Chihuahua	**Apachito** **Azul** **Complejo Serrano de Jalisco** **Cristiano de Chihuahua** **Gordo** **Amarillo de Montaña**

[29]. Ibid., No. 20 pp. 99

Ocho hileras	**Ancho** **Blando** **Bofo** **Bolita** **Elotes Occidentales** **Harinoso de Ocho** **Jala** **Onaveño** **Tablilla de Ocho** **Tabloncillo** **Tabloncillo perla** **Zamorano Amarillo**
Chapalote	**Chapalote** **Dulcillo de Noreste** **Elotero de Sinaloa** **Revantador**
Tropicales Precoces	**Conejo** **Nal-Tel** **Ratón** **Zapalote Chico**
Dentados Tropicales	**Celayo** **Chiquito** **Cubano Amarillo** **Nal-Tel de altura** **Pepitilla** **Tepecintle** **Tuxpeño** **Tuxpeño norteño** **Zapalote Grande**
Maduracion Tardia	**Dzit-Bacal** **Comiteco** **Coscomatepec** **Mixteño** **Motozinteco** **Negro de Chimaltenango** **Olotillo** **Oloton** **Quicheño** **Serrano** **Serrano Mixe** **Tehua**

Table 3: *Domesticated Corn found in Mexico*. Table adapted based on the data collected from Mexico's CONABIO[30]

Corn was important as Table 3 shows the different types of corn, but there were other dishes in the Aztec's diet, the food of the great Moctezuma for example was very varied.

[30]. CONABIO, "Razas de maíz de México," *Biodiversidad Mexicana*, accessed February 25, 2021, https://www.biodiversidad.gob.mx/diversidad/alimentos/maices/razas-de-maiz.

Moctezuma's servants brought fish from the coasts of Veracruz for the tlatoani to consume. Bernal Díaz del Castillo describes this luxury:

> In eating, his cooks had him over thirty ways of stewing, made in his way and custom, and they had them put in small clay braziers underneath so they would not get cold, and of what the great Montezuma he had his people prepare him more than three hundred dishes, with no more than a thousand for the guard people: ..... they cooked him chickens, dewlap roosters, pheasants, partridges of the land, quails, tame and wild ducks, deer, land pigs, little birds of the cane, and doves and hares and rabbits, and many other types of birds and things that we believe are from these lands.[31]

The Spanish were amazed at the dishes, and luxury of Moctezuma, as even the kings of Europe didn't have this luxury, as many letters sent by Cortez. Nopales, chapulines, deer, spices, tomatoes, and seeds contributed the essential amino acids, and vitamins, the body needs and omega-3 fatty acids from fish.

In the Aztec diet, corn was the primary source of calories. The main ingredient of tortillas, atole, tamales, esquites, and many other dishes is corn.

I find odd the calculations described in Ortiz de Montellano's *Aztec, Medicine, Health, and Nutrition,* as the nutritional model is not adequately representative of the Aztec diet. Still, its rationing is very vague since, for example, in *diet number 2*, Montellano calculates 2,200 total Calories in the complete diet. Nonetheless, the author assumes 300g of corn in a meal; where does he get 300g? Although corn is the most consumed, a can of corn from the supermarket has approximately 300g.

[31]. Bernal Díaz del Castillo, *HISTORIA VERDADERA DE LA CONQUISTA DE LA NUEVA ESPAÑA*, n.d., 169.

- One tortilla includes about 30g of corn.
- (30g of Corn/Tortilla) x (4-Tortillas) yields 120g of Corn
- (120g of Corn/Meal•Day) x (3 Meal • Day) yields 360g of Corn

My calculation does not include, tamales, pozole, and the atole, which are all corn heavy meals. The point I'm trying to argue here, is that a rich diet is part of Aztec medicine, which I made very clear in the previous chapter. To prove that the diet was rich, and similar to the one proposed by the USDA I based my findings in the work of Ortiz de Montellano, as the codices that talked about diet didn't survive the colonization. Ortiz de Montellano might be a little bit off, which I contribute to enhancing an understanding for further researchers. Spanish talked very little about Aztec nutrition during pre-conquest, everything we have is post-conquest.

The consumption was about four tortillas per meal. Montellano's calculation may be below what the Aztecs consumed in corn. The few writings we have, talk about Moctezuma's diet, but it's irrelevant to compare Moctezuma's diet (a Tlatoani) and a modern-day leader. I think a better approach will be to compare an Aztec warrior's nutrition, to that of an ivy league athlete given is less bias, and we get a much better data as the one shown in Table 5.

Bernal Diaz del Castillo describes Moctezuma as:

"He was the great Montezuma, up to forty years old and of good stature and well proportioned,
and frowning, with little meat, and the color not very dark, but rather the color and matrix of an Indian man, and his hair was not very long, but rather just enough to cover up his ears... "[32]

[32]. Ibid.,

Given Moctezuma's rank as a tlatoani, he was not expected to be in battle or performing heavy physical activities. Still, the *Cuauhpipiltin*, the *Ocelopilli*, and the *Tlacochcalcatl*, whose discipline and physical activities required a diet affluent in nutrients, ate even more than Moctezuma. The physical abilities of this *Teyaochihuanis* gave the invaders trouble, as a *Tlacochcalcatl* captured a Spanish spear in mid-air and another with his hand killed a horse with one hit. All these crops contribute excellent properties, including spices and other condiments.

The addition of other condiments and herbs to corn enhances its nutritional properties. For example, when I went to Nanacamilpa as a child with my grandmother, I noticed locals use a nixtamal (kernels of corn with lime powder) in the food. I asked my nana why they put sugar in it, and she answered, "It's not sugar, it's lime, it's good for the bones." In my ignorance, I laughed and continued playing with my toy. Torres Vaca talks about the favorable properties of lime usage in Aztec nixtamal:

> The diet, in general, was adapted to the needs of the population. It was balanced, rich in vitamins and minerals, varied in flavors, colors and preparation, so it had a good nutritional contribution. By studies carried out on beans and corn,
> essential amino acids were found, calcium was ingested by the consumption of tortilla, when sewing the nixtamal lime is added, thus preventing many osteoarticular and bone diseases.[33]

Squash is sown from March to June, blooms in July and August, and is harvested from October to November.[34] There are more than 20 subspecies of the domesticated squash,

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[33]. Ibid., No.15 pp. 52.

[34]. Enrique Vela, “Calabaza,” *Arqueología Mexicana* Cultivos mesoamericanos. Las especies que México dio al mundo, no. 84 (February 22, 2019), accessed February 25, 2021, https://arqueologiamexicana.mx/ediciones-especiales/e84-cultivos-mesoamericanos-las-especies-que-mexico-dio-al-mundo.

and more than half originated in Mexico. Its uses vary from food to eating utensils, such as plates and food containers.[35] Corn an important ingredient in the diet has many domesticated variations, and squash is not the exception, most of the domesticated squash comes from Mesoamerica, and we thank the indigenous people of those times for domesticating it and contributing to our diet.

Chili peppers also contributed to the diet, and some of the chili peppers are the ancho, bolita, arbol, cascabel, de agua, de arbol, gordo, guajillo, habanero, jalapeño, manzano, mulato, pasilla, piquin, serrano, and many more. Similar to chili peppers, it was popular to grown chili with tomatillos, which have important medicinal uses.

The tomatillo is sown from December to March and harvested from June to July.[36] Tomatillo's iron, carbohydrates, and proteins' primary nutrients make the fruit a medicinal remedy for high blood pressure and stomach pain.[37] Tomatillos is still used in Mexico City by some Nahuas to treat high blood pressure, but some people attribute this fruit to stomach ulcers. Tomatillo is mostly consumed when making salsas.

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[35]. CONABIO, "Calabazas, tamalayotas, pipianas, chilacayotes," *Biodiversidad Mexicana,* accessed February 25, 2021, https://www.biodiversidad.gob.mx/diversidad/alimentos/calabazas.

[36]. Enrique Vela, "Tomate," *Arqueología Mexicana* Cultivos mesoamericanos. Las especies que México dio al mundo, no. 84 (February 22, 2019), accessed February 25, 2021, https://arqueologiamexicana.mx/ediciones-especiales/e84-cultivos-mesoamericanos-las-especies-que-mexico-dio-al-mundo.

[37]. Servicio de Información Agroalimentaria y Pesquera, "Tomate verde: ingrediente esencial de la comida mexicana," *gob.mx*, accessed February 25, 2021, http://www.gob.mx/siap/es/articulos/tomate-verde-ingrediente-esencial-de-la-comida-mexicana?idiom=es.

In Mexico City, tomato is the correct word to refer to "Green tomato," whereas Jitomate is the appropriate word to refer to "Red Tomato." *Figure 4* shows some biological properties of *Tomatl*. Tomatillo contains chemical properties such as Physalin B and Ixocarpalactone A and essential vitamins such as Vitamin C and phosphorus.[38] Some of the beneficial aspects to modern medicine concerning the phytochemistry of tomatillo is found in Table 4. Tomatillos increases bone formation, as tomatillos contain high levels of calcium that intestines uptake.

Table 4: *Tomalt phytochemistry*

Compound	**Biological Activity**	**Biological Model**
Physalin B	Anti-Inflammation	LPS-Induced Macrophages[39]
Ixocarpalactone A	Apoptotic Activity	Colon Cancer-Cells[40]

[38]. CONABIO, “Qué nos aportan los tomates verdes,” *Biodiversidad Mexicana*, accessed February 25, 2021, https://www.biodiversidad.gob.mx/diversidad/alimentos/que-nos-aportan/N_tomates.

[39]. Yanjun Yang et al., “Physalin B Suppresses Inflammatory Response to Lipopolysaccharide in RAW264.7 Cells by Inhibiting NF-KB Signaling,” Research Article, *Journal of Chemistry*, last modified June 6, 2018, accessed February 25, 2021, https://www.hindawi.com/journals/jchem/2018/7943140/.

[40]. Juliana K. Choi et al., “Ixocarpalactone A Isolated from the Mexican Tomatillo Shows Potent Antiproliferative and Apoptotic Activity in Colon Cancer Cells,” *The FEBS journal* 273, no. 24 (December 2006): 5714–5723.

The Healthy and Prosperous Mesoamerican diet

The Mesoamerica people cultivated corn, chili, pumpkin, tomato, tomatillo, and quelites, which are still part of traditional Mexican Cuisine. Mexico suffers from malnutrition and is one of the most obese countries in the world. If we start consuming the correct nutrients, we can increase our life expectancy, and become healthier.

I grew up in Nezahualcoyotl, a rural city outside Mexico City. Thanks to my Grandmother, I learned some basics of herbology, oral narratives, and farming practices, which guided me to write this thesis. The nutritional guidance my grandmother provided to her patients introduced me to the importance of nutrition. According to data provided by select sources, the crops cultivated ensured that the Aztec diet was rich in nutrients, proteins, vitamins, and amino acids.

The rich Mesoamerican diet (combined with rigorous exercises) gave the Europeans trouble during the battle of Mexico-Tenochtitlan, as described by Bernal Diaz del Castillo.

> I don't know why I write it so warmly, because some three or four soldiers who had been in Italy, who were there with us, swore many times to God that they had never seen such furious wars that had not been found before between Christians and against the artillery of the King of France, nor of the great Turk; nor people like those Indians, who with so much enthusiasm to close the squads saw, and because they said many other things ....[41]

A typical male *Teyaochihuani* was on average of 20 years and active. According to the *United States Department of Agriculture* (USDA), a typical 20 yr. old male athlete, around 5ft 8in, around 197lb, should have an estimated daily caloric need of 3419

[41]. Ibid., No.30 pp. 246.

kcal/day.[42] The number of macronutrients, minerals, and vitamins in the Mesoamerican diet is similar, to the one recommended by the USDA, and similar to the recommended nutrition intake. If we compare the Dietary reference intake of the 20-year-old Aztec *Teyaochihuani* (*20YOAT*) and the theoretical 20-year-old athlete (*T20YOA*), we should get something like this:

Table 5: *20YOAT Per Meal Vs. T20YOA Per Day*. Same age, height, activity level, and weight.

Macronutrients	**20-Year-old Aztec Teyaochihuani (Per Meal)**	**Theoretical 20-year-old Athlete (Per Day)**
Carbohydrate	247.71 g	385 - 556 g
Protein	82.63 g	72 g
Fat	21.91 g	76 - 133 g
Water	1.1687 L	3.7 L
Vitamins	**20YOAT**	**T20YOA**
Vitamin A	557.1 mcg	900 mcg
Vitamin C	285 mg	90 mg
Vitamin D	4.65 mcg	15 mcg
Vitamin B6	2.351 mg	1.3 mg
Vitamin B12	2.37 mcg	2.4 mcg
Vitamin E	3.72 mg	15 mg

[42]. "DRI Calculator Results," accessed February 25, 2021, https://www.nal.usda.gov/fnic/dri-calculator/results.php.

Vitamin K	46.6 mcg	120 mcg
Riboflavin	1.072 mg	1.3 mg
Folate	507.65 mcg	400 mcg
Niacin	25.106 mg	16 mg
Pantothenic Acid	2.751 mg	5 mg
Minerals	**20YOAT**	**T20YOA**
Calcium	596.1 mg	1,000 mg
Copper	1.827 mg	0.9 mg
Iron	19.68 mg	8 mg
Magnesium	787.55 mg	400 mg
Manganese	4.621 mg	2.3 mg
Phosphorus	1766.55 mg	700 mg
Potassium	4740.6 mg	3400 mg
Selenium	90.6 mcg	55 mcg
Sodium	252.55 mg	1500 mg
Zinc	8.88 mg	11 mg

The meal of an average Aztec warrior consisted approximately of 700g of corn, 150g of beans, 60g of squash, 100g of tomatillos, 100g of amaranth, 25g of red pepper, 50g of green pepper, 150g of fish, and 200g of nopales. I plugged the data into *nutritionvalue.org* to get the data for *20YOAT*. It's important to note the data of *20YOMT* is per meal, whereas the data of *T20YOM* is per day.

It's obvious from the data, and arguments presented that my thesis is correct that Aztecs had a healthy eating habit that is by far superior to the one used in Mexico. As

explained above, Mexico can grow corn and crops throughout the country, from January to December. This raises the question, why is Mexico one of the countries with the highest diabetes rates? Is it our habits? is it our diet? I wouldn't say habits or socioeconomic status, given Mexico is a rare exception where both wealthy and poor individuals are obese, but there are different causes. Future research is needed to determine solutions derived from the rich indigenous diet in order to solve the obesity, and hypertension problems. Economic growth and equality without negatively affecting future generations are ideal for us to become more sustainable. "The Sustainable Development Goals (SDGs) aim to transform our world. They are a call to action to end poverty and inequality, protect the planet, and ensure that all people enjoy health, justice and prosperity. It is critical that no one is left behind."[43] Since most diseases in the most vulnerable communities are due to malnutrition, we can substitute planting methods that pollute the environment with chinampas. We can replace junk food with better foods, healthier, and much more economical. Many companies claim to be self-sufficient, but the chemicals they use pollute the environment and cause respiratory illnesses.

Ticitl: Illness, The Sources, and The Herbs

The concept of disease can be thought of an imbalance in the *tonally*, as I have described, or physiological forces. I will concentrate more on the disease's physiological aspects. The Codex *de la Cruz* has provided me with sufficient information about the

[43]. "Sustainable Development Goals," accessed February 25, 2021, https://www.euro.who.int/en/health-topics/health-policy/sustainable-development-goals.

Aztec's understanding of herbology. This work is of utmost importance as it is the only surviving herbalism literary work dictated by an Aztec descendant. Many of the codices were destroyed by the Europeans, and some of the books we have were written by Spanish interpretation of the culture. The codex de la Cruz is an Aztec herbal that was written under Spanish command, but this was done for commercialization, and many of the indigenous spiritual beliefs were excluded.

The *Badiano Codex* was written into Latin by Juan Badiano, from which several books got adapted and translated into other languages. Martin de la Cruz -a *Ticitl* from Tlatelolco wrote this manuscript, and Juan Badiano, who translated it into Latin from Nahuatl. As with many indigenous cultures, there were designated healers who were skilled practitioners in the art of herbalism.

Ticitl, the Aztec term for physician, but also for witchdoctor or shaman, were the ritual specialists that studied the appropriate and intricate uses and sacred powers of medicinal plants. These doctors provided the patient information on which plant is represented by and connected to a particular deity, such as *Tlaloc* – the supreme god of rain – and his connection to the plant *Artemisia mexicana*, a subspecies of *Artemisia ludoviciana.*[44]

Ticitl gained most of their understanding of plants by studying in the *Calmecac* – an institution specifically for the sons of Aztec nobility, that also taught spiritual traditions and wartime tactics. As a method of survival and coexistence, the Spanish and later the enslaved Africans had to learn the indigenous medicinal traditions of the Aztec.

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[44]. Ibid., No.20 pp. 194.

However, the Africans embraced the similarities in their cultures to their indigenous allies, while the Spanish appropriated the indigenous knowledge of nature and its medicinal properties.

This Aztec herbal manuscript was written at Francisco de Mendoza's command as a gift to King Carlos first of Spain. De la Cruz's renowned reputation on medicinal knowledge was able to aid in the *cocoliztli* pestilence of 1545. The Europeans handled the natives as slaves, and the Spanish heavily regulated religious and philosophical traditions. Nevertheless, the Spanish allowed de la Cruz to maintain these "privileges" and even horse-riding to facilitate commanded errands.[45] One should regard that *Ticitl* was presumably present during the smallpox epidemic in 1520, where relatively more than 8 million people died.[46]

Decolonizing Nahuatl to Understand the Codex

Mesoamerica presented to the world chocolate, peanuts, beans, corn, chili, tomato, vanilla, pumpkin, pineapple, and many medicinal plants.[47] Still, more than previously mentioned, another major contribution is the Spanish language enrichment by Nahuatl,

[45]. Martin Clayton, Alejandro de Avila, and Luigi Guerrini, *Flora: The Aztec Herbal*, 1830, 21.

[46]. Rodolfo Acuna-Soto et al., "Megadrought and Megadeath in 16th Century Mexico," *Emerging Infectious Diseases* 8, no. 4 (April 2002): 1.

[47]. Linares Edelmira and Roberto Bye, "Flora que ha aportado México al mundo," *Arqueología Mexicana* Aportaciones de México al mundo, no. 130 (December 30, 2016): 52, accessed February 25, 2021, https://raices.com.mx/tienda/revistas-aportaciones-de-mexico-al-mundo-AM130.

and other indigenous languages. Today in Spanish, there are more than 4000 Nahuatl words, many of which are found in letters, and messages the looters wrote.[48]

One of the concepts that I have proposed is the discontinuation of the *RAE* of Nahuatl. Many Nahuatl speakers write Nahuatl following the *RAE*'s grammatical rules; Nahuatl is phonetic. We must report it as it sounds, not following European grammatical rules; currently we write Nahuatl with Latin symbols. Why not respect our Nahuatl language's phonetic symbolism? Many Nahuatl speakers write *Nahui* (four) instead of Nawi, write -sh instead of X. For example, we should write: *Kualli tonalli, Newatl notoka Julio, Newatl nichanti nikan Miami* instead of *Cualli tonalli, Nehuatl notoca Julio, Nehuatl nichanti nican Miami*. (Good day, my name is Julio, I live here in Miami.) And why is this important? Once we recognize our own identity, we will be able to value our grandparents' philosophy much better, since our grandparents Nahuatl was symphonic and tried to personalize the language with nature.

The human body is part of the cosmos, and every aspect of the universe is part of us. When the word tomato is brought up, what comes to mind is pasta, pizza, bruschetta, or any other Italian food. The word "tomato," which comes from Nahuatl, translated as *Xiktomatl = Xitktli* (Xictli-belly button), *Tomawak* (Tomahuac-fat, obese,) *Atl* (Water), fat water belly button.

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[48]. Ascensión Hernández de León-Portilla, “El Impacto de Las Lenguas Mesoamericanas En Otras Lenguas Del Mundo,” *Arqueología mexicana* 22, no. 130 (2014): 61.

Nahuatl is more descriptive in terms of being embodied in the world, everything is based on the natural world. In Nahuatl when the prefix of a word starts with a- or ends with -atl this usually implies water. Man is part of the world, and the world is part of the human, any damage to the environment is damage we do to ourselves. Understanding this teaches us to coexist with nature and treat it as a companion and not just matter. Which brings us back to the original argument that Mesoamerican medicine implements a harmonious symbiotic relationship with nature, which can be very beneficial in today's world. Mexican medicine takes into consideration the interactions with the mineral and plant world that surrounds us. An example of the aforementioned is that Nahuatl means "order" or "harmonic sound," This language takes into account the symbiotic relationships between living beings. Many of the Nahuatl words are symphonic, which must sound harmonious. Unfortunately, many people do not pronounce Nahuatl correctly, including me. Aztecs created several of the Nahuatl terms through observation. Many plants in Nahuatl have the prefix of constellations, parts of the human body, natural elements, or other organisms that contribute to their development. The sapodilla (*Manilka zapota*)-know in Mexico as (chicozapote-Xikotzapotl)-is a medicinal fruit, where its name derives from *Xikotli,* a type of bee that helps pollinate the plant.[49] As we can see, another example in the language's harmony with nature, providing credit to the insect that allows the plant to spread.

The Aztec herbal codex contains drawings that may confuse European copyists trying to recreate the codex, as many of the pictures require plant and ecological

[49]. Ibid., No. 36.

background. For example, a stone may signify very little detail in the drawing for a European copyist, but that stone happens to be a snail. Why does that matter? Well, because the mollusk represents clean, clear water. An example of this is the Mexican flag; if you look at it, there is a lake with small shells that means the lake is clean and full of life.

To fully understand the codex, you must know what those symbols mean, which I have tried to explain. Many authors have published books trying to identify the plant, but they have failed miserably; sometimes, they provide data about plants not endemic to Mexico during the conquest or not found near a river as the codex illustrates.

I created *Figure 6*, based on my basic understanding of the Codex, and interpretations, as well, as personal observations made while I lived near the Zocalo in Mexico City, the same place *Figure 22* was taken.

The codex-de la Cruz shows us that plants' chemical compounds affect our health and other natural elements, such as minerals and metals. *Table 6*, adapted from *An Aztec Herbal: The Classical Codex of 1552*, and *Codex Cruz-Badiano,* shows the 13 chapters of the codex. The most common metals found in the codex are *Eztetl, Temamatlatzin, Tetlahuitl,* and *Yztactlalli*.

Eztetl is a type of jasper whose meaning derived from Nahuatl is "stone of blood." (*Eztli*-blood; *Tetl*-stone), to treat the *Teyolia* the blood stone was carved in a heart shape.[50] The *temamatlatzin* is challenging to identify or translate; the image appears to be

[50]. Millie Gimmel, "Hacia Una Reconsideración Del *Códice de La Cruz Badiano*: Nuevas Propuestas Para El Estudio de La Medicina Indígena En El Período Colonial," *Colonial Latin American Review* 17, no. 2 (December 2008): 280.

moss on a stone, like lichens. And the *Yztatlalli* is the salt or (Ixtla-Salt Tlalli-Eart), for white earth.

Copper water is required to prepare the *teamoxtli*: this is water kept in a copper vessel for a long time.[51] The Aztecs did not drink the water solution, they only kept it in their mouth for a few minutes to lower throat heat. My grandmother used to keep some of her plants in copper jars, as she said they lasted longer similar to the way the Aztecs prepares the teamoxtli. The Cruz-Badiano codex has 13 chapters, as mentioned earlier, and Table 6 illustrates the Aztecs understanding of the human anatomy, and the remedies that treat illnesses through plants.

[51]. "Copper Water: Basics, Benefits, and Downsides," *Healthline*, last modified September 2, 2020, accessed February 26, 2021, https://www.healthline.com/nutrition/copper-water-benefits.

CHAPTER 1	Conditions of the Head, boils, broken head.
CHAPTER 2	Conditions of the Eyes, cataract, make sleepy.
CHAPTER 3	Conditions of the Ears.
CHAPTER 4	Conditions of the Teeth.
CHAPTER 5	Conditions of the Mouth, and gums.
CHAPTER 6	Conditions of the Yaw, and hands.
CHAPTER 7	Conditions of Chest and heart.
CHAPTER 8	Condition of the groin, and bladder.
CHAPTER 9	Condition to treat hemorrhoids, and fever.
CHAPTER 10	Conditions to treat epilepsy.
CHAPTER 11	Conditions to treat childbirth, and breast milk.
CHAPTER 12	Conditions to treat child pain.
CHAPTER 13	Conditions to sings of someone dying

Table 6: The 13 Chapters of the codex *Cruz-Badiano*.

Figure 4: Codex Cruz-Badiano Pg. 7A. *Xiuhhecapatli, Yztac ocoxochitl, Teamoxtli*. Public Domain Image.

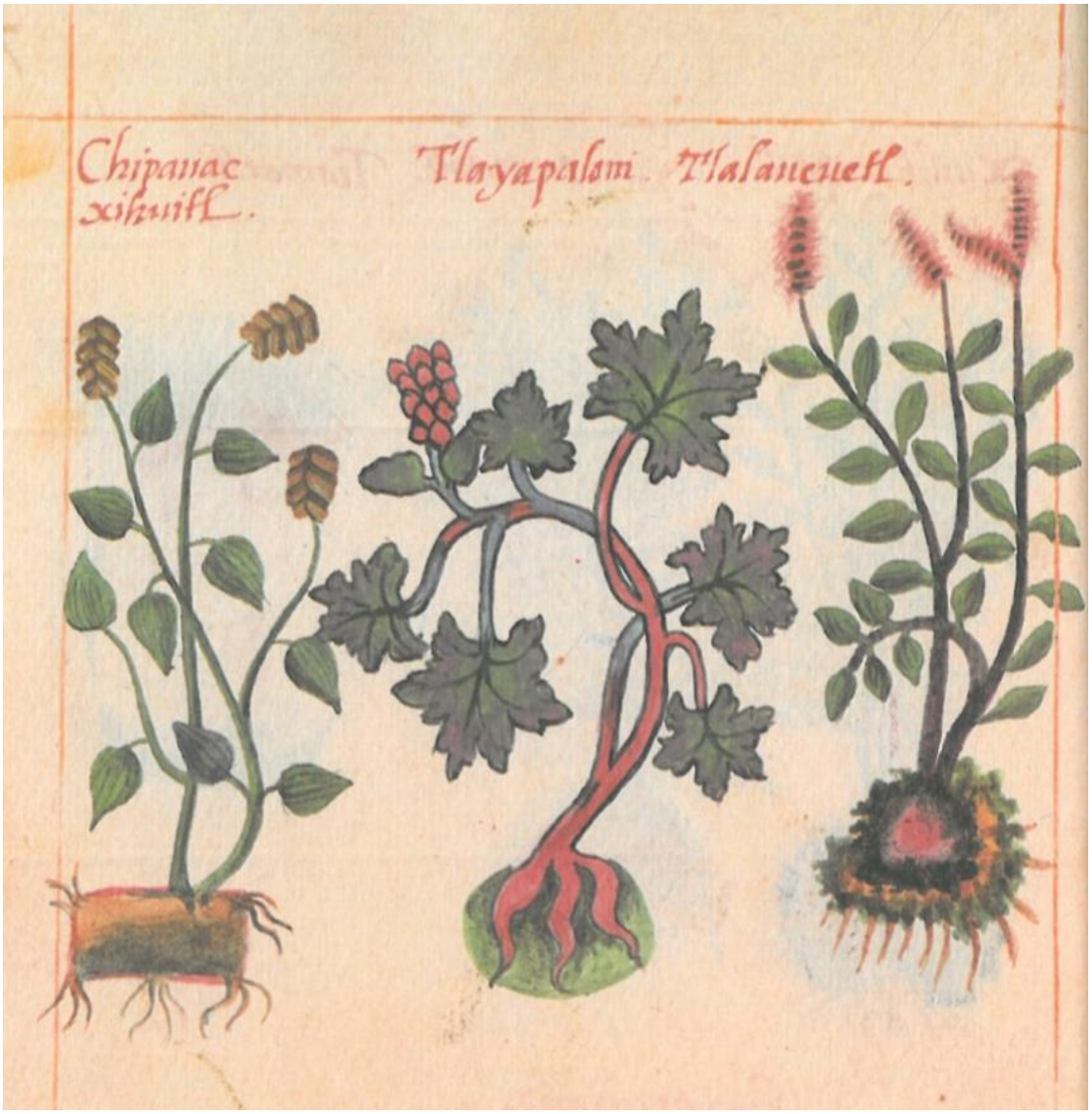

Figure 5: Codex *Cruz-Badiano*. *Chipauacxihuitl, Tlayapaloni (Tlayapalom), Tlalaueuetl*. Public Domain Image.

Plant A	With Plant(s)	Mineral(s)	Other	Assay	Application	Treatment	Imbalance
Xiuhhecapatli	Yztac-ocoxochitl	Tetlahuitl Yztactlalli Eztetl Temamatlatzin	Tendon from an Eagle's neck and feet	-Mix these ingredients well in the presence of cold water -Mix well	-apply it to the affected area three times a day - and the neck and throat will be tied with the tendon of the foot and neck of an eagle	-Head temperature decrease -headache sufferers should avoid sitting in the sun, working, or bathing. It is advisable to eat onions in honey.	-Tonalli (head energy) -Wind remedy
Yztac Ocoxochitl							
Teamoxtli (leaves)	Tlanextia-xiuhtontli(leaves) Tolpatlactli(stem)	Eztetl	Copper water	Mix the copper water with the herbs, and the eztetl (jasper)	The person with heat in the throat should put the liquid in their mouth without swallowing, it should only be held in the mouth.	Heat in the throat	
Chipauacxihuitl							
Tlayapalom							
Tlalaueuetl(root)	Tlalaueuetl(leaves) Tlayapalom (root) Chipauacxihuitl (root)		-Egg yolk -Urine (if head rots, use urine to wash)	The roots and leaves must be crushed with the yolk of the eggs, this procedure must be done without water	-This procedure must be performed daily, during the morning and during the evening -Once the boils have been cleaned of the pus, the head of the boils should be covered with the solution created.	-Head boils - However, if only part of the head rots, then the head must be washed with urine, and the solution created must be reapplied.	

Figure 6: *The first six plants*. Table Constructed based on the first six drawings of the *Codex-Badiano*. Originally, I had made a table, but it looks distorted when a new page is added. I decided to make the table into an image. My own interpretation of the Codex. I received feedback from a *Curandero* in Mexico City's Zocalo, but I have misplaced the document with the feedback while moving to Florida from Georgia.

The argument here is that there has not been much interest in studying the plants of the Aztec manuscript to date, as it is considered irrelevant. It is necessary to identify the plants in the manuscript since these can provide, apart from national identity, new medicinal treatments to treat conditions that medicine has not fully understood today, such as epilepsy. In this section of the thesis, I try to identify some plants through comparison.

Xiuhhecapatli: Illustrated in *Figure 4* (codex *Cruz-Badiano* Pg. 7A). In the book *History of the plants of New Spain* by Francisco Hernandez, the plant is identified as *Ecapatli*, which translates to "Wind Medicine,"[52] This probably occurs because the natives that helped Hernandez identify the plant used another type of Nahuatl toponomy. Still, William Gates, in the book *An Aztec herbal the classic codex of 1552*, identifies *Xiuhhecapatli* as *Senna occidentalis*,[53] which is highly unlikely since this plant is endemic to Asia[54] and not from the American continent, it is more likely that it belongs to another species. Matin Clayton, Alejandro de Avila, and Luigi Guerrini would also

[52]. Francisco Hernández, "Historia de Las Plantas de Nueva España," *Instituto Biología de La Universidad Nacional Autónoma de México* (Instituto de Biología de la Universidad Nacional Autónoma de México, n.d.), 412, accessed February 26, 2021, http://www.ibiologia.unam.mx/plantasnuevaespana/index.html.

[53]. William Gates, *An Aztec Herbal: The Classic Codex of 1552*, Unabridged edition. (Dover Publications, 2012).

[54]. The plants are native to Asia, but it has been determined that existed in parts of South America as well.

classify the plant as *Senna occidentalis* in *Flora: The Aztec Herbal (The paper museum of cassiano dal pozzo.)*[55]

If we compare the codex's pictogram and the specimen collected by *CONABIO*, we can see *Xiuhhecapatli* it is not *Senna occidentalis*. But then what plant is it? Based on the drawing, I first thought they were tomatoes (*Lycopersicon esculentum*), but the branch bud is hanging, while *Xiuhhecapatli*'s is erect. *Solanum corymbosum* and *Solanum pseudocapsicum* are the other possible options. *Solanum corymbosum* has the fruits closely together, while *Solanum pseudocapsicum* has a more similar pair to *Xiuhhecapatli*. However, the leaves are not very similar in distribution and shape; the stem and fruit distribution are identical. The plant has red fruits similar to tomatillos in appearance, but it contains a not very robust vascular stem with slightly elongated seeds. I included a picture from each plant I mention in the codex to give the reader a better understanding of the Aztecs knowledge of the plants, and acknowledgement of tht the surroundings do impact plant growth, such as shells, or soil type.

My mom Ma de la Luz bought this plant on her trip to Oaxaca, as it has a very particular similarity to tomatoes. However, I don't recall my grandmother implementing *Solanum pseudocapsicum* in any remedy. During my stay in Ixtapaluca, I never saw the plant in any of the herbal shops, which leads to my conclusion that the plant must be from outside Mexico City.

Table 7 shows the phytochemistry of *Xiuhhecapatly.* The Aztecs used *Xiuhhecapatli* to treat the head, as shown in the manuscript *Cruz-Badiano*. However,

[55]. Ibid., No. 44.

traditional medicine has implemented *Solanum pseudocapsicum* to treat head boils, abdominal pain, and gonorrhea around different parts of the world.[56] The Unripe fruit is much more toxic than ripe fruit; this allows the fruit to adequately mature for the herbivores to eat and disperse the seeds. In *Solanum pseudocapsicum*, the seeds contain secondary metabolites dichloromethane, diethyl ether, ethyl acetate, and Hexane, which have insecticidal-like properties;[57] rural Communities could use this alternative method to lessen crop damage caused by insects.

Ocoxochitl: *An Aztec Herbal: The classical Codex of 1552* and *Flora: The Aztec Herbal* identity *Ocoxochitl* as *Didymaea mexicana*. Francisco Hernandez' "*Historia de las Plantas de Nueva España*" refers to *Ocoxochitl* as *Aocoxochitl*. Mixing *Didymaea mexicana* and *Tagetes erecta*, a flower also known as *Cempasuchil*, or flower of the death, can be used to relieve the chills during fever.[58]

Ocoxochitl is referenced a few more times in the manuscript, such as to lower the heat of the eyes, gut growl, stomach purging, fever, and wounds caused by lightning. I know this plant as "Hierbabuena del Monte" but while doing research for the thesis I kept

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[56]. A. A. Aliero, D. S. Grierson, and A. J. Afolayan, "Chemical and Nutrient Characterization of Solanum Pseudocapsicum Berries," *African Journal of Biotechnology* 4, no. 11 (2005), accessed February 26, 2021, https://www.ajol.info/index.php/ajb/article/view/71376.

[57]. Jeyasankar, Premalatha, and Elumalai, "Biological Activities of Solanum Pseudocapsicum (Solanaceae) against Cotton Bollworm, Helicoverpa Armigera Hübner and Armyworm, Spodoptera Litura Fabricius (Lepidotera."

[58]. Ibid., No. 51 pp. 345.

reading *Didymaea alsinoides*, a researcher also made the same conclusion, and requested further research that would better separate and classify both plants.[59]

Plant Extract	Biological Activity/Property	Compound	Biological Model
Seed[60]	Insecticidal	Ethyl acetate	*Spodoptera litura* *Helicoverpa armigera*
Leaves[61]	Antitumoral	o-methylsolanocapsine	*In vitro* HeLa cells
Fruit[62]	Cell inhibition	Salonine	TKO cell
Leaf[63]	Cytotoxic properties	o-methylsolanocapsine	HeLa cell lines

Table 7: Phytochemistry of *Xiuhhecapatly*.

Chipauacxihuitl: Illustrated in *Figure 5* (codex *Cruz-Badiano* Pg. 7B). Arthur O. Tucker and Jules Janick's *Flora of the Codex Cruz-Badianus* identifies *Chipauacxihuitl* as *Dioscorea galeottiana*,[64] however the leaves look more like *Dioscorea convolvulacea*,

[59]. David Lorence, "Lectotypification of Didymaea Mexicana Hook. f (Rubiaceae, Rubieae) and the Identity of D. Alsinoides (Schltdl. & Cham.) Standl.," *Acta botánica mexicana*, no. 88 (July 2009): 74.

[60]. Ibid., No. 56.

[61]. Santoshkumar H. Dongre et al., "In Vitro Cytotoxic Properties of O-Methylsolanocapsine Isolated from Solanum Pseudocapsicum Leaves," *Indian Journal of Pharmacology* 39, no. 4 (July 1, 2007): 208.

[62]. Xia Yan et al., "α-Solanine Inhibits Growth and Metastatic Potential of Human Colorectal Cancer Cells," *Oncology Reports* 43, no. 5 (May 2020): 1388.

[63]. N. Fadl Almoulah et al., "Antibacterial, Antiproliferative and Antioxidant Activity of Leaf Extracts of Selected Solanaceae Species," *South African Journal of Botany* 112 (2017): 369.

[64]. Arthur O. Tucker and Jules Janick, *Flora of the Codex Cruz-Badianus*, 1st ed. 2020 edition. (Springer, 2020), 22.

as comparing *Dioscorea* genus found in Mexico, and specimens provided by Mexico's *CONABIO*. Victoria Sosa, and Ismael Valdivieso describe *Dioscorea convolvulacea* as:

> "Staminate flowers with 3 stamens and with a widening in the center of the disk; reduced or absent pistil."[65]

Tlalaueuetl: Illustrated in *Figure 5* (codex *Cruz-Badiano*, Pg. 7B). My grandmother used to buy *Agastache mexicana*, and dry it in a newspaper, but I can't recall the uses of the plant. She called the plant "Toronjil," but the one in the codex looks more brownish. *Tlalaueuetl* is used to treat head boils[66] and wounds. However, toronjil was used as an antispasmodic remedy.[67]

The plant could be *Acalypha phleoides*,[68] given the shape of the leaf, but it could also be *Acalypha mexicana*, given the location found. *Acalypha Indica* not native to the American continent is nevertheless used in Mexico as well, given the leaves healing properties on wounds,[69] which is the proper use in the codex.

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[65]. Victoria Sosa and Ismael G. Valdivieso, "Familia Dioscoreaceae," *Flora del Bajío y de Regiones Adyacentes*, no. 177 (February 2013): 5.

[66]. Alfredo Lopez Austin, *Cuerpo humano e ideologia: Las concepciones de los antiguos nahuas II*, 1st edition. (México: Universidad Nacional Autonoma de Mexico, Instituto de Investigaciones Antropologicas, 1980), 84.

[67]. Ibid., No. 51. pp. 227.

[68]. Ibid., No. 63. pp. 24.

[69]. "PLANTAS MEDICINALES," accessed February 26, 2021, https://www.iqb.es/cbasicas/farma/farma06/plantas/pa86sm.htm.

Figure 7: Codex *Cruz-Badiano,* Pg. 9A. *Xiuhamolli*. Public Domain Image.

Xiuhamolli: The plant is found in page 9A of the *Codex Cruz-Badiano*. *Xiuhamolli*'s root and *Copalxocotl* was used to wash the hair.[70] The plant has been identified as *Saponaria americana,* but I doubt the validity given the plant has purple petals instead of white, and the plant is not found anywhere near a stream or lake, as shown in *Figure 7*. *Saponaria americana,* nevertheless has similar uses as *Xiuhamolli* in

[70]. "Museo Nacional de Las Interveniones," accessed February 26, 2021, https://intervenciones.inah.gob.mx/breviariodetalle/268/sobre-la-higiene-en-la-%C3%A9poca-prehisp%C3%A1nica.

Mexico as a personal hygiene product. My grandmother used a plant similar to *Saponaria americana,* with white petals mixed with chili peppers apparently to promote hair growth, I only used it once in Mexico.

There is not enough research in attempting to identify this plant. Mexico has more than five thousand medicinal plants, and only about 240 plants made it into the manuscript. The tonally is found in the head; Martin de la Cruz mentions this plant and draws it, whereas other plants are not. Further research is needed to identify the plant correctly.

I have tried to identify the plants, but it does require much work. I have broken down the plants by chapter, based on the human body, as discussed in the previous chapter. I have done this through chapter five (Figures 8-13) but require more time to complete the other seven chapters. The names are a bit off, because it's difficult to read the names above the drawings.

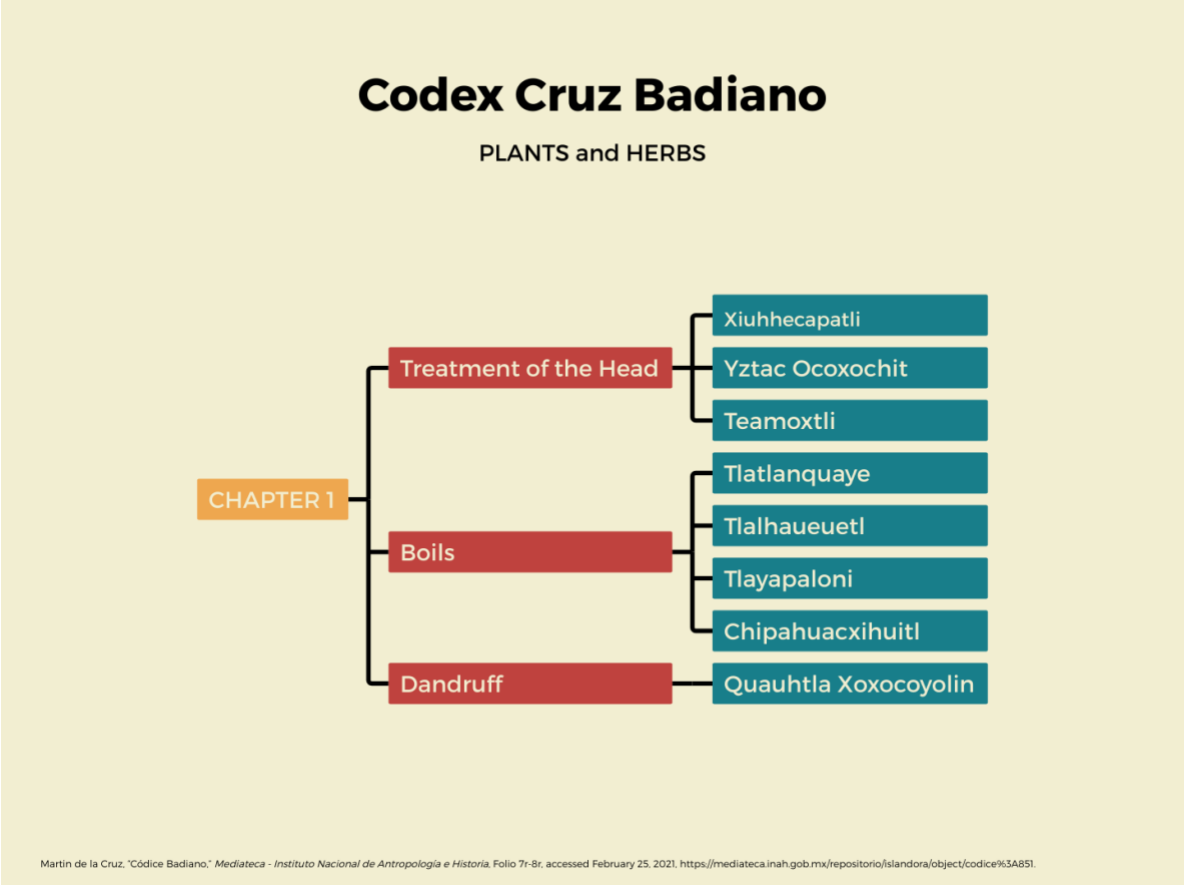

Figure 8: *Chapter 1*. Plants of codex *Cruz-Badiano*. Names might be a little of, as the name in the pictures are not very clear.

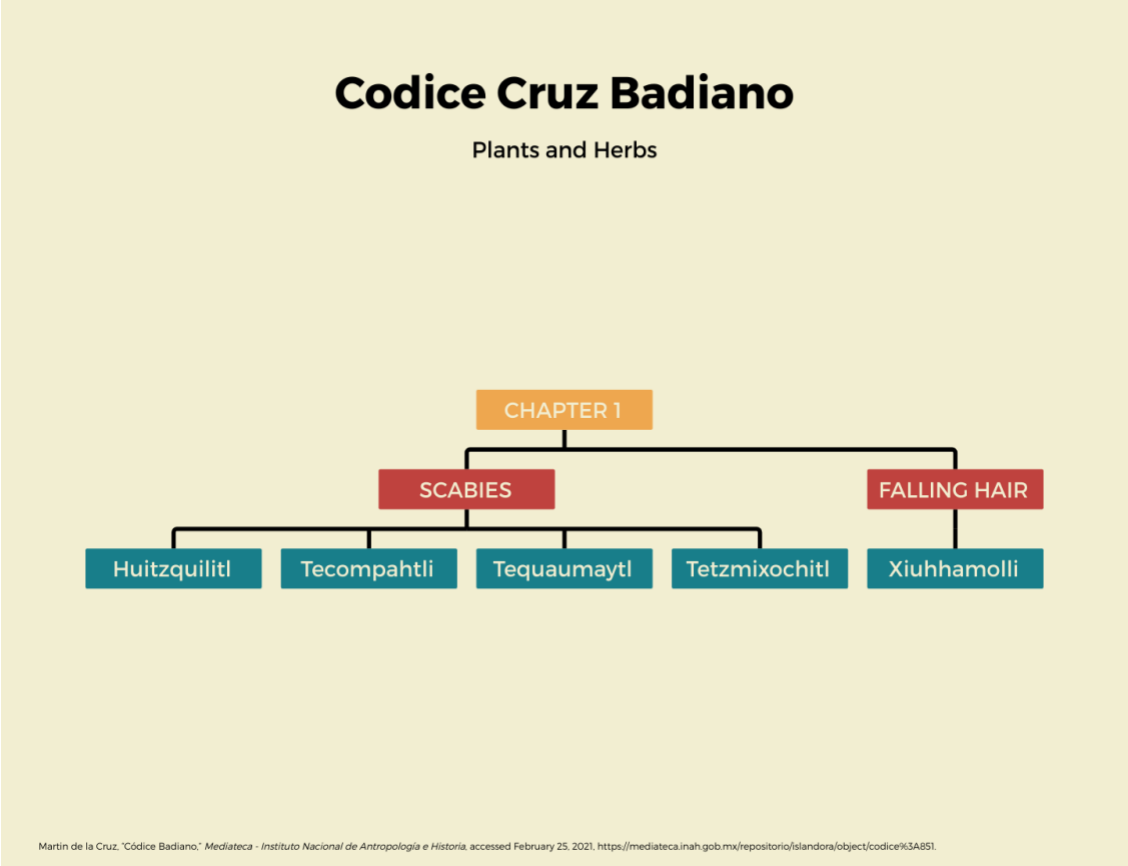

Figure 9: *Chapter 1 Continuation*. Plants of codex *Cruz-Badiano*, continuation. Names might be a little off, as the name in the pictures are not very clear.

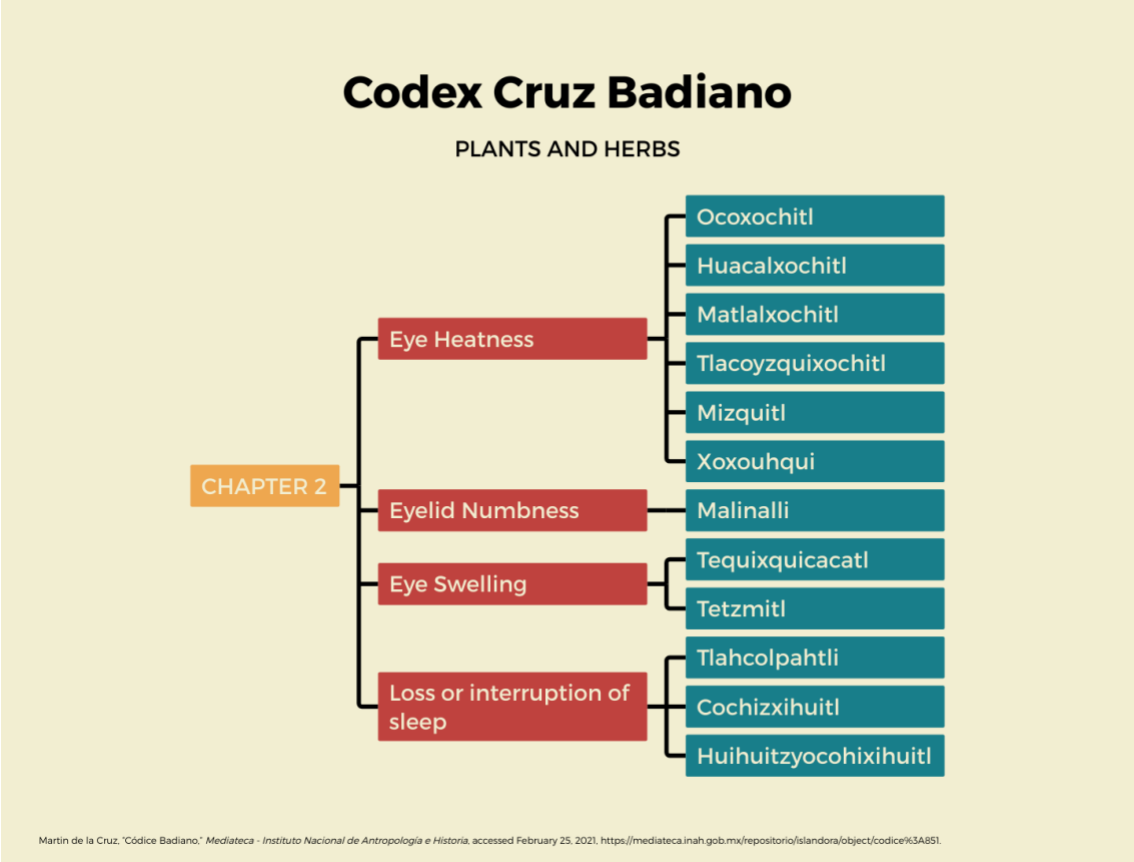

Figure 10: *Chapter 2*. Plants of codex *Cruz-Badiano*. Names might be a little off, as the name in the pictures are not very clear.

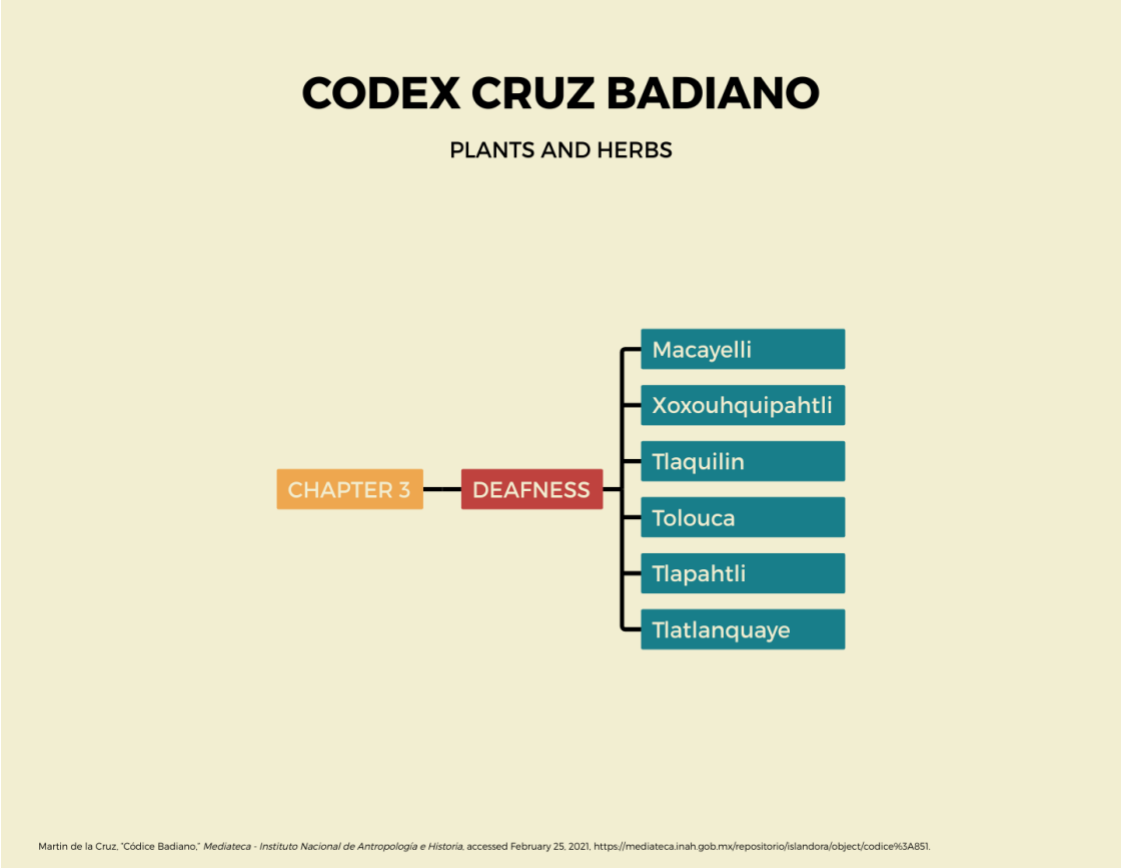

Figure 11: *Chapter 3*. Plants of codex *Cruz-Badiano*. Names might be a little off, as the name in the pictures are not very clear.

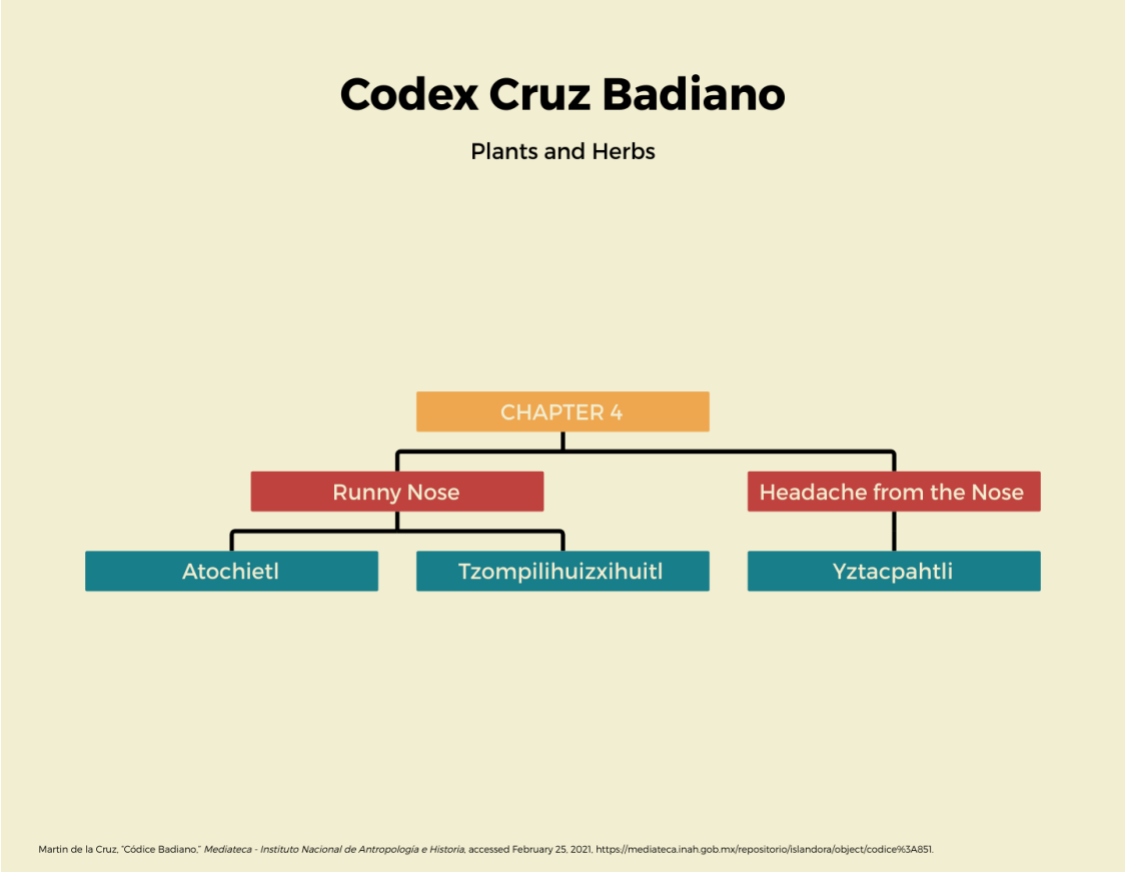

Figure 12: *Chapter 4*. Plants of codex *Cruz-Badiano*. Names might be a little off, as the name in the pictures are not very clear.

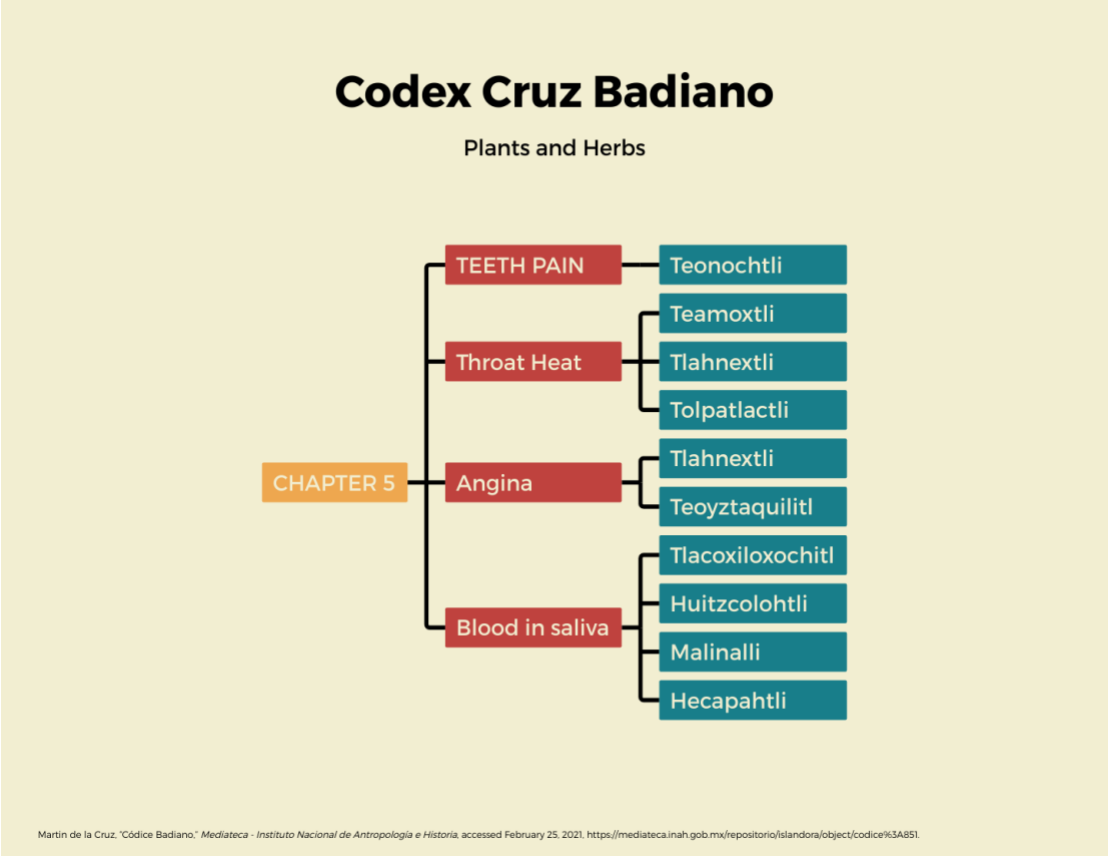

Figure 13: *Chapter 5*. Plants of codex *Cruz-Badiano*. Names might be a little of, as the name in the pictures are not very clear.

Tlatzonquixtiliztli
Conclusion

Mesoamerican medicine is based on the treatment and prevention of diseases and a balance with the environment. In this chapter, I demonstrated that nutrition and health are related to each other, as this could clear some misconceptions people still have about a good diet, and it's a combination of ingredients that fulfill all the nutritional values per meal. The chapter has shown that the central idea of Mexican medicine is a balanced nutritious diet which is wed to the worldview of animistic forces discussed in the previous chapter.

In this chapter, I also showed that an Aztec warrior's diet is the same or much better than a professional athlete's diet; if they had the exact parameters of age, size, weight, and height, this is important as we can implement a similar diet to places where food is scarce, and the cost to sow this Mesoamerican product is relatively cheaper. People in Mexico nowadays rather drink soda than drink atole, or eat fried junk food, thank eating pozole. I introduced the method of sowing crops called chinampa, which can be implemented today to solve malnutrition problems in the world. The chinampas give more yields in less time than other methods of sowing, without the use of deadly chemicals, as planting corn, beans, and pumpkin together breaks down soil nutrient much efficient, and terpenoids from the pumpkin, we can conclude that chinampas are more ecological friendly, and yield more products given they are on top of fermented soil, and water. The Aztecs domesticated various types of corn which are very easy to harvest. This technological advance of growing corn, beans, and squash together helped produce more crops for the significant population of Tenochtitlan.

Amino acids are needed for the synthesis of proteins and are acquired through the diet we intake. The proteins and amino acids per serving were around 82.63 g of protein, whereas Aspartic acid, Glutamic acid, and Lysine were the most abundant amino acids in the diet. Cysteine is probably the lowest amino acid found in Aztec diet, as this amino acid is found mostly in yogurt, eggs, and cheese. Most people of indigenous descent lack the lactase enzyme which breaks down this disaccharide into two monosaccharides glucose, and galactose. Fatty acids are stored as a triglyceride, as energy storage in the body. Using the same parameters to find the data for the *20YOAT* we can see the fats and fatty acid analysis per serving to be mostly composed 42% polyunsaturated, 27% saturated, and 30% monounsaturated fatty acids. Before gathering the data, I expected to have a higher concentration of unsaturated fatty acids. The analysis per serving estimates around 247.71g of Carbohydrates, 36.1g of fiber, and 59.33g of sugar, which 57.27g are attributed to starch sugar (a polysaccharide).

This chapter provided an insight into the Aztec medicinal manuscript and present further research to correctly identify *Xiuhhecapatli*, as the Aztecs attributed its biological activity in treating fever and headaches. I conclude the plant to be *Solanum pseudocapsicum*. Phytochemical properties have shown the ethyl acetate, salonine, and alkaloid o-methylsolanocapsine of the plant to contain insecticidal, and antitumoral properties, as well as cytotoxic properties in HeLa cell lines. The study of the codex needs further research as man

Chapter 1 of the Aztec manuscript contains the plants Xiuhhecapatli, Yztac Ocoxochitl, Teamoxtli, which are used to treat the head. Tlatlanquaye, Tlalhaueuetl, and chipahuacxihuitl to treat head boils. Quauhtla Xoxocoyolin for dead skin of the head

(dandruff). Huitzquilitl, Tecompahtli, Tequamaytl, Tetzxochitl, are used to treat scabies. Xiuhhamolli is used to treat the head when the hair is falling, my grandmother used a plant similar to Xiuhhamolli, but she added more ingredients, such as spices. Chapter 2 contains plants that treat the eyes, especially due to fever, numbness, swelling, and insomnia. Chapter 3 is for conditions related to the ear, the plant attributed are Macayelli, Xoxouhquipahtli, Tlaquilin, Tolouca, Tlapahtli, Tlatlanquaye. As we notice we are finding a pattern, we started with conditions of the head, eyes, ears, and chapter 4 talks about conditions of the nose. Atochietl, Tzompilihuizxihuitl, Yztacpahtli, as remedies for the nasal area, specifically from runny nose, I would expect this plant to be related to the water, male force of Tlaloc. Chapter 5 has plants that treat the throat, and mouth.

If we make an observation, many of the plants described in the Aztec manuscript have chemical compounds that support the claims of its biological activity, and mode of usage. Others are yet to be properly identified, as they could be from various sub-species. This chapter has demonstrated that biological and cultural aspects are essential to Mesoamerican medicine and treatment of illnesses. The nutritional value of the diet, the plants role in ecology, and their phytochemical properties are all important. The chapter demonstrates the trial-and-error method used by the Aztecs as they categorized medicinal plants in thirteen different chapters with their respective biological model. It is clear from the above data & arguments that the absolute sufficiency of Mesoamerican medicine, is the appropriate use of medicinal plants to cure illnesses, and a healthy diet to prevent diseases, as plants belong to our world, and we are part of the world, any damage we make, we are damaging ourselves. Plants, mushrooms, and even rocks play a role in our lives. Fungi break down organic matter, which in turn benefit the plants.

AMOXXEXELOLIZTLI YEI
CHAPTER 3

The Community

In chapter two, I presented supporting data on the Mesoamerican diet in order to show the nutritional value of Mesoamerican cuisine, and its contribution to human health. I introduced the codex *Cruz-Badiano,* an Aztec manuscript that talks about plants and their medicinal uses. I refer to this manuscript for referencing certain medicinal aspects, as the Nahua community come from the Aztec people as well. In this chapter I concentrate on the medicinal practices and remedies of the Nahua community.

In this chapter, I only focus on the works from the Mexican government's "*National Institute of Indigenous Peoples*," (INPI) which hosts the digital library of traditional Mexican medicine of the Universidad Nacional Autonoma de Mexico (UNAM) and the research that the University conducted. According to the data collected by Mexico's *INPI,* 2,886,767 Nahua people were living in Mexico City's 16 municipalities[71] in 2015. As shown in Figure 14, Iztapalapa has the most significant Nahua population density in Mexico City, making it the most vulnerable municipality to crime, organ trafficking, and inequality.

Currently, Iztapalapa is the municipality in Mexico City with the highest percentage of *covid19* deaths, and they were the last ones to receive the *covid19* vaccines. Apart from *covid,* Figure 20 illustrates other mortality causes amongst Nahua communities in Mexico. To obtain the vaccine, one has to register on the Mexican

[71]. "Nahuas del Distrito Federal – Estadísticas," *Atlas de los Pueblos Indígenas de México. INPI,* n.d., accessed February 26, 2021, http://atlas.inpi.gob.mx/?page_id=6390.

government website, a convenience that many indigenous communities find. Apart from the fact that the web page crashes every so often, many autonomous communities in Mexico lack electricity, drinking water, much less a computer to register.

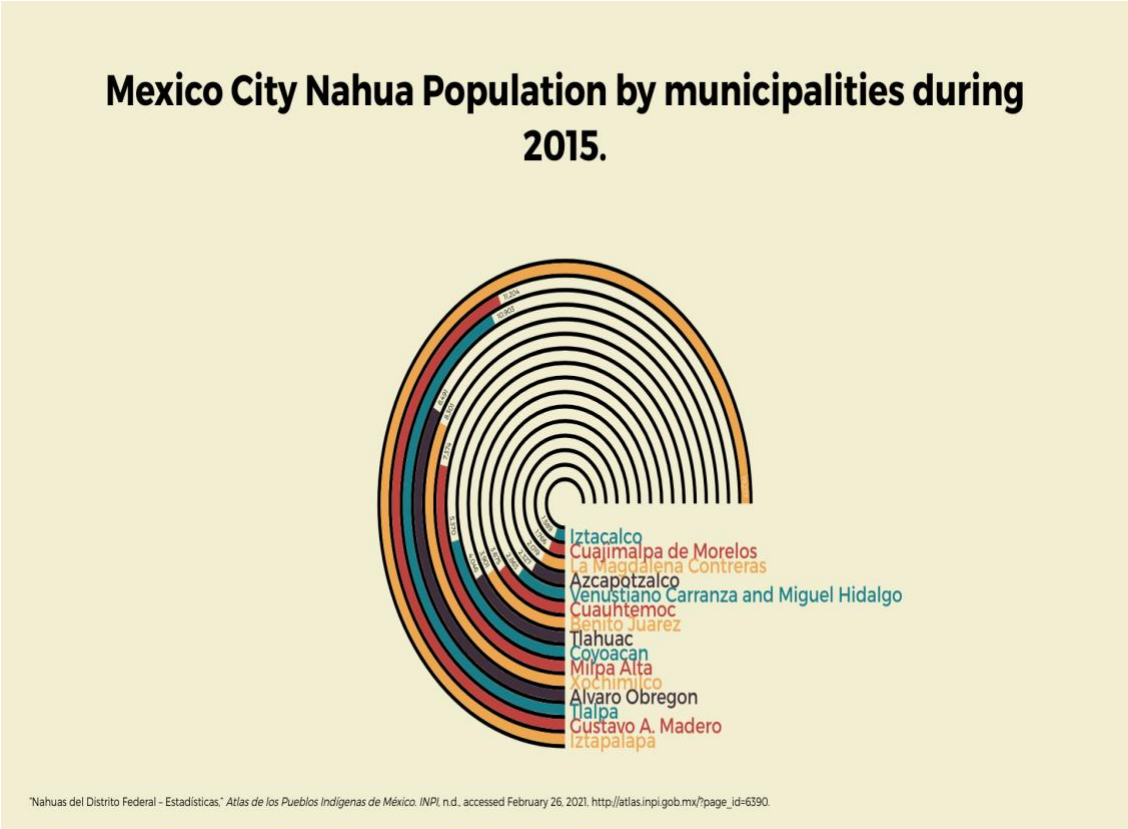

Figure 14: Chart of Nahua population by municipalities of Mexico City in 2015. Graph adapted from the numerical data provided by Mexico's *INPI*.

It is important to note that Nahuas live in central and southern Mexico, but I will only focus here on the community in Mexico City. My grandmother is from Tlaxcala and raised in Mexico City. I include here (Figure 14) a Nahua population chart comparing all of Mexico City's municipalities. The population is increasing as more people are moving into the city.

According to the data collected by Mexico's INPI 2,886,767 Nahua people are living in Mexico City 16 municipalities[72] in 2015. Based on the data provided by the INPI, I created *Figure 15*. Upon close analysis, it is evident that both male and female populations are increasing in a steady pace. The male population has increased 11.4141% from 2010 to 2015, whereas the female population has increased 11.7149% from 2010 to 2015.

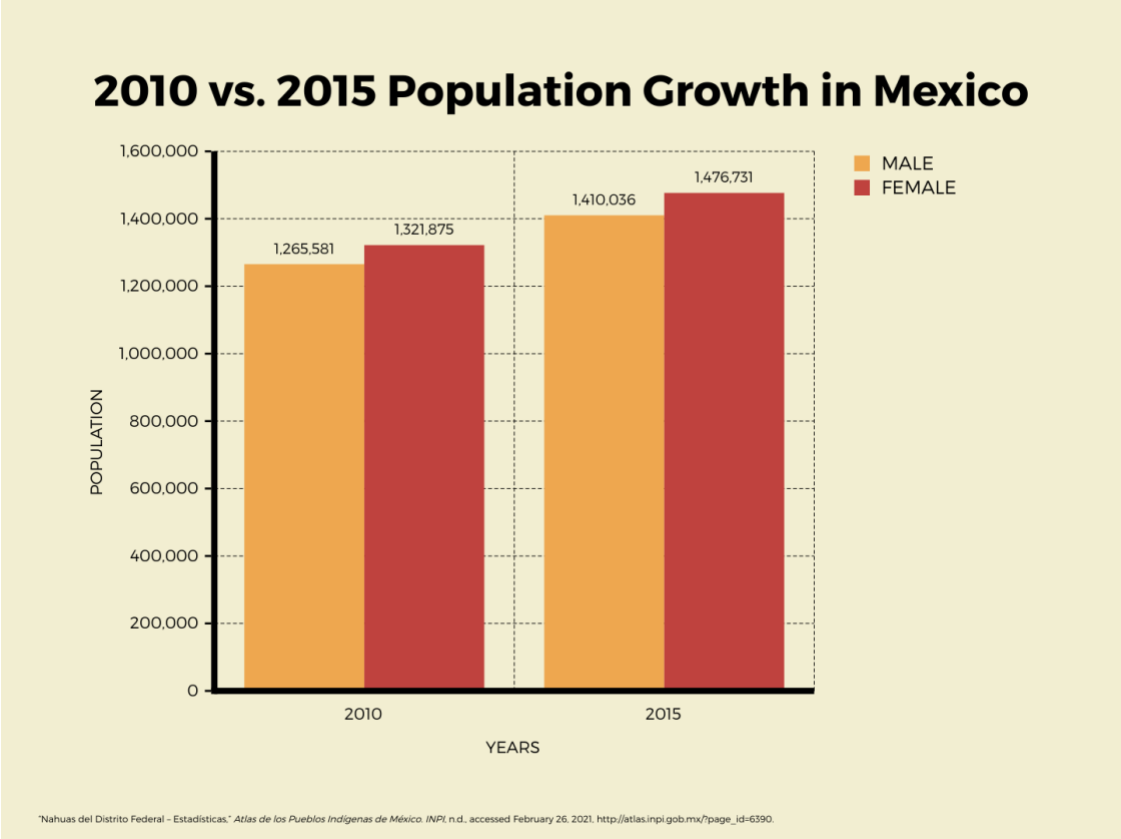

Figure 15: Chart Comparing 2010 vs 2015 population growth in Mexico City. Chart adapted from the data provided by *INPI*.

[72]. "Nahuas del Distrito Federal – Estadísticas," *Atlas de los Pueblos Indígenas de México. INPI*, n.d., accessed February 26, 2021, http://atlas.inpi.gob.mx/?page_id=6390.

The research provided by the *UNAM* on 206 total traditional therapists consisted roughly of 60% women. The therapists derived from Puebla, Hidalgo, Guerrero, Michoacán, and Veracruz. Fifty-three came from Puebla, and 51 came from Hidalgo.[73] The premise of the research conducted by *UNAM* is to gather information on Nahua human resources and the primary health demands provided by the Nahua therapists.

The study does not state how the researchers collected information on the gender of the therapists. Did the researchers give a paper to mark a gender as female or male? Did the therapist state they identify as a female? Did the researchers assume based on physical characteristics? How was the gender data collected? An important question the authors left out. Another problem with the research is that it does not state the date and time of the study. The first question is crucial, as women more often become healers rather than males. Many people in Mexico have a male oriented mentality, and this means that they understand plants, and indigenous medicine as irrelevant and not worth studying.

In Mexico, a colonial mentality of inferiority towards indigenous culture is prominent in modern day Mexican people. There are very few schools that teach Nahuatl, or schools that teach the curriculum in Nahuatl, forcing indigenous people to adapt to Spanish, and lose their language, or just completely stop attending school.

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[73]. "La Medicina Tradicional de los Pueblos Indígenas de México: Biblioteca Digital de la Medicina Tradicional Mexicana," *Biblioteca Digital de la Medicina Tradicional Méxicana.* (UNAM, 2009), last modified 2009, accessed February 27, 2021, http://www.medicinatradicionalmexicana.unam.mx/.

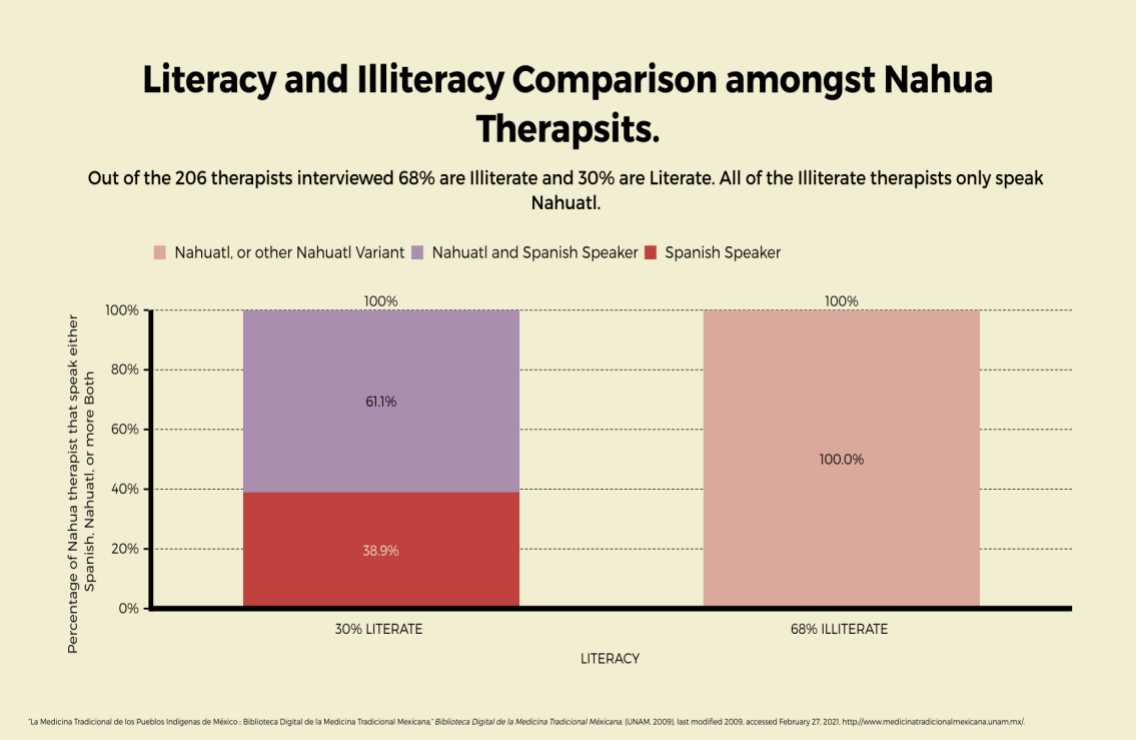

Figure 16: Chart Comparing Literacy and Illiteracy Comparison amongst Nahua Therapists. Chart adapted from the data provided by *Biblioteca Digital de la Medicina Tradicional Mexicana*.

Figure 16 describes how (the) Nahuatl is disadvantaged by illiteracy; schools only teach classes in Spanish and don't adapt to the Nahuatl culture curriculum. In my case, I picked a few Nahuatl words from my grandmother and can have basic Nahuatl conversations, but it takes time to get used to the different Nahuatl dialects and more complex ideas and conversations.

My grandmother did not teach Nahuatl to my mother out of fear that my mom would face discrimination, and I only picked up a few words when my grandmother

talked to her patients. She forbade me to learn after I told her I wanted to practice medicine because medical schools in Mexico looked at indigenous Nahuatl speakers negatively. The UNAM researchers proposed more learning institutions for Nahuatl speakers, this could be a good start, but we also need to implement more humanities classes in the curriculum, because even after indigenous people get their education, they will still be looked down upon, and will continue to have disadvantages.

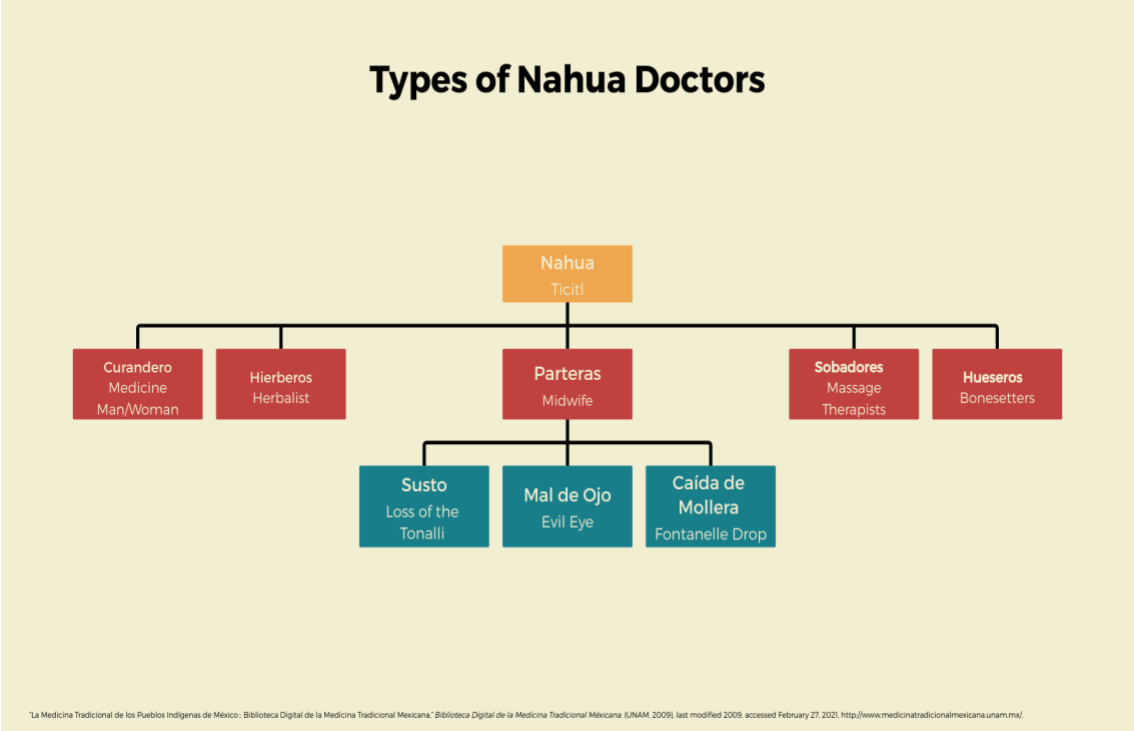

Figure 17: Chart Describing the different types of Nahua ticitl. Chart adapted from the data provided by *Biblioteca Digital de la Medicina Tradicional Mexicana*.

Nahua doctors have many medicinal specialties; I created *Figure 17* to show the most popular Nahua therapeutic specialties. Sylvia Marcos describes the role of *parteras*, a *Ticitl* specialist as follows:

> Throughout the world, delivery care has traditionally been a specialty of women; but also, in the Aztec world, midwives acted as priestesses in rituals related to births. The birth was conceived as a battle zone, and in this situation, the priestess midwives

> encouraged and supported the women. The midwives directed the birth process, administered herbs, and took the women to the temazcal baths for the vapors to heal them.[74]

In chapter two, I presented the *tonally* theory, which functions as an energy source for the body. During a *susto*, the tonally leaves the body and loses heat to the environment. To prevent heat loss, the midwife recommends bathing in a temazcal with *Casimiroa edulis*. The midwife also cleans the new mother with *Casimiroa edulis*, as my grandma once told me.

It's fascinating that the research also mentions Zapote-Blanco as a treatment for new mothers. Zapote is used to treat hypertension, insomnia, and even as a sedative, as shown in *Figure 18*. According to Dr. Edgar Torres Casi, Zapote-Blanco zapote activates "Sweaty, hypnotic, and sedative properties of the nervous system. Promotes circulation and fights insomnia."[75]

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[74]. Sylvia Marcos, *Cruzando fronteras. Mujeres indígenas y feminismos abajo y a la izquierda – Librería En el Blanco* (CIDECI-Universidad de la Tierra, Chiapas, n.d.), 207.

[75]. Edgar Torres Carsi, *Herbolaria Mexicana: Enciclopedia Medicinal*, 4th ed. edition. (México, D.F.: Grupo Editorial Tomo, 2008), 253.

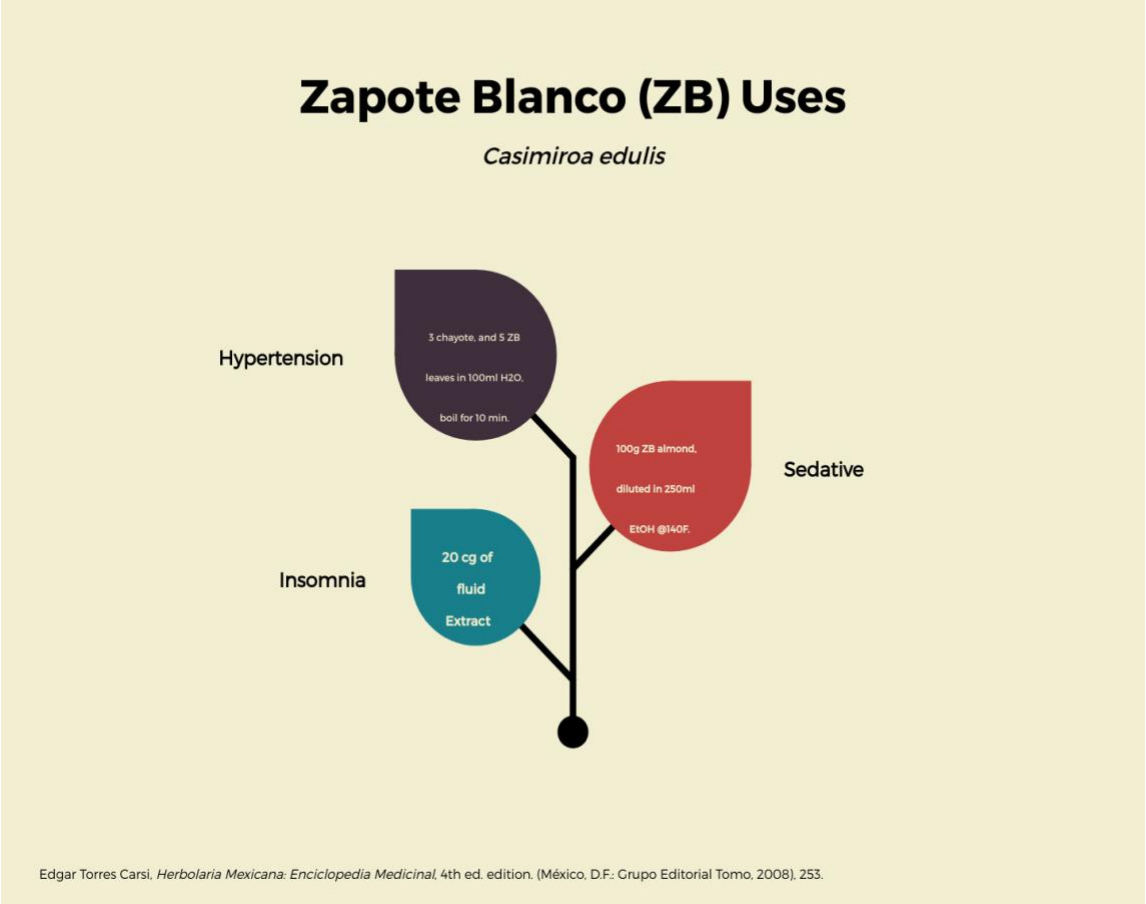

Figure 18: Chart Describing the *different uses of Zapote Blanco*. Chart adapted from the data provided by Dr. Edgar Torres Carsi.

Apart from treating hypertension with the leaves of the white sapote, this plant can also be used to cure digestive problems. My grandmother mixed chamomile with white sapote leaves to cure stomach pain. Resent research has found anticoagulant and antimutagenic properties in Zapote-blanco, as *Table 8* shows.

Plant Extract	Biological Activity/Property	Compound
Leaf[76]	Anticoagulant	Umbelliferone Esculetin Imperatorin Xanthotoxol
Leaf[77]	Antimutagenic	(R,S)-5-methoxy-8-[(6,7-dihydroxy-3,7-dimethyl-2-octenyl)oxy]psoralen Casimiroin

Table 8: Phytochemistry of *Casimiroa edulis*.

The anticoagulant properties of Sapodilla should be more extensively studied, since it can provide novel alternatives to treating patients who have suffered from strokes. According to phytochemical data collected in *Table 8*, the plant has properties that are very valuable, since it can both be used in stroke prevention, and acts as an antimutagenic, which can be used as a preventive some forms of cancer. It's very important to note that Dr. Carlos Edgar Torres Carsi, also argues that Zapote-Blanco' (in Figure 18) can be used to treat hypertension, which can also cause strokes.

Sustos are traumatic experiences that the *Curanderas* heal. My grandmother cured *Sustos* with copal resin and a plant. I can't recall the name, but she used the whole

[76]. Amani S. Awaad et al., "New Biological Activities of Casimiroa Edulis Leaf Extract and Isolated Compounds," *Phytotherapy research: PTR* 26, no. 3 (March 2012): 452–457.

[77]. Aiko Ito et al., "Antimutagenic Constituents of Casimiroa Edulis with Potential Cancer Chemopreventive Activity," *Journal of Agricultural and Food Chemistry* 46, no. 9 (September 1, 1998): 3509–3516.

plant, including the root, to massage the patient. In the ethnographical research conducted by the *UNAM*, one of the therapists used *Capraria mexicana*; my grandmother used a similar flower, but the petals were more erect, and the stamens were yellow. The usage of different plants to treat the same condition is really interesting, as it could mean that: 1) The plants are extinct, and Nahua doctors, use other plants; or 2) If the plants used by other Nahuas different, how do they differ phytochemically?

When I lived in Mexico City, many of the shamans used the same plant to conduct many cleansings, but my grandmother disagreed. She argued that more than one person could not use a plant. My grandmother was also particular about where the plant was collected or the day it was sown. I remember she once told me that the best flowers to gather are from Xochimilco, given the soil's properties and the sun's reflection. Near the place she collected the plants, there is a catholic church on top of an ancient Aztec botanical garden; the placing of catholic churches on old Aztec (and other Indigenous) religious cites was pretty typical of the colonial era. Many of the buildings destroyed were Aztec places to learn about medicine, and their different types of medicinal specialties. The Aztecs treated many conditions from bones injuries, surgery, and dental medicine, many of these practices are still done by Nahua healers, but less Nahuas are becoming interested in Medicine.

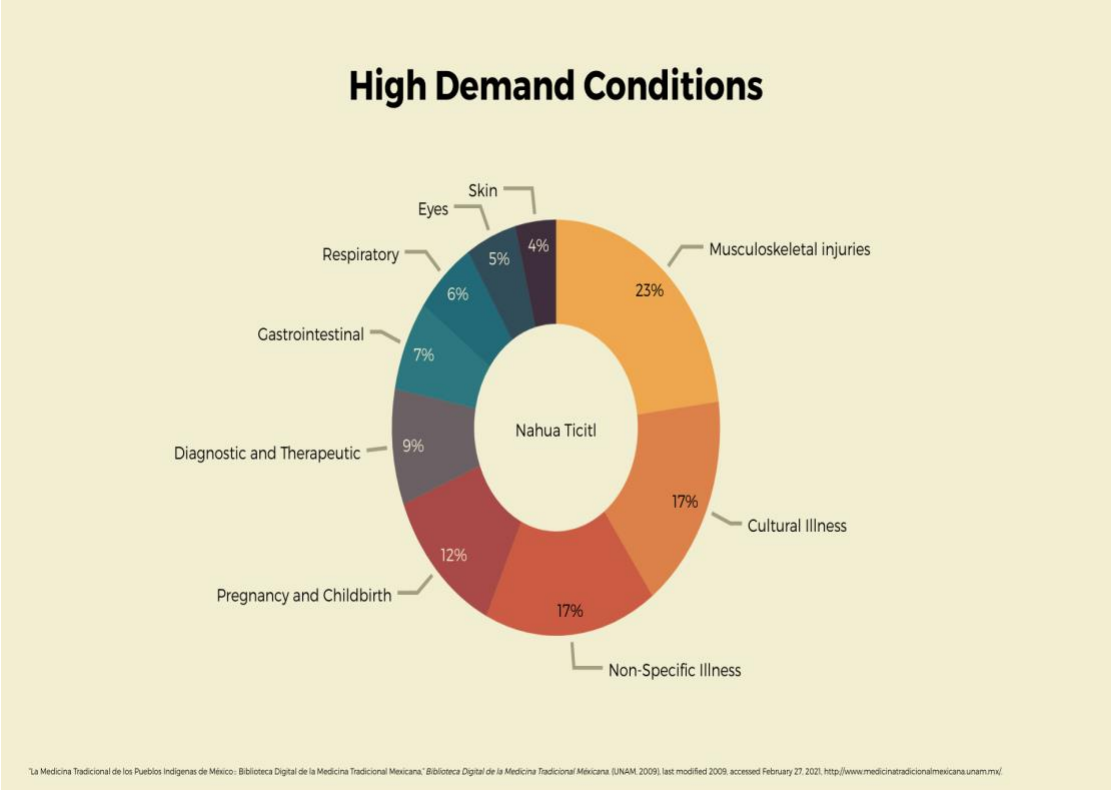

Figure 19: High Demand Conditions. Chart adapted from the data provided by *Biblioteca Digital de la Medicina Tradicional Mexicana*.

According to *Figure 19*, the three major demands (percentage wise) for Nahua healers are for bone injuries, cultural illnesses, and non-specific illnesses. The *hueseros* attended bone pain, rheumatism, foot injury, head blows, spinal blows, bruised clavicles, damaged hips, bruises, and swollen bumps, amongst others.

For cultural illnesses, the Nahua therapists attended bad-air, evil eye, and spiritual cleansing. For Non-specific conditions, the therapists treated fevers, hair loss, headaches, cough, insect bites, and malnutrition. According to Figure 20, these illnesses make up the highest percentage in mortality causes. For the "Pregnancy and Childbirth" percentage, bleeding, abortion, vaginal inflammation, and hemorrhage, were the conditions of highest demand.

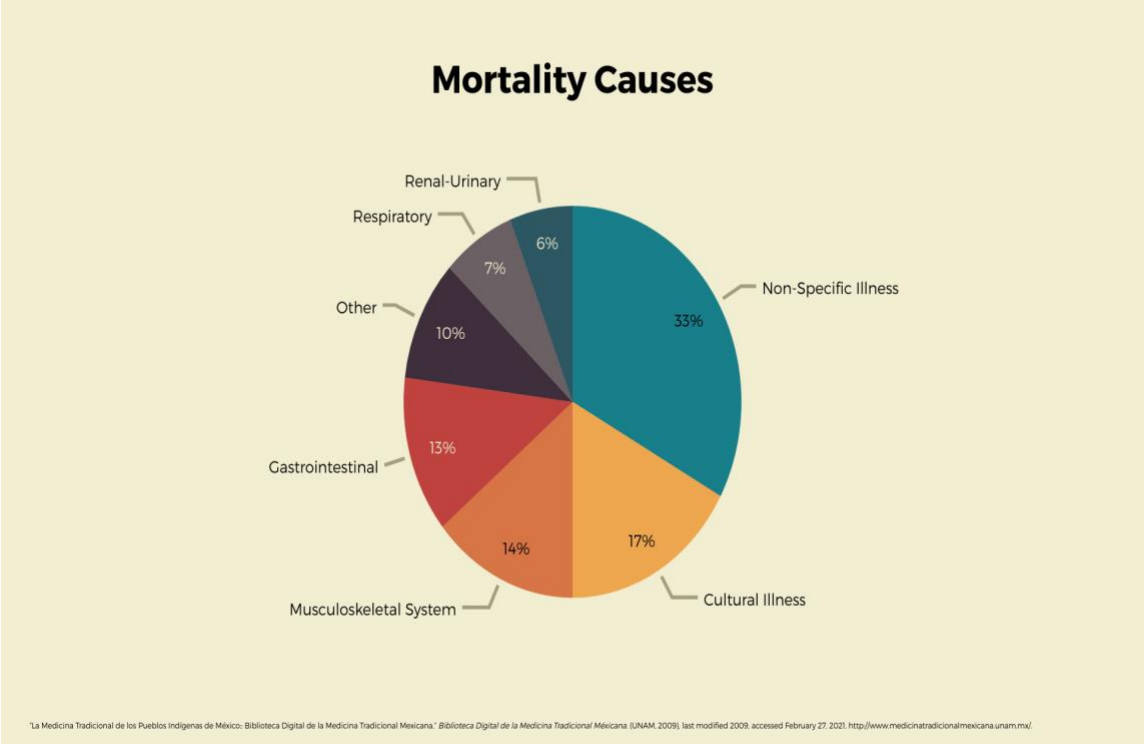

Figure 20: Major mortality causes in the Nahua Community. Chart adapted from the data provided by *Biblioteca Digital de la Medicina Tradicional Mexicana*.

Many things could cause bleeding; however, as expected, the Nahua therapists' plants are warm, as bleeding is a warm condition. According to the study, the plants used to treat bleeding caused by an accidental abortion are: Roots of *Artemisia ludoviciana sub. mexicana*, and *Lippia alva*, about two pieces of chocolate, *Lippia dulcis*, *Plumeria acutifolia*, *Psidium guajava*, *Persea americana* drunk as a tea.

In her book *Plantas medicinales de la medicina tradicional mexicana para tartar afecciones gastrointestinales* Lidia Osuna Torres mentions that Artemisia should be drunk with Albahaca, spearmint, cinnamon, and chamomile to treat diarrhea. However, spearmint should not be drunk when having diarrhea, as it's a cold plant, and diarrhea itself is a cold illness, according to the few and vague understanding of the plant I remember my grandmother discussing. My grandmother would probably disagree with

drinking spearmint while having diarrhea, as Lidia Osuna Torres has mentioned. Spearmint can be used to lower stomach pain, but not to treat diarrhea.

The account of cold and heat, dual forces in the human body, still exists in my family. My mother forbids eating any watermelon when having diarrhea, as watermelon is a cold fruit, and diarrhea is a cold illness. Some of the plants used by the therapist are also found in the codex *Cruz-Badiano*, such as the ones in *Figure 21, 22, 23,* and *44*.

Nopales, Toloache, & Artemisia

Figure 21: Codex Cruz-Badiano. *Tlatoc nochtli.* Public Domain.

Nopales shown in *Figure 21*, can be found in page 49B of the codex. Nopales have been used in Mexico to treat diabetes. My grandmother used nopales to treat

diabetes, and now my aunt uses them to control her diabetes *Figure 22*. My grandmother mixed nopales and *xoconostle* to treat diabetes, whereas, in the research conducted by UNAM, they only use nopales with lemon. Infants that suffer from indigestion eat nopales. Nopales induce diarrhea-like symptoms when consumed in excess; nevertheless, I find it odd that the data collected from the Nahuas was incorrect during the research mentioned earlier. Based on the information provided by the researchers, nopales reduce diarrhea, which is not entirely true. The root prevents diarrhea, but not the nopal itself. Every Nahua in Mexico City uses Nopales to treat digestive problems such as Irritable bowel syndrome, which makes me think that the research conducting the interviews in Nahuatl misunderstood what the Nahua doctors were saying. My grandmother, my mom, and I cook nopales, and eat them. When my mom had cholecystectomy, and we eat nopales almost on a daily basis. Just about everyone in a street market in Mexico can testify that Nopales aids in digestion, and does not treat diarrhea, but rather induces it.

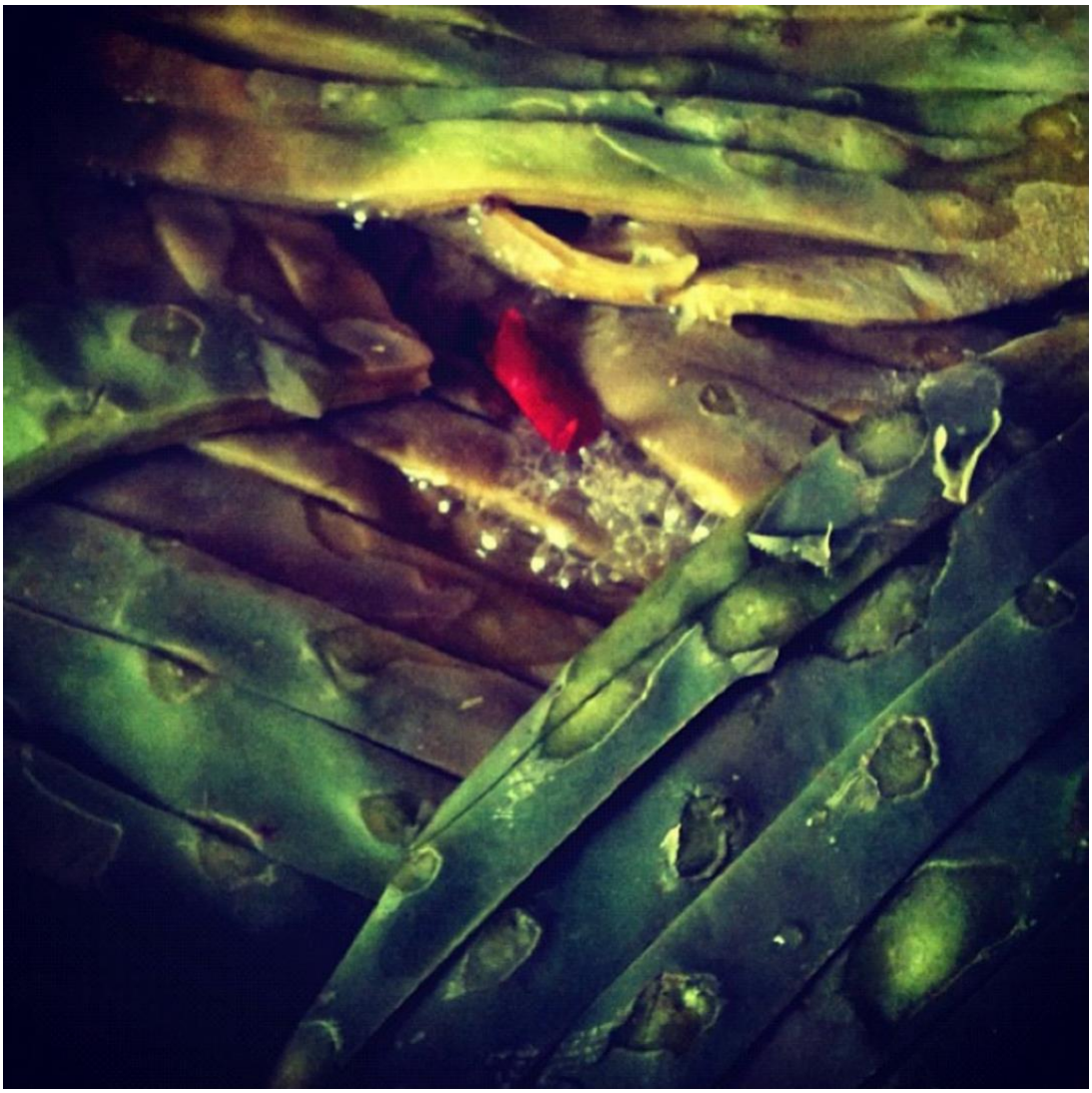

Figure 22: Cooking Nopales. My mom adds a red little pepper which prevents the nopales from releasing their viscous properties.

Figure 23: *Tolohua xihuitl*. Public Domain Image.

Toloache *Figure 23* is found in page 49B of the codex. My grandmother used toloache in Mexico as a remedy to treat the bones. Toloache nevertheless has a bad reputation as many people consider it to be a 'plant of the devil,' as many people use it to drug others, this is a horrible misconception, as we are adapting a European symbol “devil” to label a plant. Labeling plants as devils or evil is a mentality that we inherited from the Europeans, and one, I argue, we need to get rid of. Many people in Mexico use this plant to manipulate people. If you make someone drink the leaves of this plant in tea, the person will become in a zombie like trance, and will trust no one but the person that gave the drink to the victim. People have used this plant for personal greed, and needs, and have forgotten that this plant has the right to live. Ancient rain priests used toloache for

their offering to mother nature.[78] The plant has other uses such as muscle pain relief, and muscle relaxation.[79] The plant is probably related to Tlaloc (*Figure 25*.), or Tezcatlipoca. In a recent review published by the *Nahata College of Pharmacy* a phytochemical review of *D. stramonium* was done, the plant has shown to show anti-asthmatic, anticholinergic, anti-inflammatory, and anti-microbial activity.[80] The major alkaloids found in toloache are hyoscyamine and scopolamine, which are used to treat muscle cramps.[81]

Despite its many uses, this plant should never be drunk. My grandmother never allowed me to get near the plant, she used it mostly as a gel to massage the bones and toes. Given this plant to cure bone pain, and muscle contraction, we can assume the Aztecs viewed this plant as a 'cold plant,' and therefore the statement made by Richard Evans Schultes is correct. *Artemisia mexicana*, is another cold plant.

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[78]. Richard Evans Schultes, Albert Hofmann, and Christian Rätsch, *Plants of the Gods: Their Sacred, Healing, and Hallucinogenic Powers*, 2nd edition. (Rochester, Vt: Healing Arts Press, 2001), 79.

[79]. Ibid., No. 74 pp. 239.

[80]. Priyanka Soni et al., "Pharmacological Properties of Datura Stramonium L. as a Potential Medicinal Tree: An Overview," *Asian Pacific Journal of Tropical Biomedicine* 2, no. 12 (December 2012): 1002–1008.

[81]. Ibid., No. 77 pp. 107.

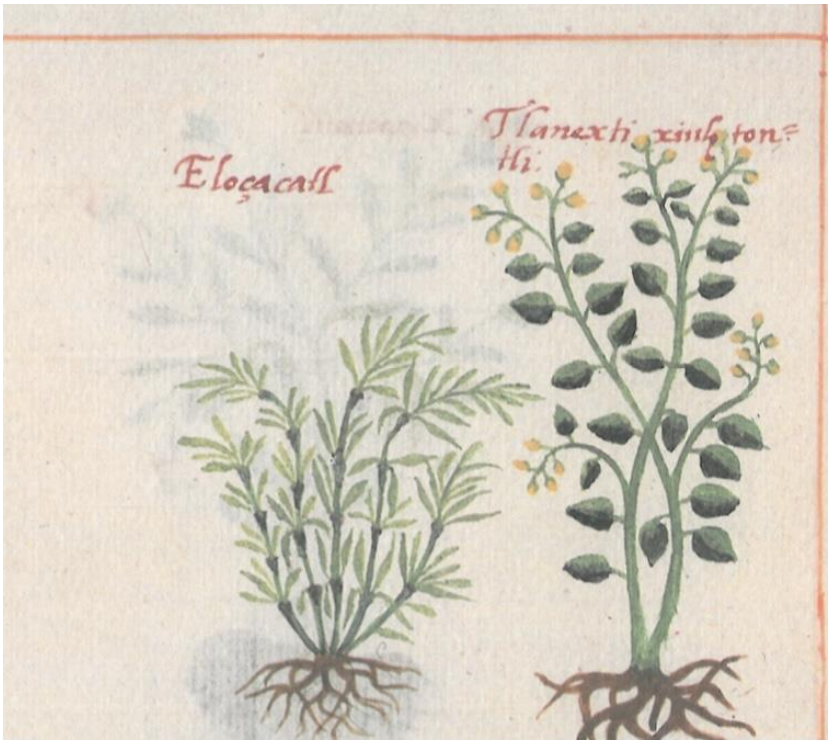

Figure 24: Codex *Cruz-Badiano*. *Elocacatl*. Public Domain Image.

Elocatl shown in *Figure 24*, is used by the Nahua, and it's found in page 31B of the codex. *Elocatl* is used in Mexico as it believed to have diuretic, astringent, and pectoral properties.[82] I know this plant by the name of *cola de caballo*.

My grandmother treated patients having abdominal pain with a plant similar to *Elocatl*. my mother had a cholecystectomy when I was 7 years old, and I'm almost certain, that this plant was used by my grandmother to relieve the pain. In the *Academy Press* a study was published, the procedures and results gathered were the following:

> In this study, antinociceptive and anti-inflammatory effects of hydroalcoholic extract of stem from *Equisetum arvense* in mice were evaluated. The extract (10, 25, 50 and 100 mg kg $^{-1}$, i.p.), reduced the writhing induced by acetic acid in 49, 57, 93 and 98%, respectively……. These results indicate that this extract exhibits an

[82]. Ibid., No. 74 pp. 89.

> antinociceptive effect in chemical models of nociception which is not related to the opioid system, as well as anti-inflammatory properties.[83]

Gallstones are really painful, yet the research conducted tested the positive Antinociceptive and anti-inflammatory properties found in the plant. My mom, and many other Nahua people take this plant to treat abdominal pain. Further research needs to be done to determine the partition coefficient of each chemical components of the plant.

Many of the patients came to my grandmother asking her to prepare this remedy. Some say it is addictive, but my mom took the plant, and it did not get addicted to it." Nevertheless, the plant only treats the pain, it does not cure the problem. Until this day my mom still suffers from abdominal pain.

[83]. Fabrício Hoffmann Martins Do Monte et al., "Antinociceptive and Anti-Inflammatory Properties of the Hydroalcoholic Extract of Stems from Equisetum Arvense L. in Mice," *Pharmacological Research* 49, no. 3 (March 2004): 239.

Figure 25: Image of the *Tlaloque* found in the *Codex Rios*. Public Domain Image.

Artemisia mexicana is mostly associated with the male force of water, Tlaloc, shown in Figure 25, and Figure 2. The plant is known in Nahuatl as *Yztauhyatl. Artemisia mexicana* is found thought most the chapters of the codex Crux-Badiano. The plant is spasmolytic and should not be taken in case of pregnancy.[84] There are many plants in the codex, but Artemisia is one that gets my attention, as is a plant that grew just right outside my house, and it's a plant that spread through the entire American continent.

[84]. Ibid., No. 74 pp. 41.

Based on the codex previously mentioned we can find *Artemisia mexicana* to treat hand weakness when mixed with *Xoxouhcapahtli*, and *quetzalxoxouhqui*. Given this plant was associated with Tlaloc, it was also used to treat the body after a lightning strike, which worked by adding *ayauhquahuitl*, *tepapaquiltiquahuitl*, and *Artemisia mexicana*.[85] The plant was also used to wash the hair. The plant was given to those that had stomach parasites or suffered from stomach cramps; I personally drank it. As already mentioned above, plants are not a monetized instrument, but a living being with cosmic energy like that of tonally. To give a good example, the mugwort plant belongs to the masculine energy of water-Tlaloc. Other plants belong to the power of *Mictalntecuhtli* and *Mictlancihuatl*, which we can predict are found in the last chapters of the Azteca herbal. Again, this shows that the ideas of healing and health were tied up with the rest of the natural world and cosmology. This is a much more "holistic" approach to medicine that doesn't limit value and worth to the human, but to the entire cosmos.

Currently in Mexico, many people are turning to *Artemisia mexicana* as 'protection' from Covid19. Many people in Mexico are drinking this plant, as there is a shortage of vaccines. Santonin is the active principle of *Yztauhyatl*, the biological activity of the plant is antibacterial, antifungal, and anthelmintic against *Staphylococcus aureus*, *Candida albicans*, and *Ascaris lumbricoides* respectively.[86]

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[85]. Martin de la Cruz, "Códice Badiano," *Mediateca - Instituto Nacional de Antropología e Historia*, accessed February 25, 2021, https://mediateca.inah.gob.mx/repositorio/islandora/object/codice%3A851.

[86]. Lidia Osuna Torres, *Plantas medicinales de la medicina tradicional mexicana para tratar afecciones gastrointestinales* (Barcelona: Publicacions i Edicions de la Universitat de Barcelona, 2005), 43.

Tlatzonquixtiliztli
Conclusion

In this chapter, I introduced the ethnographic study of the *National Autonomous University of Mexico* on 206 Nahua doctors. The study contained several faults, such as not properly documenting the date, of the research, or explaining how they collected the gender of the Nahua doctors, as we Nahuas believe in a multigender human. Still, it was necessary to include it in my research, given its one of the broadest and most recent works of Nahua medicine.

In this study, the researchers interviewed 206 Nahua therapists with narrow medical specialties. Of the 206 doctors, 68% are illiterate and Nahuatl speakers, 30% are bilingual (Nahuatl and Spanish), and have more economic opportunities. We Nahuas have less opportunity in careers such as medicine or law since stereotypes and lack of support puts us at a disadvantage in for admission to medical schools. In my situation, they put labels on me devoted to the difficulties that I had during my bachelor's degree due to economic hardship and legal status.

The chapter continues with the description of the white zapote and its phytochemical properties. The *Digital Library of Traditional Medicine* provided by the researchers indicate that most of the consultations by Nahua doctors sought by the indigenous community are due to cultural diseases (such as empacho, evil eye, bad luck, or for spiritual cleansing), musculoskeletal accidents, and non-specified illnesses such as fever, cough, diarrhea, or pain.

In Figure 20, we notice the highest mortality index are non-specific diseases, which are fever, diarrhea, infections, poisoning, and malnutrition. The previous chapter

showed that good nutrition is part of Mesoamerican medicine; in pre-Hispanic times, malnutrition was almost non-existent. Today, malnutrition is one of the most significant causes of mortality. I contribute the great mortality rate to the deforestation of the jungles and globalization. This has led down to a breakdown of the holistic connections that make traditional medicines and cultures possible. This chapter complements the first two chapters and opens the way for the fourth and final chapter, which focuses on globalization, biotechnology, and possible solutions to problems arising from them.

AMOXXEXELOLIZTLI NAWI
CHAPTER 4

The Problem & Concluding Solutions

In their continued attempts to appropriate and annex the sacred medicinal secrets of the Aztec, the Spanish, mostly interested in immediate gains, only collected and documented the plant's evident and discernible uses. Their lack of consideration and respect for Aztec religiosity did not allow them to extract the most valuable element of the herbalism they were witnessing which was the spiritual component and godlike essence of Aztec horticulture. All of these interests in the plant world of the indigenous would culminate in the 16th century with the first period of globalization and the metropoles interest in creating a spice trade route. It was then that plants were converted into merchandise in agreement with the expansion of capitalism.

Plants produce a high diversity of toxins for self-defense purposes, and animals (naturally) and humans (scientifically) have sequestered such compounds for personal use and gain. We have completely ignored the spiritual and sacred identity of these plants. The Aztecs viewed plants as having spiritual qualities associated with other living entities

associated with duality, the elements, and other sacred beings, and not as mere shrubs for simply mundane usage. One example of this human-like factor is the Flower of Death, or as they call it in Mexico, *Flor de Cempasuchil.* The Mexican Marigold is a plant the Aztecs related to *Cihualcoatl* or *Quilaztli*, a female serpent-like female force with patronage over fertility and motherhood.[87] She was believed to help barren women give birth and is associated with the festivities of the Day of the Dead, the now popular Mexican rituals dedicated to honoring the dead-on November 2. Cultivating this plant throughout Mexico by native indigenous people using traditional cultivation methods are now at risk due to globalization. Cempasuchil is known worldwide as a Mexican plant associated with "Day of the Dead," and the plants are grown by indigenous communities, taken care of, and distributed to cemeteries so people can put this plant on graves, without using heavy chemicals that harm the environment or other people. The plant introduced Mesoamerican tradition to the world, and this beautiful plant is now commercialized.

For many years, other surviving cultures of indigenous peoples acknowledged Mexico as the leading exporter of the Mexican native *Tagetes erecta* plant. However, as mentioned earlier, globalization has put Chinese commercial interests ahead of those who initially cultivated the plant and promoted the plant's positive biochemical activity with respect, dignity, and, most importantly, a place of identity. China is currently the leading export of this native Mexican plant, and without any intentions of preserving ancient

[87]. Patrizia Granziera, "Concept of the Garden in Pre-Hispanic Mexico," *Garden History* 29, no. 2 (2001): 187.

Aztec religiosity, or giving credit to the indigenous people's millenary knowledge of nature, the Chinese commodification of these sacred is a continuation of the devastations fostered by the metropoles during the invasion of Mesoamerica.

In tandem, there are a plethora of scholarly works on ancient Aztec plants and their uses that also completely ignore how faith and cosmology shaped the understanding of their medicinal properties. The limited practical content of this literature only provides a partial or scant account of Aztec medicine, ignoring the deep networks of sacrality that have for centuries woven these fibers with the sacred knowledge that preserves grassroots understanding and mastery of these plants' positive biochemical activity and their sacred properties to treat imbalances in the human body, spiritually, mentally, emotionally, and physically.

China, like the US and other European countries before, only look at species of plants and animals as commodities that can be useful in terms of food, clothing, and medicine. The Chinese, for instance, have an insatiable desire for the threatened Totoaba, an endemic fish from the Gulf of Baja California. It is utilized as a remedial medication in China. Notwithstanding illegally netting in national waters, they leave the rods and nets in the water, generating collateral damage to the vaquita porpoise, an endangered cetacean.

According to the *Secretaría del Medio Ambiente y Recursos Naturales*, the vaquita porpoise's abundant population declined by about 85% from 1997-2016. In 1997, an estimated 567 specimens, compared with 240 estimated individual porpoises in 2008, decreased by 7.3% per year. There are approximately 55 porpoises by the end of 2015, a

reduction of 39% per year.[88] To date there has been no president or authority that confronts the Chinese government for these problems. The governors have handed over national sovereignty to private individuals who seize the land and the sea as they like. These governors have forgotten the oath they made when they took power.

Humans have had a significant impact on the planet's climate. The industrial revolution became the pivotal event in carbon dioxide emissions since its beginning in 1760. Around 1750, our CO_2 emission was negligible, whereas our atmospheric CO_2 was lower than 280ppm according to the *National Ocean and Atmospheric Administration* (NOAA). From 1840 to 1870, a minor peak of no more than three billion tons of CO_2 emission occurred. The steady increase of atmospheric CO_2 followed. Around 1930, we had reached five billion tons in CO_2 emission, and the atmospheric CO_2 had passed the 300ppm. Still, the most significant pressure is occurring now, given the atmospheric CO_2 was 350ppm, and our CO_2 emissions were 20 billion tons in 1990. In contrast, in 2020, we had 410ppm in CO_2 and more than thirty-five billion tons in CO_2 emission.[89]

The cutting of trees increased as the demand for wood progressed, as so did the extermination of thousands of animals that made the forest their home. Many trees depend on other plants or even fungi, bacteria, and algae such as lichen, and when you

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[88]. "Recuadro | Una Especie En Peligro de Extinción: La Vaquita Marina," Gobierno de México, *SEMANART: Secretaria de Medio Ambiente y Recursos Naturales*, accessed March 3, 2021, https://apps1.semarnat.gob.mx:8443/dgeia/informe18/tema/recuadros/recuadro4_1.html.

[89]. Rebecca Lindsey, "Climate Change: Atmospheric Carbon Dioxide," *Climate.Gov Science & Information for a Climate-Smart Nation.*, accessed March 3, 2021, https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide.

destroy or target one living organism, you are targeting affecting more than one. The killing of fish expanded as the coal mines poisoned the rivers and lakes with heavy metals. Global warming has increased seaweed in coastal waters, which reduce sunlight at the bottom of the ocean and destroys coral reefs, which need sunlight and are full of life.

Improving our ecological attitudes and contributing to science to explore practices that would enable us to coexist with the environment in an ethical way would be a fundamental move in changing for the better of our "common home." The change must consider each living organism's uniqueness on this planet and its role. During environmental catastrophes, underdeveloped countries are the most vulnerable to significant natural events given their lack of medicine or technology; most islands fall under this classification.[90] In the case of Mexico, many indigenous people lost their sacred land to large corporations and private interests.

Many Mixtecs, Nahua, and Purepecha moved to the city, but many others remained. The high levels of lead in water caused many psychological and congenital disabilities, and to make things worse, many plants that only grew in specific locations became extinct. The drawings in the codex made by Martin de la Cruz depict flowers and plants that are difficult to find or impossible to identify, as they are no longer found in nature.

[90]. Matthew T. Riley and Whitney A. Bauman, “Wicked Problems in a Warming World: Religion and Environmental Ethics,” *Worldviews* 21, no. 1 (2017): 2.

What is nature? What is the Natural world? How do humans coexist with nature? What social implications does the natural world reflect on ourselves? Whitney A. Bauman, religious studies professor at *Florida International University* argues that:

> Whether nature is understood as distinct from or related to human cultures, the idea of nature is indisputably a product of human culture. When we talk about the natural world, we reflect the values and assumptions of our societies. This means that nature has social implications, and that discussions of nature reveal much about the ways we justify and understand cultural systems and human actions. 'Nature' is a word invented and used by human beings, a word which has been frequently misused by those with power against those without it. It is a word that has historically contained a lot of power.[91]

The way we treat nature is the way we view ourselves. Do we justify animal cruelty based on the idea, we have the right to name and classify this planet's living creatures? Do we explain our negative ecological impact on this world as an "it's going to happen anyway?" Do we hide our greed and 'superiority' and think Global warming is a hoax (which is not)? Or do we think of ourselves as owners of the world given to us by God? Whichever way we think, it is always minorities that are negatively affected the most by a given worldview or understanding of human-earth relations. This is because most often the dominant worldviews in a given culture and society are constructed to support dominant identities within that culture or society.

Dr. Bauman understands the facts of not only cultural colonization but ecological colonization, and presents the following argument:

> Along similar lines, Native American and other postcolonial activists have noted that European settlers dismissed the original inhabitants of other

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[91]. Whitney A. Bauman, Richard Bohannon, and Kevin J. O'Brien, eds., *Grounding Religion: A Field Guide to the Study of Religion and Ecology,* 2nd edition. (London; New York: Routledge, 2017), 56.

> continents as 'uncivilized' and therefore 'natural.' This attitude justified denying these peoples basic property and human rights: Because indigenous peoples were seen as less civilized, they were treated like animals. A similar impulse can be found when sympathetic colonizers sought out "noble savages" who could teach civilized whites how better to live as "nature" intended.[92]

In academic careers such as medicine or law, indigenous communities have many disadvantages from other people of non-indigenous origin. Many of the disadvantages result from the stereotypes that society, in general, has of traditional medicine or the indigenous communities themselves. During my degree, I had several financial problems, due to my legal status, in the country and personal issues both in Mexico and the United States. We all have issues that we have to face, but in my situation, I had the daily difficulties that everyone has, plus the additional issues that as an immigrant. Unfortunately, such challenges continue for the rest of our lives unless outside help arrives. These stereotypes label us and give us a significant disadvantage, and the institutionalized forms of classism, racism, sexism, and other oppressions often mean that even well-meaning people don't always recognize their participation in daily discriminations.

It is difficult for people who endured economic and social problems early on in life to enter medical school; many would not even consider it. Since the age of five in a candle factory cleaning resin from the machines in Mexico and later in construction in the United States, I've worked. I have worked all my life since the age of five. It wasn't until the fall of 2017 that I got a better job at Williams-Sonoma. Later on, I got a more stable

[92]. Ibid.,

job at a travel agency. Now at the best occupation, I've ever had, as a Masters' student with a TA'ship at *Florida International University*. Other more privileged people with much more comfortable "struggles" are admitted into medicine before a person like me. And it is not because those people are necessarily smarter or have a greater passion and love for medicine than I do.

Struggles like this are what make many Nahua (and other indigenous) people quit their dreams for medicine (and other professions), but not me. I will get into med school, and I will wear my white coat, but I will always have my indigenous roots very well planted in the soil. The very few Nahua that hold a medical degree from a university tend to go into private practice. They do not do enough for their community and other minorities.

We need more care and humanity in medicine. I remember volunteering at a clinic in Cutler Bay, and a pre-med student was telling me how he was worried about not having enough volunteer hours and how this might look bad on his med school application. I comforted him, and I told him I had the same number of hours as he did, or probably a little less. The student told me it was hard having a social life, school, volunteering, meeting with his fraternity brothers, and his part-time job. At that moment, instead of being impressed, I envied him (in a good way). The volunteer had a motorcycle, studied full time, and most importantly, had a social life. I worked every day in construction, painting houses, or fixing yards; his only concern was volunteer hours. My concerns at that time were: will I bring enough money for the house today? Will my aunt and brother get fired for not having the proper legal documentation, will I have enough money for this month's bus pass, will I finish paying the immigration attorney,

will I make the payment today for the debt my family and I have in Mexico? Indigenous struggles in society are not the same, as we tend to have a disadvantage in education, healthcare, and daily life. I consider myself lucky for everything I have and will achieve.

Recognition of intellectual property is absent when dealing with traditional Mexican medicine. Many medical treatments and achievements have been overlooked and attributed to Europeans. This is just another form of institutional injustice: it takes resources from indigenous people and often pollutes their environments, while making money for corporations that are often have no ties to local communities.

In 1768 William Heberden, an English Physician described angina pectoris as:

> The volatile, or saponaceous liniment, may be rubbed in over the part affected. Bathing in the sea, or in any cold water, may be used at the same time. But there is a disorder of the breast marked with strong and peculiar symptoms, considerable for the kind of danger belonging to it, and not extremely rare, which deserves to be mentioned more at length. The seat of it, and sense of strangling, and anxiety with which it is attended, may make it not improperly be called angina pectoris.[93]

William Heberden is accredited for being the first one to describe angina pectoris, nevertheless, the concept, description, and identification was known in Mexico, more than 300 years before the arrival of the Europeans.[94]

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[93]. William Heberden, "Description of Angina Pectoris by William Heberden," *The University of Medicine and Dentistry of New Jersey* (Commentaries on the History and Cure of Diseases, London (1802), n.d.), accessed March 3, 2021, http://rwjms1.umdnj.edu/shindler/heberden.html.

[94]. Carlos Viesca Treviño., "MEDICINA DEL MÉXICO ANTIGUO," September 2010, http://www.medicinaysalud.unam.mx/temas/2010/09_sep_2k10.pdf.

Biopiracy and intellectual theft is another threat for Mesoamerican culture. From Carolina Herrera's stealing of Indigenous clothing designs to Michael Kors culturally appropriating a Mexican jacket: there needs to be an agency that protects tangible and intangible cultural property. A perfect example is the Nitrogen-fixing maize of Oaxaca, the Oloton maize, where research scientists went into the community of Totontepec and stole hundred years of knowledge from the Totontepec community and are making a profit from the patented corn. Maize that can fertilize itself is a revolutionary finding, yet the indigenous Oaxacan community remains poor, and the researchers, without shame, took all the credit and profits.

The problem is that we have a patriarchal-oriented mentality. We tend to think of nature, flowers, ecology as feminine, weak, submissive, and people who valued this ideology and concepts as the same. These people are "closter to nature" in a patriarchal hierarchy of value and thus in need of civilizing and educating. What might an understanding of medicine, technology and health look like if it broke away from these patriarchal models? I believe the Nahual understanding of life promotes medicine and health for planetary flourishing (not just for some human being's health and wealth).

I presented the definition of biotechnology by the Biotechnology Innovation Organization at the Introduction of this thesis. Can we learn from Indigenous biotechnology from indigenous people? How can this information help us make a better world and diversify modern science to solve today's problems? Let us remember that the pumpkin, corn, chili, and tomatoes got domesticated in Mesoamerica using indigenous cultivation methods. The Nixtamalization process, shown in Figure 26, is a method for producing nixtamal masa from corn. Mexican biologist Alfonso Larqué-Saavedra,

defines Nixtamalization: “It is the fundamental biotechnological process for obtaining the dough from the corn grain, and with-it making tortillas, the staple food of the Mexicans since pre-Hispanic times.”[95] Nixtamal is rich in nutrients, and can help malnutrition places around the world, why can’t we use this crop to expand in order to solve a problem rather than make a profit?

[95]. Alfonso Larqué-Saavedra and Alfonso Larqué-Saavedra, “Biotecnología prehispánica en Mesoamérica,” *Revista fitotecnia mexicana* 39, no. 2 (June 2016): 108.

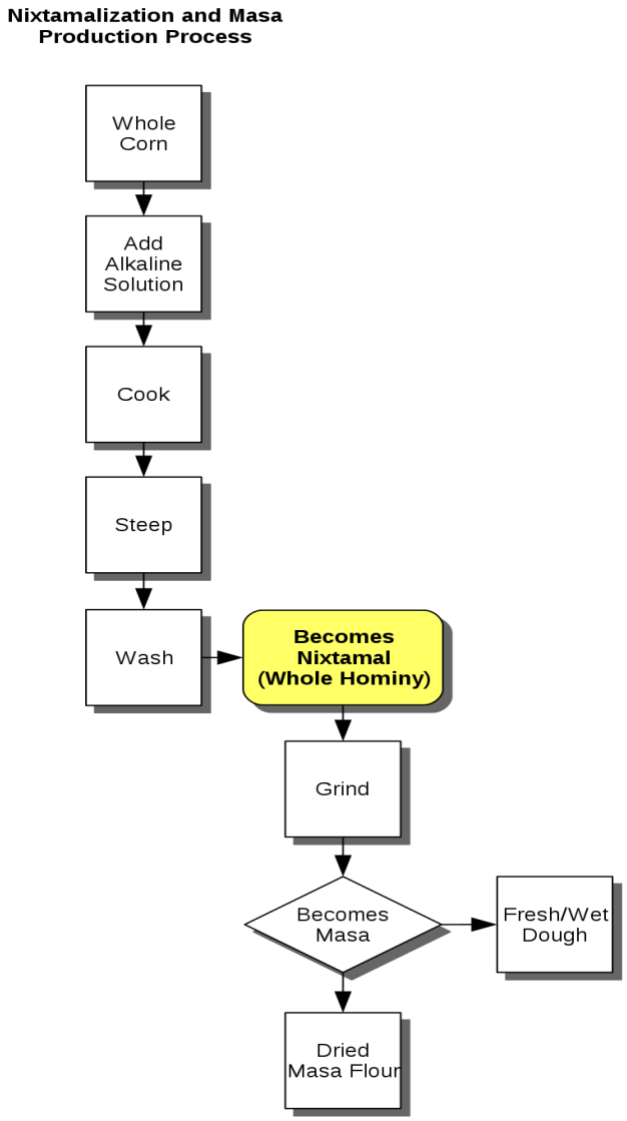

Figure 26: Nixtamalization Flowchart. (Public Domain Image)

My grandmother used to make Nixtamal. I wanted to help her, but she never allowed me. She said I have to learn the theory behind the food before I can prepare it. Unfortunately, I never finished the lessons she wanted me to know, as I moved to the United States and worked to send money back home.

Figure 27: Timeline on making tortillas from Nixtamal maza. Corn is a widely grown crop that we could use to decrease famine; as mentioned above, the Indigenous communities are the most affected by biopiracy.

From Figure 26 and Figure 27, we can see the data is similar. However, different regions of Mexico have different ways of making the maza. The data collected to make *Figure 26* was probably collected from a Nahua community, as the steps are similar. Biopiracy has been an instrument of looting humanity. Many plants used by the Nahuas are restricted, such as peyote, due to biopiracy since many people monetize the pre-Hispanic flora for personal benefit. Biopiracy has severe consequences since it can put trafficked species in danger of extinction. The vaquita porpoise is an excellent example of biopiracy since the porpoise is trapped in fishing nets who steal the ecosystem and humanity for personal gain. These looting actions are not part of our cultural identity. We

must return to our pre-Hispanic philosophies to decolonize our mentality and practice what we can now call a form of 'medicine' that is congruent with our ethical thoughts with nature and our actions.

Indigenous culture is dying at an accelerated rate; many factors have contributed to such declines, such as globalization and discrimination. Traditional Mexican medicine is the most affected by globalization. There is a lack of Nahua doctors or indigenous doctors overall. As I'm writing this thesis, Mexico is one of the countries with the highest number of *Covid19* deaths. The highest death tolls are from cities where Indigenous communities live. Indigenous people in the United States, especially in Norcross, Georgia, and New York, have also been hard hit. In addition, African Americans and Hispanics have been hard hit.

As I was volunteering at *CHI-Doris Ison Health Center* a couple of years ago, I was surprised at the number of Indigenous people from Central and South America living in Cutler Bay and Homestead. Even though I was only a volunteer, they only talked to me; they did not want to speak to the dentist, doctor, or even the pharmacist. As I continued to volunteer more, I noticed more people of indigenous backgrounds entering the clinic, and they all had one thing in common, they knew my name. Why? I was not providing any health care; why would they only want to talk to me? Many of them were of Nahua origin, as I understood a few words, they spoke with themselves. As I added more hours to my volunteer schedule, more people were attending the dental department. The patients brought to my attention that they trusted me. During the summer of 2014-15, for instance, I had given my phone number to one patient, as she wanted me to translate to the dentist if I was not present that day at the clinic. In less than a week, I had more

than 45 people calling me for help, I ended up changing my number, as I was only a volunteer, and it got pretty demanding with work and school. After I stopped volunteering in the dental department and transferred to the pharmacy department, the number of people seeking my help increased again. I do not know what happened to those more than 50 patients after I stopped volunteering, but the dental assistant had told me the patients were not showing up anymore to their appointments. Many of the patients had area codes from Las Vegas, as one of them said to me that it's easier to open a phone line if they did not have proper immigration status in other states, like California, Nevada, or New York.

Hispanics, mostly Mexican, Central, and South Americans tend to avoid doctors and usually stick to the home remedies, which is not terrible. Still, it's ideal to be up to date with modern advances in medicine. This concept leads to negative stereotypes as Dr Bauman points out, "Contemporary indigenous peoples face the same stereotype with a different impact, as they are often assumed to be 'closer to nature' and therefore uninterested in or unqualified for the trappings of technological culture."[96]

There is little ethnographic work on indigenous medicine and its plants. In the previous chapter, I included information based on research conducted by UNAM, which in my opinion, is one of the most completed recent works done on the subject despite its flaws. Nevertheless, indigenous medicine is not adequately regulated, as there are many issues with indigenous people using medicinal plants such as marihuana or peyote. When I visited Tlaxcala, a curandera got fined for using a peyote cactus for medicinal purposes

[96]. Ibid., No. 90.

on a patient's foot. How can we solve this problem? How can we learn from other cultures? Diversity and learning from different cultures can help us adopt new ways of thinking to solve common problems.

India as well as Mexico's common problem is colonization. Yoga, Homoeopathy, Naturopathy, Unani, Siddha, and Ayurveda make up traditional Indian medicine.[97] But unlike conventional Indian medicine, where some branches like yoga are widely known, Mesoamerican treatment is poorly known worldwide, yet its contributions and crops are famous worldwide. Curanderos, yerberos, hueseros, sobadores, and parteras are all negatively viewed in Mexican society; they are sometimes seen as equally worthless by regular citizens. In Indian medicine, there seems to be a hierarchy in traditional medicine branches, as Dr. Steven M. Vose, Assistant professor in the Department of Religious Studies at *Florida International University* points out:

> There has been a shift in attitudes toward Ayurvedic medicine over the last 30-40 years, which is one of several Indian domains of medical knowledge, toward greater promotion and acceptance. Ayurvedic knowledge tends to be dominated by upper-caste groups (i.e., Brahmins and other elites), so there has been a concerted effort made to valorize this form of medical knowledge in popular Indian discourse, placing it alongside western science-based medical practice. Some try to integrate the two; others try to show Ayurveda's superiority. There are a number of high-profile public "gurus" who have tried to mass-produce and market Ayurvedic products, such as Baba Ramdev has done under the Patanjali label (he recently got sued by the farmers who supply him his raw materials for underpaying them). Lots of middle-class to upper-class people have some knowledge of Ayurvedic principles, and religiously

[97]. B Ravishankar and VJ Shukla, "Indian Systems of Medicine: A Brief Profile," *African Journal of Traditional, Complementary, and Alternative Medicines* 4, no. 3 (February 16, 2007): 321.

> minded people often speak of eating “pure food” that follows the Ayurvedic theory of what counts as a ‘pure’ food.[98]

Two different but relatable problems between India and Mexico regarding traditional medicine, are that in India the medicine is sought by the upper caste, and kept away from the middle class, whereas in Mexico traditional medicine is looked down upon by rich people. Yet India tends to be more protective of its cultural identity. The Mexican government has a few archived online libraries with very little information on indigenous medicinal plants free of charge. In contrast, India has extensive research at the Traditional Knowledge Digital Library (TKDL), but not open to the public.[99] Both the Indian and Mexican governments (as well as others) should work together to prevent patenting of traditional knowledge. In a TV show called "Shark-Tank Mexico," an entrepreneur went to India and wanted to introduce Mexican people to traditional Indian medicine; the businessmen, horrified, made their voices heard and started labeling the remedies as outdated, useless, trash, irrelevant, etc.

Mexican society's problem is not whether the treatment is traditional Mexican, Indian, or African medicine. If the treatment does not originate from a European nation, it not thought of as useful or worthy enough to be studied. This paper has argued the central ideas of Indigenous medicine through medicinal plants by first establishing the nutritional value of the Aztecs, a diet still consumed today. Then, the paper demonstrates the efficiency of the plants utilized by the Nahua community and the codex Cruz-Badiano

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[98]. Steven M. Vose, “Dear Dr. Vose. Good Morning.,” February 21, 2021, Gmail.com.

[99]. Ibid.,

and data collected by the National Autonomous University of Mexico. Photochemical studies have validated the medicinal properties of many of the plants used by the Aztecs to treat illnesses. Also, I supplemented this thesis with oral information from my grandmother when I lived in Nezahualcoyotl and the knowledge she got from living in Nanacamilpa. This thesis points to the absolute necessity to decolonize ancient Mexican medicine to in order to preserve cultural identity to the indigenous people, and to provide non-reductive understandings of health and medicine. What would our food, medicine, and other technologies look like if we took our relationships with the rest of the natural world and the cosmos seriously? Further research is necessary to determine how we can implement Mesoamerican biotechnology such as nixtamalization to combat world famine or ethnobotanical work to identify all the Aztec manuscripts' plants correctly.

One of the teachings that the Nahua grandparents teach their grandchildren is to be eagle warriors. What is being an eagle warrior? Being an eagle warrior means taking everything as a challenge and overcoming obstacles. Do not regret or make excuses or lament anything since everything leaves us a life lesson. An eagle warrior questions everything and makes his conclusions due to what he analyzes after hearing and seeing. An eagle warrior considers the problem, which is the colonization of traditional Mexican medicine. And Instead of lamenting, he provides solutions and tries to neutralize the problem through actions. One solution to help the homeless is to implement nopales farms, feed the homeless population, which is cheap and nutritious. And in the meantime, train them in a field of their choice and prioritize them to give them a chance.

As I already mentioned, nutrition is part of medicine. We can eat nopales in various dishes like tlayudas. Tlayudas as seen in figure 22 combines nopal, beans, corn,

chili peppers, onion, coriander, and cheese. Prickly pear cactus and corn are very inexpensive and easy to plant. Still, governors and politicians are afraid of investing in indigenous knowledge since they fear failure. Instead, they support privatized prisons and mass incarceration to make a profit, which should be a crime. Homeless people are systematically neglected, and on top of the burden society puts on them, public institutions open doors to private entities that don't have their interests in mind. There have been times where people have been incarcerated for years for carrying marijuana, a plant that poses little to no, biological, physical, threat to society. Gun's, on the other hand can easily be purchased on every corner. Many innocent people are in prison now, as more people are in prison the more profit is made. The eagle warrior is not afraid of dying since they are part of the ecosystem. The warrior understands that ideals are immortal, and never gives up when obstacles block the way; on the contrary, the eagle warrior licks them as if they were wounds and continues to strengthen its Tonally.

Figure 28: Me eating a Nopales Tlayuda for less than $2.00 USD. A great investment needs to be done to fight malnutrition.

Tlatzonquixtiliztli
Conclusions

Mesoamerican medicine is composed of three basic thoughts. The first defines the human being as the "microcosm" at the center of the earth. The second theoretical thought is the strength of the three animistic energies, the Tonally, Ihiyol, and Teyolia, which give humanity a sense of importance since there is a microcosm-environment connection. The third thought is the ethical attitude we have toward the environment. These three ideas define Mexican medicine as a scientific method to cure diseases through herbalism, preventive medicine through a healthy diet, and the ethical

relationship with the environment. In this thesis, I have argued that modern society can implement traditional Mexican medicine to help prevent diseases. One of the problems that prevent the spread of Mesoamerican medical treatment is globalization, biopiracy, and the looting of knowledge for private, corporate interests. In the face of European medical theories, an inferiority complex has always clouded Mesoamerican medicine's academic development.

This thesis has demonstrated Mesoamerican medicine's central idea to prevent diseases and plants' ethical use. I also contrast the scientific results with the Mesoamerican practice of making medicine. The results show that Mesoamerican medicine was highly sophisticated. Chapter one demonstrates the central idea of the Aztec's cosmovision and the planetary law of duality—the human body's importance and its reflection with the animistic forces. I presented the importance of plants in the day of the dead celebration and the importance of the *Ihiyotl, Tonally*, and *Teyolia*. This chapter served as the essential foundation for the following chapters. The importance of Teotl, the cosmic force that governs planetary laws, and the micro-cosmos show the Aztec's creation from elemental carbon, nitrogen, and pulverized bones collected by Quetzalcoatl.

Chapter two demonstrated that Aztec preventive medicine's central idea is a well-balanced nutritious meal, as nutrition played a significant role in health and treatment. Secondary metabolites of medicinal plants demonstrate the accuracy of Aztec herbology drawn in the Aztec manuscript.

Chapter three supplements my thesis with an ethnographical work done by the UNAM. Chapter three presents the percent growth of the Nahua community from 2010 to

2015 in Mexico City. The chapter introduces the reader to the reality of the high percentage of illiteracy of Nahua speakers. The high mortality index chart shown in Figure 20 shows malnutrition as a high yield mortality rate, which shows that we could implement some of our ancient preventive medicine through the diet, and better cropping methods.

Biopiracy is a global problem, which should have stricter legal consequences since it enables another modern method of slavery. Deforestation, and global warming, have wiped out flora and fauna and poisoned rivers with metals: these all affect local peoples while making profits for the biopirates. As I already mentioned, this thesis's argument suggests a stable balance between humans and the environment. If the human, also known as the microcosm, is not in harmony with the territory, theoretically, diseases and pandemics may arise to balance the microcosm and the ecosystem.

As I mentioned earlier, capitalism and globalization have impeded the academic development of traditional Mexican medicine. An essential factor in the high mortality rate in Amerindian communities is plants' extinction due to biopiracy and deforestation. Plants' roles are vital in our culture since these living beings have personalities and are considered our sisters.

To say that Mesoamerican medical concepts are extinct is not correct, but it is also not good to say that they are recognized and valued.

Another problem that we can observe is that we understand more about pathogens every day, and it is essential to stay updated on medical advances. Today there are very few authentic Nahua physicians who treat medicine with ethics and devotion. In Mexico, there were many deaths from the Covid19 pandemic. Still, there were more deaths in the

United States, most of which were minorities like indigenous people and our African American brothers and sisters. This last chapter shows the extraordinary greed of global powers such as China, putting their claws in peaceful countries like most Latin American countries.

Central and South America's indigenous communities in the US are usually the most affected by public health issues. This may be due to a lack of trust in institutions or simply not feeling comfortable. For whatever reason, there are many obstacles to studying medicine in the US. Government institutions take away the right to use our plants, they steal our culture, they make us foreigners in these lands, and apart from all this, they take away the opportunity to do what we most love, which is medicine. More needs to be done not for us but for future generations.

It is essential to communicate my work's message since it promotes the preservation of cultural identity. Mesoamerican medical knowledge and the theory of disease prevention should be widely known. These medical practices can help heal peoples, sometimes without the huge costs of modern western medicine. A clear example is a diabetes. Mexico is one of the most overweight countries globally, with the majority of the population suffering from hypertension. They sell bottles of soda and sweets high in sugar in hospitals, even for hypoglycemic patients. Traditional doctors who know medicine and are not frauds would never make a patient with cancer consume large amounts of sugar since it feeds heat, which is cancer.

Cancer is fire, which consumes the whole body if it is not extinguished in time. Water can put out a fire, but in the "microcosm," fire is not extinguished with water; on the contrary, it can have secondary consequences. The water has to be treated with stones

and minerals that I do not know, but my beautiful grandmother knew them like the back of her hand. It is good to rescue this knowledge to have a cultural identity and to be able to treat patients with respect, regardless of differences. Ticitl's job is to ethically promote the health of its patients without prejudice.

Religion teaches us to be ethical, and science helps us in our daily lives, but this should not affect the generations to come. According to traditional Mexican medicine, the theoretical bases to maintain a healthy life are diet, herbal medicine, and a healthy neighborhood with nature. It isn't easy to maintain a relationship with nature and other living beings if scientists plagiarize the botanical knowledge of Mesoamericans to patent such information and receive academic credit and profit. It is also challenging to adapt to new ways of treating emerging illnesses without modern scientific understanding. Therefore, religion and humanitarian studies should be a requirement for all scientific disciplines since science is studying living organisms. Pre-Hispanic medicine shows us that it is essential to be sustainable and ethical with the environment simultaneously. That is why we must protect this medicinal practice since it is sustainable and beneficial for the environment.

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