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The Convents of Mexico City in the Colonial Biological Exchange: Notes for Colonial Environmental History from the Sixteenth to the Eighteenth Centuries

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I. Introduction

The Spanish conquest of the powerful Mesoamerican cities located in Mexico's central highlands launched a period of unprecedented biological exchange in the region. Beginning with the conquest of the Aztec city of Tenochtitlan in 1521, New Spain became a place where Old World and New World pathogens could transfer freely through trade, human-to-human contact, and agricultural introductions that radically shaped the construction of the new Hispanic baroque society.[1] The Europeanization of the New World set into motion a long process that attempted to recreate the political, economic, cultural, and natural environments of the Iberian Peninsula in the territory of New Spain. The native environment was not only transformed by novel crops and livestock imported from the conquistadors' homeland, but was also transfigured by plants and animals which had been moved from the Antilles to the continent. The creation of Spanish harbors modified the original ecosystem which had existed before the arrival of Spanish.

In the particular case of Mexico City and its surrounding lands and populations inside the basin of Mexico, the insertion of non-native animals – including the European bearded man – in the early sixteenth century brought about significant changes that are difficult to perceive today. The plants and animals that the Spanish introduced in the fertile soils of Lake Texcoco, Chalco and Ecatepec modified the previous ecosystem. Thus, in the decades following the conquest of Mexico-Tenochtitlan large farms of wheat, barley, corn, and other seeds were established and developed in the region, which together with the raising of steadily growing numbers of livestock altered the natural lacustrine environment of the lake region.

The cultivation of fruit trees of Eurasian origin was a relevant concern during this first century of Hispanic life in the Americas. The Church played a significant role in the process of adaptation of these species, with convent orchards serving as a primary site for their cultivation. In addition to this participation, the regular clergy have left us testimony in their provincial chronicles of two crucial cultural phenomena that were developing in the territory: firstly, the promotion of some particular devotions and the existence of certain hagiographical figures who exalted the spirituality of a religious corporation within a providential historical reality; and, secondly, at the level of earthly historical reality. The chronicles expressed the vision that some clergy had of the future of the human communities that interacted politically, economically and culturally in the cities of Hispano-American, placing special attention on their concern for knowing the geography and nature of the New World through the lens of the philosophical relationship of Providentialism with Pantheism and Neo-Platonism.

It is within this cultural context contained in the local historiography produced at the time that the present work aims to address the importance of the convents of Mexico City within the Hispanic biological transference in the colonial period through two primary areas of focus. Based on the presentation of some of the first moments of colonization led by Hernán Cortés in the 1520s, the first section will study the relevance of the region where Mexico City was founded within this biological process. An additional aim was that of reconstructing the process of the introduction of different plant species into the territory through some of the most important chronicles and writings of the Indies, an objective for which the consultation of documents related to the subject from the General Archive of the

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Nation of Mexico and in the Historical Archive of Mexico City was fundamental.

The sociocultural repercussions brought about by the introduction of non-American species into the territory through gastronomy and the economy will be briefly discussed in this section. In the second part of this work, two case studies will be analyzed on the role of the convent gardens in this process of biological transference: the gardens of the Discalced Carmelites and their convents located in Santo Desier to de Santa Fe (Holy Desert of Santa Fe) and San Ángel.

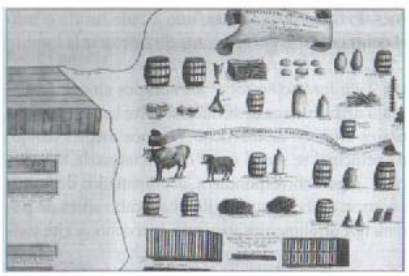
II. Colonial Biological Exchange: The Case of Mexico City and its Surroundings

> Aquí, Señora, el cielo, de su mano,/ parece que escogió huertos pensiles/ y quiso él mismo ser el hortelano;/ todo el año es aquí mayo y abriles,/ temple agradable, frío comedido,/ cielo sereno y claro, aires sutiles/ […] Bellísimo sin duda es este llano,/ y aunque lo es mucho, es cifra, es suma, es tilde,/ del florido contorno mexicano;/ ya esa fama de hoy más se borre y tilde,/ que, comparada a esta inmortal frescura,/ su grandeza será grandeza humilde. […] Al fin, ninfas, jardines y vergeles,/ cristales, palmas, yedra, olmos, nogales,/ almendros, pinos, álamos, laureles,/ hayas, parras, ciprés, cedros, morales,/ abeto, boj, taray, robles, encinas,/ vides, madroños, nísperos, serbales,/ azahar, amapolas, clavellinas,/ rosas, claveles, lirios, azucenas,/ romeros, alhelís, mosqueta, endrinas,/ sándalos, trébol, toronjil, verdenas,/ jazmines, girasol, murta, retama,/ arrayán, manzanillas de oro llenas,/ tomillo, heno, mastuerzo que se enrama,/ albahacas, junquillos y helechos,/ y cuantas flores más abril derrama,/ aquí, con mil bellezas y provechos,/ las dio todas la mano Soberana:/ este es su sitio y estos sus barbechos/ y esta la primavera mexicana.
>
> *Bernando de Balbuena, Grandeza Mexicana (1604)*

This was the allegorical immortal springtime that Bernardo de Balbuena wrote about Mexico City in the early seventeenth century. His work had been conceived with the intention of exalting the political, economic and social importance of the capital of the viceroyalty of New Spain[2] and serves as a testimony of the modification that the natural landscape of the Valley of Mexico basin suffered as a result of the Hispanic biological exchange that began between August and September 1521 with the Spanish conquest of Mexico-Tenochtitlan.

As Alfred W. Crosby wrote, the process of "Europeanization" that the American territory suffered as a result of the Columbian contact of 1492 was gradual.[3] In 1519 the soldiers who accompanied Captain Hernán Cortés on the expedition left the island of Cuba for terra firma on the shores of the Yucatan Peninsula, with the expedition culminating in the conquest of the powerful Mesoamerican empires of the central highlands between 1521 and 1523. Naturally, they required food, fibers and skins for their subsistence both before and after formally establishing themselves in the territory. From where and how did they obtain these provisions to resist the warfare against the Indians and the inclemency of the climate of the New World? From his departure from the Antillean island, Cortes had transported on his ships domesticated fruits, vegetables, and animals that would not be consumed by his crew during the sea voyage but would be of benefit when they reached the mainland.

Following the logic of conquest established by Christopher Columbus almost two decades earlier, the Antilles became a laboratory of experimentation for the adaptation of plant and animal species from the Iberian Peninsula to transfer and adapt the modus vivendi of the Spanish society who would populate the Caribbean islands. The history of Hispaniola in 1493 is an example of this situation; during Columbus' second trip, the Genoese admiral established European horticulture through the settling of twelve hundred men who travelled on seventeen ships as well as the cultivation of wheat seeds, chickpeas, melons, onions, radishes, green vegetables, grapevines, sugar cane, and fruit trees.[4] As Alfred Crosby points out, the results were initially encouraging according to the admiral's testimony, although crops such as wheat, olive trees, and grapevines failed because of the island's hot, humid climate.



Source: Antonio Rubial Garcia (cord) Historia de la vida Cotidiana en Mexico II.La ciudad barroca Mexico Colmex, FCE 2012

Fig.1: Provisions that are Shipped to give the daily rations to the passengers of the ship in the *Album* of the marquisof victory

Hispaniola – the so-called "foyer of the Americas" – was the place where European horticulture began (naturally, with some failures) and, by 1500, the transformation initiated by the Spaniards was successful. Thus, following the conquer of Mexico-Tenochtitlan, they aimed to initiate the same process in

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New Spain. When Hernán Cortés and his army arrived in the territory of Mexico, in addition to bringing smallpox and other viral diseases previously unknown to the region, they rode their road to the capital of Mexica empire "on horses fed in the Antilles and accompanied by guard dogs coming from the same islands."[5]

Once the conquest of Mexico-Tenochtitlán was successful, Hernán Cortés ordered that the new Spanish city to be built on top of the old Mesoamerican city. The construction process was more protracted and demanding than the Spaniard had anticipated, continuing into the mid-sixteenth century. Wheat bread was the most appreciated foodstuff for the Spaniards; cereals and other seeds reached the Valley of Mexico before 1530 for the benefit of the new city's population.[6]

In 1524, Cortés wrote and ordered the proclamation of the *Ordenanzas de buen gobierno para los Vecinos y moradores de la Nueva España* (*Ordenances for the Good Governance of the Residents and Inhabitants of New Spain*). In the text, Cortés wrote that the Spaniards would arm and Christianize the Indians who were distributed to them, and that "any resident [*vezino*] who has Indians at his disposal [*indios de repartimiento*] is obligated to give them, for each hundred Indians that he has at his disposal, one thousand grapevine shoots…these grapevine shoots can be planted wherever he sees fit, without harming any third parties, and that he plants them each year in the seasons in which it is advisable to plant them, until he arrives at the quantity of one hundred to one thousand vines for each hundred Indians whom he has at his disposition."[7] Further on, in the eighth point of this *ordenanza*, Cortés ordered that "there being other tree plants from Spain and wheat or barley and any legumes, [the residents] likewise are obligated to plant and sow them in the towns of the Indians that they have, with the aforementioned punishments."[8]

As for the production of wine – the second most important dietary element in Iberian gastronomy – the shoots that prospered as a result of this courtly policy gave some bunches of grapes from which low-quality wine was produced;[9] the grapes did not ripen perfectly due to Mexico's temperate climate.

A crop that followed a similar path to that of the grapevine in the center of the New Spanish Viceroyalty, particularly in Mexico City, was that of sugar cane, which had been remarkably successful in adapting to various regions of the New World since the end of the fifteenth century. The sugar plant was able to prosper in Hispaniola as it had in the Canary Islands and the Azores due to its weather conditions. This crop of Asian origin had been cultivated practically without any problem in the lands of Andalusia and Granada with the Muslim expansion in North Africa and the Iberian Peninsula. In the case of North America, Crosby postulates that sugar became a common crop in the lowlands and deeper valleys of these regions that had a hot climate.[10] In the case of Mexico City, the sugar farms that were established (such as the one Cortés had in Coyoacán) did not prosper for several reasons, as Alexander von Humboldt conjectured. It was Baron von Humboldt who suggested that this crop had to disappear from the landscape of the valley of Mexico because the tree felling of forests over the next three centuries "cooled the climate";[11] this erroneous judgement by the Prussian geographer and naturalist on the decrease in temperature of this region of Anahuac can only be explained by the ravages caused by the climatic phenomenon now termed the "Little Ice Age" (1600-1850).[12]

During the remaining years of the sixteenth century, different modifications to the landscape of the Anahuac region were made by the Spaniards as the introducers of European and Asian animals, fruit and vegetable species. These changes were also provoked by the indigenous peoples of the territory in their roles of personal service to the *encomendero* or as farmers within their communities. We will now highlight some cases recorded in the chronicles and writings of the natives. Despite the fact that in North America few olive trees grew and produced oil – to the extent that their production was insignificant during this and the following two centuries – different travelers who passed through New Spain, such as the aforementioned Humboldt, reported that the olive tree was successfully cultivated in the valley of Mexico. The areas where this Mediterranean crop is known to have flourished included the village of Tacubaya,[13] the village of Milpa Alta,[14]the town of San Joaquin, the neighborhood of Necaltitlan (belonging to the town of San Juan Moyotlan, a neighborhood of Indians within the Republic of San Juan Tenochtitlan),[15] and Xochimilco.[16]

Sugarcane prospered in different communities near the capital of the viceroyalty, such as the jurisdictions of Chilapa and Cuauhnáhuac, the latter belonging to the Marquesado del Valle.[17] A testimony of the importance of this crop in the territory can be found in the *Ordenanza para que no siembren las tierras de caña de azúcar* (*Ordenance to not plant lands with sugarcane*)which was issued in 1599 by the viceroy Don Gaspar de Zúñiga, Count of Monterrey, in consideration of the fact of many lands of Mexico were good for sugar production but should be used for more practical crops. He wrote, "the production of wheat and maize and other seeds is more important and necessary for the Republic than sugar, that there has been a great deal more than what is required for forced uses and that the land for the production of wheat and maize has been lacking and is being reduced to a smaller size than that required for such production".[18]

In regards to wheat, the most popular and interesting crop in New Spain, there are several testimonies about its presence in the territory of Anahuac. Within the historiography of the Indies that

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took place at this time, it is possible to observe how Augustine Vetancurt, a Franciscan clergy member of the province of del Santo Evangelio de México, observed that in Cuautitlán, Tlalnepantla, Chalco, Tultitlán, Tepepan, Texcoco, y San Jerónimo Aculco there were farms dedicated to the cultivation of wheat.[19] Friar Antonio de Ciudad Real, a Franciscan clergy member, reported that wheat was abundant in the Valley of Mexico.[20]

One aspect that is impossible to deny is the footprint was left by wheat and barley production on the economy of the Kingdom of New Spain, particularly in our region of this study. In the Colonial Institutions branch of the General Archive of the Nation of Mexico, it is possible to observe a number of files, distributed in different sub-branches, that show that this agricultural activity closely linked to colonialsocietyand its most important product – wheat –had to be sent to Mexico City in order to satisfy the population's demand.[21] The archival documents highlight the importance of certain populations, such as Texcoco, in the supply of grain;[22] the sale of wheat and, once processed, flour by the natives of their crops;[23] the need for different plantations to be supplied with Indians for wheat cutting and bread making;[24] permissions to the local authority for some Spanish neighbors to grow wheat and barley on the outskirts of the city;[25] and permissions for the production of common bread by mixing fine and ordinary wheat so that its cost would be accessible to the poor,[26] among other socioeconomic issues.

As noted above, the importation and raising of livestock in these lands was essential for the survival of the new settlers who established themselves in the different Spanish towns, villages, and cities, among which Mexico City was the most important political and administrative center. Which livestock animals were introduced to the Mexico Valley basin between the sixteenth and eighteenth centuries? Alexander von Humboldt's later testimony reveals that in Mexico City and its surroundings oxen, horses, sheep and pigs abounded, a list of animals to which we would add dogs and chickens.[27]

A peculiar case in this work is that of the roosters and hens from the Old World who were raised in the area of the Archbishopric of Mexico, a subject little known in colonial environmental studies. In the 1617 *Ordenanza sobre que cada indio tributario críe 12 gallinas de Castilla y un gallo y seis de la tierra en cada un año* (*Ordenance concerning that each tribute-contributing Indian raises 12 hens from Castile and a rooster and six from the land per year*), the natives of each of the towns of New Spain had the obligation to raise six American and twelve European hens each year, plus one rooster, due to the following reasons: "there is a great lack of them and with this their increase in price [*encarecerse*], it is practical as a remedy, so as the republics are provided with this genus."[28]



Fig. 2: The Capital before the great Flood of 1629 Map of Ciudad de Mexico Painted of juan Gomez de Trasmonte

It is not known from the documentation produced at the time if the introduction of this domestic bird caused any effect on the natural environment of the villages and towns of New Spain in addition to being used for reproductive purposes and cockfights.

From this brief study of the fruit and vegetable species that were introduced in Mexico City between the sixteenth and eighteenth centuries, we can observe how the capital of the viceroyalty of New Spain was shaping the natural physiognomy that Bernardo de Balbuena described in 1604 when the process of Europeanization of flora and fauna of the New World was already irreversible. In the same period that Balbuena wrote his Grandeza Mexicana, the friar Antonio de Ciudad de Real noted the process of Hispanic biological exchange that Mexico City was

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experiencing: oranges, limes, lemons, ciders, walnut trees, apple trees, pomegranates, peaches, apricots, quince jellies, pear trees, fig trees, plums, cherries, grapes ,and olives were transplanted from Spain,[29] fruits to which he added the list of flowers and herbs: "Castilian roses, carnations, wallflowers, lemon balm, rue, pennyroyal, chess, oregano, cumin, caraway, Our Lady's herb and fennel, among others not mentioned, have been brought from Spain".[30]

A century and a half later, José Antonio de Villaseñor y Sánchez, a cosmographer and royal accountant, published the first volume of his *Theatro Americano. Descripción general de los reinos y provincias de la Nueva España* (*American Theater. General Description of the Kingdoms and Provinces of New Spain*). In this work, in addition to a detailed description of the territorial political organization of the Viceroyalty of New Spain, he recorded the modifications that the natural ecosystem of North America had undergone as a result of the Hispanic biological exchange that began in 1521. In the specific case of Mexico City, Villaseñor points out that in its surroundings, wheat, chickpeas, lentils, rice, flax, grapevines, olives, peas, corn, beans, and barley can be harvested, as well as the raising of bulls, steers, cows, and pigs.[31] The capacity of these fertile lands of the Valley of Mexico basin at the time had three important lakes that fertilized the wetlands: Texcoco, Chalco, and San Cristobal and facilitated the existence of wheat and barley farms in areas like Tacubaya. Additionally, they provided precious water for the orchards in convents and country houses where pears, peaches, prunes, apples, plums, apricots, pomegranates, quince jelly, and some citrus fruits such as oranges and lemons were grown.[32]

Every one of these fruits, plants, and animals were brought from the islands of Hispaniola and/or from the ports of Seville and Cadiz to the port of Veracruz using a trip of little more than three months made by the fleets that had sailed from the Old World. Their arrival had an important impact on the daily life not only of the inhabitants of Mexico City but also of the American viceroyalty. Juan de Viera refers to this biological impact in 1777 in two areas: commercial and cultural. In the commercial sector, he wrote that Mexico City sells salted and cured meats, hens, wreaths of roses from Castile, 124,895 annual loads of wheat flour, pomegranates from China and watermelons, almonds, walnuts, hazelnuts, coconuts, pine nuts, figs, pears, limes, oranges from China, and loads of barley, straw, and oranges.[33] This variety of products had an impact on the New Spanish cuisine, which, since very early times acquired a strong mestizo character. This is why, in addition to the sale of these fruits and animals, tamales with pork meat, goat and cow cheeses, butter, pineapple, guava, prickly pear fruit, almond pulp, and liqueurs were also offered in the city's *tianguis* and markets which survive today. In addition, Viera offered a list of nearly ninety-four fruits, both American and European, that entered the twenty-four squares of Mexico, as well as the meats that supplied the forty-two butcher's shop and wheat flour to the forty-six bakeries, gave us a fact about the place where they grew some of these fruits that were for sale in the city: "Here[in the vicinity of the lake town] you can see the mountains of fruit, where the number of fruit trees abounds all year round, and the number of which exceeds 90, as will be seen in the memoir that I will attach to this story: in the same way the vegetable gardens are seen and recorded, so that not even in the fields themselves is there so much abundance, as is seen together in this theatre of wonders".[34]

A little more than three decades later in the nineteenth century, Alexander von Humboldt witnessed the result of the transformation of the Valley of Mexico's ecosystem during the colonial period, writing "To the south of the valley are orange, peach, apple, cherry and other fruit trees from Europe"[35] and later adding that "[there is] a large crop of cherries, plums, peaches, apricots, figs, grapes, melons, apples and pears on the Central Table. They are especially found in San Agustín de las Cuevas, Tacubaya, in Carmelo de San Ángel and in the garden of Fogoaga in Tlalnepantla."[36] The participation of the Church in the biological conquest of New Spain will be discussed later.

Other travelers of European origin who visited New Spain between the end of the seventeenth and beginning of the eighteenth centuries provide us with other relevant data on the impact of the biological transfer from the Old World to the New World. In the case of Giovanni Francesco Gemelli Careri, a Neapolitan traveler who passed through North America in 1697 from the Philippines, we find some interesting data that coincides with the descriptions of other travelers and chroniclers who described the territory at that time. Gemelli Careri was surprised by the exuberance and fertility of the New Spanish lands since He arrived in Acapulco; his first comment was that "on the road from Acapulco to Mexico, there are wild lemons and oranges."[37] Once he arrived in the capital of the viceroyalty, the Neapolitan man recorded in his diary some aspects of the flora and fauna that caught his attention: "in the orchard of the convent of Tepotzotlán there is fruit like that of Europe,"[38] and not only there, but elsewhere: "there are all the European fruits[in the region], except hazelnuts, cherries, medlars and sorbs."[39] This last comment leads us to ask the ships a kind of Noah's Ark for transporting animals and fruits of all kinds, also possessing contagious diseases that, once landed on land, could generate epidemics among plants?[40]

The last traveler we will examine in this study is the French captain Jean de Monségur, who arrived in New Spain in 1707 after having suffered misfortunes in

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the waters of the Caribbean Sea after having faced two Dutch sloops. The French navigator was also interested in the urban composition of Mexico City, in addition to referring in his memoirs to matters of geopolitical and economic interest to the Spanish Crown with regard to commercial contact with the American kingdoms. He held a particular fascination for the volcanic rock tezontle with which some buildings were built, including the aqueducts that provided water to the city. The Alameda, a plaza which was built by the orders of Viceroy Luis de Velasco "The Young" between 1590 and 1592, he saw that some poplars were sown in early days.[41] The fact that this tree species caught his attention is not by chance, as this species is of Eurasian origin and must have been introduced into American territory at some point in the sixteenth century.

So far, some comments have been provided on the transformation of the landscape. But who brought certain plants to certain places during three centuries of Hispanic presence in the American territory? And what role did the natives play in the Hispanic biological exchange that the region of the Valley of Mexico experienced?

Alfred Crosby said that at the beginning of the sixteenth century, the Jesuit José de Acosta asked who had planted the "forests and whole forests of orange trees" in the Andean area of the viceroyalty of Peru that he visited and somebody replied to him that "oranges fell to the ground and rotted and their seeds germinated, and that those that the water drags to various parts grew these very thick forests".[42] In this sense, in regards to the first question, it is likely impossible to know who in particular took certain seeds, trees, and plants from Spanish ports to the Americas to be placed in different parts of the continent, as the passenger books of the Indies neither inform us in detail about the objects that the travelers carried with them nor assure us that the people on the register were those who actually crossed the ocean. Since they lack this precise data, this work proposes three actors who were able to bring seeds, plants, and livestock with them to the New World and particularly to Mexico City: the conquistadors, the Spaniards who were to settle in the city, and the clergy of different religious orders.

In the case of the conquistadors, as mentioned above, it was these men-of-arms who were responsible - once they became *encomenderos* - for introducing the first cattle in the lake region of the Valley of Mexico. They also introduced other species into other regions of Mesoamerican territory such as the Oaxaca Valley, where Hernán Cortés, after having introduced Merino sheep into the Toluca Valley and sowed sugar cane, was responsible for the introduction of the first cattle into the lake region of the Valley of Mexico.[43] There is a significant possibility that the Spaniards who arrived after the fall of Mexico-Tenochtitlan to approach the new Spanish city intentionally transported seeds for human consumption in the folds of textiles, in clods of soil, in manure, or in many other possible ways, as Crosby points out in the case of clovers and some forages.[44]

And the clergy? Independently of their evangelizing project in the Indies, the members of some of the different religious orders, seeing their work in the regions with high density of Indians strengthened and seeing that church and convent were built for Christian activities, created their gardens to plant olive trees, flowers (such as the rose of Castile), and some fruit trees such as apple trees, pears, and other European fruits. These include the olive orchards that were planted in the Carmelite convents of San Ángel and San Joaquín, the Santo Desierto of Santa Fe, of the same religious order, where roses from Castile and apples were sown; the convent of San Diego in whose small square in front of the convent poplars and willows were planted; and the college of Saint Francisco Javier Tepotzotlán of the Society of Jesus in its the orchard bore European fruits, according to Gemelli Careri. For these and other reasons, it is proposed in the following section of study to see the convent garden as the main laboratory of botanical adaptation – next to the gardens of the Spanish country houses – of the process of Hispanic biological transference between the sixteenth and eighteenth centuries.[45]

Up until this point, I have explained the biological historical changes that the ecosystem and landscape of Mexico City and its surroundings had during the colonial period as a result of the Hispanic biological exchange. Here, I would like to introduce the case study that motivated the realization of this work, which is the participation of the convents of the capital of New Spain in the biological transference from their orchard. I propose that it was the basis for the expansion of European horticulture into Indian communities and other newly discovered points on the American map. In this section I analyze the biological experience of the Carmelite convents of San Angel and the Santo Desierto de Santa Fe, both located to the west of Mexico City.

III. Colonial Biological Garden: A Place of Spiritual Contemplation and Botanical Experimentation

- The Holy Desert of Santa Fe

The Order of Discalced Carmelites was characterized, in comparison with other religious orders in New Spain during the sixteenth and seventeenth centuries, by its active contact with the natural and spiritual environment through the concept of the "desert."The desert, conceived in 1592 by Friar Thomas of Jesus,[46] was a large convent house accompanied by some hermitages or chapels that in its surroundings had lush gardens and free fauna that was limited by a perimeter fence under the protection of the Carmelite

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friars. The creation of this special convent away from all human contact had the purpose of connecting the clergy with the roots of their religion; that is to say, the primitive organization of the order on Mount Carmel in present-day Israel and Palestine with biblical figures such as the prophet Elijah and his hermits.[47]



Source: Manuel Ramos median El Carmelonovosipano, Mexico CEHM 2008.

Fig. 3: Remains of an olivemill in the convent of san Joaquin

The allegorical reconstruction of this contemplative past of the Order in New Spain was an important element for the Carmelite to develop his life in solitude within the particular setting of the natural world. This element was based on the ideal of finding paradise on Earth in the discovered lands of the New World.[48] The deserts founded since 1593 in the Spanish congregation of San José were a kind of "Edenic shelter"[49] inside it where the human spirit could return - in its contact with nature - to the paradise from which the divine creation came and thus be able to reach communication with God through prayer and penance. This mythical longing for the past materialized in the very figure of deserts, regardless of whether it was real or not; the desert integrated[50] a space isolated from the outside that included the reality where impossible dreams could come to fruition.

The formal foundation on January 1, 1605 of the first and only desert of the Province of San Alberto in the mountains of Santa Fe was the work of Friar Juan de Jesús María "el Indiano" and the sponsorship of the assayer Melchor de Cuéllar. The space that made up the prayer hall was a truly mystical garden that dazzled with its beauty and colorfulness as described by the chronicler brother Agustín de la Madre de Dios:

> They lie towards the part that falls between the west and north of Mexico City, some robust and thick mountains whose entrance is through a valley that begins with a small entrance and slowly gets wider and wider as one walks through. (…) Witness that place dressed in so much green that no other color is seen and since its creation this vestment has never moved, as not even the winter strips [the valley] of it nor does time wizen it. The woods are so dense that they form closed forests and almost on the entire mountain one walks beneath the pavilions that weave the *guayemeles*, pines, and other plants that create so much variety and abundance that one's feet barely fit. There the branches embrace each other, the beeches with the ashes, the strawberry trees with the oaks, the cedars with the white pines, the alders with the laurels, and they are so interwoven that even with rays the sun can barely penetrate them in order to illuminate the valleys.[51]

The desert thus represented a paradisiacal place that might well remind us of its description in the book of Genesis about the Divine Creation and the Garden of Eden, but which, in spite of the various adversities of time, is currently maintained with the same magnificence under the legal classification of National Park of the Desierto de los Leones since 1917. Now, the Discalced Carmelites have been replaced by the hundreds of tourists who visit it every weekend to enjoy its rich vegetation and history.[52]

The relationship that the Santo Desierto de Santa Fe had with the process of Spanish biological transference during the seventeenth century was evidenced in its garden. Of the ten species of trees present in the mountains that housed the perimeter fence of the convent complex, at least three species were present (the strawberry, the oak, and the laurel) were introduced by the clergy, by the native peoples who illegally crossed into the sacred area, or by Spaniards prior to the settlement of the Carmelites in the hills of Santa Fe.

Some of the observations and descriptions on the nature of this area of the Valley of Mexico made by Fray Agustín de la Madre de Dios and contained in his chronicle *Tesoro Escondido en el Monte Carmelo Mexicano. Mina rica de ejemplos y virtudes en la historia de los carmelitas descalzos de la Provincial de la Nueva España (Hidden Treasure in the Mexican Mount Carmel. Rich Mine of Examples and Virtues in the History of the Discalced Carmelites of the Province of New Spain*), the author refers to other observations on the modification of the natural ecosystem following the introduction of European plant and animal species into the territories of the New World by the Spaniards.

> Authors have said much of the fecundity of these countries; there are valleys in these parts that produce so much wheat that in a single eat one thousand and sometimes two thousand grains can be counted, as the highly knowledgeable Solórzano said of the wheat of this earth (…) Two and three

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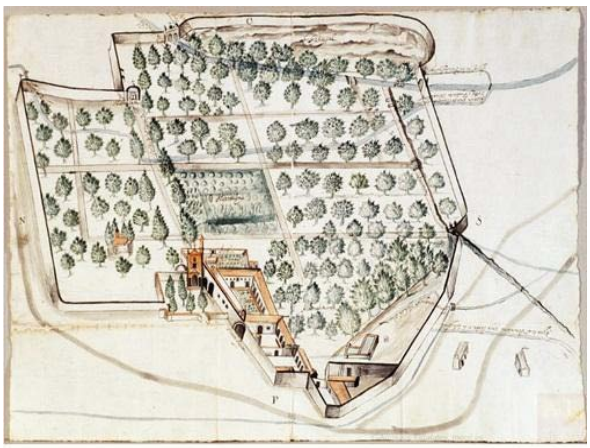
> times a year the wheat is harvested, like in the valley of Atlixco currently is experienced, after one hundred years without a single harvest. The trees are continually dressed with the adornment of their leaves and in a single one in any season there can be seen flowers, ripe fruit, and unripe fruit, always serving as a tribute to the ungrateful man without interruption. (…) There is a great deal of diversity among the animals, because when together those from Europe and those that America fill mountains and valleys and make many wealthy Spaniards. One named Camargo (referring to Antonio de Herrera [y Tordesillas]) multiplied over ten years in a valley by Mexico from only two sheep that he raised, forty thousand heads of livestock.[53]

This description written by the Carmelite chronicler Fray Agustín de la Madre de Dios took up other native writers, such as Antonio de Herrera and Tordesillas, and is illustrative and unique as a provincial chronicle of religious orders whose purpose was to exalt the miracles of portentous images and the prodigious lives of the clergy who formed part of the Carmelite family in New Spain. There exists the possibility that Father Agustín exaggerated in his account the effects that the biological transference originated in the valleys of Mexico, Atlixco, and Toluca, but the virtues and properties that the lands of the New World had at that time were not diminished by the chroniclers and travelers who travelled through North America. For this reason, we must give a vote of confidence to the Carmelite chronicler on the information that is to be found here.

The modification of the ecosystems of these three valleys is important. As Father Agustín suggested in the case of Mexico, the cultivation of wheat gave strong results due to the fertility and the temperance of the land; in Atlixco, fruit tree crops prospered in the last hundred years with three harvests per year. These statistics indicate that, if we take into account that the chronicler is writing this passage between 1646 and 1653, the cultivation of fruit in the region of Puebla must have been introduced between the decades of 1520 and 1550 as well as in Toluca, a place which is inferred by the chronicler's reference to the fact that in a valley next to Mexico sheep farming reached 40,000 head within ten years of the introduction of two animals of this species.

- The Convent of San Ángel

The Convent of San Ángel is located in the town of San Jacinto Tenanitla next to the town of Coyoacán, which served as the administrative headquarters of the Marquesado del Valle. The convent school and church of San Ángel was founded by the Discalced Carmelites between 1614 and 1615. The complex that was built was of large dimensions, had an extension of more than a league and a half of circumference, and was bordered by a wall of five rods high.[54] Inside it housed the theological college, the church under the title of San Angelo Mártir (later under the title of Santa Ana), and a convent that had cells, a domestic chapel, and a library, among other services. According to Manuel Ramos Medina, the convent's orchard was exceptional in its time because of its size; it was because of its extension that the Carmelites, under the help of the Indians of the town of Tenanitla, prepared the land for cultivation and thus take advantage of fertile soil.[55]



Source: Archivo General de Indias, MP MEXICO, 762

Fig. 4: Map of the School of santa Ana of the town of San Jacinto jurisdiction of Coyoacan of the Discalced Carmelites

In order to favor the cultivation of crops in the orchards, the Carmelites formed dams to take advantage of the water of nearby rivers. These constructions allowed the clergy to plant fruit trees of plums, peaches, figs, grapes, apples, and pears, according to Alexander von Humboldt.[56]

On the other hand, within the family of the Carmelites there were prominent clergy who were characterized by their specialization in one or more areas of scientific and/or technological knowledge, as was the case of Andrés de San Miguel. This friar who lived in New Spain during the first half of the seventeenth century and who was an architect, hydrologist, and mathematician wrote a handwritten a series of treatises on carpentry, geometry, the manufacture of sundials, astronomy, glasswork, nature and the site of the waters, and - in particular - on the breeding of peaches in the orchard of the convent of San Ángel, a Carmelite foundation that was built under his instructions.[57]

The treatise on the breeding of peaches acquires a unique and incomparable value within his work, demonstrating the importance of the convent garden as a "laboratory" for adapting the species brought from the Iberian Peninsula to the warm and fertile lands of North America. This historical fact allows us to see religious orders not only as spiritual agents

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dedicated to the conversion of souls at the crossroads of the so-called Spiritual Conquest, but also as transformers of the urban and rural environment from the introduction of rams and plants like the rose of Castile and orange and peach trees that in a short- to medium-term period impacted not only on the modification of the ecosystem at the local but also at the regional level. We can see how did work the convent garden – independently of its purpose of religious recreation – as a platform in the process of adaptation of new plant species. In the words of Friar Andrés de San Miguel:

All these genuses want template breezes, neither cold nor vigorous (…) The tree is raised easily and quickly grows old, although they can be planted with a branch and from the offspring that are born at its foot the good and most beneficial are those that are planted from their seeds (…) The time in which they should be planted in this garden, so that they are sprouted and grown well, are fifteen or twenty days pass after having eaten them, having dried in the shade. The entire seeds, unbroken and spaced by a fourth or a third, four fingers deep, and in the nipple of the seed turned downwards, which becomes the root (…) the first weeding may be done with a hoe, cutting the plans between two soils, as the seeds do not grow here until the peaches start to grow their leaves (…).[58]

The fruit mentioned in this fragment of the description about the cultivation of peaches in the orchard of the convent of San Ángel was surely not only used in the diet of the clergy of El Carmen, but also must have been sold among the Spanish and Indian neighbors of the town of Tenanitla with the intention of obtaining income for the sustenance of convent life.This fact is proven by the lawsuit filed by the colonial authorities in 1681 against the Carmelites to force them to pay the corresponding tithes for the production of the fruit trees in their orchards.[59]

This text has studied the production of the convent orchards of the Discalced Carmelites in Mexico City, work that could later be incorporated into the impact that peaches had on the diet of the New Spanish settlers, a situation that could be understood if some handwritten recipes of the time were found. Other sources where the role of the regular clergy in the Hispanic biological transference could be understood would be the accounts of the convents and estates they were in charge, in these texts, which included information about the type of cattle they raised and the seeds they grew, as well as their quantity, could be better understood.

IV. Concluding Considerations

The study of American nature in its continuities and transformations could not be understood within the colonial period without the reading of the Jesuit José de Acosta's *Natural History of the Indies*. He structured his work with the intention of following the tradition of the medieval rhetorical writers, dividing history into two main aspects: natural history, which included the geographical descriptions (mountains, rivers, valleys) and the animals, plants and mineral products of a region; and moral history, which narrated the facts of men and the descriptions of warrior feats by kings and nobles were exalted.[60]

This division allowed not only the Jesuit, but also the various civil and ecclesiastical writers of the sixteenth and seventeenth centuries, to analyze the geography and nature of the Indies within a historical narrative with providential tones.Their religious association did not deny them the possibility to discuss the proposals of Pliny the Elder and Aristotle on the points of terrestrial space with the intention of refuting the ancestral lies about the existence of the antipodes and the impossibility of inhabiting the torrid zone.[61] These misunderstandings were empirically possible to refute based on the discovery and conquest of the Mesoamerican and Andean civilizations by Hernán Cortés and Francisco Pizarro, respectively.

For these and other reasons offered by the writers of the Indies, the American continent was reconfigured as a place full of natural wealth and a temperate and friendly climate that allowed it to be inhabited and biologically adapted to the needs of the subjects of the kings of Spain and Portugal. In the particular case of the Valley of Mexico basin, and Mexico City, then-capital of the viceroyalty of New Spain and a commercial meeting point for goods from Europe and Asia, the Hispanic biological transfer left a solid mark on the modification of the Mexican ecosystem that persists today. Livestock both large and small modified the areas where there were large pastures where cattle, sheep, goats and other grazing animals altered the soils of the neighboring valleys including Toluca and Ixmiquilpan. The temperate climate of the lake region of Mexico allowed the fruits and vegetables of European and Asian origin to flourish in the vegetable gardens of Spaniards, Indians, and members of the clergy, which had a significant impact on the cuisine and diet of the people of New Spain.

Possibly one of the most singular and important cases that epitomizes the biological transference in Mexico City was that of the Virgin of Guadalupe, in whose maguey fiber ayate the portentous image "must have been painted with rose juice because of its tone," according to Juan de Viera, who follows the official version of the Guadalupan apparitions.[62] The American maguey and the rose of Castile, by means of a mystical or fictitious mixture, gave rise to a virgin, image and identity of the Mexican people and symbol of the legacy of the Hispanic biological conquest that began in 1521 and continues to this day.

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[4] Alfred W. Crosby, *El intercambio transoceánico*, op. *cit*., pp. 72-73
[5] "en caballos alimentados en las Antillas y trotaban a su vera perros guardianes provenientes de las mismas islas." *Ibidem*, pp. 84-85. Translation by the author.
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[8] *Ibidem*., pp.77-78. "habiendo otras plantas de árboles de España e trigo o cebada e otras qualesquier legumbres, ansí mesmo sean obligados a los plantar e sembrar en los pueblos de los indios que tobiesen, so las penas susodichas" Translation by the author.
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[27] Alejandro von Humboldt, *op. cit*., p. 299. The introduction of European livestock into the Valley of Mexico region was a topic of interest in colonial public life, a situation that is evidenced within the different documents of medium and lesser interest concerning judicial disputes and prices and restrictions concerning the livestock that are contained within the Historic Archive of Mexico City in branches such as: Abasto de Carne, Potreros de la Ciudad and Alcabalas y Almacenes.

[28] "haber mucha falta de ellas y con esto encarecerse, a que conviene por remedio, por tanto y para que la tenga y las repúblicas estén proveídas de este género" Translation by the author. *Ordenanzas del trabajo. Siglos XVI y XVII, op. cit.*, p. 58.

[29] Antonio de Ciudad Real, *op. cit*., p. 60.

[30]*Ibidem*, p.66. "se han traído de España rosas castellanas, claveles, clavellinas, alhelíes, toronjil, ruda, poleo, ajedra, orégano, comino, alcaravea, yerba de Nuestra Señora e hinojo, entre otras no mencionadas" Translation by the author.

[31] José Antonio de Villaseñor y Sánchez, *op. cit*. pp. 145 y 154.

[32] *Ibidem*, pp. 178 y 183.

[33] Juan de Viera, *Breve y compendiosa narración de la Mexico City*, trans. Beatriz Montes, presentation by Jorge Silva Riquer, Mexico, Instituto Mora, 1992, pp. 29, 30, 110, 132, 136, 137 y 141.

[34] Juan de Viera, *op. cit*., p. 28. Translation by the author.

[35] Alejandro von Humboldt, *op. cit*., p. 120.

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[37] Giovanni Francesco Gemelli Careri, *Las cosas más considerables vistas en la Nueva España*, trans. José María de Agreda y Sánchez, prologue by Alberto María Carreño, Mexico, Ediciones Xóchitl, 1946, p. 33.

[38] *Ibidem*, p. 90.

[39] *Ibidem*, p. 151.

[40] *Cfr.* Flora Trejo, "El barco como una ciudad flotante", in Antonio Rubial García (coord.), *Historia de la vida cotidiana. La ciudad barroca*, t. II, Mexico, Colmex, FCE, 2012, pp. 160-161.

[41] Jean de Monségur, *Las nuevas memorias del capitán Jean de Monségur*, trans. Florence Olivier, Blanca Pulido and Isabelle Véricat, edition, prologue, and instroduction by Jean-Pierre Berthe, Mexico, UNAM-IIH, IFAL, CEMyC, 1994. pp. 28-29

[42] José de Acosta, *Natural and Moral History*, cited in Alfred W. Crosby, *El intercambio transoceánico*, *op. cit*., p. 72.

[43] Alejandro von Humboldt, *op. cit.*, p. 302.

[44] Alfred W. Crosby, *El intercambio transoceánico*, *op. cit*., p. 80.

[45] *Cfr*. Paulina Machuca, "El arribo de plantas a las Indias Occidentales: el caso del Balsas-Jalisco a través de las Relaciones geográficas del siglo XVI", in *Relaciones. Estudios de historia y sociedad*, El Colegio de Michoacán, Zamora, Michoacán, num. 136, v. 34, Fall 2013, pp. 83-91.

[46] Serafín Puerta, *El Carmelo teresiano. Compendio histórico*, trans. Ildefonso Moriones, Roma, Carmelo Teresiano de Antequera, 2011, p. 221.

[47] *Cfr.* Daniel Rops, *La Iglesia de los apóstoles y de los mártires*, Barcelona, Luis de Caralt, 1954, p. 529-531.

[48] Manuel Ramos Medina, *El Carmelo novohispano*, Mexico, CEHM Carso, 2008, p. 119

[49] *Idem*. This element of the Edenic garden present in the "desert", *vid*. Eduardo Báez Macías, *El Santo Desierto. Jardín de contemplación de los carmelitas descalzos,* photography by Pedro Cuevas, UNAM, 1981, p. 35-42.

[50] Nowadays, the Santo Desierto de Tenancingo in the State of Mexico remains in operation.

[51] "Yacen pues, hacia la parte que cae entre poniente y mediodía de la ciudad de México, unos membrudos y pesados montes cuya entrada es por un valle que empieza en pequeña boca y se ensancha poco a poco, al paso que se encumbra. (…) Mírase todo aquel sitio vestido tan de verde que no se ve otro color y desde que le criaron jamás mudó el vestido, pues ni el invierno le despoja de él ni el tiempo le envejece. Están por todas partes tan densas las arboledas que forman bosques cerrados y casi por todo el monte se camina debajo de los pabellones que tejen los guayameles, los pinos y otras plantas de que hay tanta variedad y muchedumbre que apenas caben de pies. Allí se abrazan las ramas de las unas con las otras, las hayas con los fresnos, los madroños con las encinas, los cedros con los ayacahuites, los alisos con los laureles, y quedan tan enlazados que aún con rayos el sol apenas puede romperlos para dar luz a los valles." Translation by the author. Agustín de la Madre de Dios, *Tesoro Escondido en el Monte Carmelo Mexicano. Mina rica de exemplos y virtudes en la historia de los Carmelitas Descalzos de la Provincia de la Nueva España*, book 4, chap. V, n. 2, p. 512. Translation by the author.

[52] *Vid*. Agustín Tornel Olvera, *Desierto de los Leones*, Mexico, Secretaría de Agricultura y Fomento, Dirección Forestal y de Caza y Pesca, 1922.

[53] "(…) Mucho han dicho los autores de la fecundidad de estos países; valles hay en estas partes que producen tanto trigo que en una espiga sola se pueden contar mil granos y algunas veces dos mil, como dice el doctísimo Solórzano del trigo de la tierra (...) Dos y tres veces al año se recogen las cosechas, como en el valle de Atlixco hoy día se experimenta, después de cien años que se cultiva sin descansar uno solo. Los árboles están vestidos continuamente del adorno de sus hojas y en uno mismo se ven en cualquier tiempo flores, fruta maduray fruta verde, estando siempre tributando a la ingratitud del hombre sin tener interrupción. (…) Hay en los animales tanta copia cuanta hermosa diferencia, porque juntos en uno los de Europa y los que engendra la América llenan montes y valles y enriquecen a muchos españoles. Uno llamado Camargo (refiere Antonio de Herrera [y Tordesillas]) multiplicó por espacio de diez años, en un valle junto a México, de dos ovejuelas solas que metió, cuarenta mil cabezas de ganado." Agustín de la Madre de Dios, *Tesoro Escondido en el Monte Carmelo Mexicano. Mina rica de exemplos y virtudes en la historia de los Carmelitas Descalzos de la Provincia de la Nueva España*, book 1, chap. VIII, n. 2 y 3, p. 46-47. Translation by the author.

[54] Francisco Fernández del Castillo, *Historia de San Ángel*, en Manuel Ramos Medina*, op.cit*, p.133.

[55] *Ibidem*, pp. 133-134.

[56] Alejandro von Humboldt, *op. cit*., p. 275.

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[57] Andrés de San Miguel, *Obras de fray Andrés de San Migue*l, 2nd ed., introduction, notes, and paleographic version by Eduardo Báez Macías, Mexico, UNAM-IIE, 2007, p. 25-30.
[58] "Todos estos géneros quieren aires templados, no fríos ni recios (…) Este árbol que con facilidad se cría y en breve se envejece, y aunque se pueden plantar de rama y de los hijos que le nacen al pie, pero los buenos y más provechosos son los que se plantan de sus huesos (…) El tiempo en que se deben sembrar en esta huerta, para que nazcan y se críen bien, es quince o veinte días después de haberlos comido, habiéndose enjugado a la sombra. Siémbranse los huesos enteros y sin quebrar y una cuarta o tercia desviados, hondos cuatro dedos, y en la parte del pezón abajo, que es la raíz (…) la primera escarda se puede hacer con azadón, cortando la yerba entre dos tierras, porque los huesos no nacen aquí hasta que los duraznos comienzan a brotar sus hojas (…). Translation by tha author. *Ibidem*., p. 342-343.
[59] Manuel Ramos Medina, *op. cit.*, p. 134.
[60] *Vid*. Joseph de Acosta, *Historia natural y moral de las Indias,* 3rd ed.,edition, prologue, and appendixes by Edmundo O'Gorman, Mexico, FCE, 2006, p. 73-142.
[61] *Ibidem.*, p. 30-45.
[62] Juan de Viera, *op. cit*., p. 127.

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