

Arthur O. Tucker · Jules Janick

Flora of the Voynich Codex

An Exploration of Aztec Plants



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*For Sharon L. Tucker, Patricia M. Ryan, and
our children: Angelica, Arthur IV, Melissa,
Peter, and Robin.*

*This book is dedicated to the memory of Dr.
Arthur O. Tucker who sadly died on August 5,
2019 when this book was in press.*

Cover image: The cover image, folio 94r of the *Voynich Codex*, is identified as *Viola bicolor* Pursh (*V. refinesquii* Greene). The phytomorph clearly shows linear terminal stipular lobes as in the North American native *V. bicolor*, not spatulate as in the Eurasian *V. tricolor* L. Its blue flowers match *V. bicolor* in contrast to the tricolored ones of *V. tricolor*. The delineation of *V. bicolor* as native to the New World and not introduced from elsewhere, was only elucidated in 1961.



Reverend Dr. Hugh O'Neill (1894–1969)

Preface

The mysterious *Voynich Codex* has been shown to be a sixteenth-century Mexican manuscript, on the basis of the presence of New World plants and animals and the presence of Mexican landmarks. The evidence dates to a seminal 1944 note by the Reverend Dr. Hugh O’Neill, who reported the presence of sunflower and capsicum pepper in the *Voynich Codex*, clear evidence that the *Voynich Codex* must be post-Columbus because these two species are indigenous to the New World. This counterevidence to the almost universally accepted dogma that the codex was a European fifteenth-century manuscript was ignored, discounted, or explained away by most of the Voynich community, all non-botanists. The number of identified phytomorphs was increased to 37 (Tucker and Talbert 2013) and then to 58 (Tucker and Janick 2016). In our book, *Unravelling the Voynich Codex*, the count went up to 60 (Janick and Tucker 2018). This new work raises the number of phytomorphs identified as New World plants to 169 and provides evidence that the *Voynich Codex* must be included as one of the seminal contributions to sixteenth-century Mexican botany. Thus, we have titled this book *Flora of the Voynich Codex: An Exploration of Aztec Plants*. It is too early to know the reception of this work by an exuberant, albeit seemingly fanatical, community unable or unwilling to accept botanical evidence.

We dedicate this work to the memory of Hugh O’Neill, who has been disregarded and vilified despite his credentials as a distinguished botanical taxonomist with outstanding work on tropical American flora.

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West Lafayette, IN, USA

Arthur O. Tucker
Jules Janick

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Chapter 1

An Introduction to the *Voynich Codex*



The Mysterious Codex

The *Voynich Codex* is a bizarre, profusely illustrated manuscript that has been considered the most mysterious manuscript ever written. The work is encyclopedic and has been divided by convention as follows:

Herbal, 127 pages containing 131 plant images plus text (Fig. 1.1)

Pharmaceutical, 20 pages with 228 small images of plants or plant parts, plus apothecary jars, many labeled with symbolic script (Fig. 1.2)

Balneological, 19 pages with nude nymphs, singly or in groups, many cavorting in pools with strange plumbing or vascular systems (Fig. 1.3)

Astrological, 12 pages containing signs of the zodiac surrounded by nymphs, mostly nude (Fig. 1.4)

Cosmological, 16 pages including combinations of the sun, moon, planets, and stars (Fig. 1.5)

Rosette, a large insert the size of 6 pages, with 11 circles or rosettes resembling a kabbalah tree-of-life symbol that is a map of central Mexico cities and volcanos (Fig. 1.6)

Recipe, 23 pages of text, probably medicinal prescriptions, or possibly poems or incantations, with each phrase highlighted by a six- to eight-pointed star in the left margin (Fig. 1.7).

The *Voynich Codex* includes symbolic writing, referred to as *Voynichese*, that has evaded decipherment by eminent cryptologists, and its original language has been under dispute. The symbolic script follows rules of languages, and the suggestion that the *Voynich Codex* is a modern hoax has been universally discredited. Robert Brumbaugh (1978) assumed it was a forgery, whereas Gordon Rugg (2004a, b) declared it was gibberish. These theories have been tested by modern cryptographic analysis based on the frequency of letters or words. Antoine Casanova (1999) concluded that the *Voynich Codex* had the qualities of a synthetic language whose

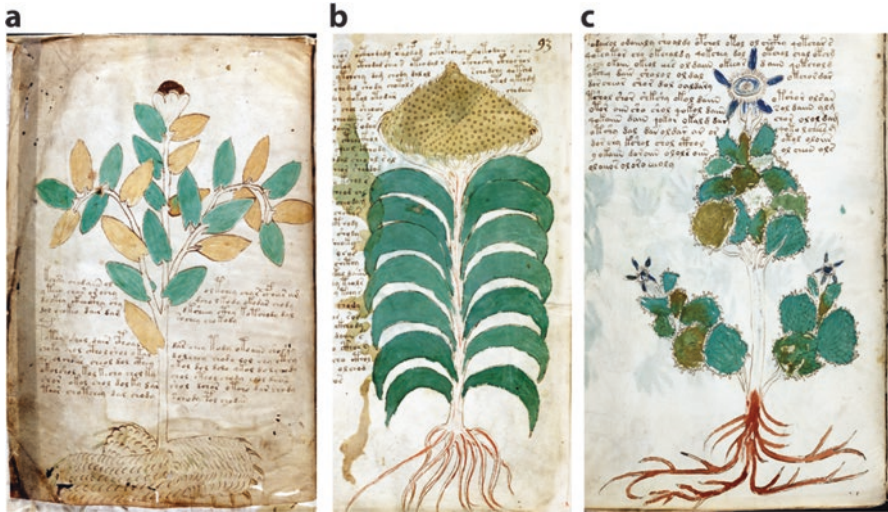


Fig. 1.1 Herbal section phytomorphs: (a) folio 1v, *Ipomoea arborescens*; (b) folio 93r, *Helianthus annuus*; (c) folio 23v, *Passiflora* sp. section *Decaloba*; cf. *P. morifolia*

alphabet was subject to transformations. M. A. Montemurro and D. H. Zanette (2013) demonstrated that the language organization is complex, but the distribution of words is compatible with real language sequences and the distribution of letters follows Zipf's law, as in other languages. D. R. Amancio et al. (2013) concluded that words display compatibility with natural languages and are incompatible with random texts.

Provenance

An untitled manuscript was purchased by a Polish book dealer, Wilfred Voynich (Fig. 1.8), in the Villa Mondragone at Frascati, Italy. This patrician complex, constructed in 1573 on the site of a Roman villa, had been transformed into a Jesuit college for young aristocrats in 1865 and was discreetly selling off parts of its library.

The work, now known as the *Voynich Codex*, has long bedeviled historians of science. It has been traced to the Emperor Rudolf II (1576–1612), Emperor of the Holy Roman Empire (Fig. 1.9) and a collector and connoisseur of art. A 1667 letter to the Jesuit scholar Athanasius Kircher from Joannes Marci, Rector of Prague, noted that the manuscript was sold to Rudolf II for 600 gold ducats. Its association with the court of Rudolf II was confirmed by the embedded signature on the first page of the manuscript of Jacobi à Tepeanecz, the 1607-ennobled name of Jaobus



Fig. 1.2 A page in the Pharmaceutical section (folio 100r) with 16 images of phytomorphs labeled in Voynichese symbols and two apothecary jars

Horčický (1575–1622), Imperial Chemist and personal physician of Rudolf II. However, the origin and the author of the work has been a mystery.

Wilfrid Voynich considered the manuscript to be the work of Roger Bacon (ca. 1219–1292), but his attempts to sell it at a high price (\$160,000) after he moved to the United States were unsuccessful. After the death of Wilfrid Voynich’s wife, Ethel Lilian Boole, in 1960, the manuscript was sold to the book dealer H.P. Kraus, who also failed to sell it. In 1969 it was donated it to the Beinecke Rare Book & Manuscript Library at Yale University, where it now resides as Manuscript 408.

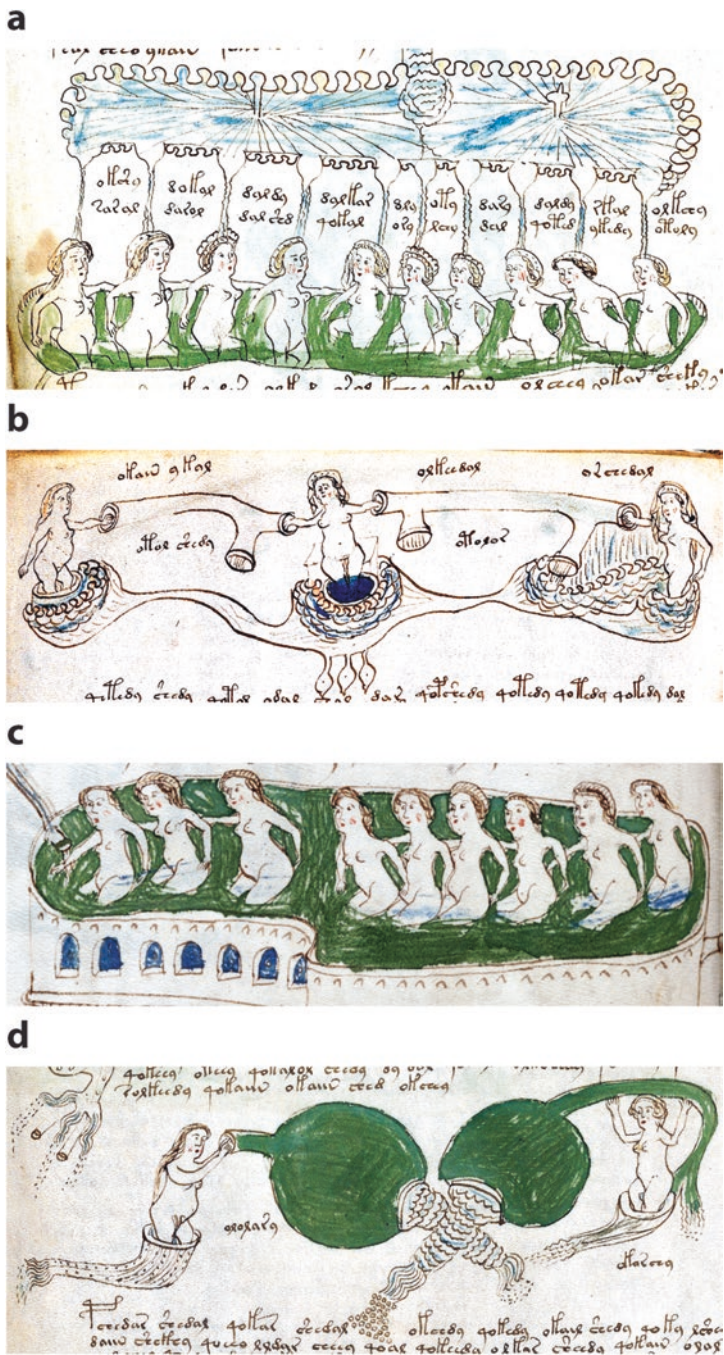


Fig. 1.3 Balneological images of nude nymphs: (a) folio 75v; (b) folio 77v; (c) folio 78v; (d) folio 83v

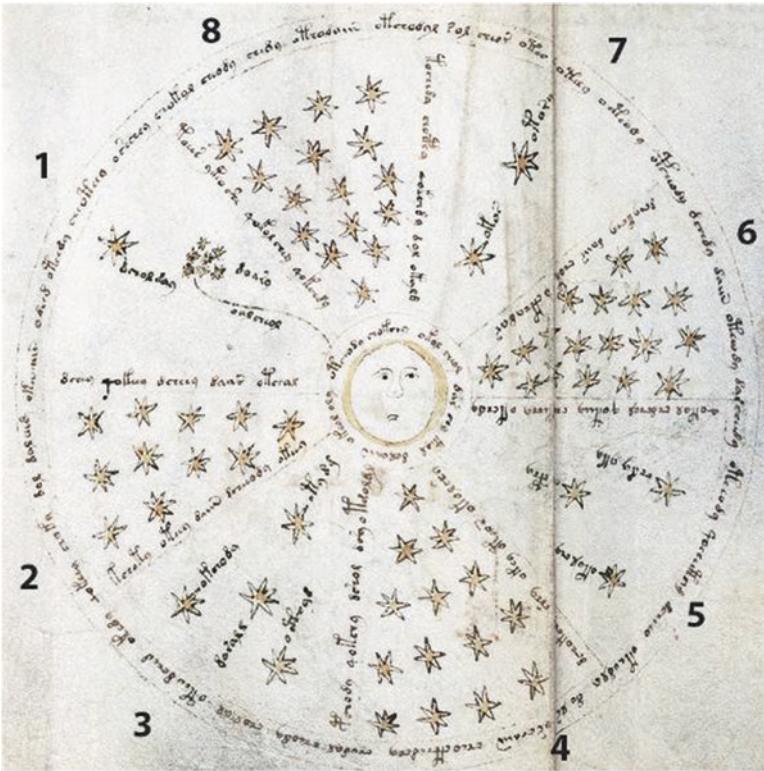


Fig. 1.4 Astrological signs with Mexican animals: (a) folio 70r, Pisces represented by an alligator gar; (b) folio 71v, Cancer represented by Mexican crayfish; (c) folio 72r(1), Leo represented by on ocelot; and (d) folio 73r, Scorpio represented by a jaguarundi

Dating and Origin of the Codex

In 2011, the University of Arizona issued a press release on the age of the *Voynich Codex* vellum using carbon dating (Stolte 2011). Dr. Gregory Hodgins of the university's Department of Physics performed the analysis in 2009 using an accelerator mass spectrometer to measure the ratio of ^{14}C (carbon-14) to ^{12}C (carbon-12) in four snippets of the manuscript. The samples dated from 1404 to 1438. Following this, Hodgins made several oral presentations and announcements with additional data, but the information has not been published (Zandbergen 2012).

This fact, as well as its provenance in Italy, has led to the widely held view and current dogma that it was a fifteenth century European work. However, botanical evidence indicates that the work contains New World plants (O'Neill 1944; Guy 1991; Tucker and Talbert 2013; Tucker and Janick 2016; Janick and Tucker 2018), which contravenes the conventional wisdom based on the dating of the vellum. A Mexican connection to the *Voynich Codex* had been hinted at by Jacques B.M. Guy (1991), proposed by James C. Comegys (2001), published in a peer-reviewed journal by Arthur O. Tucker and Rexford T. Talbert (2013), and reported in an unpublished manuscript by John D. Comegys that appeared online in 2014 (copyrighted 2013). This hypothesis was fully expanded in *Unraveling the Voynich Codex* by Jules Janick and Arthur Tucker (2018). A signature in the first botanical image provides evidence that the author was Gaspar de Torres, a Spaniard of Jewish heritage born in Santo Domingo, and Master of Students of the *Colegio Imperial de Santa Cruz* at Tlatelolco 1568–1572. Ligated initials on the same folio suggests that the Illustrator was Juan Gerson, an indigenous artist (*tlacuilo*) born in Mexico (Janick and Tucker, 2017).



Moon, and stars, fol. 68r(3)

Fig. 1.5 Cosmological image, folio 68r(3), showing sun and labeled stars, including the Pleiades star cluster in section 1

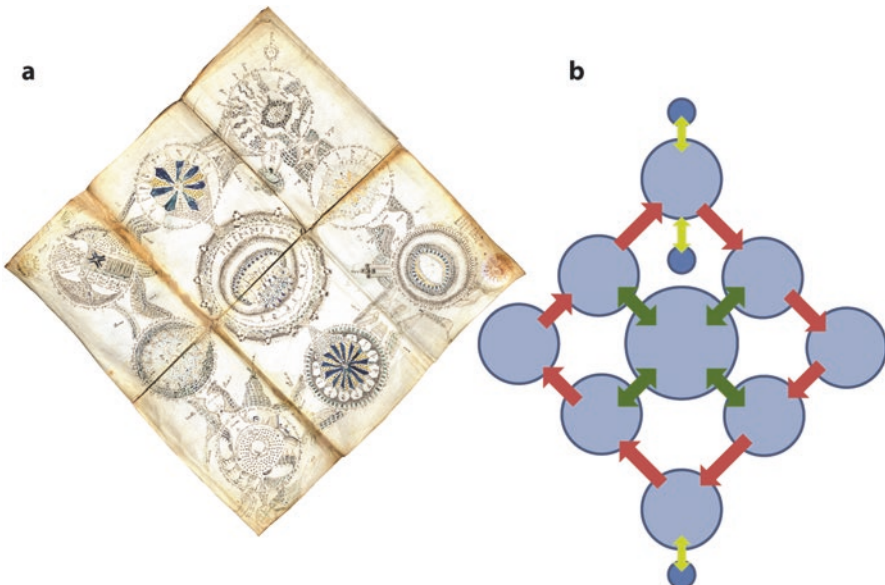


Fig. 1.6 The Rosette page, folio 86v: (a) oriented with suns in an East-West position, representing a kabbalah-like map. (b) Schematic diagram of folio 86v

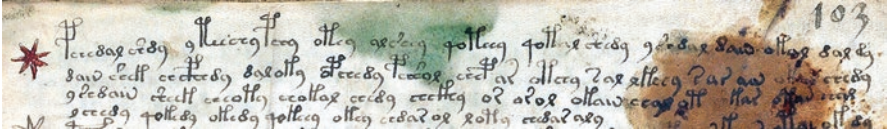


Fig. 1.7 The first entry of folio 103r in the Recipe section, showing symbolic script known as Voynichese

Fig. 1.8 Wilfrid Voynich (1865–1930)



The connection of the *Voynich Codex* to sixteenth century New Spain suggests that the book was either a palimpsest written over the vellum of an old book, or simply written on reused vellum that was known to be imported to the *Colegio Imperial de Santa Cruz*. In New Spain in times of scarcity, use was made of already printed paper, which was sold as a waste product (Reyes 1948, cited in Romero Ramírez 2013:39 Vol. 1), and new Spanish paper was available in the large market at Tlatelolco from paper sellers called *amanamac* or *amaoztomecatl* (Hirth 2016). Reused parchment was available at the scriptorium of *El Colegio de Santa Cruz de Tlatelolco* in New Spain (Gravier 2011). Researchers from the Bodleian Library at the University of Oxford have demonstrated that the *Codex Selden*, also known as the *Codex Añute* (1560) and written on a deer hide, was a palimpsest written over a pre-colonial manuscript (Snijders et al. 2016).

Evidence of a New World origin is supported by the following:

1. The plants are indigenous to the New World or circumboreal, with the exception of one weedy Spanish introduction.
2. The animals identified are indigenous to the New World, including alligator gar, armadillo, coati mundi, caecilian, jaguarundi, horned lizard, Mexican crayfish, and ocelot, or are Spanish introductions.

Fig. 1.9 Emperor Rudolf II (1552–1612), portrait by Hans von Aachen



3. The landmarks in the Rosette page (folio 86v) include cities and volcanoes of central Mexico.
4. The first botanical illustration includes the ligated initials of Juan Gerson, Tlacuilo (“JGT”), an indigenous artist of Mexico, and the name “Gasp.Torres” (Gaspar de Torres), born in Santo Domingo and master of students at the *Colegio Imperial de Santa Cruz*.

Description of the Work

The *Voynich Codex* is composed of folded sheets called *folios*, each composed of two pages numbered *recto* (r) (right side) and *verso* (v) (reverse side). Folios are referred to by their individual numbers as 1r, 1v, 2r, 2v, and so on, up to 116v. However, 14 folios are missing (12, 59, 60, 61, 62, 63, 64, 74, 91, 92, 97, 98, 109, 110). Adjusting for missing folios and foldouts of two to four pages, the original work is equivalent to 262 pages, but only 234 remain. The folios are bound into set quires of four folios (8 pages each) and sewn together, but improper binding has altered the original sequence so that some of the sections are not contiguous.

Illustrations

With the exception of the recipe section, almost every page contains tinted illustrations drawn with a pen and most tinted with a limited palette of four colors: blue, red, green, and red-brown. Pigment analysis in 2009 by McCrone Associates Inc. of Westmont, Illinois, indicated that symbols are made with iron gall ink made by reaction of iron sulfate with oak galls. The green pigment was a copper and copper-chlorine resinate, probably derived from atacamite. The blue pigment was derived from azurite, and the red-brown pigment was red ochre derived from hematite. The binder was unidentified but was not gum arabic. The blue and red-brown pigments are compatible with a New World origin; the green pigment is unlikely to be of European origin because European greens were only rarely derived from a source of copper-chlorine pigment such as decayed bronze (which provides paratacamite, not atacamite).

Decipherment

Attempts to decipher the *Voynich Codex* have failed gloriously. The fact that William Friedman, the world's most eminent cryptologist and breaker of the Japanese Purple cipher, has been unsuccessful in deciphering Voynichese suggests that ciphers or secret writing is not involved. Friedman's conclusion, published in a cipher code revealed in 1970, indicates that Voynichese is an artificial or universal language of the *a priori* type (*i.e.*, an invented or synthetic language).

Decipherment of the plain text of the *Voynich Codex* requires both that the symbols be decoded phonetically (transliteration) and that the appropriate language be identified (translation). The simplest interpretation of Voynichese, consisting of about 37 symbols, is that they are derived from scribal shorthand of sixteenth century New Spain; these transliterate to either a Nahuatl *lingua franca* or a phonetic alphabet or syllabary of either a real and/or an invented language.

The labeled plants in the Pharmaceutical section provided a path to a decipherment of the symbols. Tucker and Talbert (2013) decoded the Voynichese symbols based on the identification of two plants derived from primary names, *nāsh̄tli*, a phonetic derivative from Nahuatl, *nochtli* (*Opuntia ficus indica*) and *māgueoy*, derived via Taino from *maguey* (*Agave atrovirens*). Other plant names expanded the symbol decoding, and although none were previously recorded Nahuatl names, many were descriptive in the manner of Nahuatl names. This decoding system allowed decipherment of Nahuatl cognates and some cities and words, including dialects of Nahuatl, Latin American Spanish, Mixtec, Huastec, and Taino; that gave us confidence that the decoding was on the right track, but much to our chagrin, it failed strict Classical Nahuatl. It might be a synthetic language (as suggested by William Friedman) composed of various indigenous languages. We are convinced that a Nahuatl dialect is involved, because the decoded symbols identified the city

of Huejotzingo, confirming a previous independent identification. We agree with William Friedman that Voynichese may be a mixed synthetic language. It probably was invented from various contemporary languages such as Latin American Spanish (including Nahuatl, Taino, and other languages of central Mexico) and perhaps a North African Arabic dialect for astronomical names extant in sixteenth century New Spain. Another possibility was a Nahuatl *lingua franca* used in commerce by the *pochteca*, Aztec traders (Dakin, 1981; Janick and Tucker, 2018).

Objectives

It is our belief that the inability to decipher the symbols and translate *Voynich Codex* stems from the erroneous belief that the manuscript must be a European work. This has led to plant misidentification, wrong linguistic analysis, and circular reasoning. We are convinced that the original sin of failure to correctly identify the plants of the *Voynich Codex* as New World plants and accept the possibility of New World languages is a serious error in *Voynich Codex* scholarship. The objective of this work has three interconnected objectives:

1. Identification of all plants in the Herbal section of the *Voynich Codex* and many in the Pharmaceutical section
2. Association of the plants with Aztec botany and medicine
3. Relation of the plants of the *Voynich Codex* to period herbals of New Spain and Mexico, as well as 16th to early seventeenth century herbals that describe plants of the New World

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Chapter 2

Aztec Botany, Agriculture, Trade, and Medicine



Mexico and the Aztec Empire

Mexico, a botanical paradise located in southern North America, is the third largest country of Latin America and one-fifth the size of the United States. Mexico's climate varies from temperate to tropical and from wetlands to desert. Mountain ranges as high as 7000 feet are responsible for the huge variation in microclimates and ecosystems.

With 23,324 native plant species, Mexico has the fourth largest floristic richness in the world; its endemic species (50%) are surpassed only by South Africa (Villaseñor 2016). Mexico is one of the centers of origin for many cultivated plants. The native food crops include allspice, amaranth, avocado, cacao, chayote, chia (*Salvia hispanica*), guava, chili pepper, lima bean, maize, papaya, *Phaseolus* beans, pumpkin, sunflower, sweet potato, tomato, and vanilla. It is also the source for many horticultural ornamentals, including cosmos, dahlia, frangipani, jacaranda, Jacobean lily (*Sprekelia*), marigold, Mexican poppy (*Argemone*), Mexican sunflower (*Tithonia*), *Laelia* orchids, morning glory, sages, shell flower (*Tigridia*), tuberose, and zinnia. The wide variety of plants in Mexico selected over several millennia provides the knowledge base for the extensive medicinal lore of its indigenous people.

The present population of about 123 million persons now constitutes the world's largest population of Spanish speakers, 80% of whom live in Mexico City. This enormous city is located on the remains of the Aztec capital, Tenochtitlan, centered on Lake Texcoco, now drained. The Aztec empire (Fig. 2.1) extended to much of Mesoamerica and touched the Gulf of Mexico and the Pacific Ocean (Moreira 2018). Tenochtitlan, the magnificent, sumptuous, island city known for its *chinampas* ("floating gardens") was founded in 1325 and was destroyed by the conquistador Hernán Cortes in 1521 and decimated by diseases. The name *Aztecs* was coined by Francisco Clavijero in 1780 (Clavijero and de Mora 1844) based on their legendary home, *Aztlán*, but they referred to themselves as *Mexica*, and this word is

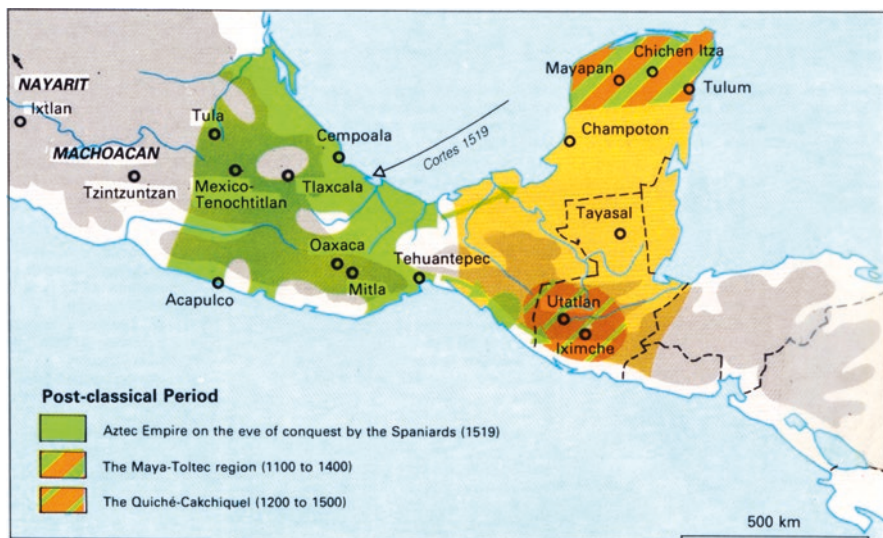


Fig. 2.1 Aztec empire in 1521. (Source: The Harper Atlas of World History, rev. 1992)

enshrined in the country's present name. They were also known as *Tenochca*, the people of Tenochtitlan. The Mexica spoke Nahuatl, part of the Uto-Aztec language family group that extends from Oregon to Panama and still is spoken by more than a million people. Many Nahuatl-derived words from Mexico now are common in English, such as avocado, chili, chocolate, coyote, and tomato.

The Aztecs, latecomers to central Mexico, were the dominant rulers at the time of the Spanish encounter with the New World. At the time of the conquest, the Aztec population was estimated at about 11 million, but smallpox introduced by the Spanish in 1519–1520 killed five to eight million people. *Cocoliztli*, probably an indigenous hemorrhagic fever transmitted by rodent hosts and associated with a bacterial pathogen, killed another seven million in the epidemics of 1545 and 1576 (Acuña-Soto et al. 2002; Vágene et al. 2018). The devastation brought about by a combination of warfare and megadeath from introduced disease drastically reduced their population, but the remnants of the Aztec population interbred with Spanish conquistadors and immigrants, and their descendants now are an integral part of the Mexican population.

The Aztecs were a complex, advanced civilization. They practiced a bewildering state religion with stone pyramid temples and created a complex, interconnected religious and secular calendar. Their art was sophisticated and included feather weaving, painting, and sculpture, as well as illustrated codices. Priests and nobles studied astronomy, for they believed cyclical phenomena of the sun, stars, and planets were linked to earthly events including the agricultural calendar and ever-impending doom, ameliorated only by captive sacrifice. They utilized a logophonetic writing system, yet in many ways they were a Stone Age culture lacking beasts of burden and even the wheel.

Formed by a triple alliance between three city states (Tenochtitla, Texcoco, and Tlacopan), the Aztec Empire was a tribute system organized into various ethnic political units of city states (*altepetl*). At the time of the conquest, they were ruled by an emperor king, Moctezuma II. The Aztecs were militarily aggressive, with hegemony over 450 city states that were mostly in Central Mexico but reached as far as Guatemala. It was a trading society, with large markets carrying products from all over the empire.

Trade

Marketplaces existed at every major city, but the largest was at Tlatelolco, the sister city of Tenochtitlan and not part of the Triple Alliance. However, this great market declined during the sixteenth century, with the trade passing to Tenochtitlan. Anthony Pagden remarked on the letters of Cortés sent to the emperor: “A new Indian market at San Hipólito came into being in the 1540s. Cervantes de Salazar described it as a ‘square of such enormous size that it is wide enough for building a city’. It was flanked by a Franciscan monastery—containing the Colegio de Santiago de Tlatelolco—the residence of the Indian governor and an Indian prison. Cervantes de Salazar estimated that the number of Indians using this market amounted of twenty thousand or more.” (Cortés 1986:507). At Tenochtitlan, Cortés noted in his second letter to the emperor in 1519: “There are streets of herbalists where all the medicines, herbs, and roots found in the land are sold. There are shops like apothecaries’, where they sell ready-made medicines as well as liquid ointments and plasters.” (Cortés 1986:103). Native *amatl* (amate) and maguey fiber papers used by Aztecs were available from paper vendors (*amanamacac*, *amaoztomecatl*) (Hirth 2016). Feldman (1978) provides a rather detailed map of a typical Mexica market, while Durand-Forest (1971) provides a map of the market at Tenochtitlan (Fig. 2.2).

The herb seller was the *quilnamacac*, “a producer of herbs, a field worker, a plucker of herbs.” (Sahagún 1961:92). The apothecary, the medicine collector, was the *pachichiuqhui* (Molina 1571). The medicine dealer apothecary was the *panamacac*: “He sells all things, medicines, herbs, wood, stones, milk, alum...on a reed mat” (Sahagún 1961:85–6). Hirth (2016:164) remarked, “Medicine was another retail product. The apothecary (*panamacac*) sold a wide variety of herbal and natural remedies. These included fourteen kinds of different herbs together with types of wood, stones, milk, and alum. While he may have collected some of these, it is more likely that he relied on a selection of forager-collectors to provision him with a number of natural remedies. Some of the concoctions sold were undoubtedly prepared by the apothecary himself since Sahagún [1961:86] indicates that he sold things cooked in pots like skunk excretion. In this regard the medicine seller was probably part retailer and part producer-seller.”

The herb sellers themselves were supplied by a special class of Aztec merchants called the *pochteca*. This class, including both men and women and nobility and commoners, often provided military and political aid to the nobility. The *naualoztomeca*

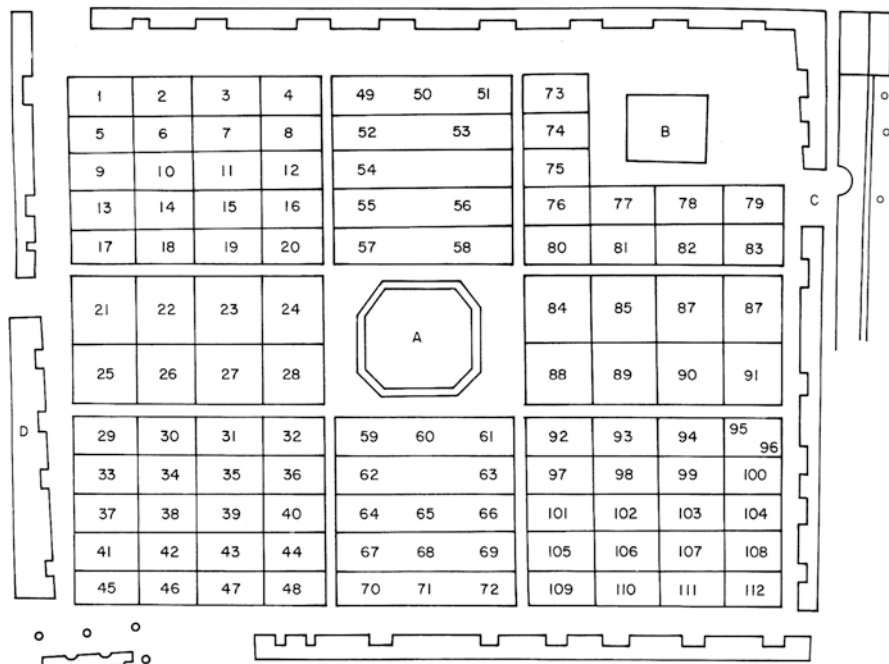


Fig. 2.2 Reconstruction of a pre-Hispanic Aztec market. (Adapted from Feldman 1978)

of the *pochteca* were “disguised traders” who were multilingual and acted as spies. The *pochteca* were wealthy and extremely secretive. Book 9 of Sahagún’s *Florentine Codex* (Sahagún 1959) is devoted to these merchants. Their influence, and thus their trading routes, extended throughout the southeastern and southwestern United States to Georgia and Utah and as far south as the Andes in Peru (Berdan 1975, 1980, 1985, 1986, 1988; Nichols 2013; Oka and Kusimba 2008; Salomón 1978; Washburn et al. 2014; White and Weinstein 2008). In summary, the long-distance travels of the *pochteca* imply that the herbs (and the knowledge of their uses) sold at the markets did not have to come from Mexico alone but rather from the extent of the trading routes of these merchants. This fact also has implications for the language of the *Voynich Codex*, as the *pochteca* would have spoken a *lingua franca* based upon Nahuatl, such as discovered by Dakin (1981), a Pidgin- or Creole-like language now extinct and supplanted by Spanish.

Agriculture

Food production was vital in feeding the capital population and the one million others who lived in the central basin. The chief foods were agave, amaranth, chia, capsicum peppers, maize, and squash. The diverse agricultural production

The Parts of a Mexica Market¹

Section I: Restaurants, Produce, Meat, and Fish

- 1., 2. *Tlaxcalnamacac*: The Tortilla Seller
3. *Aioachnamacac*: The Seller of Gourd Seeds and cakes of gourd seeds
4. *Tlaquetzalnamacac*: One who provides people with the chocolate drink of the rulers, of the nobles
- 5., 6. *Tlaxcalnamacac*: see above No. 1
7. *Atolnamacac*: The Atole Seller, sells hot atole drink
8. *Cacaoanamacac*: The Cacao Seller, sells cacao beans
9. *Totoltenamacac*: The Egg Seller
10. *Picienamacac*: The Seller of Fine Tobacco
11. *Chiennamacac*: The Chía Seller; The Oil Seller
12. *Henamacac*: The Bean Seller
13. *Totolnamacac*: The Turkey Seller
14. *Vauhnamacac*: The Amaranth Seed Seller
15. *Tlaolnamacac*: The Seller of Maize Grains
16. *Chiquipantlacatl*: The Displayer of Wares on a Large Basket, the seller of colors, of various colors, of dyes
17. *Nacanamacac*: The Meat Seller
- 18., 19. *Xoquilacanamacac*: The Stench Seller (Fish Seller)
20. *Tochominamacac*: The Seller of Rabbit Hair

Section II: Meat and Produce

21. *Nacanamacac*: see above No. 17
- 22., 23. *Suchiqualpantlacatl*: The Man with Fruit; seller of maize stalks, green maize, tortillas, cooked gourds, tree fruit, cactus fruit, sweet potatoes, manioc
24. (thread)
25. *Nacanamacac*: see above No. 17
- 26., 27. *Suchiqualpantlacatl*: see above No. 22
28. (thread)

Section III: Hardware, Hides, Pharmacy, and Wine

29. *Ocnamacac*: Wine or Pulque Seller
30. *Amolnamacac*: Soap Seller
31. *Quinamaca Cuetlascactli*: Seller of Cured Leather Sandals
32. (rope)
33. *Quilnamacac*: Herb Seller
34. *Hihujnamacac*: Feather Seller; the Spinner of Feathers into Thread
35. *Euanamacac*: Hide Seller (based upon Nahuatl rules of compound word construction)
36. *Sihquilnamacac*: Turquoise Herb Seller; sells black clay mixed with *uixachin* leaves for coloring things

(continued)

¹Unless otherwise stated, all Nahuatl terms are from Sahagún (1961).

37. *Panamamacac*: The Medicine Seller; sells medicines of herbs, wood, stones, milk, alum, and things cooked in ollas
38. *Tzacunamacac*: The Glue Seller
39. *Suchiocutzonamacac*: The Seller of Liquidambar; sells pine resin, possessor of pine resin trees
40. *Acaquauhnamacac*: The Smoking Tube Seller
41. *Ocutzonamacac*: The Seller of Pine Resin; sells pine and other resin, a woodsman, a collector of pine resin
42. *Poponamacac*: The Broom Seller
43. *Vitzmallonamacac*: The Needle Seller; sells needles, awls, punches, bells, axes, adzes, fish hooks, chisels
44. *Olnamacac*: The Rubber Seller
45. (cochineal)
46. not known
47. *Pinolnamacac*: The Pinole Seller (based upon Durand-Forest 1971)
48. not known

Section IV: Cloth, Minerals, Produce, and Services

49. *Tequixquinamacac*: The Seller of Saltpeter
50. *Tizanamacac*: The Chalk Seller
51. *Monamacac*: Self Seller (prostitute)
52. *Tomanamacac*: The Tomato Seller
53. *Chilnamacac*: The Chile Seller
54. *Chientzotzolnamacac*: Wrinkled Chia Seller
- 55., 56. *Iczotilmanamacac*: The Seller of Palm Leaf Fiber Capes
- 57., 58. *Veicapantlacatl*: “The Principal Merchant;” sells worked capes, worked shifts, fine skirts

Section V: Maguey Goods and Building Material

59. *Necunamacac*: The Maguey Syrup Seller
60. *Aianamacac*: The Seller of Coarse Maguey Fiber Capes
61. (hats)
62. *Cacnamacac*: The Sandal Seller; sells sandals of maguey fiber
63. (hats)
64. *Cacnamacac*: see above No. 62
65. *Xiquipilnamacac*: The Bag Seller
66. *Neilpilonamocac*: The Sash Seller; sells narrow strips of cloth
67. *Quauhnanamacac*: The Wood Seller; sells lumber
68. *Quruhxinquil* “The Carpenter;” sells beams, wooden pillars, lintels, roofing, wooden columns, boards, planks
69. *Tenexnamacac*: Seller of Lime; adjacent to seller of building stone
70. *Quathnanamacac*: see above No. 67
71. *Quauhxinqui*: see above No. 68
72. *Tenexnamacac*: see above No. 69

(continued)

Section VI: Produce, Salt, Cloth, and Money

73. not known
 74. *Chilnamacac*: see above No. 53
 75. *Iztanannacau*: The Seller of Salt; sells salt balls and salt ollas
 76. (pieces of *cueitl* or skirt cloth sold) (Durand-Forest 1971)
 77. (pieces of *tilmatl* or *manta* cloth sold) (Durand-Forest 1971)
 78. (selling of gold-filled quills)
 79. (*ocotl* torches sold) (Durand-Forest 1971)
 80.–82. *Tilmapan Tlacatl, Quachnamacac*: The Man With the Capes, The Seller of Large Cotton Capes
 83. (seller of *tomitilmatl* or woolen *mantas*) (Durand-Forest 1971)

Section VII: High-Value Goods

84. *Tilmapan Tlacatl, Quachnamacac*: see above No. 80
 85. *Xicalnamacac*: The Seller of Gourd Bowls
 86. *Tlapitzalnamacac*: The Seller of Cast Metal Objects; sells objects made out of precious metal, either gold or silver
 87. *Iluinamacac*: The Feather Seller
 88. *Tecoani*: The Slave Dealer
 89. *Amanamacac*: The Paper Seller
 90. *Chalchiuhnamacac*: The Seller of Green Stones
 91. (sellers of bees' honey)

Section VIII: Woven Goods, Pots, Trinkets, and Services

- 92., 93. *Chiquiuhnamacac*: The Seller of Large Baskets
 94. *Cozcatetecpanqui*: The Displayer of Necklaces
 95. *Zoquichiahqui*: The Clay Worker; sells all pottery except griddles
 96. *Comalnamacac*: The Comal Seller
 97., 98. *Chiquiuhnamacac*: see above No. 92
 99. not known
 100. *Tananamacac*: The Seller of Small Baskets
 101. (sellers of bird skins)
 102. (sellers of shells)
 103. *Tezcanamacac*: The Mirror-Stone Seller
 104. *Petlanamacac*: The Reed Mat Seller
 105. (barbers)
 106. *ltznamacac*: The Obsidian Seller; sells blades on demand
 107. *Otlachiquiuhnamacac*: The Seller of Stout Cane Carrying Baskets
 108. *Petlanamacac*: see above No. 104
 109.–112. Not known

Section IX: Structural Features

- A. Stage
 B. Court House
 C. Entrance to the Courts of the Great Temple
 D. Arcades