

Chapter 5

Plants as the Rosetta Stone of the Voynich Codex©

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The language of the Voynich Manuscript (referred to here as Voynichese) had defied decipherment since it was brought to public attention in 1912. The text appeared to be a combination of an unknown alphabet or syllabary in an unknown language. Nevertheless, the text was extensively analyzed by the renowned cryptologist William F. Friedman of the U.S. National Security Agency who indicated that it has all of the qualities of a real language and is not a cypher (Reeds, 1995). This conclusion was reinforced by a recent sophisticated computer analysis by Montemurro and Zanette (2013), although Rugg (2004) claimed it may be gibberish without offering any analysis (*see* Chapter 11).

Voynichese contains about 32 strange characters or symbols (Knight, 2009). Because of the difficulty of writing them on a typewriter, Rene Zandbergen (2012) transposed them to about 77 key strokes in a font called EVA. While this allows easy typing of the Voynichese characters, novices can become confused in accepting à priori that this is an alphabet with transliterations into English from the keyboard. Thus, in this chapter we have retained the Voynich symbols (*see* Table 3).

The approach to decipherment of any lost language is twofold: (1) the transliteration of the symbols into either an alphabet (letters that can be arranged to form sounds, usually by combining consonants and vowels) or a syllabary (in which the symbols form syllables directly) with Latin letters, and (2) the translation of the resulting words into a recognizable language. The discovery of proper names attached to some of the plants has revealed the language to be an extinct language related to Nahuatl, the language of the Mexica (Aztecs) and still spoken in Mexico today in almost 30 different dialects.

Classical Approaches to Decipherment of Lost Languages

The most fruitful, logical approach to initially decipher ancient languages has been the use of proper names. Thomas Young (1773–1829) and Jean-François Champollion (1790–1832) initially deciphered Egyptian hieroglyphics with the names of pharaohs that were found in cartouches, coupled with a study of Coptic. The initial attempts by many researchers to decipher Sumerian cuneiform were the names of kings, in conjunction with links to ancient Persian. Michael Ventris (1922–1956) and John Chadwick (1920–1998) initially deciphered Linear B with identification of cities on Crete, finding links of the names to ancient Greek. Heinrich Berlin (1915–1988) initially deciphered Mayan logograms with the identification of “emblem glyphs” with cities and ruling dynasties or territories, allowing the breakthroughs of Yuri Knorosov (1922–1999), coupled with a study of Mayan dialects. Michael Coe (b. 1929) and others later found the names of gods from the *Popul Vuh*, the Mayan bible, in Mayan logograms (Coe 2012; Cottrell 1972; Robinson 2002). The approach of these distinguished and successful linguists, after identifying proper names in a related known language was then to compose a

dictionary of cognates and then construct a grammar, paying particular attention to prefixes, suffixes, and internal letter or syllable arrangement in context.

We note that, in almost all cases of these successful decipherments, the linguistic community did not immediately accept their conclusions, and nasty and libelous statements were issued by their contemporaries, sometimes for ten to thirty years after publication of the seminal papers. However, these successful linguists and their approaches are heralded today, while their illogically harsh contemporary critics are forgotten.

Deciphering the Language Symbols of the Voynich Manuscript

The characters of Voynichese are unique but similar in concept to the Cherokee syllabary created by Sequoyah (George Gist) in 1821 by modifying letters from Latin, Greek, and Cyrillic that he had encountered. The resulting Cherokee syllabary did not carry along the pronunciations from the original language, and many new characters were created that had no direct correspondence with existing languages but were obviously inspired by them.









An examination of documents from pre-1600 from Nueva España reveals one, the *Codex Osuna* (Valderrama 1600), that shows letters similar to some of the symbols in the Voynich Manuscript. The four most unique symbols in the Voynich Codex are , , , and . In fol. 12v and elsewhere in the *Codex Osuna*, also in as well *Codex Aubin* (Anon. 1576), there is a version of “tl” in Nahuatl that matches the same character  found in the Voynich Manuscript (Fig. 1A). This character for “tl” from the *Codex Osuna* is unique in that it also accompanies the same pronunciation in Voynichese. Throughout the *Codex Osuna*, the Nahuatl “s” (Fig. 1B) is written as a large, conspicuous backward version of that found in the Voynich Manuscript  with the new pronunciation of “n.” On fol. 13v and 14r of the *Codex Osuna* the florid Spanish signatures (Fig. 1C) have several inspirations for the  in the Voynich Ms. with the new pronunciation of “hu/gu.” On fol. 12v of the *Codex Osuna*, the “nj” sound in the word *naranjas* accompanying the picture of orange fruits (Fig. 1D) resembles the  in the Voynich Manuscript which has the pronunciation “ch”.




Fig. 1. Calligraphy in the *Codex Osuna* with corresponding symbols from the Voynich Manuscript. (A) “tl” in Nahuatl words from fol. 12v matching the Voynichese character fl ; (B) “s” in Nahuatl words from fol. 7r when reversed matches the Voynichese z ; (C) A florid Spanish signatures from fol. 13v inspiring the Voynichese fp ; (D) “nj” from fol. 12v from *the Codex Osuna* for *naranjas* (a Nahuatl word borrowed from the Spanish meaning oranges) matching the Voynichese d .

We thus conclude that the author of the Voynich Codex made up his syllabary/alphabet, and the letters were borrowed from contemporary post-Conquest MesoAmerican manuscripts such as the *Codex Osuna*. This would imply that the author was a scribe and had access or participated in these manuscripts. Applying this background to the Voynich Codex, the next approach was to match proper names of the identified phytomorphs with names of plants in dialects of Nahuatl. In the 12 pages of the Pharmaceutical section of the Voynich Manuscript where jars, roots, leaves and shoots are portrayed (99v to 102v; there are two folios of three pasted pages) at least 179 plants, plant parts, or mineral are illustrated, with 152 accompanied by names. This is the Rosetta Stone of the Voynich Manuscript!proper

Plant #8 of the 16 plants in fol. 100r was identified as a cactus pad, probably *Opuntia ficus-indica* or a related species (Table 1). Thus, the Voynichese name, zafg can be associated with the name *nochtli*, the Nahuatl name for either fruit of the prickly pear or the plant bearing the fruit. Later, with more transliterations, we refined this to *nashтли*. This name confirms the use of calligraphy from the *Codex Osuna*, using two letters, z and fl suggesting we are in the right track. This transliteration provides the sound of 5 Voynichese letters: $\text{z} = n$, $\text{o} = a$, $\text{v} = sh$, $\text{fl} = tl$ and g is the sound *i* or *y*.

Next, plant #4 of fol. 100v was identified as the pressed specimen of a young yucca species or *Agave* species (possibly *A. atrovirens* or a related species) with the name $\epsilon\sigma\sigma\tau\epsilon\sigma$ (Table 1) that can be transliterated to *maguoey*, a variant of the Taino name, *maguey*, that entered Spanish in the mid-16 century. This adds the sound of 3 new Voynichese letters: $\epsilon = m$, $\sigma = gu/hu$, and $\tau = e$. With these initial letters, additional letters of the syllabary/alphabet of Voynichese was then deciphered by matching phyto-, zoo-, and geomorphs to proper names in languages of central Mexico, later adding diacritical marks when compared with Classical Nahuatl to produce the following syllabary. Proper names in Voynichese listed in Table 1 provides the pronunciation of 14 Voynichese symbols listed in red in Table 1 and underlined in Table 2. All of the V-ynich symbols were then decoded to Latin equivalents with appropriated diacritical marks in Table 2 with here frequency in Voynich as well as in 17th century Classical Nahuatl.

Table 1. Critical phyto-, zoo-, and geomorphs and city in the Voynich Manuscript whose proper names allowed the preliminary development of a Voynichese syllabary/alphabet.

Fol. & plant # of Voynich Manuscript	Phyto-, Zoo-, or Geomorph or City	Voynichese	Transliteration	Cognate, translation, & identification
100r #8	<p>Botanicals</p> 	$\epsilon\sigma\sigma\tau\epsilon\sigma$ $\tau = n$ $\sigma = \bar{a}$ $\epsilon = sh/x$ $\sigma = tl$ $\tau = i/y$ Red letters are new decipherments	nāshtli	<i>nochtli</i> (Nahuatl)=fruit (tuna) of the prickly pear cactus or the plant bearing the fruit most probably rooted cladode of <i>Opuntia ficus-</i> <i>indica</i>

100r #4


 $\alpha\sigma\text{m}\alpha\text{r}\eta$
 $\alpha=m$
 $\sigma=\bar{a}$
 $\text{m}\alpha=\text{gu/hu}$
 $\alpha=0$
 $\eta=e$
 $\eta=i/y$

māguoey

maguey (Spanish from Taino mid-16th century)

most probably
Agave atrovirens

88r #11


 $\sigma\text{m}\alpha\text{r}\delta\sigma$
 $\sigma=\bar{a}$
 $\text{m}\alpha=\text{gu/hu}$
 $\alpha=0$
 $\delta=c\hat{a}$
 $\delta=\text{ch}$
 $\sigma=\bar{a}$

āguocāchā

agua (Spanish) =water + *catcha* (Nahuatl)=callus

most probably a lupine
(*Lupinus montanus*)

99r #16,
86v, 1v
 $\alpha\sigma\text{m}\eta$
 $\alpha=m$
 $\sigma=\bar{a}$
 $\text{m}\eta=\text{tl}$
 $\eta=i/y$

mātli

matli (Nahuatl) =animal front leg, branches

unknown root

99r #28


 $\text{m}\eta\sigma\alpha\text{r}\eta$
 $\text{m}\eta=\text{tl}$
 $\sigma=\bar{a}$
 $\sigma=c\hat{a}$
 $\eta=n$
 $\alpha=0$

tlācānoni

tlacanoni (Nahuatl) =bat or paddle

most probably
camote del cerro

2=n
9=i/y



99v #10



8auɛ
8=ch
a=0
wɛ=ll
e=a

cholla

cholla (Spanish)
=skull, cactus

unknown, perhaps
root of
Cylindropuntia sp.

99v #18



oxllɔ
o=ā
x=cā
ll=tl
9=i/y

ācātli

acatli (Nahuatl)
=reed

unknown, perhaps
root of a reed

100r #1



αολαροεος

mānoetzācā

mano (Spanish)
=hand + tzacua
(Nahuatl) =to close,
enclose

α=m

ο=ā

λ=n

α=ο

ρ=e

ο=ā

τ=ts/tz

ο=ā

ϣ=cā

unknown, perhaps
an *Agave* sp.?

100r #2



λοοροεϣε

nāmāepi

nama (Mixtec)
=plant which
produces soap

λ=n

ο=ā

α=m

ο=ā

ρ=e

ϣ=p

ϣ=i/y

most probably
Philodendron
mexicanum

100r #5



λαρ ααρ δανδ

noe, moe-choll-
chi

cholla (Spanish)
=skull + chi
(Nahuatl) =root
word for owl

δϣ

λ=n

α=ο

ε=a

α=m

α=ο

ρ=e

δ=ch

α=ο

ωδ=ll

δ=ch

most probably 3
flowers of bladder
sage or paperbag
bush (*Scutellaria*
mex)



100r #7



ḡ=i/y

αοξλαιω

α=m

ο=ā

ξ=câ

λ=n

α=0

ω=l

mācanol



icana)
macana (Taino)
=obsidian &
wooden sword
similar to the Aztec
macuahuitl
(Nahuatl)



most probably
*Philodendron
goeldii*

100r #14



οξααοḡ

ο=ā

ξ=câ

α=m

α=a

ο=ā

ḡ=yâ/hâ

ācâmaāya



acamaya (Nahuatl)
=crab or crayfish

most probably fruit
of *Gonolobus
chloranthus*

100r #15



Mineral

atlacân

o=ā

tl=tl

o=ā

x=câ

2=n

ātlācân

atlacaneci
(Nahuatl) =bestial
man

unknown, perhaps
Mexican cypress,
Montezuma cypress
(*Taxodium huegelii*)

102r #4



Animal

atlan

o=ā

tl=tl

c=a

o=ā

2=n

ātlān

atlan (Nahuatl) =in
or under water
(probably referring
to the blue color)

most probably the
mineral boleite

70r



City

atlacâocâ

o=ā

tl=tl

o=ā

x=câ

a=o

x=câ

ātlācâocâ

atlaça (Nahuatl)
=fishing folk + *aca*
(Nahuatl)
=someone

most probably the
alligator gar
(*Atractosteus*
spatula)

86v
(sphere 2)
 $\text{Pav} \text{off} \text{ax} \text{c} \text{P} \text{z} \text{g}$

huoxeātlocâpi

huoxeatl(Nahuatl)= willow
+ *capi*= Spanish for
Latin American
capital city
 $\text{P} = \text{hu/gu}$
 $\text{a} = \text{o}$
 $\text{v} = \text{sh/x}$
 $\text{z} = \text{e}$
 $\text{o} = \text{ā}$
 $\text{ff} = \text{tl}$
 $\text{a} = \text{o}$
 $\text{x} = \text{câ}$
 $\text{P} \text{z} = \text{p}$
 $\text{g} = \text{i/y}$
Monastery of San
Miguel Megun ca.
1543, Huejotzingo,
Puebla (México),
spelled in period
documents and
maps asHuexucincó,
Huexutcincó,
Huexotzincó, or
Guaxocingo*atlmchonon* = water
seller based on
Nahuatl cognates:
atl+*m*+*aca* = water
+ someone and
chonon = seller.
Water seller =
nickname for Vera
Cruz86v
(sphere 8)
 $\text{oifc} \text{z} \text{da} \text{z} \text{a} \text{z}$
*Atlmchonon**atlmchonon* = water
seller based on
Nahuatl cognates:
atl+*m*+*aca* = water
+ someone and
chonon = seller.
Water seller =
nickname for Vera
Cruz

Table 2. Voynichese characters with proposed Latin equivalent letters or syllables. Voynichese character counts and percent frequencies (out of 160,602 total characters) were calculated from Knight (2009). Selected 17th century Nahuatl incantations of a *ticitl* (doctor or seer) from Alcarón (1987, Sixth Treatise, Chapters 1–24) were typed and percent frequencies were then calculated to get an approximation of early Nahuatl as a comparison (9,451 total characters). EVA = European Voynich equivalent.

Voynich character	Proposed Latin equivalent ²	EVA	Voynichese character count & frequency	Count & frequency 17 th century Classical Nahuatl
o	ā	o	25,468=15.9%	ā=609=6.4%
c	a	e	20,227=12.6%	a=753=8.0%
g	i/y	y	17,655=11.0%	i=1318+y=160=1478=15.6%
ff	}	k	16,020=10.0%	tl=443=4.7%
ff		t		
a	o	a	14,281=8.9%	o=685=7.2%
8	ch	d	12,973=8.1%	ch=125=1.3%
z	m	ch	11,008=6.9%	m=285=3.0%
x	câ	l	10,471=6.5%	ca=180=1.9%
z	e	r	6,716=4.2%	e=449=4.8%

4	<u>qu/kw</u>	q	5,423=3.4%	qu=214=2.3%
2	<u>ts/tz</u>	Sh	4,501=2.8%	tz=113=1.2%
∞	<u>ll</u>	iin	4,076=2.5%	ll=53=0.6%
?	<u>n</u>	s	2,886=1.8%	n=741=7.8%
ff	}	cKe	1,858=1.2%	cu=85=0.9%
ff		cTe		
ff	}	f	1,844=1.1%	hu=306+uh=155=461=4.9%
ff		hu/gu	p	
∞	<u>l</u>	in	1,752=1.1%	l=710=7.5%
5	<u>yâ/hâ</u>	m	1,046=0.7%	ya=13+ha=2=15=0.2%
∞	<u>c/k</u>	ir	591=0.4%	c=496=4.9%
x	<u>?</u>	x	524=0.3%	
,	sh/x	i	(listed by Knight as .?) 316=0.2%	x=206=2.2%
ff	}	cFe	291=0.2%	p=148=1.6%
ff		p	cPe	
∞	<u>z/ç</u>	n	157=0.1%	z=351=3.7%
∞∞	<u>t</u>	iiin	156=0.1%	t=545=5.8%
∞∞	<u>?</u>	iir	148=0.1%	
5	<u>h</u>	g	96=0.1%	h=306=3.2%
5	<u>?</u>	im	52=<0.1%	
5	<u>?</u>	il	31=<0.1%	
∞5	<u>?</u>	iim	17=<0.1%	
∞5	<u>?</u>	iil	14=<0.1%	
∞5	<u>?</u>	iiil	2=<0.1%	
∞5	<u>?</u>	iiim	1=<0.1%	
∞∞	<u>?</u>	iiir	1=<0.1%	
^		v		

⁷Decipherment not underlined is tentative

Cognates of Voynichese in Classical Nahuatl

Besides the proper names attached to the plants, animals, mineral, and cities, a number of other words in the Voynich Manuscript have cognates in Classical Nahuatl, providing evidence that Voynichese is not Classical Nahuatl but is related to a dialect of Nahuatl. These are listed in Table 3. The use of “tl” and “chi” (or “chy”) endings places this dialect of Nahuatl in central or northern Mexico (Canger 1988; Lacadena 2008).

Table 3. Selected words in Voynichese with cognates in Classical Nahuatl of 16th century Nueva España.

Fol.	Voynichese wrong symbols	Transliteration	Cognates & translation
1v, 86v	ox	ācâ	<i>aca</i> (Nahuatl) = someone
99v	ox89	ācâchi	<i>Acachi</i> is located in the municipality of <u>Urique</u> in the Mexican state of

1v		otlocânâcâmai	<i>-itloc</i> (Nahuatl) = adjacent to, close to + <i>ana</i> (Nahuatl) = to seize + <i>cama</i> (Nahuatl) = let
86v		paâe	<i>pa</i> (Nahuatl) = color, dye, paint
1r		pâcâ	<i>paca</i> (Nahuatl) = to wash, bathe, launder something
1v		qua	<i>qua</i> (Nahuatl) = biting, eating someone (see <i>cua</i>)
86v		tlâcâ	<i>tlaca</i> (Nahuatl) = men
1v		tlâchi	<i>tlachia</i> (Nahuatl) = to look, see, or observe from a watchtower
1r		tlâe	<i>tla</i> (Nahuatl) = something, if
1r, 1v, 86v		ts/tzâcâ	<i>tzaca</i> (Nahuatl) = to enclose, lock up
100r		ts/tzâcuâi	<i>tzacua</i> (Nahuatl) = close, to enclose

Orthography of Voynichese and Comparison to Nahuatl

From the proper names, a table of syllables and letters was then developed. In Table 3, the frequency numbers from Knight (2009) from the Voynich Manuscript are indicated in the parentheses and compared with 17th century Nahuatl incantations from Alcarón (1987). This comparison shows that Voynichese is similar but not identical to Classical Nahuatl, *i.e.*, it may be a dialect of Nahuatl (most likely extinct).

We also note that transliteration of the proper names in historical sources show the same phoneme being written as *gu* vs. *hu* (likewise *ts* vs. *tz* and *x* vs. *sh*), depending upon the source and time. For example, Sir Francis Drake sacked a town in April 1579 listed in contemporary accounts as Guatulco in the Gulf of Tehuantepec, Mexico; no Guatulco exists on current maps of Mexico, but Huatulco occupies the same geographical location. Also, comparing words in the Voynich Manuscript in compiling a dictionary, it appeared that the variants of “*tl*” (and and “*cu*” (and may have been the result of quick, sloppy writing, and these are not separate characters.

Nahuatl is the language of the Nahuas, including the Mexica, the chief tribe of the Triple Alliance, popularly known as the Aztecs, and their predecessors. Nahuatl, a language of the Uto-Aztecan language family, has been spoken in central Mexico since the 7th Century CE. The Conquest introduced the Latin alphabet to writing Nahuatl; the Tenochtitlan variety is known as Classical Nahuatl. With almost 30 recognized dialects of Nahuatl today, it is difficult to apply general orthographic principles that cover all of dialects, but surveying Nahuatl dictionaries and grammars (Bierhorst, 1985; Canger, 1985; Herrera, 2004; Karttunen, 1983; Lacadena, 2008; Launey, 2011; Lockhart, 1990, 2001; Robinson, 1969; Siméon, 2010; Sullivan, 1997; Walters *et*

al., 2002; Whittaker, 2009), the syllabary/alphabet that we developed for Voynichese agrees with the basics.


Pre-conquest Nahuatl was ideographic, and attempts to transcribe the Nahuatl phonemes into Spanish evolved into some customary orthographic principles for Nahuatl today. Short vowels are written without diacritical marks (“a,” “e,” “y/i,” “o”) in transcribing Nahuatl into Spanish. The letter “u” by itself is not part of Nahuatl, but the vowel “o” is sometimes written as “u” when the pronunciation approaches that of the Spanish and English. Vowel length is conventionally unrepresented but, when it is written, the convention is that of the macron (“ā”). For typographical reasons, the circumflex (“â”) is also used. Double vowels (“aa”) are not uncommon but typically belong to different syllables.

The Nahuatl phonemes “p,” “t,” /r/ “n,” and “m” are written as the Spanish (“p,” “t,” “l,” “r,” “n,” “m”). The letter “s” is not used in Classical Nahuatl, but “c” before “e” or “i” is pronounced like the English “s,” and “z” is also pronounced like the English “s” (“ç” may be used sometimes in place of “z” in transliteration). The Spanish “tl” (as a consonant rather than a full syllable), “ts/tz,” “ch,” “x,” “cu” (not a syllable), and “hu/uh” are attempts to approximate the Nahuatl phonemes (Spanish does not have a “w” but some modern linguists now use the English “w” instead of the Spanish “hu”). The Nahuatl phoneme “k” is written as a “c” when preceding a back vowel or consonant and “qu” when preceding a front vowel.” “H” is an attempt to approximate the Nahuatl phoneme and actually represent a “silent” glottal stop. The Nahuatl double “ll” is not pronounced like the Spanish (“y”) but rather as a long “l.” Sometimes this double “ll” is lost and written as one “l.” In some dialects, it is pronounced as “hl” and typically written as “jl.” The letter “x” is pronounced in English as “sh.”

These are the general guidelines of spoken Nahuatl into written Spanish that were formulated by the Catholic priests of the 16th and 17th centuries in Nueva España. However, if the Voynich Manuscript was written by an amateur and not proofread by a Spanish priest, then we have to accept that the transcribing of the Nahuatl phonemes may not have followed these generalities, further compounding the difficulty to transliterate Voynichese.

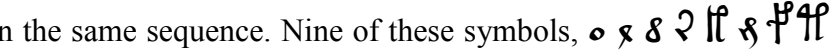
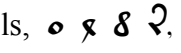
SpanNahuatl

Lockhart (1992) outlines three phases in the development of Nahuatl in Nueva España: *Stage 1* encompassed the arrival of the Spaniards in 1519 to ca. 1540 to 1550 and was characterized by no change in Nahuatl. *Stage 2* extended from 1540–1600 to the mid-17th century and saw massive borrowing of Spanish nouns, but the Nahuatl language remained unaltered in other aspects. *Stage 3*, from about 1640–1650 until today involves a deeper and broader Spanish influence.

In the Voynich Manuscript there are various nouns that are either Spanish or combine both Nahuatl and Spanish (what we have called SpanNahuatl). Table 2 includes not only Spanish words such as *nanoya* (grandmother) and but also the fusion of Spanish and Nahuatl words, such as *aguocâchâ* (*agua*, Spanish for water + *cacha*, Nahuatl for callus). In other examples of geographical names, fol. 86v of the Voynich Manuscript provides  or

Huoxeatl(o)capi as an alternate name for Huejotzingo of today (alternately called Huexucinco, Huexutcinco, Huexotzinco, Guaxocingo in period documents and maps). This is a combination of a cognate of the Nahuatl *huexotl* for willow and the Spanish *capi* for Latin American capital. These examples of proper names provide evidence that the Voynich Ms. falls within Stage 2 of the development of the Nahuatl language, i.e., from 1540–1550 to 1640–1650.

An Alphabetical Sequence of Voynich Symbols

Folio 57v displays four women’s heads and shoulders each with an arm extended in a circle surrounding a “rosette” form (Fig. 2). Surrounding the figures are 4 rings of text. What is unusual, and may be a key to decipherment, is that Ring 2 from the top contains 17 symbols repeated four times in the same sequence. Nine of these symbols, , are very frequent in Voynich. The other symbols, many of which are rare or absent in Voynich are here ignored. The assumption was made that the sequence contained important information and the first conjecture was that the sequence was alphabetical. To test this, the Voynich symbols decoded by Tucker and Talbert (2013) were put in sequential order based on the Spanish alphabet and compared to the sequence of f.57v (Table 4). We were immediately struck with the fact that the first four symbols, , in the sequence 1, 2, 3, 4, of f.57v had the same relative sequence as decoded symbols in the Spanish alphabet sequence (1, 3, 4 6).

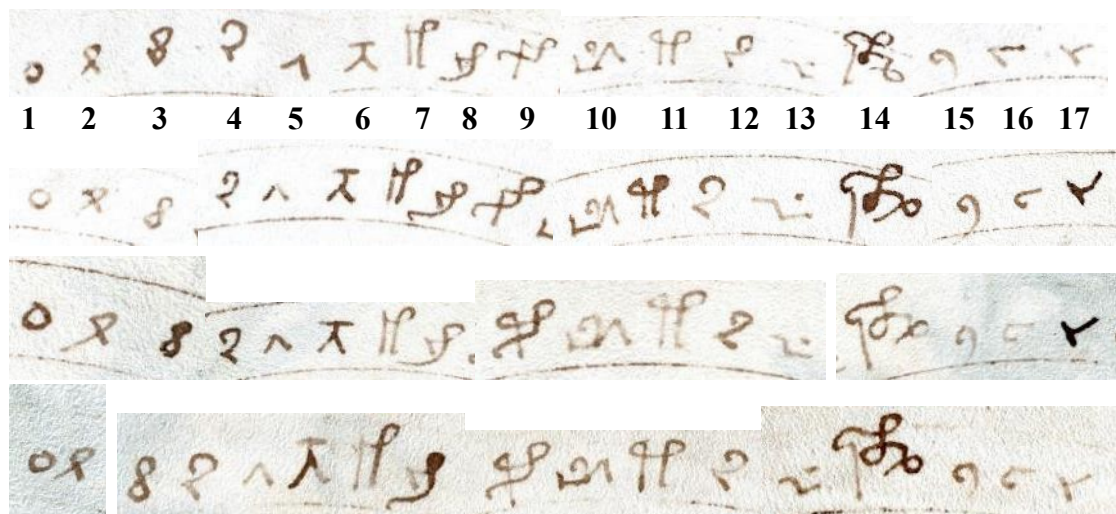


Fig. 2. Folio 57v

Table 4. “Spanish alphabet” and corresponding Voynich character and sequence compared to sequence in f. 57v .

Sequence	Spanish alphabet	Spanish pronunciation	Voynich symbol based on plant labels	Voynich pronunciation	Voynichese symbol in f.57v	Sequence in f.57v	Comments
1	a	(a) amigo	α	ā	ο	1	
2	b	(be) bonita	?	a			
3	c	(ce) cereal	χ	câ	χ	2	
4	ch	(ch hache) chocolate	δ	ch	δ	3	
5	d	(de) dedo					
6	e	(e) español	Ϛ	e	Ϛ	4,12	
7	f	(efe) feo	ω	fl			
8	g	(ge) gato					
9	h	(hache) hormiga	ξ	hâ	ξ	8	
			ϣ, ϣ	hu/gu/uh	ϣ	9	
10	i	(i) iglesia					See 28
11	j	(jota) José					
12	k	(ka) kilo	κ	k/c ????			Where does this come from
13	l	(ele) lobo	ll	tl?	ll	7	
14	ll	(elle) lluvia	ϣ	Nahuatl tl = ll	α	11	
15	m	(eme) mama	α	m			
16	n	(ene) no	?	n			
17	ñ	(eñe) ñoño					
18	o	(o) ojo					
19	p	(pe) pelo	ϣ, ϣ	p			
20	q	(cu) quemar	4	qu/kw			Where does this come from
21	r	(erre) ratón					
22	s	(ese) soso	∩	sh/x			
23	t	(te) tocar	ω ?	t	???		Where is symbol t as 1st letter of Tecamachalco, Tenochtitlan, Tepeaca, Texcoco, Tlatelolco, Tlaxacala?
			α	ts/tz			
24	u	(u) uva					
25	v	(uve) vamos					
26	w	(uve doble) whisky					
27	x	(equis) xilófono					
28	y	(i griega) yate	9	y/i	9	15	
29	z	(zeta) zorro	∩	z/ç			Where does this come from

We noted two similar symbols, ϣ and ll, which had been assumed to be variant forms of ll with the difference a result of sloppy calligraphy. Their presence together in f.56v indicates that two separate symbols are intentional. They were out of sequence assuming that they had a “tl” sound. However, the Nahuatl pronunciation of *tl* is given as follows:

“This sound is a lateral fricative that doesn’t really exist in English. It sound like the “ll” in the Welsh name “Llewellyn.” Some English speakers can pronounce it well if they try to pronounce the “breathy l” in the word *clue* with the *c* in front of it. (http://www.native-languages.org/nahuatl_guide.html)

It seemed therefore that the \mathfrak{H} symbol should not be under “t” but under the letter “l” in the English alphabet. Furthermore the Spanish alphabet contains two letter with the “l” sound: l and ll, it was conjectured that \mathfrak{H} referred to the Spanish letter ll and \mathfrak{L} referred to the Spanish letter l. However, two other symbol, \mathfrak{D} =l and \mathfrak{W} =ll, may have a similar pronunciation.

Another problem was the symbol \mathfrak{G} which we had decoded as i/y. Transferring \mathfrak{G} from “i” to “y” in the alphabet improved the sequence. There was one other problem: the symbols \mathfrak{Q} (pronounced e) appears twice, 5th and 12th in folio 57v. We have no explanation why his symbol is recorded twice.

It was conjectured that these nine symbols taken together with pronunciations as above, were close to an alphabetical sequence (Table 4). It suggests that the author when inventing the code, started with the Spanish alphabet in sequence from a to z. If this is correct it supports most of the symbol decipherment of Tucker and Talbert (2013). However, we were concerned with one issue. Many of the cities in Mexico begin with the letter t, e.g. Tecamachalco, Tenochtitlan, Tepeaca, Texcoco, Tlatelolco, Tlaxcala. It is unclear which Voynich symbol would be pronounced t at the beginning of a word. Since we assumed that in that circle 4 in f.86v is Tlaxcalla, and that circle 6 is Tecamachalco or possible Tepeaca, we had thought that these word might be found in f.86v but we have not found them. According to our translation of voynichese the cities beginning with the letter t might be spelled as follows: Tecamachalco = \mathfrak{W} \mathfrak{D} \mathfrak{Q} \mathfrak{X} \mathfrak{C} \mathfrak{O} \mathfrak{S} \mathfrak{O} \mathfrak{W} \mathfrak{R} \mathfrak{A} ; Tepeaca = \mathfrak{W} \mathfrak{D} \mathfrak{Q} \mathfrak{K} \mathfrak{Q} \mathfrak{O} \mathfrak{X} ;

Tlaxcala = \mathfrak{H} \mathfrak{O} \mathfrak{X} \mathfrak{L} \mathfrak{O} or \mathfrak{H} \mathfrak{O} \mathfrak{X} \mathfrak{W} \mathfrak{O}

Conclusion

Manys of the symbols in Voynich have been decoded based on the association of Voynichese labeled names on some plants with their names in Nahuatl or Spanish. Despite our apparent success as decoding the voynich symbols and the decipherment of some plants, a mineral, an animal, and a city, most of the text of Voynich defies translation suggesting that another language is involved beside Classical Nahuatl. This may be a dialect or an extinct Meso-American language. This will be covered more fully in Chapter 13.

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