

The Voynich Manuscripts and Caterina Sforza's "Gli Experimenti"

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Abstract: Caterina Sforza's "Gli Experimenti", one of the earliest compilations of cosmetic and herbal recipes, is compared with a mysterious encoded manuscript of roughly the same period - despite similarities, the latter's enigma remains unbroken. Any ideas that might resolve this are warmly welcomed!

1. Introduction

The set of manuscripts known as the "Voynich" or the "VMS" undoubtedly comprises one of the most mysterious sets of documents currently known - its more than 234 remaining pages are written in a code of which researchers have so far failed to decode even a single word conclusively. This present paper addresses issues of its pictorial content and layout - extensive analyses of its provenance and code can be found elsewhere.

Physically, the Voynich is quite small (15cm x 22cm) and is divided into a number of quires, whose contents - if they do indeed match up with the diagrams! - may be divided into a number of categories:

- **Herbal** - fantastical-looking plants with bizarre or distorted root-systems
- **Astrological** - curious circular charts, each with 29-30 small naked "nymphs" holding a star
- **Cosmological** - relationships between sun, moon, stars, and perhaps other planets
- **Pharmaceutical** - odd exaggerated albarelli (*pharmacy jars*), with visual recipes beside them
- **Balneological** - more nymphs, but in the context of (presumably medicinal) baths
- **Recipes** - a long indexed section at the end, possibly containing almanackes or recipes
- **Maps** - a strange fold-out diagram with nine rosettes, thought to be a map (though unproven)
- **Miscellaneous** - pages which fit no obvious categories (a poem?, a volvelle?, etc)

Attempts to try to match any of these with existing graphical, iconic, or textual traditions have all failed - with one notable exception.

As a graphical motif, the nymphs appear very similar to a set of similar women in a 10th Century astrological illustration to Ptolemy's Handy Tables - Vat.Gr.1291. However, this is profoundly unsatisfactory, as it merely replaces one answer with an even larger set of unanswered questions.

Other images in the VMS are quite extraordinary, which any explanation would need to cover:

- Curious maiolica albarelli, many of which seem to be impractically complex
- A glass-topped albarello, vaguely similar to a hookah
- A castle with swallow-tailed merlons, a central square-walled tower, and two external demilunes
- Complex (yet symbolic) representations of plant fertilisation

Similarly, the dating evidence seems sketchy at best, with perhaps the strongest indication coming from the hairstyles of the nymphs that this originated in the late 15th Century - though the general style of the handwriting has been identified as a 15th Century humanistic hand.

Also: no physical-evidence assault (ie, vellum, pollen, pigment or binding analysis) has yet been undertaken - but there are tantalising signs that this may happen before long.

2. Is it a "physician's folding calendar"?

Nancy Siraisi (1990) briefly describes these portable handbooks: these were small, handy data-sources, dating from the late fifteenth century, designed to be carried around by a physician hanging from a belt. They usually comprised compactly-arranged data on pages that folded out, and often had large red letters on the exterior of each folio or fold-out, to make locating the appropriate chart easy.

Certainly, the Voynich shares similarities with these:

- A diverse collection of quite possibly medical-related data
- Folio-structured, with many individual fold-out pages
- Astrological content, possibly even including a diagram for a volvelle

- Very first page has two big red letters, similar to folding calendars' external index marks

However:

- There are no external index marks on any folio after the first one
- No classical folding calendar contents (like "zodiac man", or uroscopy charts)
- No obvious external indexing mechanism
- Probably slightly too large to be comfortably carried on a belt

However, it is possible that there *is* a subtle external indexing mechanism, but one which has escaped notice to date: on the front page of several of the herbal quires, there are rough extra drawings incorporated into the design:-

- quire 1 (f1r) a pair of bright red letters
- quire 2 ?
- quire 3 (f17r) a pair of eyes drawn into the roots
- quire 4 ?
- quire 5 (f33r) a pair of heads drawn into the roots
- quire 6 ?
- quire 7 (f49r) a pair of worms threaded through the roots
- quire 8 ?

This pair-every-other-quire pattern suggests that the present quire-division may be incorrect, and that each of the original herbal quires may well have comprised twice as many pages.

Supporting this hypothesis:

- some folios in the balneological section are out of sequence - for example, f78v and f81r should be side-by-side (as a diagram crosses the gutter between them)... but aren't.

So: given a slightly different binding-style, there *could* well be an external indexing mechanism - and the divisions suggested by the pairs are strongly suggestive of general herbal categories.

It is therefore important that we bear in mind the possibility that these pairs might have been a subtly, visually-encoded indexing mechanism.

Even though indexing (for concordances, etc) had been done by the Cistercians since the 13th Century (using their home-grown numbering system - see King (2002) for more on this), and Ramon Llull's abstract ontological diagrams were well known to scholars at this time, this still seems remarkable.

My understanding is that most herbals of the time were arranged alphabetically - so if the Voynich is in code, it may well be possible (by rearranging bifolios into their correct quires) to deduce features of the underlying language from the names of identified plants, and the order in which they appear. Trying to do this without the correct order may well be counterproductive!

Against this hypothesis:

- the plant with the eyes in the roots resembles fennel, which is separately connected with eyes
- none of the other quires' front-pages has any obvious paired features

Finally: according to Siraisi: "*For the most part, the more elite the physician, the more general the practice. Specialization in particular kinds of care - eye conditions, hernia, midwifery (the last practiced only by women) - was a mark of low status.*"

Eye infections, headaches, and parasites were all common medical problems - so these could well form sensible groups for arranging herbal descriptions into. It should also be of little surprise that the plant on Voynich page f21r has recently been strongly identified with herniaria (rupturewort).

3. Is it an "alchemical herbal"?

Once the idea spread that the sign of a real physician was his possession of a carefully-prepared folding calendar, quacks quickly produced fake versions of them as props to help convince the gullible. These fake herbals developed in complexity, incorporating increasingly extraordinary designs and colours,

and appropriating signs, shapes, and diagrams from such sources as astrology, herbals, and alchemy.

This class of strange document is known as an "*alchemical herbal*", and it is important to compare the Voynich with such documents - especially as a renowned expert on alchemical herbals (Sergio Toresella) believes not only that it is an alchemical herbal, but that it was the work of a madman.

However, the alchemical herbal is an autonomous tradition that may have begun in the XIII century. No existing specimens predate the middle of the XIV century, their heyday was the XV century, and they disappeared at the middle of the XVI century. "They all seem strictly Italian because, except for two cases, all the alchemical herbals, about seventy, were produced in Italy, in prevalence in northern Italy, in the Veneto area."

My own belief is that the printing press killed the alchemical herbal - as physicians more and more used small printed books with the same data in as folding calendars, so the usefulness (to a charlatan) of fakes went down. Simply: it was easier to buy a book than to fake a mysterious herbal.

Describing the VMS as an "alchemical herbal" is, then, perfectly sensible - and (in the absence of any other data) probably the only rationalisation that fits directly and easily into an existing tradition. There are many people today who look at the VMS and think the same basic thought - that it's nonsense, concocted to fool those people foolish enough to want to impose order on the world through thought.

However, whether created by Edward Kelly to fool Emperor Rudolph, or by a forger to fool Wilfred Voynich, or by a quack to fool patients - this is essentially a negative viewpoint that can't be disproved... except by finding unexpected order within its text or images.

However, the more I understand the VMS, the more I discover unexpected patterns within it that are possibly indicative of deeper order beneath the external layer(s) of obfuscation.

Alternatively, Toresella may well be correct - and we are merely fishing for clues in the layers inside a madman's pathology, and being constantly surprised by our varied and wonderful catch.

4. Is it a "gynaecologist's folding calendar"?

The nature of the content (especially in the balneological section) gives the impression of being gynaecologically-oriented, but this is hard to prove, although there is an older tradition that has much in common - "Dioscorides de herbis feminis" - which had all the Dioscoridean female-oriented herbs.

One intriguingly plausible suggestion concerns the astrological section: this has 30 "nymphs" per astrological sign, one per degree, each holding a star. The idea here (courtesy of Steve Ekwall) is that a dot in the centre of a star represents a male birth - and refers to (probably) the moon's position at the time of conception.

The chronicler Matthew Paris recounts story of how Emperor Frederick I consulted his astrologers to determine the perfect time to conceive in order to produce a male heir - nine months later, a son was duly produced (much to the astrologers' relief, I'm sure).

However, by 1500, this same "astrological determinism" would have been classed as heresy - many astrologers were executed (1490-1500) for this. This time marked the ascendancy of "psychological astrology" (as proposed by Marsilio Ficino), which - in its ability to be reconciled with external religion - soon became the main theoretical framework for astrology, right up to the present day.

It is also tempting to look at the poses of the nymphs as being some kind of binary-based language (up-down, front-back, etc) to represent other activities thought to be associated with the sign/degree of the moon - for example, blood-letting, surgery, etc.

All the same, the experts on medieval astrology I have discussed this with can point to no precedent for this structure or layout - if true, this would be another extraordinary thing about the Voynich.

There are also some interesting objects depicted in the balneological section, one of which "Glen Claston" recently proposed (on the Voynich mailing list) could be a "syringe":

One of the instruments of physicke associated with bathing is a bladder for inserting herbal washes and medicines into the "matrix". This tool was called a "syringe". I've been searching for a picture of this instrument, but all I've found to date is the description. There is a second type that looks something like a child's wooden top that was used for inserting suppositories into the "foundament" (you guessed it). Until I find a picture of the "syringe" bladder, I can't be certain, but it's a good probability.

Another gynaecology-related suggestion was emailed to me following a letter published in New Scientist. Tony Clarke replied:

[Page f78r] seems to show the flower head of the pineapple mayweed, *Matricaria matricarioides*, being "filtered" into large containers or baths where women who seem to be in pain are splashing about. This plant has been known for many years to be a herbal remedy for period pains.

However, whether pineapple mayweed was known for this (or indeed known at all) in 1500 has yet to be fully verified (and efforts to contact Tony Clarke have been unsuccessful).

On balance, though, could this *really* be a gynaecologist's folding calendar? It's certainly possible that:

- the herbal section is a kind of "Dioscorides de herbis feminis"
- the astrological section relates to conception
- the balneological section relates to herbs added to women's baths
- the pharmacological section relates to more complex herbal cures

This is still speculative - but certainly has the twin merits of consistency and relevance in its favour.

One incidental argument in support of this: my strong belief is that there appears to be little or no sign of literary, metaphoric or allegorical modes of representation in the whole document - by and large, each image almost certainly is what it appears to be... the person drawing is faithfully drawing what s/he sees in her/his life and work. It's not primarily a work of imagination or fiction.

Given that, what then are we to make of the many hundreds of carefully observed nymphs that populate the VMS, and all their varying hair and head-dresses etc? My inference is that these were women carefully observed by the VMS' owner (who, on balance, I think was probably a woman), probably in public baths.

However, even though the spas and sources in Romagna - Salsamaggiore, Aqua, etc - have a long and interesting history, descriptions of them (and their social ecology) circa 1500 have proved quite hard to track down. Research on this area continues...

5. What do Caterina Sforza's "Experimenti" have to do with all this?

If we assume that the VMS is meaningful, and that some (or all) of the data it contains is copied from other sources, then we should endeavour to predict what those other sources might be. Even if we are able to disprove our predictions, the process of doing so should get us closer to the correct answer.

While thinking about how large (or small) the maiolica albarelli in the Pharma section might be, I wondered whether in fact they were the size of perfume bottles - and whether they might in fact *be* very early perfume bottles. This led me to consider the history of perfume - and, while researching perfume history on Stefan's Florilegium website, I stumbled across a mention of Caterina Sforza's *ricettario*.

For those who don't know about her "Experimenti": this was a collection of recipes she compiled from numerous sources over twenty years, covering many of the gynaecological, health, beauty (and occasionally alchemical) obsessions of the day:

- changing your hair colour - to red, black, blonde
- smooth skin
- white skin
- soft hands
- removing stains

- white teeth
- poison
- preventing pregnancy

Her "Experimenti" would have subsequently been lost to time, except that in 1525, her son Giovanni delle Bande Nero allowed Count Antonio Cuppano da Montefalco to make a copy of the manuscript, which still exists today. It contains 454 recipes, of which 358 are medicines, 30 chemistry/alchemy, and 66 cosmetics.

By comparison, the VMS has 20 pharma paragraphs, plus 323 starred paragraphs in the last section, of which folios 109 and 110 are missing. If a folio has (say) 15 stars to a side, and we're missing 4 sides, that's roughly a further 60 recipes: so $20 + 323 + 60 = 403$, which is of the same order of magnitude.

	VMS	"Gli Experimenti"
<i>Date</i>	1490-1500 (<i>probably</i>)	1485-1505
<i>Patron</i>	Powerful, courtly, perhaps female?	Caterina Sforza
<i>Location</i>	Romagna	Imola and Forlì
<i>Obsessions</i>	Pharmacy, herbs, gynaecology	Pharmacy, herbs, health & beauty
<i>Codes</i>	Pervasive	Medieval magic code for poison potions
<i>Secret?</i>	Definitively!	Only copied 15 years after death
<i>Diagrams?</i>	Throughout	None noted in Pasolini's transcription
<i>Exotic plants?</i>	Sunflower	Sunflower ("mira el sol")
<i>Poison?</i>	2 nd herb is "deadly nightshade"	Contains poison potions
<i># of recipes?</i>	Approximately 403	454 (in 1509)
<i>Language?</i>	None yet identified	Multiple - Italian, Latin, etc

However, one tantalising note is that, in her "Experimenti", we can see the Romagnan folk-belief that fennel ("finocchio") is good for the eyes ("occhio") because of the linguistic coincidence between the two. And - as mentioned above - the Voynich plant with the pair of eyes drawn into its roots resembles fennel (though opinions do differ on this).

Another coincidence is that the first noted use of "4o" (which occurs frequently in the VMS' alphabet) for misdirection in a cipher-alphabet is in the Milanese chancellery records (Tranedino), where it was marked (in 1450) as being part of the private code of *Tristano Sforza*, Caterina Sforza's uncle.

A further coincidence is that Emperor Frederick I's key astrologer was Guido Bonatti of Forlì, whose home-town retained a long association with astrology (and astrological determinism), right up to the time when Caterina Sforza lived there.

And a final coincidence is that a castle (with demilunes and swallow-tailed merlons) depicted in the Voynich is a close match for Imola's *Rocca Sforzesca*, where Caterina Sforza lived for many years.

6. Conclusions And Ongoing Work

My guess is that the different types of stars on the starred paragraphs in the VMS' recipe section form an *indexing system*, whereby particular types of recipe - "a far bella", for example - could be located.

If true, then a comparison of the patterns of types of recipes in both the VMS and the ricettario could be useful - the author of the VMS' code possibly didn't consider that we might have the plaintext to work from when trying to crack the code.

This work is ongoing - unfortunately, it's hampered by the fact that a catalogue of the particular colourings of the stars in the VMS' recipe section appears never to have been made available to researchers.

Similarly, there may be layout information in the Cuppano copy which - though removed by Pasolini's 1894 transcription - may also have been retained in some way in the VMS copy. Unfortunately, the Cuppano copy is in the hands of a private collector somewhere in Northern Italy, and is not accessible by researchers (or by anyone else) - so this too is hard to determine.

Finally: a frequent pattern in the "Experimenti" is amounts measured in "uncia" - whether a length (inch), weight (ounce) or a volume (ie, fluid ounce), the same word was used. For example, "on ij".

Similarly, in the widely printed book Isabella Cortese's "Secreti" (which comprises a further set of similar recipes, though some 50+ years later than the "Experimenti"), "uncia ij" also occurs frequently, with "uncia" replaced (in some editions) with the apothecary's symbol.

Many years ago, Brigadier John Tiltman suggested that the frequently occurring "8ain", "8aiin", "8aiiin" symbols in the Voynich may be a code for "i", "ii", "iii".

Having looked at Caterina Sforza's "Experimenti", I strongly suspect that this is only half the story: and that (in combination with these) "8" represents "on" (ie, "uncia"). In which case, a possible decrypt of common uses of this symbol could well be:

ain	1	8ain	1 ounce	8air	1 st measure
aiin	2	8aiin	2 ounces	8aiir	2 nd measure
aiiin	3	8aiiin	3 ounces	8aiiir	3 rd measure

Naturally, all of this is far from any kind of proof - but proofs take time.

One interesting research direction might be to examine the few documents which are known to have influenced the "Experimenti", to see if they might have (graphical or diagrammatic) content used in the Voynich. For example, the Italian pharmacy historian Patrizia Catellani reports that:-

La composizione che Caterina riporta verso la fine del 1400 è molto simile a quella di un anestetico, a base di oppio, di succo di more acerbe, di foglie di mandragola, di edera, di cicuta e altre piante, riportata su un manoscritto del nono secolo conservato nel Monastero di Montecassino e anche su di un libro di chirurgia uscito a Bologna nel 1265.

Any similar ideas like this for proving (or disproving) a link with Caterina Sforza's "Experimenti" - or, indeed, any link with physicians' folding calendars, gynaecology, alchemical herbals, etc - would be much appreciated. The keys to unlocking this mystery really could come from anywhere...!

7. Bibliography

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Patrizia Catellani's excellent set of web-pages on Caterina Sforza's "Experimenti":

<http://chifar.unipv.it/museo/Catellani/catSforza/CaterinaSf.htm>

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