

'The Most Mysterious MS' Still an Enigma

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By Elizabeth Smith Friedman

Mrs. Friedman, a cryptologist in her own right with many years of distinguished Government service; is the wife of Col. William F. Friedman (USA, ret.), the famed American cipher expert. In this article, she describes one of his journeys along the byways of his profession. Washington residents since 1921, the Friedmans together wrote the fascinating study, "The Shakespearean Ciphers Re-examined," published in 1957.

THE MOST mysterious manuscript in the world," so named 40 years ago by the late Prof. John M. Manly of the University of Chicago, is now for sale in New York for \$160,000, although not one cipher word on the 235 pages has ever been deciphered. The owner, Hans P. Kraus, the rare book dealer of Vienna and New York, upon being reproached for asking such a price, said that when deciphered, the manuscript would be worth \$1 million.

The existence of the manuscript has been known in the United States for 50 years. In 1912 it was purchased by a New York rare book dealer, the late Wilfrid M. Voynich, at a place never before disclosed but now identified by Kraus as the Mondragone Monastery in Frascati, near Rome. The age of the manuscript is not certain; neither is its language. Is it cipher? Voynich was convinced that it is, and now Kraus shares that opinion.

A Gamut of Art

THE MANUSCRIPT is a small volume approximately 6x9 inches. It is on vellum and is illustrated with almost 500 drawings: approximately 125 pages of a botanical nature, many of them in pale tones of green, yellow, brown, blue or dark red; astrological and zodiacal diagrams; drawings of realistic and symbolical cell development, and strange line drawings of nude female figures.

All these are surrounded by, and other whole pages are filled with, text still utterly unidentified, although numerous scholars have given the manuscript an appreciable amount of study. From 1912 to 1919, Voynich attempted to interest scholars in both America and Europe in solving its mysteries while he himself carried on an assiduous search to determine its origin.

Accompanying the manuscript was a letter of transmittal written in 1665 by Johannes Marcus Marci at the court of the Emperor Rudolph in Prague. Marci sent the manuscript as a present

to Athanasius Kircher, a celebrated Jesuit scholar and scientist in Rome who had written a work on ciphers. Marci challenged Kircher to solve the mystery; Kircher's fame was such that his failure to do so probably discouraged other scholars, perhaps for centuries, from attempting the task.

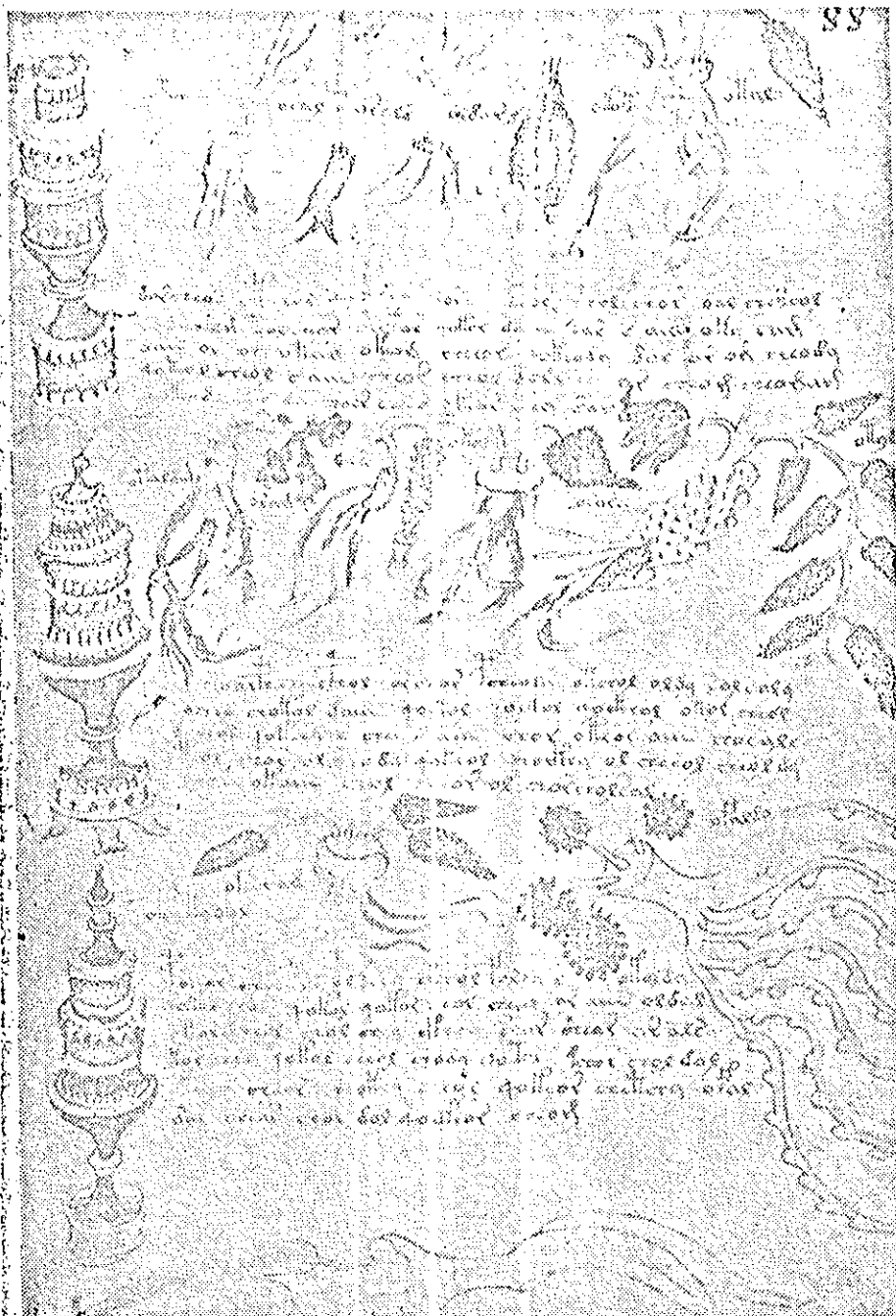
The Marci letter said that the manuscript once belonged to the Emperor Rudolph and was thought to be the work of Roger Bacon, a statement which Voynich accepted as true. He later established that the manuscript was in existence at least as early as 1608 when, after chemical treatment of a faded page, there appeared in the margin the signature, Jacobi de Tepenez. The title de Tepenez was bestowed on this botanist and alchemist in 1608.

The Speculation Begins

WITH THIS DATE, the facts as to the age of the manuscript ended and Voynich's speculation began. He believed the manuscript to be by Roger Bacon (who lived circa 1214-1294); that it was taken to the court of the scholar-Emperor Rudolph by John Dee, the famous English mathematician and astrologer (1527-1608), who was known to have come into possession of about 1200 Bacon manuscripts; and that the language of the manuscript would be found to be Latin. As to why Bacon had written in cipher, Voynich said that since Bacon had written dissertations in plain language on the subject of ciphers, it was logical to assume that he would have put his own precepts into practice.

Among the scholars whom Voynich approached in seeking to solve the cryptic writing was William R. Newbold, professor of moral and intellectual philosophy at the University of Pennsylvania and an expert in Greek, Latin and other ancient languages. Newbold began work on the manuscript in 1919 and in April of 1921 he told the College of Physicians and the American Philosophical Society that he was convinced the manuscript was Bacon's because he had deciphered the name "R. Baconi" on the last page.

Newbold said his decipherments proved that the 13th century scientist had possessed both a telescope and a microscope, whose invention history places several centuries later; that the manuscript included a drawing of what was undoubtedly the great spiral nebula in Andromeda, of whose existence Newbold had been entirely unaware,



This page of the baffling Voynich manuscript is illuminated with drawings of earthenware and fantastic plants, presumably imaginary.

and that he had deciphered the date of a falling comet and other facts likewise unknown to him before then.

Reported widely here and abroad, the Newbold revelations caused a sensation. Some sick souls believed that Newbold had learned the secrets of black magic, and one deluded woman traveled hundreds of miles to beseech him to cast out the demons that had taken possession of her.

The world of scholars and experts was in a ferment and became divided between those who proclaimed the professor's work a great achievement and those who just as vigorously disagreed. All scholars competent to judge the manuscript, however, were—and still are—agreed that it is definitely not a hoax or the doodlings of a psychotic but is the homogeneous, creative work

of a serious scholar who had something to convey.

When Prof. Newbold disclosed his discoveries, there were present two men who had become known for their work in cipher solution in World War I: the late Prof. John M. Manly, chairman of the English department of the University of Chicago, noted as an iconoclast of claims in the field of "literary ciphers" as well as for his official work as assistant chief of the Washington Cipher Bureau during the war; and William F. Friedman, who after service in France had come to Washington in 1921 to enter upon a Government career, thus switching his analytical and scientific gifts from genetics to cryptology.

Friedman and Manly corresponded

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and conferred often in ensuing months and produced different results from ciphers on which Newbold had demonstrated his methods. For instance, from a Vatican manuscript partly in cipher, they obtained, by the straightforward methods of solving simple ciphers, a medieval recipe for making home brew; Newbold, using his complicated methods, produced a totally different result.

Newbold continued to work on his "decipherments" until he died suddenly in 1926. In 1928, his colleague and literary executor, Prof. Roland G. Kent, published a thick volume from Newbold's voluminous notes and work sheets.

The complex method used by Newbold was reducible to nine steps. The first and last of these, without any consideration of the intermediate abstruse and confusing processes, are utterly devoid of precision and are incapable of yielding one and only one plain-language text—a rigid requirement of any legitimate cipher method.

His first step was to convert the individual strokes of each symbol into Greek shorthand, a process of which Newbold himself said: "I frequently find it impossible to read the same text in exactly the same way." The reason for this, paleographers say, is that what Newbold saw as separate strokes of a symbol are merely the results of the cracking, uneven spreading and fading of the ink and the condition of the vellum because of the manuscript's age.

A Flexible Anagram

THE FINAL Newbold step, that of anagramming his many variant possibilities for the Roman letters he derived, can readily be found to yield other "decipherments." As an example, here are only five letters with their variants, selected at random from the Professor's text. This will serve to demonstrate the flexibility and inextinguishability of his method.

P	N	E	B	E
C	E	S	S	I
G	Z	Z	J	
K			Y	
Q			O	
			U	
			V	

One letter in each column of variants may be selected and those selected may be assembled in any order. With only five letters, it may readily be seen that any one of the words BEING, SPINE, BEGIN, PINES and others can be termed a "decipherment." Which one of them is the correct one, if any?

A sequence of letters from Newbold's Roman-letter text, shown by Manly in an article in *Speculum* in 1931, when treated in the manner of the foregoing brief example yielded several "decipherments" in only a few minutes:

Newbold's: De Via ex Terra ad Coelos. Despiciat . . .

Friedman's: Paris is lured into loving vestal . . .

My own (E. S. F.): Friedman will uncover secrets so . . .

Thus, one Latin and two modern English "decipherments" result from the final step in the Newbold method. What does this mean? Obviously, even if one were to accept as valid all his preceding steps, his "decipherments" are purely subjective and his entire complex of steps has no validity whatsoever.

A second extraordinary feature of Newbold's work was that in eight years of labor he brought forth from the strange manuscript only 400 words of "plain text," of which over 200 contain directions for deciphering the text.

In his 47-page article in *Speculum*, Prof. Manly completely demolished Newbold's hypotheses and methods and pretty well ended the controversy over that "solution." Unfortunately, Manly had no substitute to offer, nor did anybody else for over 20 years.

In 1943, a Rochester lawyer, Joseph Martin Feely, published a book entitled, "Roger Bacon's Cipher: The

Right Key Found." Feely was the author of "Shakespeare's Maze," "Decyphering Shakespeare" and other items catalogued in the Friedman collection under the heading, "Cryptologic Follies."

Feely's method, which is not a method, produced text in medieval Latin which is not medieval Latin, in abbreviated forms which are not the authorized forms and are therefore not authentic abbreviations.

In 1946, a startlingly different interpretation of a portion of the manuscript appeared in the magazine Science. Its author was Dr. Leonell C. Strong, a research scientist in the Yale school of medicine. Dr. Strong asserted that the author of the manuscript was one Anthony Askham, thereby placing its origin in the latter half of the 16th century.

Strong claimed to have deciphered a chemical formula which he and another Yale scientist had tried out successfully. The language in which he read the formula was, he said, medieval English.

Experts said that what he produced was not medieval English. As for his cipher "method," he said little about it, but what he did say made no sense to cryptologists.

A Pooled Effort

THESE FUTILE attempts moved Friedman to bring the problem to the attention of a group of serious scholars engaged in war work in Washington. Awaiting demobilization at the end of hostilities, they became interested in the manuscript.

The group comprised specialists in philology, paleography, ancient, classical and medieval languages and literature; Egyptologists, mathematicians and authorities in other sciences depicted in the manuscript. Under Friedman's direction, they agreed to meet after working hours and concentrate their talents on an attempt to master the document.

Because the preliminary work of transcribing the text into machine-processable symbols could only be done after working hours, demobilization was practically complete before the manuscript was ready for final study. The scientists thereupon disbanded and returned to their universities or research projects. Their considered opinions as to the age, authorship and general nature of the manuscript, based on their extracurricular work, are still valid today, however, as will appear below.

It Looks Simple

WHAT IS generally the initial reaction of a professional cipher

expert to the manuscript? At first glance, it looks as though it should be very easy to solve, because the "text" seems to be in word lengths and word repetitions stand out clearly on practically every page.

A simple frequency table would be made at once of a portion of "text," just as Poe did in "The Gold Bug." But to do that necessitates deciding how many different symbols there are in the manuscript, and this is neither simple nor easy. For what seems at first to be a single symbol often appears to be a composite made of perhaps two or three symbols.

For instance, a symbol often resembling our handwritten small letter "m" just as often looks as though it is composed of three separate symbols. Are they the same or different symbols?

If a frequency table is made for a piece of text amounting to about 500 consecutive "words" (which come to about 2500 characters), it presents the characteristic "rough" appearance of a frequency table for a simple substitution cipher: a few symbols have a very high frequency; a few have a very low frequency; the rest are of varying but medium frequencies. Besides the many repetitions of single "words," there are also many repeated sequences of two, three or more "words."

The first impression, therefore, is that here is a simple substitution cipher. However, the decipherer is doomed to utter frustration when no solution based on such a theory is reached. Trials in Latin, Greek, German, Italian, etc., yield nothing at all. So maybe it's not simple substitution.

But then the possibility of transposition, of combined substitution-transposition or of multiple alphabet substitution are also ruled out for the reason that there is entirely too much repetition. We find thousands of repetitions of three-, four- and five-letter "words" throughout the text.

For example, in 19 lines of text, a certain three-character group appears 66 times. And in regard to repetitions of complete "words," the whole manuscript is quite homogenous; the "words" in all sections are very much alike.

Gertrude Stein Style

INDEED, SOMETIMES, and not too rarely, one finds the same "word" appearing three times in succession, producing something similar to Gertrude Stein's "A rose is a rose is a rose . . ." Also, there are thousands of cases in which two "words" of four, five or more characters differ from each other by only one character, as in English, the words "strike" and "stroke," "store" and "stork."

How many different "words" are there in these 235 pages of text? Not very many; too few, in fact.

To summarize, the phenomena which must be explained before a logical theory of solution can be formulated are:

1. The number of basically different symbols employed in the manuscript is quite small—perhaps 20, or even fewer. However, tiny variations and affixes may make multiple forms of a basic character, which might suggest counting them as different symbols.

2. The symbols are grouped into "words" and the number of different "words" is quite limited.

3. The "words" are generally short, averaging about $4\frac{1}{2}$ symbols; rarely are they over seven or eight symbols in length.

4. There is a very large number of repetitions of single "words" and of groupings of two, three or more "words."

5. There is a very large number of "words" which differ from one another by only one or two symbols.

6. Certain "words" occur in successive repetition; that is, two, three or four times, as mentioned above.

7. The text is homogeneous, the same "words" appearing in all sections, whether botanical, astrological, biological or astronomical.

8. "Words" of just one or two symbols appear very rarely.

9. Certain symbols appear most frequently as the initial symbols of "words," rarely as central ones; others appear most frequently as the final symbols, rarely as central ones.

10. Certain symbols appear so infrequently as to suggest that they are extraneous to the text or are errors, made perhaps by the author himself or by some scribe who transcribed the original.

Key to a Solution?

THROUGH THE years since 1921, Friedman has continued to interest scholars and cryptologic experts in the problem, besides giving it what spare time he could himself. In the opinion of this writer, Friedman's studies have produced a theory which constitutes a logical basis for an attack that may lead to a solution of this baffling manuscript.

Proof of the validity of his theory may take much time and labor. Unlike most unsolved ancient writings—the Mayan hieroglyphics, for example, where most scholars believe there is insufficient material and too little repetition—this manuscript presents exactly the opposite characteristics.

It appears to be gibberish to many serious-minded academicians, who are apt to scoff at the idea that its solution would be of any value to science or

learning—as did a great foundation to which Friedman once applied for a grant for the detailed study of the manuscript. In the opinion of the foundation's board, a solution would not advance human knowledge; the manuscript probably contains only trivia, the board said.

The reader may therefore justifiably ask, "Why should anyone wish to decipher it?" When Sir Edmund Hillary was asked why he wanted to climb Mt. Everest, he replied, "Because it's there." In the same way, Friedman says of the manuscript: "Because it hasn't been read."

Friedman is not alone in being intrigued by this mystery. It has aroused the intellectual curiosity of a group of scientists of the Radio Corp. of America engaged in research and analysis in the field of information systems. As a result, RCA has offered Friedman the use of free time on one of its modern computers, the 301.

In addition, a number of RCA specialists will be working "extracurricularly" under the general direction of Friedman during their free time in another attempt to solve the cipher manuscript, a complete photostatic copy of which the late Mrs. Voynich (former owner of the manuscript) graciously permitted Friedman to make.

The new attempt may not succeed; the theory of solution may be wrong; the technical brains, including Friedman's own, may not be of sufficient power to achieve success; the problem may be insoluble; but at least a serious attempt to solve the mystery, using modern electronic aids, will be initiated regardless of its outcome.

Agreement on 1500

FRIEDMAN and certain other experts who, in the opinion of this writer, are most qualified to assess the manuscript find themselves in agreement with the group of wartime scholars mentioned above on certain points. These may be summarized as follows:

1. Paleographic experts agree that the nature of the drawings, the writing, the ink and vellum, etc., indicate that the manuscript is certainly of later origin than the 13th century. The female figures, for example, are not the angular forms characteristic of that period but are of a later, rotund, period. Some experts suggest that the probable period in which it was written was 1500, plus or minus 20 years. Since Roger Bacon died in 1294, he could not be the author.

2. There can be no question that the same scribe wrote the text and made the drawings, as any handwriting expert would readily agree.

3. The folio numbers and designations of folio gatherings are in still a different hand.

4. The country of origin is definitely European; it might be England, France, Italy or what is now Germany.

5. The text is based upon a written

language that is probably Latin, the language of all learned and scientific discourses of that period, but may be medieval English, French, Italian or Teutonic.

6. The "botanical" and largest section of the manuscript (125 pages) is probably herbalistic in character, and the manuscript may constitute what is now called a pharmacopœia. Herbals, which are known to have been in existence since 500 B. C., were used for centuries in the practice of medicine, or as a substitute therefor. The illustrations in the manuscript include containers resembling a pharmacist's mortar with pestle.

Although a well-known American botanist, Dr. Hugh O'Neill, believes that he has identified two American plants in the illustrations, no other scholar has corroborated this, all agreeing that none of the plants depicted is indigenous to America. Sixteen plants, however, have been indisputably identified as European by the great Dutch botanist Holm. The remainder are composite: i. e., the root system belongs to one plant, the stem system to another, the leaves and flowers to still others. A few show imaginary root or flower structures.

Theory in Anagram

ALTHOUGH FRIEDMAN has a definite theory for solving the mystery, he is reluctant to disclose it until he is ready to provide proof in plain text that will satisfy the tests for validity established by professional cryptologists.

In a footnote to an article in the January, 1959, *Philological Quarterly*, Friedman says that there is a statement

of his theory in plain English in the archives of the *Quarterly's* editor. Following a precedent established, as he says, by such more distinguished predecessors as Galileo and Huygens, however, Friedman published a statement of his theory in the footnote in anagrammatic form. He did so to date his theory in case someone else comes up later with the same solution.

His anagram:

I PUT NO TRUST IN ANAGRAM-
MATIC ACROSTIC CYPHERS,
FOR THEY ARE OF LITTLE REAL
VALUE—A WASTE—
AND MAY PROVE NOTHING.—FINIS.

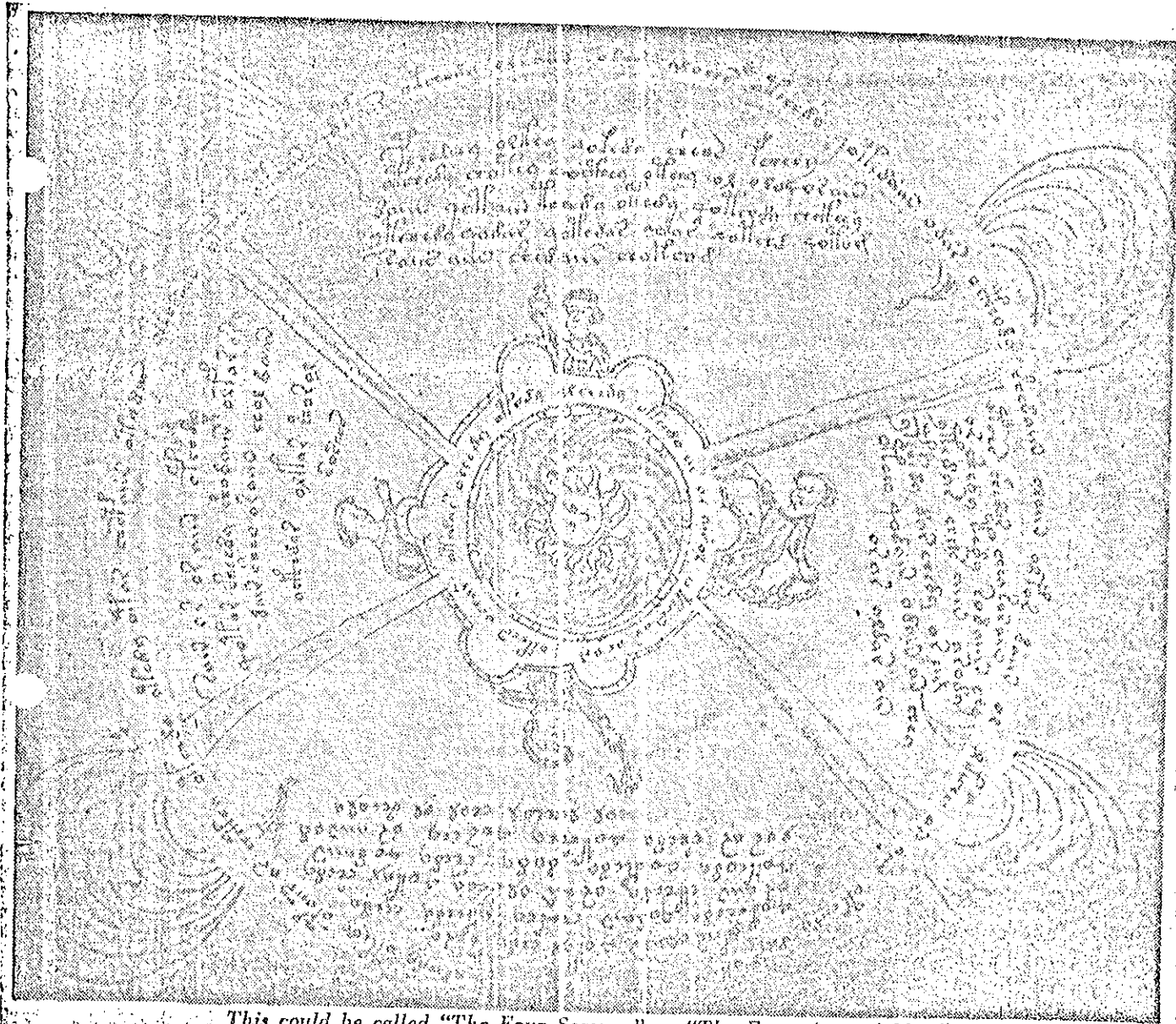
The anagram contains the identical letters of Friedman's original statement of his theory; no letters have been omitted, added or changed. Solution of an anagram of this length is not simple, but it is not impossible. The trick is to reconstruct from the anagram using its letters, the original statement in good English. Thus, far no correct solution to his anagram has been offered.

And the contents of the manuscript remain a complete enigma. As a French savant said of it: "C'est une diablerie."

Egyptian hieroglyphic writing intrigued scholars for centuries. All attempts at solution were unsuccessful until the Rosetta Stone was found in 1799. Even with the trilingual writing on that stone, and with one of the versions in the well-known language Greek, the decipherment took 30 years.

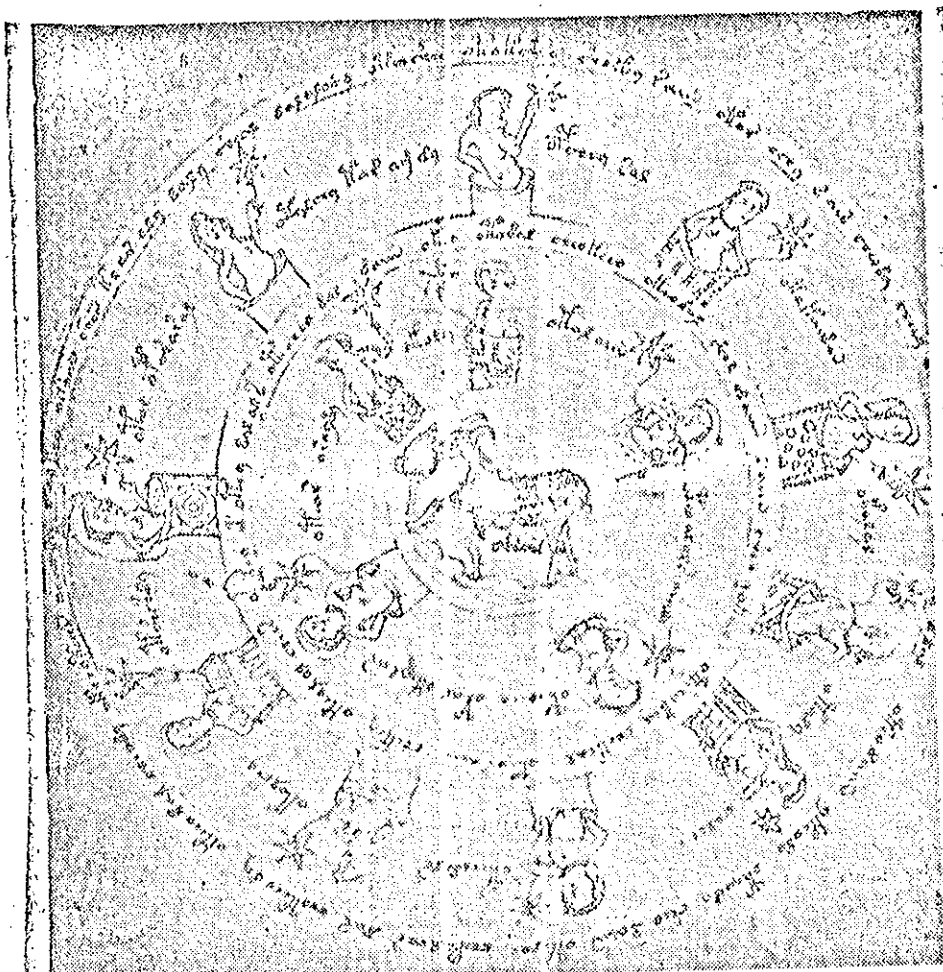
So far as is known, there is no similar key or "crib" for the solution of this most mysterious Voynich manuscript. It represents a real challenge to serious scholars.

'Most Mysterious MS'



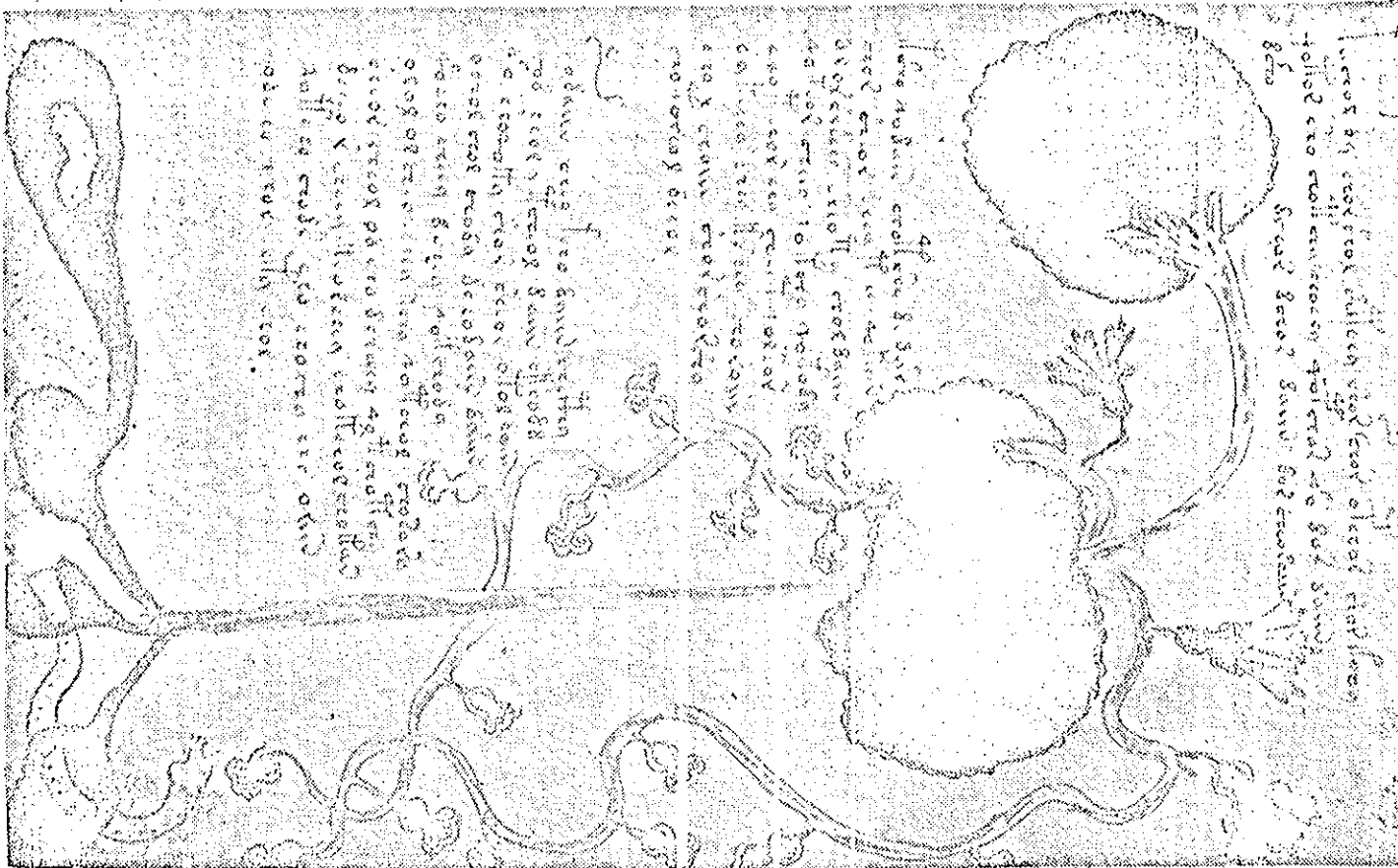
This could be called "The Four Seasons," or "The Four Ages of Man."

Is Still Undeciphered

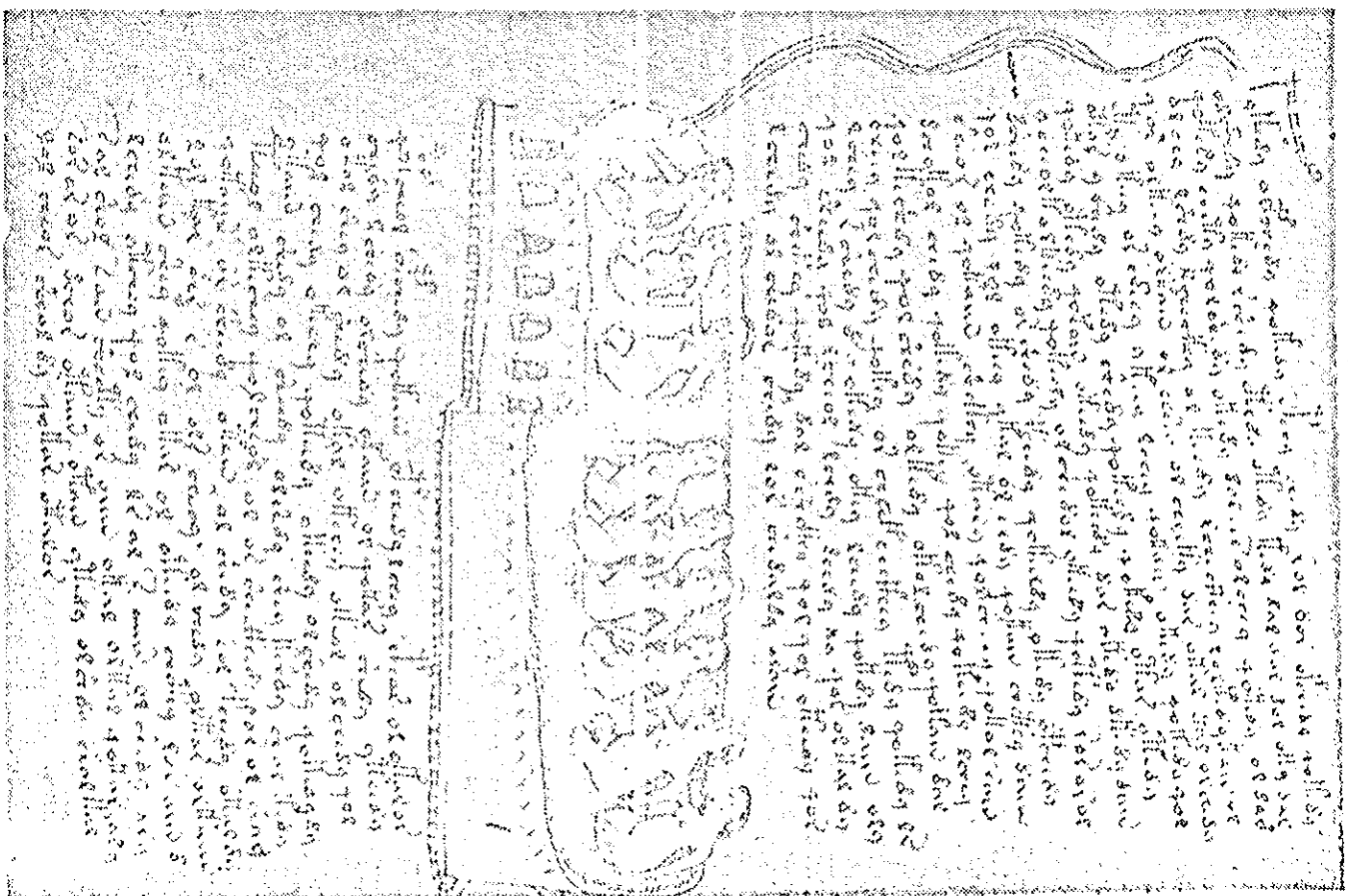


This sheet of vellum suggests a zodiacal pattern.

h



A serpent gnaws at the roots of some imaginary tree.



A panel undraped women decorates some of the pages.