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THE PHENOMENON AND THE PROTOTYPE OF ALCHEMY

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ABSTRACT

In the modern world, various projective images of alchemy, of the alchemist, of the 'great work' and of the philosopher's stone were formed.

The aim of the work is to search for the prototype of an alchemic operation and to prove that it is an operation to create a measure for measuring an unknown quantity that can be chemical, geometric, psychological or of some other nature.

The method of investigation is a representative measurement theory based on assigning numbers to things; in this case, things are the letters that make up the word 'alchim'. The assignment of figures to things in alchemy happened so that they began to present facts. This representation is due to the fact that the sequence of letters formed a word having historical origins, and the numerical sequence formed a digit having a mathematical meaning.

The article distinguishes between the word and the term 'alchim'. As the term 'alchemy' is not the genesis of a word from some language but an artificial construction, one of the representation of the number ' π ' (Ludolph's number). The side result was the search for approximations to the value of the number ' π '. The alchemists achieved a numerical approximation of the number ' π ' and considered ' π ' to be 3.1415 or 3.1418.

Keywords: alchemy, alchemic operation, alchemic term, alchemist

INTRODUCTION

Nowadays the topic of alchemy is widely represented in art and popular science fiction. Modern artistic and scientific-publicist literature attracts attention not so much to the philosopher's stone as to the protagonist searching for it, to the alchemist. In other words, modern prose emphasizes not the object of the Great Work but its subject. Alchemy and the philosopher's stone are present in the popular series of novels for children and young people by Joanne Rowling about Harry Potter, 'the boy who lived'. The first book, which brought the writer world fame, was devoted to hiding the philosopher's stone – the central object and purpose of alchemy – from the forces of evil. The alchemist, his formation, search and 'transmutation' is the subject of a series of alchemical novels by Gustav Meyrink (1868-1932). It must be said that the work of Meyrink stands out among other works on the topic. The very sequence of novels reproduces the order of the operations of the Great Work: nigredo → albedo → rubedo (black, white, red).

Alchemy in modern consciousness ceased to be perceived as a scientific fallacy which led to a mass of fruitless attempts to obtain the philosopher's stone, that is, some

substance through which one can turn lead into gold and with the help of the latter gain dominion over the world. In all the above works, alchemy is present as a phenomenon the essence of which is mysterious and incomprehensible, or is lost. Alchemy and the Philosopher's Stone today in society is perceived as *Magnum ignotum* (the Great Unknown).

Today the topic of alchemy is widely represented in the artistic and philosophical literature. In the philosophy of the twentieth century, the alchemical theme continues in the works of René Guénon, Julius Evola, Mircea Eliade. Ludwig Wittgenstein also touches upon the topic of alchemy: "One can speak of a kind of alchemy in mathematics" [1]. Psychological interpretation is given by the deep psychology of C. Jung and his followers.

DISCUSSION AND RESULTS

Accentuating the image of the alchemist and his search, modern literature offers an unusual twist of the story – the search is more important than the Stone, and what is meant by the Stone will be revealed only at the end of the search. The image of alchemy unfolds in the works in the following sequence: the alchemist, alchemy, the philosopher's stone or the elixir of immortality.

Understanding the place of the alchemist in the alchemic process makes possible the psychological interpretation of alchemical texts, started in the XX century in psychoanalysis by Herbert Silberer (1917) [2] and continued in the depth psychology of K. Jung (*Eranos III*, 1935 [3]) and in the works of post- and neo-Jungians [4].

Jung's approach emphasizes the subjective component, understanding it as a component of the psychological. The latter, in turn, is represented by the individual and collective properties of the subject, within which the archetypal ones are distinguished, which represent the object within the subject. The subject of alchemic doing 'The Spirit Mercurius' in the eponymous work of Jung is regarded as a spirit enclosed in an artificial body – a bottle, and this foreign body is incorporated into the human psyche and for the time being is undetected and unknown there.

The prerequisites of his concept Jung saw in the imaginative approach to the search for the philosopher's stone in alchemy. An approach linking the activity of the imagination with the search for the philosopher's stone or the elixir of immortality was formed by Paracelsus. Alchemy, according to this point of view, is based on the ability of the imagination. One of the names of the philosopher's stone is 'projection powder'. At a certain stage of alchemy, the adept must project a substance in a hermetic vessel, an image from the depths of his imagination and memory. Paracelsus paid attention to the fact that the imagination penetrates the body; thus, the pictures of the imagination of the future mother influence the child: "As in *vitriolo* (here: copper), the imaginary (imprinted) is imprinted (minted) with the help of imagination. This is the imprint of the light of nature (*luminis naturae*) and there are rays (*radiance*), which are imprinted in you, imprinted with the power of imagination" [5]. True, imagination should be distinguished from fantasy; in the latter case imagination is subject to reason. Imagination by Paracelsus is the power of the soul produced by active consciousness and will.

However, whence the power of imagination arises remained incomprehensible. Alchemists based their methodology on the principle of similarity, formulated in the

"Tabula Smaragdina", which was attributed to the legendary Hermes. However, as shown by J. Ruska (1926) [6], the text is of Arab origin. In Europe, it is used in an alchemical context, while the Arab application of the Emerald Tablet refers to the areas of talismanic magic and astrology. Regarding the penetration of the text into Europe, R. Rashed observes: "There is thus a continuity of tradition, and it has been suggested that, on their return to Andalusia, they may have introduced to that country both the works of Thabit b. Qurra and the techniques of talismanic magic which were to blossom in Spain in the eleventh century with the Ghayat al-hakim (Picatrix) of Abu Maslama al-Majriti. In the tenth century also Ibn Juljul used Latin and Arabic sources to write his *Tabaqat al-atibba'*, and amongst the latter is the *Kitab al-uluf* by Abu Ma'shar. The interest in this type of astrology is also apparent in the introduction of the *Liber Universus* of 'Umar b. Farrukhan al-Tabari to Córdoba towards the end of the tenth century. During this century the *Rasa'il* of Ikhwan al-Safa' and the *Tabula Smaragdina*" [7].

The talisman magic used words and numbers in combination with geometric figures to create spells, that is, it used simultaneously alphabetic-phonetic and ideogrammatic (pictorial) letter. According to the historian of writing systems, Ignace Gelb: "the picture writing per se carries a magic import, or that, so to speak, the virtues of the medicinal incantations are enhanced by the fact of their being expressed in picture-writing" [8].

Wittgenstein noted it is not the drawing in general that affects, but the power of perception lies in geometry. The power of logical proof lies in the power of a geometric proof and is destroyed along with it. "The relation of what we experience, our field of consciousness, to the subject of experience is analogous to that of the visual field to the eye - not the sense-organ, but what he later called the 'geometrical eye'. This self is an 'extensionless point', and the human individual a 'microcosm'. Arguably, this metaphysical subject is identical with the 'willing subject', which is the bearer of good and evil" [9].

The "geometric eye" of the seeing, experiencing, willing and conscious subject creates the prototype of the world. The closed spherical surface of the field of view is a form of a geometric prototype. The creation of spells is one aspect of the practice of talismanic magic. Giving spells some geometric form (their location in a circle, square, etc.), is although strange, but rationally explainable application of geometry.

'Ripley Scrolls'

This role of the alchemist is embodied in 'Scrolls' of the Treatise attributed to Sir George Ripley (d.1490) – 'Ripley Scrolls' (XV – XVII c.). "The Scrolls' size varies from that of a ladies' silk scarf to that of a dinner table that would seat about twenty people—the smallest Scroll 1 (Bodleian Libraries University of Oxford MS Add. 5025 (2)) measures 1.25 m × 14 cm, the largest (Cambridge, Fitzwilliam Museum MS 276) extends to 5.5 m × 60 cm. The question of the original purpose and function of the Scrolls has been asked variously but not yet successfully answered in existing literature. One theory states that the Scrolls were intended to be on permanent display in an apothecaries' shop; however, since the oldest surviving Scroll (Bod Bodley Rolls 1) is so large that it can only be unrolled gradually, allowing the reader to see only a single section at a time, this is unlikely. Another proposes that the Scrolls were used for educational instruction in laboratories; this possibility is called into question by the

sophistication of the artwork on most of the Scrolls and the entailed cost of production” [10].

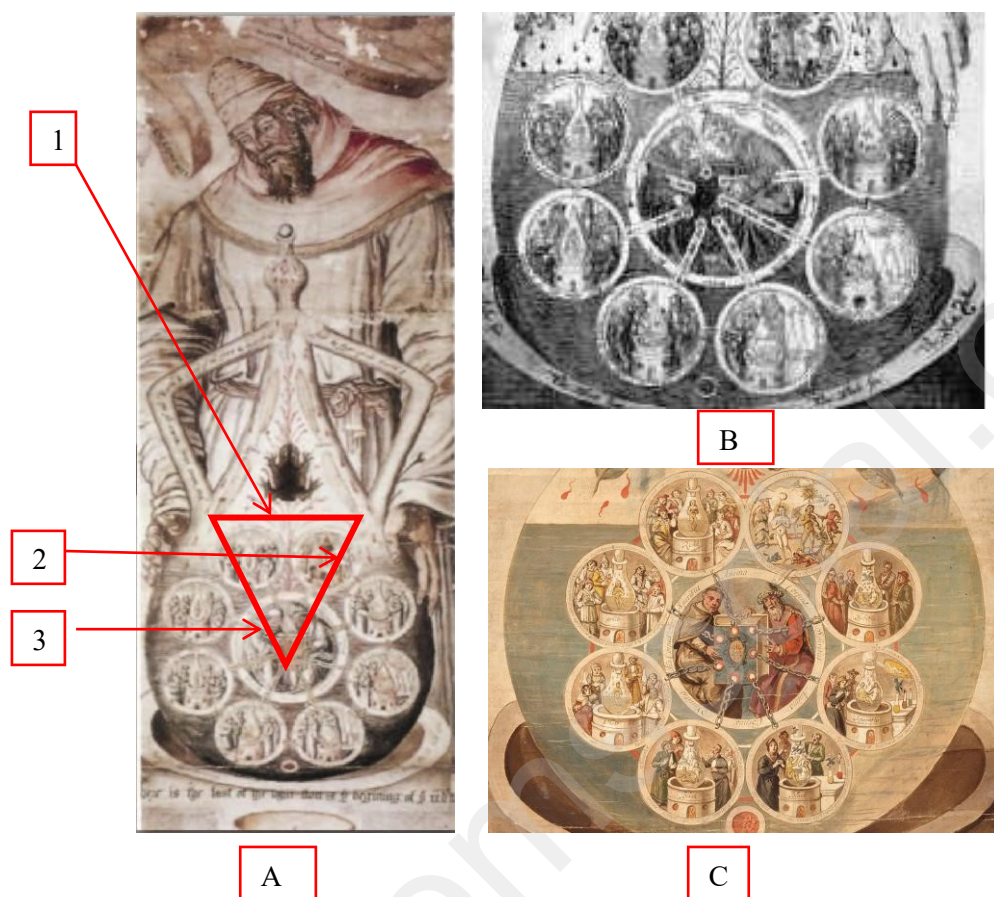


Fig. 1. 'Ripley Scrolls'. Illustration (A) of the Ripley scroll of the Bodleian Libraries University of Oxford, XVII century [11]. Illustration (B) of section of the Ripley scroll of the Royal College of Physicians of Edinburg, (1640) [12]. Illustration (C) - the modern reconstruction of the fragment of the Ripley scroll.

The adept of alchemy holds in their hands a sealed vessel similar to a woman on one side, and to a lyre (musical instrument) on the other. The inscription on the handles of the vessel goes: “YOW MOST MAKE WATER OF YE ERTHE AND ERTHE OF YE AYER AND AYER OF THE FIRES AND FIER OF YE ERTHE” (Fig 1A).

The inscription should be read as: "So shall it be: water of the earth is earth of the air, and air of the fire is fire of the earth". The inscription represents a logical puzzle, because it is inscribed in an incomplete geometric figure. The figure can be closed through Line "1" and through the center, by Lines "2" and "3" (Fig 1A). Continuing the logic of the text and the geometry of the figure along Line "1", we get the missing part (italics): "Water of the earth → earth of the air, air of the fire → fire of the earth, earth of the water → water of the earth". The spell (alchemical doing) is cyclical and can continue indefinitely as a movement along the circumference.

However, continuing the movement along the geometry of the figure along straight Lines "2" and "3", we get not a logical but a geometrical conclusion: "fire of the water"

and "water of the fire ". In the center of the whole picture is a closed book which conceals the mystery of the "first matter of alchemists", the secret of obtaining "fiery water" (Fig. 1B, 1C). The geometry of the drawing helps see and reconstruct the hidden part of the alchemical scroll.

The interpretation of one of the geometric recipes of Michael Maier's (circa 1658-1722) alchemy

An odd referral to geometry can be found in *Michael Maier's* works. In *Atalanta fugiens* (1617) he gives the following recipe for the philosopher's stone: "Put the man and the woman in a circle, then in a square, then in a triangle, then again in a circle, and you will obtain the philosopher's stone." These words accompany the corresponding drawing by *Michael Maier* (Fig. 2). This is not only a drawing but an ideogrammatic letter. The numbers to which the geometric figures correspond are as follows: a circle is 10, a square is 4, a triangle is 3. If we reduce zero at ten, we get the following set of numbers: 1, 4, 3, 1. It seems this is not a random set of numbers, since they are all part of the first four digits of the number π , which connects the diameter (straight line) and the circumference of the circle, that is, solves the problem known as the "quadrature of the circle". The numeric expression for π is 3.141. The draftsman standing in front of this geometric puzzle in the drawing holds an open bow compass, one end pointing to the square, the second to the circle. However, it should be noted that the order of reading the number π is not defined here. However, the epigram unequivocally links the search for the philosopher's stone with the problem of the "quadrature of the circle". In the argument to the epigram and the drawing, Michael Maier discusses Plato's teaching about cognition as a remembrance and notices that this knowledge is like a dream.

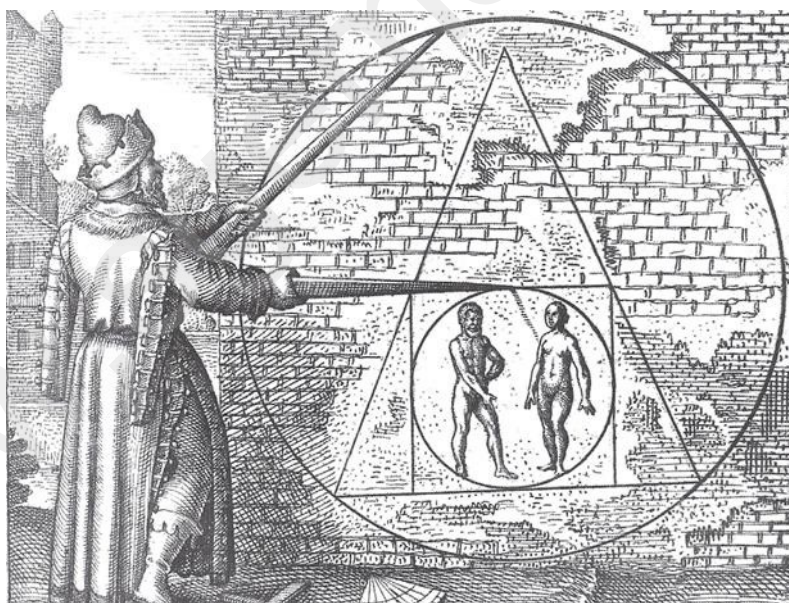


Fig. 2. Emblema XXI. "Fac ex mare & fœemina circulum, inde quadrangulum, hinc triangulum, fac circulum & habebis lap. Philosophorum". (Make of the man and woman a Circle, of that a Quadrangle, of this a Triangle, of the same a Circle and you will have the Stone of the Philosophers) [13].

The draftsman standing in front of this geometric puzzle in the drawing holds an open bow compass, one end pointing to the square, the second to the circle, suggesting

connecting these figures or their numerical values. The draftsman not only draws figures but also measures the relationship between them. The draftsman moves from drawing to measurement. If we ignore zeros, the connection will give us $1 + 4 = 5$. In addition, the figure also includes the number 9, obtained by adding the numerical values of the figures of the circle, square, triangle and circle shown. This number exactly corresponds to the fifth sign in π (3,14159). The geometry of the pattern resembles symbols from the Ripley scroll.

The word and the number: "ALCHIM".

To clarify the philosophical component of alchemical research, one can turn to the very word "alchemy" and to the language of its writing. Alchemical treatises used three sacral languages: Hebrew, Ancient Greek and Latin.

Tabula	Character de Hebraeo	Character de Syriaco	Character de Samaritano	Character de Assyriaco	Character de Aramaico	Character de Chaldaeo	Character de Persico	Character de Arabico	Character de Graeco	Character de Latino
A	A
B	B
C	C
D	D
E	E
F	F
G	G
H	H
I	I
L	L
M	M
N	N
O	O
P	P
Q	Q
R	R
S	S
T	T
U	U
V	V
W	W
X	X
Y	Y
Z	Z

A	1
L	3
Ch	5
I	1
M	4

Fig. 3. Athanasii Kircher. "Tabula Combinatoria." "Table of letter correspondences of Hebrew, Syrian, Samaritan, Assyrian, Aramaic and Latin alphabets" (1679) [14]. In the table, the Hebrew alphabet (the right row) sets the serial number, thus assigning a numerical value to the letters of the Latin alphabet (the left row).

The alphabets of the three languages are genetically related, although, as studies of the history of writing show, the development towards a full-fledged alphabet from the Semitic syllabaries required a change in the number of letters from Phoenician to Greek.

The number of letters in the alphabets of the indicated languages is different - Hebrew contains 22 letters, Greek 24, and Latin 26. Fixed order of signs in the alphabet is due to numbering the place of each sign in this sequence. Each letter received a numerical value in the alphabetic sequence, and so the letters could denote numbers, and numbers could denote letters. In Hebrew there were no special signs for numbers; the same signs denoted both letters and numbers (Fig. 3).

The problem is that in the word 'alchemy' the sound /k/ is represented by "ch" in Latin, which corresponds to the Greek x, which in turn goes back to the Phoenician "ח" which comes the eighth in the alphabet. However, a variant of transliteration through "ה" which comes the fifth in the alphabet is also possible; in this table, one and the same sign is used for them. Therefore, the letter "ח" is moved from the eighth position to the fifth and is turned into "ה".

The word "alchim", converted into a digital form, given the order of the Hebrew alphabet, will be written as "13514".

In case of writing the numerical values of letters in a circle and starting reading the word "alchim" from "1", we obtain 31415, respectively. Here the values order of the number π is observed. The word 'alchemy' is a hidden ideogram of a circle.

The very word 'alchemy' is first explicitly used in the text of a fourth-century astrologer, Firmicus Maternus. However, the famous Leonardo Pisano (who entered the history of mathematics under the name Fibonacci) only in 1220 determined the approximate value of $\pi \approx 3,1418$. In 1615, after the death of Ludolph van Ceulen, his calculations of the number π were published to the 32nd sign, hence the name "the Ludolphine number" [15]. The movement of signs in the Tabula Combinatoria by Athanasius Kircher is connected to this. The word "alchemy" is an artificial construction, an alphabetic-phonetic "puzzle".

CONCLUSION

The fact is that the phenomenon of alchemy existed historically, and the evaluation of the significance of alchemy for a culture in which this phenomenon existed and for the modern world fluctuates in a wide range. One of the images of alchemy was the number of Ludolph (π).

Since Ludolph's number (π) represents the cross-section between the areas of polygons inscribed and circumscribed around the circle and is calculated as an empirical sequence of the difference in their areas in the alchemical process, three elements can be distinguished: a chemical reaction corresponding to the inscribed polygon; a hermetic vessel corresponding to the circumference; and the alchemist himself corresponding to the described polygon.

The question of the prototype of alchemy arises – this is the image of the beginning of the alchemical operation. In most works the origin of alchemy is considered proceeding from the word 'alchemy' while it can be regarded as an artificial term.

As a result, it is justified that the alchemists of the past formed a mathematical concept, assigning numbers to letters, resulting in a number of digits but did not create a mathematical value, that is, a class of objects that are measured with this number, although they tried to do this.

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