Technology and the spirit of alchemy

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Abstract: A historical perspective can throw light on problematic aspects of technology, regarded as part of the scientific approach to Nature. The master reference in this respect is chemistry, a science which still gives priority, as its mother alchemy, to the practical imitation and emulation of Nature's most secret operations. Now, the transition from the fogs of alchemy to the rigor of chemistry is often attributed to the abandonment of the religious foundations of the alchemical 'philosophy'. In this paper, we argue that, on the contrary, the complete elimination of the 'spirit of alchemy' was an unjustified loss and a premise for the misuses of technology now seriously dreaded.

Keywords: *technology*, *alchemy*, *analogy*, *correspondence*, *ethics*, *spiritual standards*.

Introduction

The word 'technology' has been used with different shades of meaning. In this paper we shall take it to mean in general the practical dimension of science – that is to say, the collection of those operations by which man reproduces or emulates Nature. Technology can therefore be seen as one of the modes of the acquisition of knowledge – although, of course, the fact that it is susceptible to applications for aims other than knowledge remains an extremely important point. This 'gnoseological' definition is actually important because it avoids since the beginning an artificial separation of science and technology. That it should apply to what current language calls 'technology' is obvious, if one reflects that the slightest modification in technological design or production method involves some degree of understanding of new aspects of matter's actualities or potentialities. Examples of the scientific nature of practical applications are provided not only by the history of science, but by the fundamental conceptual contributions of technology to present science, such as the introduction of the notion of feedback and of information content.

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Among the traditional disciplines chemistry is probably the one in which the practical side, "learning by doing", is most important. The pure chemist's aim is to emulate Nature by finding how to transform materials into one another. As a science, chemistry is concerned with the question "why?" – *i.e.* with the search for general rules –, but that question is finalized towards a 'know-how' which will make emulation of Nature possible. A comparison with physics will illustrate this point: When Rutherford, Sommerfeld, Bohr and other great physicists were trying to understand the nature of atoms, they were not looking for ways to make atoms, and even less to make new nuclei – they just wanted to understand; in the same period, chemists were completing the construction of their simple 'stick-and-ball' model of molecular structure, which brought indeed a new conceptual world in science, but had been conceived mainly to tell which molecular structures would be stable enough to be susceptible to synthesis in the laboratory.

This means that chemistry is as it were the epitome of technology: many of the epistemological and anthropological problems posed by technology can be discussed with reference to chemistry as much, or even more, than to engineering sciences of all sorts. Now, as a field of inquiry whose method of discovery is inherently practical, chemistry has an history which goes back to the discovery of fire. Therefore, faces of the technological problem of which the present age of naïve materialism may have lost sight could be discovered by reflecting on the relation between chemistry and alchemy.

The spirit of alchemy

As is well known, chemistry evolved from alchemy between the 17th and the first part of the 19th century by the work of such great thinkers and men of science as Robert Boyle, Antoine Lavoisier, Amedeo Avogadro, John Dalton. In the process, except for a few basic notions, particularly those of 'atom' (which we now call molecule) and affinity, its original theoretical foundations were abandoned.

As far as science proper goes, it is neither surprising nor particularly regrettable that such a serious theoretical change should have happened. A long experience has shown that the aim of understanding Nature's operations in view of emulating them can only be reached by searching for cause-effect chains inherent in it (and to be formalized as logical statements). Analogies, which played a major role in alchemy, are still used extensively, in the construction of models, but just between objects and processes belonging to the same reality, that of matter. As to correspondences, they seem to have lost their place altogether.

Still, there is matter for reflection on this point. It seems unlikely that progress, supposing there is something of that sort in intellectual matters, can provide grounds for explaining the abandonment of what seemed theoretically valuable to a man of the Hellenistic times (the first centuries a.D., when the *Corpus hermeticum* made its appearance in culture), and still seemed conceptually appealing to the men of the time of Paracelsus, about fifteen centuries later and less than five centuries ago. Now, it seems doubtful that one can explain their vanishing by the consideration that we now know better, in virtue of cultural progress. History shows very clearly that there are fields in which the men of twenty-five centuries ago (or more, if you think of China) were far more advanced than we are. An American historian of philosophy illustrated this point very well in the thirties:[1]

> Greek philosophy leaped on to heights unreached again, while Greek science limped behind. Our modern danger is precisely the opposite: inductive data fall upon us on all sides like the lava of the Vesuvius, we suffocate with uncoordinated facts, our minds are overwhelmed with science breeding and multiplying into specialistic chaos for want of synthetic thought and a unifying philosophy. We are all mere fragments of what a man might be.

Thus, a general explanation of the abandonment of certain patterns of ideas about reality should rather be found in the fact that from time to time fresh approaches to reflection on the world help to overcome a number of difficulties in man's quest for understanding; and conformism amplifies them to make them the dominant, indeed the only acceptable ones. If such an explanation is valid, then we are justified in asking if, by giving up the alchemical theory of reality altogether, we have not thrown away the baby with the water.

This question is important in view of Durant's remark about the situation of man in today's most developed societies. In order to discuss it, let us first of all stipulate that what interests us here should be called the *spirit* of alchemy. This is because what has been called above the 'alchemical theory of reality' is not a theory in the modern scientific sense, but rather a way of thinking which is also used to suggest hypotheses, as can be seen, for example, from Flamel's famous books.[2]

The characteristics of the spirit of alchemy are:

- the doctrine of analogies and correspondences;
- the mystical approach to alchemical operations.

Analogies, allegories, correspondences

Analogies as such were extensively used in the Hellenistic times. For example, in his monumental effort to combine the Greek philosophical and the Hebrew religious tradition, Philo of Alexandria set up a detailed allegorical interpretation of the Old Testament, as describing and prescribing the soul's progress towards a perfect spiritual life in God.[3] Although, according to the specialists,[4] Philo did not take a clear stand on the literal meaning of the Scriptures, later development, especially that derived from the Hermetic books,[5] practically accepted the idea that in the relation between spirit and matter two or more faces of a single underlying reality are involved.

It is not just a matter of interpretation; analogical sentences are assumed to possess double or even multiple meanings,[6] for the words in them are taken to have multiple referents in different orders of reality. In other words, the same expression applies to two or more orders of reality, one corresponding to the immediate meaning, if any exists, the others to meanings beyond the access of the senses, and therefore only describable by analogies or vague terms. For example, the sentence "God made the living beings which swim in water",[7] can be given a double meaning: the explicit one, and the 'philosophical' one,[8] which, after a detailed analysis and checks for consistency all along the text of the Scriptures, might turn out to be something like: "by His grace, God made it possible for certain persons to become open to the world of spirit."

The belief that analogies describe actual realities may be seen as the root of the concept of correspondence, a concept which is officially absent from today's intellectual world, but is being rediscovered at the less critical level in the form of astrology, cosmic-energy theories, and so on.

The step from analogies to correspondences was easy, at least before Galileo introduced a new way of thinking. The argument can be summarized as follows: If there is a correlation, there must be an analogy and *vice versa*; if there is an analogy, there must be some common reality underlying the relations and the modes of change of the terms of the analogy. Such was the argument by which one could establish correspondences between the celestial bodies, the seasons, the personalities of human beings born in different seasons or months, and so on. Particularly important for alchemy, was, for example, the idea that objects which play a receptive role are feminine, those which play an active role are masculine. This view entails, for example, that the Sun plays the role of the King, the Moon that of the Queen. This is not just an analogy, but a *correspondence*, if it is taken to imply, for example, that the presence or absence of the Sun in the sky may affect the success of a chemical operation. In Platonic terms, one could say that the idea of masculinity is, so to speak, an entity in itself belonging to the 'real reality' underlying everything; therefore, there must be basic patterns of behavior common

to all masculine objects; those patterns may be more evident in certain objects, say celestial bodies, and then they can be detected by observing those objects; the knowledge thus gained serves to understand and predict the behavior of other masculine objects – say, sulfur – in which the same patterns are not evident for a variety of reasons.

Alchemy made extensive use of correspondences, both within the material level and between the material and the spiritual level. There seems to be some confusion in the literature, and specialists could perhaps clarify certain apparent disagreements or contradictions. For our illustrative purposes, the following corresponding pairs will suffice:[9]

- matter and form in Aristotelian ontology;
- the Moon and the Sun in the sky;
- the Queen and the King in human society;
- flesh and spirit (or body and soul) in man;
- mercury and sulfur in matter.

Roughly speaking, the old alchemists expected that, *if the right procedure and conditions could be found*, then sulfur would fix mercury to yield gold, precisely as form unites to matter to give a real object or as the King unites to the Queen to engender the heir to the throne. The possible objections to this sort of theory are innumerable, and most of them are decisive. The one which interests us here is that the analogies are very crude. For example, what was called flesh in the Gospel was (probably) a part or aspect of man which includes all psychic functions which are merely instinctual (*e.g.* fear of pain), and what was called spirit was related to the mind and the will.[10] The relation of these two concepts with Aristotelian matter and form seems therefore to be quite superficial, the main point in common being 'noncommutativity': form gives actuality to matter, the spirit, within limits, consciously controls the flesh; in either case, the converse is false.

The same consideration applies to the analogy between the formation of mercury sulfide and the wedding of the Queen and the King: one could easily admit that a new substance is formed by the union of mercury and sulfur, but the analogy stops there. What a difference, with respect to the analogy between an electrostatic field and the velocity field of a flowing fluid, which provided the beautiful mathematical theory of fields and resulted in James Clerk Maxwell's discovery of electromagnetic waves! On the other hand, as Poincaré pointed out,[11] the equations of mathematical physics describe general relation patterns of the reality (what Einstein later regarded as the space-time-matter continuum) of which the various classes of different phenomena are realizations, to be described by models which are not necessarily unique.[12] Thus, it would seem that the problem with alchemy was not the correspondence idea as such, but the lack of a systematic attempt to determine repro-

ducible facts and, not less important, of rigor in definitions. The combination of these faults may explain why, having realized that orpiment (arsenic trisulfide) had some of the characteristics of gold, and contained sulfur, the alchemists (who thought that 'mercury is the mother of all metals'[13] would make mercury sulfide, which is black, and then spend nights of patient work to find the conditions under which it would turn to something like orpiment and then to real gold, or to something even nobler; after all, they thought, the four elements were already present in mercury sulfide. It took centuries and the breakdown of the *ipse dixit* principle before the idea that – barring nuclear reactions – no technical operation will ever yield arsenic sulfide from mercury sulfide.

The above considerations might throw light on the intellectual torments which accompanied the birth of modern chemistry. They would justify the general contempt most modern men of science have for all the ideas of alchemy, were it not that the case of field theories suggests that analogies may have more to tell than people ordinarily think. That certainly holds as long as analogies are 'horizontal', *i.e.* as long as they are established between phenomena belonging to the same level (inorganic, living, psychological, spiritual): what about vertical analogies? For example, has the analogy between generation in biology and chemical combination any interest for us moderns?

There is room for unprejudiced reflection here, and along several lines; we shall only pursue one of them in this note: the analogy between the soul's progress towards wisdom (in both a philosophical and a theological sense) and transformations of matter induced by human agents. The latter are what chemistry, certain branches of biology, and technology in general are concerned with.

Mysticism and ethics

Many modern thinkers might well claim that science has removed nonsensible realities altogether from statements susceptible of a true-false alternative. That claim sounds naïve, if for no other reason, at least because it ignores that the psyche is neither visible nor tangible, but is real. Truly enough, a scientific explanation of psychic phenomena, say, emotions, may involve a reduction of such phenomena to physico-chemical processes, *e.g.* the release of hormone and neurotransmitter molecules; but it cannot stop at that, for there is a 'downward causation', as when an outright lie presented as truth for base political ends causes an honest man to burn with impotent rage. Anger itself can perhaps be described in terms of biochemical processes; but a full *account* of how it comes about and of the corresponding state of

consciousness cannot be given, unless those processes are seen as interdependent and coordinated (Prigogine[14] would say "coherent"), *i.e.* as forming a unitary system in the cybernetic sense of the term.

Now, neither coordination nor interdependence are accessible to our senses or to our experimental devices as such, and that is probably why certain men of science find it difficult to believe that they have an ontological status of their own. Perhaps they should try to imagine the overall effect of the same processes taking place independently of one another; then they would realize that coherence, though a mere relation in nature, does make a difference. It may well be granted that it cannot be isolated; but within physics you can find similar situations: for example, the charge of the electron is a property of a particle which has other properties, and, although the trick is used to say that the electron is the 'quantum of electric charge', in reality the electric charge cannot be isolated, and the correct statement is that the charge of the electron is the quantum of electric charge.

Similar considerations hold for the personality of a human being: It can and should be treated as something existing as an entity, albeit one whose existence depends on the existence of the person to which it belongs. For our purpose here we can indeed declare that the term 'soul' is equivalent to the term 'personality'. By this convention, the notion of a parallelism between the progress of the soul towards wisdom and the conquest of the secrets of matter can be reduced to merely human limits.

How did the soul enter the *Weltanschauung* of alchemy? In two ways:

- through the attribution of some sort of life to inorganic matter;
- through the assumption that the success of transformations of matter induced by a human being would closely match the latter's spiritual progress.

Although these views cannot be accepted as they stand even by the more open part of modern culture, our claim here – as pointed out above – is that they are expressions of invariants of man's relation to reality, particularly to material reality; invariants which society, in its unceasing swaying between extremes, has now temporarily forced out of the stage, possibly to rediscover them and give them too important a role in the near future.[15] Hints of such an inversion in the man-in-the-street's 'credibility space' can be found in the popularity of books on esoterism.

Coming to the first point, suffice it to recall that not only have chemistry and physical chemistry confirmed the existence of the 'affinities' postulated by alchemy, but they have shown theoretically[16] and experimentally[17] that under appropriate conditions even nonliving matter tends to form structures of a greater and greater degree of order, possibly of organization. Taken in

this sense and within the proper limits, the presence of a measure of lifelike activity of nonliving matter is thus confirmed by experimental work.[18]

As to the second point, the discourse is more complex. At the most general level, one could invoke the subjective-objective problem of quantum mechanics to show that the participation of the subject in the manipulation of Nature is a fact. Actually, such a consideration would be misleading, because in quantum mechanics the observer is not conceived of as a complete human being, but just as an outside operator. The point of alchemy was the involvement of the operator at the 'spiritual' level; that is to say – for those who find the term 'spiritual' unpalatable – a psychological involvement which calls into play the whole personality of the operator. This is not so surprising, because, as Blondel pointed out long ago,[19] conscious, deliberate action is a commitment of the whole person, and even its success may depend on the frame of mind within which it is carried out.

The example of Thomas Alva Edison will clarify this point. Edison, as is well known, not only invented the electric lamp, but invested 40,000 dollars to realize the dream of making electric lamps cheap enough for everybody to afford them. It would seem (and I for one believe it) that his dream really had little to do with money; Edison was certainly well aware of the fact that he would have had the same profit with a lower investment had he made lamps only available at a higher price for the market of well-to-do families. He thus gave a good example of how unselfishness and genuine interest in the product rather than in sheer profit may be conditions for great technological realizations.

In the alchemical frame of mind, this was precisely the point: the idea was that as long as personal second ends, especially that of gaining power and profit, were the motives of alchemical activity, the results would be poor. In fact, the principle of correspondence – the idea that all parallel processes are faces of a single process in the true underlying reality – applies to the experimenter with the only novelty that he, inasmuch as he is a human being, is free not to change in the proper way; then also his operations will follow a path different from the expected one.

Let us elaborate the idea that this is the side of the spirit of alchemy which is of interest today, especially in connection with technology in all its aspects.

In Flamel's writings (and in general in the 'white' Christian tradition) that side always appears with reference to God: the alchemist is trying to emulate the operations by which the Supreme Technologist causes transformations to take place in matter; therefore, he should be a worthy apprentice. The prayer of Flamel, written in a simple but attractive Latin,[20] is sufficient proof and illustration of this statement:

> Omnipotens, aeterne Deus Pater coelestis luminis, a quo etiam omnia bona et perfecta dono proveniunt, rogamus infinitam tuam misericordiam, ut nos

> aeternam tuam sapientiam (...) per quam omnia creata factaque sunt atque etiamnum reguntur et conservantur, recte agnoscere patiaris. (...)
>
> Fac [ut illa] moderate nos comitetur in omnibus nostris operibus, ut per illius spiritum [inveniamus] verum intellectum, infallibilemque processum nobilissimae huius Artis, hoc est, sapientum miraculosam lapidem, quem mundo occultasti, et saltim electis tuis revelare soles. (...)
>
> Primum recte et bene inchoemus, in eo (...) labore(m) constanter progrediamur, et tandem [eum] etiam beate absolvamus, illoque aeterno cum gaudio fruamur, per coelestem illum et ab aeterno fundatum angularem miraculosumque lapidem.[21]

Flamel's prayer is epistemologically very interesting, even for those who do not share his belief in the God of the Christians. A mystical path to personal elevation is hinted at by the second interpretation level of this prayer. It is a path at least partially open independently of adhesion to a specific religion, for the term 'God' may be taken to represent non-subjective values which man ought to respect and cultivate if he is to pursue the three Platonic ideals of truth, justice and beauty. Under the assumption that such values exist, alchemy suggests that the practical operations of science and technology require a total personal involvement of the operator, indeed are parallel to the progress of the operator in his renunciation to his ego in favor of noble ideals. There is a measure of literal truth in this. Consider specifically the operations of chemistry. It would be too much to claim that the end products of a reaction depend on the virtues of the chemist performing them. However, there may be a psychological component at least in the yield, which is often sensitive to small changes in the reaction conditions: a patient person, deeply interested in what he or she is doing, will obtain better results and possibly detect unexpected byproducts, if for no other reason, because of the loving care applied to the least detail.

In general, all practical operations have this dependence on the experimenter's psychological attitude. If we consider technology developed in view of applications, then the role of the virtues of the operator is even more evident. Those who have a certain age and have worked with personal computers since the time of the glorious "Apple II" can testify to the enormous change in quality and features between computer programs circulating before 1990 and the present expensive commercial programs. The essential difference is easily summarized: formerly, programs were made by people who took a genuine personal interest in programming as a means of providing new useful tools for intellectual work; later, the aim of programs apparently became to make the use of the computer attractive and 'easy' to persons who saw in it a sort of interactive TV set, and would feel technically important if the programs they used produced plenty of colorful pictures and required faster microprocessors and more megabytes of random-access and hard-disk memory. It would seem that priority given to profit has affected the evolu-

tion of technology so as to encourage activities which keep users busy, but have hardly any value for improving the ability of a man to enjoy beauty and knowledge. This development is probably a minor detail in the generally disquieting picture offered by our consumer society, and might even turn out, in the long run, to have a bright side; from the point of view of a philosopher of technology, however, though quantitatively far less dangerous, it may well be assimilated to the chemical production of hallucinogens.

About spiritual standards

In short, those who develop technology without even a trace of the spirit of alchemy, *i.e.* without a parallel upgrading of their spiritual standards, particularly their sense of responsibility, may be contributing to the devastating ills of our society – ignorance and neuroses – which no vaccine can prevent. Truly enough, the spirit of alchemy was centered on worship and confidence in the God of Abraham; but even those who believe that religion should be replaced by merely human ideals should have grounds for lamenting its loss, since ideals seem to have vanished altogether. Edison invested his money in the dream that even low income families could afford the joy of electric light; contemporary technological geniuses, if there are any, may be expected to use their minds to make money or gain fame by experiments like the cloning of human beings.

The 'white' alchemists believed in the necessity of high spiritual standards because they thought that the Divine Master would not allow the unworthy to learn his secrets, and that, if with Satan's help they could do so without permission, that would be cause of ills without end. The notion that information of a certain kind is a secret reserved to a small number of deserving men might sound in contrast with the whole history of modern science, which thrived because of the availability of the results obtained by other scientists; but it is not. In fact, scientists were a small number even in the nineteenth century, due to the requirement of a good general education; moreover, in our affluent society education beyond an absolute minimum is not available, even to wealthy people, except as a specialization. This trend is excluding more and more people from the group which has the broad background needed for creativity not only in humanities, but in science and technology. At the same time it is reducing the ability of the members of that group to appreciate the value and the risks of new developments. In the light of this consideration, an apparently reactionary remark by Girolamo Fracastoro – the famous physician and humanist from Verona who already in 1538 fought

against the doctrine that the course of illnesses was controlled by the stars – takes a fresh sense and validity:[22]

> Quae abditissima in natura sunt ad divina praesertim et caelestia pertinentia aut reticenda quidem et silentio continenda videntur, aut propalanda certe non modo modeste sed quodammodo verecunde; nam quae et natura ipsa occultissima esse voluit non sine quadam iniuria videntur palam proferri...[23]

Now, those who "do science" belong to three different categories: people who just do their job in science, people who consider that science offers promises of career and success, people who are sincerely interested in science and its applications. The spirit of alchemy implies that only the latter are worthy of participating in the technological enterprise, for, as Einstein wrote:[24]

> Der wahre Wert eines Menschen ist in erster Linie dardurch bestimmt, in welchem Grad und in welchem Sinn er zur Befreiung vom Ich gelangt ist.[25]

This deliverance from one's ego is only the first step; because the realization of the *Magnum Opus* – the development of technology towards full harmony with Nature and full healing of the ills of mankind – should proceed parallel to an unceasing improvement in the technologist's commitment to the great Platonic values, if not to Christian love. Thus, the considerations of Durant, Flamel, Fracastoro and Einstein support the claim that there is a fundamental aspect of alchemy which should not have been abandoned with the rest, but should have remained in science and technology to protect us from the temptation of know-how without a sense of responsibility. That aspect, as has been mentioned, can be traced back to the alchemists' belief that observed processes, physical as well as psychical, can be assigned to parallel analogy classes which correspond to one and the same process in the unique, genuine reality underlying everything. As far as science goes, a conviction of this kind is to some extent implicit in the reflections on relations and models of Henri Poincaré, a representative of the most orthodox modern physics. Its possible extension into a return to the spirit of alchemy, which is implicitly advocated by the work of the scientist-philosopher Teilhard de Chardin, remains a challenge for the philosophers of the future.

Notes:

1 Durant, W: 1934, *The Story of Philosophy*, Simon and Schuster, New York, chapt. 2, 9.

2 Flamel, N.: 1971 *Le livre des figures hiéroglyphiques*, Planète, Paris.

3 Colson, F.H.; Whitaker, G. H. (eds.): 1929-1962, *Philo in ten volumes*, English ed. and trans. from Greek, London-Cambridge/MA.

[4] Zeller, E.; Mondolfo, R.: 1979, *La filosofia dei Greci nel suo sviluppo storico*, La Nuova Italia, Firenze, part III, vol. IV (a cura di Raffaello Del Re), pp. 486 and *passim*.

[5] Nock, A.D. (ed.): 1960, *Corpus Hermeticum*, French trans. by A.-J. Festugière, Belles Lettres, Paris.

[6] We use here the term 'meaning' where many philosophers of language would use the word 'sense' just to reserve the word 'sense' for the body's input channels from the external world.

[7] *Genesis*, 1, 21.

[8] *Cf.* St. Augustine, *Confessions*, chapt. 13.

[9] *Cf.* Burckhardt, T.: 1960, *Alchemie: Sinn und Weltbild*, Walter, Olten, chapt. 11 and *passim*. Note that by the time of Paracelsus the listed pairs had been transformed into triads, *e.g.* sulfur-mercury-salt.

[10] *Cf.* "The spirit is willing, but the flesh is weak", in the Gospel of *Matthew*, 26, 41.

[11] Poincaré, H.: 1968, *La science et l'hypothèse* (1902), Champs-Flammarion, Paris; *cf.* following note.

[12] This is why Poincaré was classified as a conventionalist, probably by philosophers who were not familiar with mathematical physics. In fact, a detailed analysis of his statements proves that he did believe that science describes reality; we have tried to make this point in a paper on 'Poincaré et le mécanisme', *Philosophia Scientiae (Nancy)*, **1** (1996), spec. issue 1, pp. 55-69.

[13] *Cf. e.g.* Flamel, *op. cit.*

[14] Prigogine, I.; Stengers, I.: 1979, *La nouvelle Alliance*, Gallimard, Paris and refs. therein.

[15] The sceptical reader could probably convince himself by considering the positive and negative differences between the 16th, the 17th, and the 18th century in relation to art, to science, to religion. Of course, if one were to make the idea of societies swaying between extremes in these matters into a general theory, one should improve the model, and start from the analogy with a helical motion, so as to make room for a minimum of 'progress', whatever that notion may signify.

[16] Prigogine, Stengers, *op. cit.*

[17] *Cf.* Balzani, V.; Scandola, F.: 1991, *Supramolecular Photochemistry*, Ellis-Horwood, New York-London.

[18] Probably the most serious difficulty of alchemy on its chemical side did not lie in this assumption, but rather in the uncritical acceptance of the four-element view.

[19] Blondel, M.: 1993, *L'action* (1893), Quadrige/Presses Universitaires de France, Paris.

[20] Flamel, *op. cit.*

[21] "Almighty, eternal God Father of celestial light, from whom also come as a gift all things good and perfect, we pray to your infinite mercy that you suffer that we recognize correctly your eternal wisdom, by which all things were created and made and in this very moment are ruled and held in being. Let it accompany us step by step in all our operations, so that by means of its spirit we can find the true knowledge and the sure procedure of this very noble Art, that is, the miraculous stone of the wise, which you concealed from the world, and sometimes reveal to your elected. Grant to us that we begin rightly and well in the first place, that we [then] progress with constancy in our work, and that we at last complete it in a

blessed way, and that we may enjoy it with eternal joy, by that celestial and miraculous cornerstone founded before the beginning of time."

[22] Fracastoro, G.: 1955, *Scritti inediti*, *a cura di F. Pellegrini*, Verona, p. 207 (quoted from Rossi, P.: 1957, *Francesco Bacone*, Laterza, Bari, p. 97).

[23] "It seems that what is deeply concealed in Nature [and] belongs to the realm of things divine and celestial should be the object of reticence and silence, or at least communicated not only modestly but as it were with a measure of decency; for it seems that it would not be without a measure of offense that one would repeat in public what Nature herself has wished to be profoundly hidden."

[24] Einstein, E.: 1979, *Mein Weltbild* (1934), Ullstein, Frankfurt/M., p. 10.

[25] "The true value of a man is first of all determined by the extent and the sense in which he has succeeded in freeing himself from his ego."

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