some of the artisans began to dream of making gold itself and devoted their main attention to achieve this end. Thus arose alchemy, not found before either in Egypt or in Greece. It was existing when the Arabs acquired Egypt and was one of the elements of Alexandrian culture which diffused into Arabian civilization. There are several treatises and even books which suggest that Greek science, which flourished between 300 B.C. and 200 A.D., subsequently passed on to the Arabs who functioned as its intermediate preservers delivering it to Europeans during the Middle Ages. Such is the accepted origin of alchemy.

It now becomes necessary to offer a brief sketch of alchemy as it was founded at Alexandria. The oldest existing manuscript on alchemy is not prior to about 901/1000. But it is supposed to be a copy of a work originally written in about 100 A.D. During this early period alchemy was a semi-secret science pursued by a few obscure persons. As Taylor8 says, “although the earlier alchemists wrote in Greek, they were not Greeks, but in all probability Egyptians or Jews. They were not Christian.” And what did they call their art? This knotty problem is conspicuous by its absence in Taylor’s book. When Wilson9 came to review it, he supplied the missing information on “the derivation of the Greek name of the art.” “The word unmistakably goes back to the craft of the foundryman and metal-worker. First, there is the Greek verb ἄλημεν (alēmein), to melt and pour, as in the casting of a bronze statue, then its derivative chemeia, an ingot of cast metal, and finally from this another derivative chemeia, the art of preparing metal ingots. This in time became a technical term for the artificial preparation of the precious metals, but at first, as in Zosimus, about 200 A.D., it acquired a qualifying phrase, the chemeia of silver or gold. Before the Arabic period, however, chemeia could stand alone to denote the art of transmutation. Also before Arabic times, about 81/700 or earlier, it seems to have been confused with chemia, apparently a Greek derivative of the Egyptian word ἀχμά, meaning black. The reasons are obscure but the fact of the confusion is hardly to be questioned. Later, the Arabs took over both spellings, chemeia and chemia, prefixed its own definite article of, and handed the word on to the Europeans in about the sixth/seventh century.” Thus kemia is the Arabized form of the dual word chemeia/chemia.

The Greek and Arabic Terms Compared.—Now it is even more important to know what the Arabs received under the name kemia from the Greek-speaking alchemists—to know what the word chemeia signifies and how the Arabic word kemia compares with it in meaning. Gildemeister8 explains that “kemia with the Arabs primarily is not an abstraction (or the science of alchemy) but the name of a substance, of an agent, by which transmutation of metals is brought about, thus of the Philosophers’ Stone, or rather of

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preparations made out of it. It is thus a synonym of iškîr which likewise signifies a transforming agent. By contrast chamēza is never used by the Greeks in any other sense than transmutation of metals. There are two synonyms in Greek, chaimēza and chamēza. Gikhamsi refers to the use only of the latter, apparently taking it as identical with the former. In Arabic there are two terms kīnṣūja and iškîr, the latter not being represented in Greek literature. In fact, iškîr occurs far more in Arabic than the word kīnṣūja. Iškîr or al-iškîr has been Europeanized into elixir which has come to mean as an agent for prolonging life. According to Taylor, the alchemy of China was primarily concerned with the prolonging of life; he adds in this connection that it is very probable that the Arab alchemists received some information about it. It is certainly notable that the idea of the elixir as a medicine prolonging life was present amongst the Arabs and not known to their Greek-speaking predecessors. P. Kraus published a voluminous work on Jâbir. Its reviewer correctly noticed that "as to the origin of all those theories, Kraus maintains that not much of Jâbir's alchemy can be traced to the extant fragments of Greek alchemistic literature, and that there are certain features in his alchemistic knowledge which are definitely unknown in classical antiquity." There has prevailed so much prejudice in favour of Greek that even the word "elixir," absent in Greek and therefore inconceivable as a loan-word in Arabic, has been given a Greek root. Iškîr has accordingly been said to have come from the Greek word lekîsos, meaning dry, and has been made to connote dry powder, while elixir means essence, spirit, or fluid. How the Arabs coined their word from Greek cannot be explained. All this tends to show that the primary source of Arab alchemy lies somewhere away from Alexandria.

The Uraeus to Pursue Alchemy.—There were two types of seekers after longevity. First, the ascetic who was his own grocer, cook, and doctor and to whom infirmity of old age meant lingering death. The second was represented by a prince who had wealth and power and desired long life, only to enjoy his possessions fully. Though for different reasons, the Sufis, the nearest to ascetics, also indulged in alchemy. In fact, Wiedemann remarks that "the study of alchemy has had one undeniable result inasmuch as the representatives of the mystic movement in Islam studied alchemy, e.g., ibn al-ʿArabī." This, however, was expected, and the converse is also true, for about the master of alchemy, Ḥujjat states that "later tradition makes Jâbir

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Ibn Ḥujjat the first Sufī. Kraus explains how Jâbir, the alchemist, became interested in Sufism. He writes, "Alchemy is never practiced by Jâbir for the object of accumulating wealth and acquiring the power of gold. Its real mission is to bring about salvation." And how was this possible? He continues to say that "Salvation in the Manichaean sense means to oppose in all spheres of life the fatal mixture of light and darkness and to free the light from dark particles. The Manichaean natural history, especially alchemy, aims at the great work of salvation."

Let us now turn to the wealthy and the worldly class. According to Martin, Emperor T'ien-Hsi-Ihwang (B.C. 220), the builder of the great wall of China, is the earliest historical sovereign who became a votary of alchemy. There are a few more Chinese emperors who believed in alchemy: a couple of them had to pay with their lives for trying alchemical drugs. In the life of Ching-i K'âsin it is stated that he sent for a Taoist priest all the way from China to Central Asia, where he was enamped, to discuss if life could be prolonged for ever.

Kâhilīd, the Umayyad Prince (40-85/660-704).—There is a sub-class among the well-to-do who would like to enjoy as sport the transmutation of a base metal into gold. Such a motive on the part of a young prince can be easily imagined and one such prince appears to have been Kâhilīd, son of the Caliph Yazid I and grandson of Mu'awiya. In the Arabic literature on alchemy, compiled about 377/987 by the famous bookseller al-Nadim, it is stated, as translated by Fulk, that "Kâhilīd was the first Muslim for whom medical, astronomical, and (al)chemical writings were translated into Arabic...."

He wrote a number of treatises and books. Al-Nadim also saw the following four of his books: (1) The Book of Amulets, (2) The Great Book of the Scroll, (3) The Small Book of the Scroll, and (4) The Book of the Testament to His Son on the Art.

Introduction of Alexandrian Alchemy.—When Kâhilīd wanted to learn alchemy at Damascus, his capital, he sent for a teacher from Alexandria, a Christian monk named Marinas, a pupil of another alchemist, also of Alexandria, named Stephanos, who lived in the reign of the Byzantine Emperor Herklito I (610-641 A. D.). That the best available teacher of alchemy at the time was a monk is in full harmony with what has been said of alchemy and of Sufis here. A monograph of over fifty pages has been devoted to Kâhilīd by Professor Roska, the famous German historian of alchemy. The Oldest Alchemy and how it Reached the Muslim World.—A series of

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13 P. Kraus, "Islamic Dogmatic Theology and Manichaeism," al-Usra, Bombay, 1: 24, 1917.
authors have established that alchemy was indigenous to China. Among the older writers may be mentioned Martin, while the best historical evidence has been offered by Dube. From China alchemy reached Alexandria by the sea-route. In South China, the name of the dynasty that built the Great Wall is pronounced Ts’in, which became Tsao, the Arabic name for China. Likewise, the South Chinese term, kim-ips, Gold-making Juice, became the loan-word kimos, upon which Schneider has published the most recent communication. It is probable that the word kimos, instead of having been borrowed directly from the Chinese, was taken over from Arabic into Greek, being Hellenized there as chemeia. This is how it was written, but very probably its pronunciation was similar to that of kimos. The pre-Islamic Arabs, bringing silk from South China, all along the sea-route, also imported Theodore and alchemy as the cults of immortality. To the pagan mind alchemy made a special appeal and this explains how it came to be imported. Some of the Arab alchemists of the type of what we call fakirs must have settled at Alexandria where it gradually spread mainly among monks and other ascetics. We have just seen that even centuries afterwards this character did not change for it was the monks who brought Alexandria alchemy to Damascus.

Another way in which Chinese alchemy reached the Islamic world was the land-route. In Christianity one church tried to suppress another; and a community, speaking Syriac and calling themselves Nestorians, sought protection from outside and established an academy at Jundih-Shihur, in South-West Persia. The Nestorians migrated even up to China so that there must have been contact between the Nestorians of China and those of Persia. As an impact of Christianity upon Zoroastrianism there resulted the religion of Muzi. The Manicheans with their philosophy of duality were close to the alchemists as they also believed in a similar doctrine. Briefly, Nestorian and Manichaean Persia was in intimate contact with China and was responsible for a fresh influx of Chinese alchemy. The Jundih-Shihur academy was by no means dead during the reign of Hārūn al-Rāshīd to which period Jahīr also belonged. When Kraus and others notice that there was much in Jahīr that was not found in Greek alchemy we have to turn to Chinese influence in Persia at that time.

The Beginning of Classical Islamic Alchemy — The Umayyads ruling from Damascus had become very unpopular. There were plots to replace them by the ’Abbāsid dynasty. Such agents were active as far east as the province of Khurāsān in Persia. One such emissary was Jahīr’s father, Ḥayyān, a druggist by profession. Jahīr was born at Tūs, in Khurāsān, about 147/722, during the family’s sojourn in Persia. When Jahīr was a mere boy, Ḥayyān was arrested for his activity and had to pay with his life. Khurāsān being the

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13 W. A. F. Martin, op. cit., p. 234.

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border province was a centre of foreign cultures like Mahayana Buddhism and other schools of mysticism. It may be pointed out in this connection that it was again at Tūs, in Khurāsān, where Ḥaqqī Ḥaqqī, one of the great Muslim mystics, was born. Above all, we find in Jahīr one of the first persons to be formally called a Sufi and the first among Muslims to be recognized as the master of alchemy. Both alchemy and Sufism appear to come from the same source and to have long remained together. Some of those who have written upon the history of Sufism have noticed that in its early stages it flourished only where Neo-Platonism was found. Likewise, writers on the history of alchemy have also observed its earlier co-existence with Neo-Platonism. While Sufism and Neo-Platonism can be directly and easily connected with each other, as pertaining to the same system of thought, it requires inquiring into what alchemy originally was in order to admit that alchemy did not develop from one craft to another, from gold to making mercury, but was a kind of applied mysticism. The Sufis wanted immortality in the next world by spiritual exercises; the alchemists wanted it by virtue of drugs in this world. This motive at once becomes evident by a study of Chinese alchemy which represents its earlier phase. Instead of associating Islamic alchemy with Alexandrian Neo-Platonism it is more fruitful to connect it with Manicheism and with schools of mysticism influenced by Chinese mysticism. Khurāsān, rather than Egypt, was the centre from where Islamic alchemy got its real initiation. Between Ḥabīl ibn Ṣadīq and Jahīr ibn Ḥayyān there was a period of seventy-five years. Historically, the political power shifted from Damascus to Baghdad. At this latter centre the so-called Persian influence, but really Chinese-Manichean doctrines, rapidly promoted Islamic alchemy. Those who compare Greek alchemy with that of Jahīr notice an obvious difference between the two. If comparison is made between the doctrines and achievements of Muslim alchemists with those of China, the difference is very much less. In so far as even the alchemy of Alexandria is Chinese, though a degenerated form of it, it still has features enough for it to stand comparison with that of China. With Jahīr begins a school of alchemy much nearer to its original source, with its centre at Tūs, instead of at Alexandria. The first feature to be noticed here is that the ideal seems to be not to make gold but to prepare panacean drugs. Jahīr’s reputation as a physician grew after the services he had rendered at the Court of Hārūn al-Rāshīd. His alchemical writings on the contrary were misunderstood even by a savant like Ibn Ṣadīq who remarked that they read like puzzles. The effect of the chemical mysticism, which was alchemy, was demonstrated in the form of life-saving ātifs; the theory of applied mysticism was obtained from other systems of mysticism, such as Sufism and Manicheism. The existing literature shows that alchemy proposed to make gold only and this seems to be true of Greek alchemy. The Arab alchemists, like the original Chinese masters, worked upon

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their preparations for making everything everlasting. When the omnipotent substance, išār or ʾishās, was applied to a base metal it became rust-proof and fire-proof, which meant it changed into gold. The same agent could also convert an ordinary stone into a permanent diamond. These features are not revealed in treatises on the history of alchemy and must be clearly pointed out.

Iḫmā ḥaḏr al-Šāfiʿī (81/1481–700–765).—It will now be apparent how Jābir would venerate a master of mysticism like Iḫmā ḥaḏr al-Šāfiʿī, the sixth Iḫmā, who lived like an internee at Baghīdīl. Of all the Ixmmā he was the greatest mystic. He was deeply interested in alchemy and even composed treatises on the subject. Importance is attached to him here mainly because Jābir speaks of him as a Master and also because of the fact that alchemy and Sufism both aim at immortality. Since Jābir was both a Sufi and an alchemist, he could have received initiation from the Iḫmā at least as a mystic. Ruskā has edited a treatise attributed to the Iḫmā and discussed his position in the history of alchemy, devoting an introduction of sixty pages to the problem.

Jābir ibn Hayyān (104/200–722–815).—Our knowledge of Jābir’s life is very sketchy. He was born at Tūs, in Khurāsān, about 104/722. He became an orphan while yet a boy and was brought up in the tribe of his father. And, which lived in South Arabia. Then we suddenly find him as a man of middle age active as a physician at the Court of Hārūn al-Raḥīm and as a companion of Iḫmā ḥaḏr al-Šāfiʿī. His special patrons were Hārūn’s viziers, the Barmakīs, who really introduced him to the Court. When the Barmakīs fell into disfavour in 188/803, Jābir, then over eighty years old, returned to Kūfah where he used to live before coming to Baghīdīl. The early life of the man, say from twenty to thirty-five, must have been spent in the pursuit of alchemy probably at Tūs. If he had merely been born there he would have hardly been called al-Tūsī. Another designation of his, al-Sufi, also sets us inquiring as to where he acquired proficiency in this field. With Tūs as a common centre for both Sufism and alchemy, the search is reduced to the minimum. When he left Baghīdīl immediately for Kūfah, as an old bachelor, he could have hardly found people with whom he was familiar. Without relatives and surviving friends, his life must have been that of a stranger and he must have migrated from Kūfah to Tūs where Sufism and alchemy were very much at home. According to one source, he died at Tūs, in 200/815, which appears most probable, at the ripe age of ninety-three.

Two centuries after his death some houses in a part of Kūfah where Jābir used to live were demolished. The house which he used to occupy was found to contain a mortar of solid gold weighing two pounds and a half which went to the royal treasury of the time. This archaeological finding

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Chemistry gives much reality to the personality of Jābir with his many-sided features. Those who have been prejudiced in favour of Greek culture have nourished myths such as given by Thompson, who writes that “Jābir is said to have been either a native of Mesopotamia or a Greek who afterwards embraced Islam.” The fact that this theory originated from Suidas, who lived in the fifth/seventh century, and continued to appear as late as 1351/1932, when Thompson published his book, indicates the persistence of prejudice in favour of the Greek origin of alchemy.

The existing literature on the history of alchemy seems to be devoted mainly to textual criticism rather than to the subject proper. Hence, as late as 1933/1934 Hopkins recorded that “the fundamental work of fact-finding has so far been difficult and time-consuming that no real history of alchemy has yet appeared.” The same judgment continued to be repeated, when Taylor wrote in 1371/1951 that “it may at one be said that alchemy still remains an unsolved problem.” And both these remarks apply even more forcibly to Muslim alchemy. We have not been told as yet what the Muslim alchemists were after and particularly what was meant by ʾishās and išār; whether they were identical or whether there was a subtle difference between them. What the Europeans of the Medieval Ages got as alchemy was the system developed by the Arabs immediately before them so that observations upon the alchemy of any of these two apply to either. “Paracelsus taught,” as wrote by Thompson, “that the object of alchemy was not to make gold, but to prepare medicines.” He is the founder in Europe of ʾishās-chemistry, but it is being maintained here that this has always been the character of alchemy and is best illustrated by the popularity Jābir enjoyed among his contemporaries. The fact that Jābir could indulge in the use of a golden mortar and yet live the life of a vegetarian, bachelor, and a Sufi-ascetic shows how he was not concerned with the making of gold as a source of wealth. The other observation is from Liebig, that “the long history of alchemy clearly shows, as Liebig remarked, that alchemy was never anything else than chemistry proper to its own generation.” If instead of “chemistry” and “ʾishās-chemistry” as above we use the more familiar and precise term, pharmaceutical chemistry, then both Liebig and Paracelsus would be expressing the same idea. Here again, Jābir’s career fully confirms the remarks of Paracelsus and Liebig.

Among those who spared no energy to study the writings of Jābir may be mentioned the late Dr. Holmyard. He observes that “Jābir ibn Hayyān has many claims to be considered the first to whom the title of chemist may

18 J. Ruskā, Arabische Alchemisten, II, Gafar Almādī, Heidelberg, 1924.


21 F. Sherwood Taylor, op. cit., p. 16.

22 C. J. S. Thompson, op. cit., p. 168.

23 Maunzi Chaknashī, Alchemy and Other Chemical Achievements of the Ancient Orient, 1936, p. 1.
energy, called yin, meaning darkness. Water was frozen yin energy, and it was difficult to convert matter into energy. Matter and spirit could form only a temporary union or mixture. But if matter received the impact of an energetic principle it was changed into reactive negative energy which would then unite with the positive energy, and the result would be a real compound or a permanent union. Even a drop of the gold-making juice was taken to be bubbling with yang energy so that if a coin of copper was heated with it its ineffectual soul was expelled and the material body or copper was transformed into negative energy, and it combined with the soul or positive energy from the plant juice to make the resultant gold. Here the donor is exceptionally rich in yang energy and the ultimate transmutation of soul is due to it. Further, the donor belongs to the plant world. In countries like China and India, with their rich flora, alchemists did depend upon fresh herbs for the transformations they wished to bring about. This being denied to an alchemist like Jābir, he exploited mainly, if not entirely, minerals and metals instead; hence the importance given to inorganic raw materials and metals in the works of Arabian alchemists. Instead of kīnaya, inorganic preparations called-dāra were used.

Rūḥ.—It is necessary to describe how the minds of the alchemists worked in preparing a simple substance such as rūḥ (soul, spirit, or essence). Every substance, they must have felt, has a soul which remains like a tenant temporarily in the substance, the container of the soul. On heating the soul can be made to leave the body; on distilling the soul can be recovered more or less concentrated in the distillate. Thus a rose gives out its soul or rūḥ.

The flower is now a dead body and the soul is its perfume or essence. When such an essence or rūḥ is taken as a drug it temporarily strengthens the health of the user, like blood-transfusion or an injection of glucose. The donor here gives only one of the two elements; the material body, the flower, is discarded. When the soul of the flower is introduced into the body of another receiver it is like the temporary transmigration of the soul which must repeat at every stage if the soul is not to disappear in space.

Text.—Transmigration implies that the soul and the body do not come from the same source, the two are not permanently united, the balance between the positive energy contained in the foreign soul and the potentially negative energy existing in its present container is not ideal. All that is required is to convert the body into negative energy and reunite it with the soul previously separated from it. This is a regular art. For example, take common salt. It does not sublime. Now, if re-crystallized and mixed with alcohol, just as roses were mixed with water, and the mixture distilled, the essence of common salt evaporates along with the volatile vehicle, alcohol. The distillate is added again to the residual salt in the distilling vessel and the process of rectification is continued. A stage comes when all the salt becomes fluid, leaving no solid residue. This is the skār of common salt. The body, the material vehicle, has by now been converted into reactive energy.

86 A. J. Hopkins, op. cit., p. 137.
87 J. W. Fack, op. cit., p. 84.
89 W. Schneider, op. cit., p. 79.
negative in character, and its soul, as the positive energy, has combined with it into an inseparable whole. Salt is a mixture of a material body, or of potential negative energy, and a soul, the positive energy. Its iškār contains a permanent union or compound of positive energy coming from the soul and reactive negative energy or the transformed material body. Technically, two processes were most necessary: distillation in the first instance, to isolate the soul, the essence, or the positive element, and calcination, to purify the material vehicle, in order to convert the potential energy into the reactive negative element. Melting of metals is a very minor operation. In the case of an active gold-making plant juice, calcining of copper is limited to gentle heating. In the case of iškār of common salt no separate calcining is necessary, repeated distillation incorporates it. It is clear by now that rūj or spirit contains one element only, the positive, iškār contains two, the positive element and the negative one. Each of them belongs to the same substance and as such must necessarily contain enough quanta of both to balance like exact opposites or rather like exact supplements. When the distillation results, the substance becomes a spiritious preparation, sublimable, volatile, atomized, or potronized. Now being all energy, it represents a permanent union, inseparable for ever. When taken as a drug it makes the patient like itself, tending to become permanent. Naturally, according to the original substance, the total energy content in different cases differs and iškār also vary in their pharmacological properties. In any case an iškār is stronger than the spirit or rūj. Whereas kimyūz is a natural substance, iškār is an artificial one. To meddle with the gold-making juice in any way would be to destroy its virtues, whereas iškār can be produced only by chemical processes, above all by distillation and calcination.

Because substances like common salt are made to distill along with alcohol, such heterogeneous mixtures as contained alcohol were already treated "cloixes" by European alchemists of the Middle Ages. It will be apparent why Jābir talked mostly, if not solely, of iškār and not of kimyūz, its synonym. How iškār has been made to come from the Greek word, kúrion, merely meaning dry, cannot be explained. By constitution iškār was taken to be the purified body with its soul returned to it. It was a revivified body and a returned soul, where the two, on becoming identical, represented a third substance. The picture was essentially the same as that of man after resurrection. The soul would return to the dead body which would revive and hereafterward remain immortal. But the revived person would be a regular mutation, his body feeling neither thirst nor hunger. He would be like a spirit or ghost with a body no longer composed of matter. Hezel represents such a substance, material to look at but in fact become energy, and, what is important, also a donor of energy.

Whatever the substance iškār may have been, its use mainly decide its virtues. Jābir prepared iškār from one substance after another and as an indiscernible worker could not avoid studying the properties of inorganic acids into which he tried to dissolve his metals to purify them, instead of

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melting them alone or along with other metals. In India the metals were never purified by the use of inorganic acids but mainly by calcining them with boiled extracts of herbs. In order to have substitute a plant extract or organic acids Jābir prepared inorganic acids not for their own sake but for making iškār. His experiments spread over a wide range of substances. The preparations resulting from them must have maintained Jābir's enthusiasm and made him a master. Holmyard,24 a chemist and an author of standard text-books on chemistry, after a careful study of Jābir, rightly states that "like painting which reached its highest pitch of perfection while still in its infancy, Islamic alchemy never surpassed the level it attained with one of its exponents, Jābir ibn Hāṣaṣā." We can represent him as a noble soul, seeing diseases all over, finding no herbs to treat him with, and so taking with a vengeance to minerals as the only source of supplying remedies. Enthusiasm born under such circumstances, incorporating the personality of the worker and the poverty of the country reacting upon it, resulted in the achievement with which the world today remembers the name of Jābir. Those who do not know what iškār means, certainly not mere powders, cannot imagine the deep urge or for high aim in making them. At every stage we have to remember that Jābir was an ascetic-bachelor and a mystic-Sufi; acquisition of wealth or making of bullion gold could never have been his motive. In the absence of the right perspective much energy has been wasted in trying to separate historical data from Jābirian legends. What is still required is to isolate alchemy proper from Jābir's writings. Writers on alchemy, rather on Alexandrian alchemy, have rightly attached full importance to the early record of the word chemia. Likewise, in dealing with the history of Muslim contribution to alchemy we feel that the introduction of the word iškār played an even more significant role. Jābir apparently used it for the first time and demonstrated its claims. Paracelsus is credited with having founded astro-alchemy or having taught that the real aim of alchemy was to prepare medicines and not to make gold. Jābir would have been surprised to hear that alchemy was anything but that, and his iškār anything but highly potent, we may say, omnipotent and multipurpose drugs. Kraus4 translated from Arabic into German a text revealing what iškār can prove to be; an extract from it has also been rendered into English by Holmyard.49 Hārin al-Baghdādi's ministers belonged to the Banu Kḥālid family. One of them, Yahya, was much devoted to a lady in his harem. She fell ill. The case ultimately became so hopeless that Jābir was sent for. The report23 as coming from Jābir himself maintains: "I had a certain iškār with me, so I gave her a draught of two grains of it in three ounces of vinegar and honey and in less than half an hour she was as well as ever. And Yahya fell at my

26 E. J. Holmyard, Alchemy, p. 76.
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foot and kissed them, but I said, 'Do not do so, O my brother! And he asked about the uses of the ṭīṣr and I gave him the remainder of it and explained how it was employed, whereupon he applied himself to the study of science and persevered in it until he knew many things.' Having demonstrated such a dramatic achievement it is impossible for any sane person to have found interest in making gold instead. Jabir's alchemy consisted only in preparing ṭīṣr or wonder-drugs which were more precious than gold.

The Philosophers' Stone (Bāyiʾ Mukarram). — The preparation which marks the zenith of alchemical achievement is the Benevolent Stone (Bāyiʾ Mukarram). The alchemists called themselves philosophers or Ḥakīma as opposed to physicians or ḥabīb. The Alchemists' Stone was correctly paraphrased as the Philosophers' Stone. This is the genesis of the term. In the historical survey of the chemical arts of China by Li, we read that "Ottos, a narrative term in Chinese, first appearing in Pao-p'o tsa (a work composed about 317-332 A.D.), comes to refer to a drug or ṭīṣr which was prepared by the alchemists for prolonging life and transmuting metals. It reminds us of the Philosophers' Stone because this was considered to have the same effect as Ottos. . . . The language of the ancient alchemists is very hard to understand (a conflation recalling the judgment of Ibn Kahlīn upon Jabir). It is supposed that Ottos may have consisted of mercury, sulphur, lead, etc., a compound or mixture prepared in accordance with a theory not unlike that of Jabir, who supposed that every metal contained mercury and sulphur. The admission seems to be to the effect that the theory, that metals are composed of mercury and sulphur, did exist in China but in a vague form. Taking the simpler notion first, with Jabir all metals including gold were composed of mercury and sulphur. Davis states that, "for the Chinese alchemists, positive yin was lead instead of sulphur, negative yin was mercury." Jabir died in about 184/800. The Chinese alchemist, Chang Po-tuan, living later in 373-475/983-1082, still maintained the ancient Chinese theory that "our fellow workers must be able to recognize true lead and mercury." It is, therefore, clear that Jabir borrowed a theory as known to the Chinese but improved upon it, keeping mercury as the one element and changing the other from lead to sulphur.

The surprising feature of the Sulphur/Mercury theory about the origin of metals is that it has not been challenged by experimenters who have melted metals, calcined them, and even sublimated at least arsenic and mercury compounds. That they should have believed that iron consisted of sulphur and mercury, and that even gold consisted of the same elements, has received no explanation so far. The primitive man accepted blood as the life-giving principle

and further believed that its red pigment was the real agent. Thus redness was taken to be the active principle so that any red substance could generate blood. Of all red substances cinnabar was the nearest approach to blood in colour. When it was established by actual synthesis that cinnabar consists of mercury and sulphur, its elements came to be considered to be the elements of all metals. Animism assumed that even metals were living things, having a soul as well as a body. When negative energy froze it becomes matter and the body of the metal consists of it. The soul is represented by the positive element, one which is sublimable so that it can permeate the material body. Lead is not volatile, sulphur is; hence the Lead/Mercury theory was essentially defective and the justification of the Sulphur/Mercury modification. Further, lead and mercury do not produce a red compound, while sulphur and mercury do. But if Jabir's theory is a modification of a previous Chinese theory, how is it that in its original form it accepted lead and mercury as the elements of metals? What was required as the end-product was redness, and theorising depended upon this result. Lead heated by itself oxidizes in the air to red lead or minium. Likewise, mercuric oxide is obtained as red, orange, or yellow powder, consisting of minute crystals. Thus, the Chinese theory was, indeed, properly conceived, but it failed to include a spiritus element like sulphur, while lead obviously was not.

Alchemy as a philosophical system is based on a dualism, postulating that everything consists of two elements, of light (yang in Chinese) and darkness (yin). When the metals were ascribed their constitution, sulphur and mercury were to be taken respectively as positive (yang) and negative (yin) elements. And the realistic basis of this theory, as has been explained, came from the actual knowledge of what constituted cinnabar and the identification of cinnabar with blood. When the cosmic forces, yang and yin, are in perfect balance, it means yin exists as a negative creative energy and not as frozen matter, while yang naturally always remains spiritus; the result of their union is like that of two substances, identical in nature but oppositely charged, like positive and negative electricity. The resultant is everlasting. Pure sulphur and pure mercury are imagined to be existing as energy, even though they may not appear to be so, and their resultant, when ideal or when the two are perfectly balanced, means an everlasting union, which is gold. According to another tenet of animism, like makes like; gold, the everlasting metal, as a drug makes the consumer also immortal. Gold remaining in mines for millions of years loses this property of donation, its negative element, mercury, having become less spiritus or more material; hence gold, as a drug, must be freshly prepared. Better still it must be in a stage prior to its becoming gold, so to say, in a nascent stage when it is the ṭīṣr of gold, a ferment-like substance which will convert any metal into gold. This is the Philosophers' Stone, converting matter into energy, energizing the material or the negative element until it comes to the same level as its positive or spirituous element.

We, thus, see that rāḥ or spirit consists of only the positive element, the
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Jâbir being a mystic incorporates numerology into his alchemy, a fact discussed by some writers, above all by Stapleton. According to him, the square with the nine cells was found as a motif near Nineveh as early as 4000 B.C. But in China also from at least the seventh century B.C., if not actually from the eleventh century B.C., the nine rooms of the square of the Imperial Temple had assigned to them the first nine numbers arranged in the actual order of these numbers in the simplest Magic Square. Even Jâhir's numerology can thus be safely classed as Chinese in origin.

The Emerald Table of Hermes.—Among Jâhir's writings, Holmyard first discovered in 1342/1323 the Arabic original of the famous Latin work bearing the above name. It deals with the phenomenon of change in nature, a typical Taoist idea, couched in phrases like those used in the following quotation from it: "That which is above is like that which is below and that which is below is like that which is above." Such mystical statements are more decorative than illustrative in any other context.

Turbo Philosopher.—A Latin work of this title was very popular with European alchemists. It contained many names which were cited by Jâhir in one of his books. On that account Enka, in 1322/1323, proved that there should be another Arabic original of the Turbo and this was confirmed by Stapleton by indicating that a fourth/seventh century authority, Ibn 'Umal (see later) quoted passages from it. Pleasner having studied the problem exhaustively says, as quoted by Holmyard, that "it is the three-fold result of the cosmological discussion, the Qur'ân Creator-God, the unified world, the four elements (heat, cold, dryness, and humidity) that gives the discussion its clear direction towards the chief subject of the Turbo, alchemy." From the contents of the two classical works of medieval alchemy, the Turbo and the Emerald Tablet, incorporated in Jâhir's writings, the reputation he enjoyed in the Middle Ages can be easily visualized.

Al-Râzi (c. 251-315/865-925).—Engaged as he was in preparing elixirs, Jâhir was called upon as a consultant to use them when ordinary drugs had proved ineffective. On the contrary, Abu Bakr Muhammad ibn Zakariya al-Râzi, an account of whose philosophy has been given in Volume I (Chapter XXII) of the present work, was a physician by profession. At the age of thirty he went to Bagdad, where the achievements of Jâhir must have been narrated almost as miracles. Al-Râzi could not but have been inspired by the tradition existing at Bagdad in favour of Jâhir's elixirs. At Bagdad he decided to become a physician. As a Muslim alchemist he comes next only to Jâhir. His fame in the medical world became so high that he was consulted when a hospital at Bagdad was being extended and ultimately became its chief physician. Holmyard unwittingly remarks that "like the majority of physicians of medieval times, Râzi was led to the study of medicine by a desire to learn the secrets of alchemy."
of alchemy." In fact, alchemy has been nothing else but pharmaceutical chemistry and the physicians of those times had to prepare their own medicines. When Rāzī decided to become a physician he was probably attracted by the reports about elixirs. In other words, he became an alchemist first and a physician afterwards. Among his writings only one book dealing with alchemy has reached us. It is entitled "The Book of the Secret of Secrets" translated into German by Ruhs. 42 "Stapleton," says Holmyard, 43 "places Rāzī on an intellectual level with Galileo and Boyle." There is an illuminating article on al-Rāzī and alchemy by Heym, 44 where we read 44 that "bodies are composed of invisible elements and of empty space that lay between them. These atoms were eternal and possessed a certain size." The statement reminds us of the modern explanations of the structure of crystals. Rāzī accepted Jābir's Sulphur-Mercury-Mercury-Mercury theory of the constitution of metals but Heym says that "in the same way the attribute of saltness enters into Rāzī's scheme." He comments at the same time that "without doubt it is here [with Rāzī] that the origin of the popular conceptions of alchemy with its three elements—mercury, salt, and sulphur—can be found which reappear later in Europe and plays such an important part in the history of Western alchemy." Without mentioning Rāzī's name, Thompson 45 writes, "This Sulphur-Mercury doctrine was accepted by most alchemists until about the twelfth century; when the theory was extended by the addition of a third elementary principle, to which the name "salt" was given. It was believed to be a basic principle which gave solidity and resistance to fire. Mercury was considered to be the connecting link between the spirit and the body, and the element on which depended blood and life." The source of the Sulphur-Mercury-Salt theory not mentioned in Thompson is revealed by Redgrove, 46 who writes that "Isaac Hollandus appears to be the earliest known writer who makes mention (c. 1602/1603) of the famous Sulphur-Mercury-Salt theory." Thompson places the theory in the twelfth century; Redgrove makes it seventeenth century; while Rāzī, the real author of it, lived in the third/middle century. An explanation can also be offered as to how an alchemist of Holland came to be credited as the proponent of this modified theory. Heym writes that "in Europe throughout the Middle Ages until the seventeenth century, Rāzī's works on medicine were still part of the curriculum at Dutch Universities." It has been causally indicated that alchemy as a system of thought is based on dualism which characterizes Manichaeism and which was at its best in China. At any rate, al-Rāzī was so much influenced by dualism that Heym says, "al-Rāzī was also called a Manichean," though he gives a different

46 C. J. S. Thompson, op. cit., p. 69.
47 F. S. Redgrove, Alchemy, Ancient and Modern, 1922, p. 54.
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Stapleton and his colleagues have edited 'Umayl’s three Arabic texts and also the Latin translation in 1022/1622, along with copious notes which together make the presentation a model of scholarship. When we compare 'Umayl’s treatise with an original European work on alchemy, Splendor Solis, a classic in itself, by Solomon Trismogenis, composed about 906/1502, we get the impression that the contents and even the style of presentation are the same in both the works. The influence of alchemical literature in Arabic on medieval European writers becomes thereby quite evident.

Our present contribution will serve its purpose better if we indulge in offering in modern phraseology what these alchemists were actually after. It is a problem of science to explain how one form of energy is converted into another, e.g., heat into light. Likewise, a far greater problem, but of the same category, is to explain how matter changes into energy and vice versa. Ibn 'Umayl, like a typical alchemist, expresses this as follows: 'Turn bodies into non-bodies and non-bodies into bodies.' Haib was the energizing principle which could sublimate matter into energy. This was with regard to body, but not only. The aim was to energize the human body to make it immortal. When the soul is strengthened and the body merely reconditioned and rot thoroughly purified, life is only prolonged. The agent that purifies the human body can purify the body of a base metal as well. With a purified body man matures into an immortal being capable of flying about in the air, as Davis has clearly emphasized. With the purified body a base metal mutates into an everlasting form which is gold. Alchemical improvement ended in the permanency of form. Thus, the active agent behaved in one and the same way, converting impure body into sublime energy, resulting in man’s immortality and in the synthesis of gold. This is what Ibn 'Umayl actually meant.

Jabir ibn Hayyan (d. 707/1309)—the last authority we propose mentioning here is Jabir. One of his works, 'End of Search,' has been the subject of detailed study by Dr. M. Tašlimi of Teheran—a study which was accepted as a thesis for Doctorate by London University in 1964. Unfortunately, the thesis has not yet been published. But Holmyard summarizes it by saying, 'That there is a great deal of similarity between the ideas contained in the quotations of Jabir given in the 'End of Search' and those found in the Latin works of Geber but the correspondence is not sufficiently close to establish a definite affiliation.' Our problem has been to find how, from author to author, alchemy has actually progressed. After al-Razi or at the most after 'Umayl we find repetition of what had been said before in different words and with other

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illustrations. No wonder that Holmyard justly observes that "after Jabir there is no outstanding figure in Muslim alchemy."

Alchemy in Other Islamic Countries.—No writer to our knowledge has spoken of alchemy by Muslims outside the schools of Damascus and Bagdad. What about the impact of local schools of alchemy upon Muslims living in India, Burma, Indonesia, and elsewhere! Dr. Maung Htin Aung, Vice-Chancellor of Rangoon University, speaks as follows: "Some members (of the Burmese Science) association may be also (among those who) consider the Burmese alchemist to be a scoundrel and an impostor. But I will plead with you to spare him a sigh. Of all the religious cults that existed in Burma before the advent of Buddhism, alchemy was the noblest. Like modern science, Burmese alchemy aimed at the conquest of nature, and discovering for suffering humanity a way to preserve the human body in its vigour and beauty." Jabirian alchemy was certainly that and it is impossible to think that any two systems in incorporating such ideas did not fuse.


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Chapter LXVI

NATURAL HISTORY

A

Inasmuch as the sciences studied in any traditional civilization, that is, one based upon a divine revelation, depend upon the metaphysical and reli-

gious bases of that civilization, Muslim sciences have always echoed and reflected the central Islamic doctrine of unity (tawhid). Just as the Islamic religious and moral sciences have begun from and returned to the idea of divine unity, the natural sciences have tried to discover the interrelation of all created beings. It is a general feature of all medieval cosmological sciences1 that they seek to express the unity of all that exists. Especially in the Muslim natural sciences this goal has been central, and the idea of the unity of nature and the interconnectedness of all parts of the universe has remained as a complement to and necessary consequence of the oneness of the Creator.

Since the most legitimate and meaningful way of studying a science is with respect to its ultimate aim and from the point of view of those who have cultivated it, we shall best understand the Muslim sciences if we keep in mind that their primary aim, unlike that of the modern natural sciences which are only analytical and quantitative, has been to arrive at the unity lying behind the veil of multiplicity of natural forms by a synthetic and qualitative study of nature.2

This search for unity is clearly manifested in a general science like natural history. As studied by the Muslims, natural history covers a large number of fields and includes not only such subjects as geology, botany, zoology, 1 By cosmological sciences we mean all sciences dealing with the cosmos, includ-

2 See Seyed Hossein Nasr, introduction to the section on “Muslim Sciences” in the Mentor Foundations of Scientific Thought, Vol. II, Signet Books, New York, (in press). In his famous “’Abîd’ Al-Makhtûfî (The Wonders of Creation), alu Yahya Zakariya al-Qarawi writes that the presence of divine wisdom in every atom of the universe and in all forms of multiplicity is itself a proof of divine unity, and quotes the famous verse “ۜوَ لَمْ بِكَ آلاَّ يَكُونَنَآ وَارَّى وَاهِلَّاتِ مجَتَالَانَ” (that His sign exists in all things is a proof of His unity).

and anthropology, but also cosmogony and sacred history.3 Natural history means essentially the history of nature in the widest sense of the word, and because Muslims have never separated the spiritual and the mundane, they have usually written natural history within the context of sacred history as is seen so clearly in the universal histories like those of Tabari and Mas‘udi.

The many allusions in the Qur’an to natural phenomena and the fact that the verses of the sacred book as well as the phenomena of nature are called dhat (signs) signify that in the Islamic perspective there is a fundamental affinity between the divine and natural orders and indicate, therefore, the legitimacy of connecting sacred history with natural history.

The question of the “signs” of nature leads to another basic feature of Muslim natural history. Most Muslim scientists have sought to study nature in order to observe “signs” of the Creator in it, to witness directly the “vestiges” of God in His handiwork.4 This is a feature which seems most irritating to some modern scientists who aim to discover only the immediate and the material cause of things. But from the point of view of Islam, no science can be considered legitimate which does not ultimately consider things in reference to their divine origin and which does not take into account the transcendent cause of all finite beings. The marvels and wonders of nature and the moral and spiritual lessons drawn from plant and animal life mentioned by the Muslim natural historians, which many modern historians have ridiculed, have been from the point of view of Islam itself the most beneficial and basic elements of natural history because they have led the reader to a recognition of the divine agent present in nature.

The Islamic perspective is in a way very practical. The sciences which this perspective has nourished and matured are all in a sense useful, that is, they correspond to a basic need of man as envisaged in Islam. They may, like agriculture, medicine, and the sciences of history and society, be useful in the limited sense and fulfill man’s physical and social needs. Or, like logic and theology, they may be useful in preventing people from being misled by false reasoning. Or, finally, like the esoteric doctrines of Sufism, they may be useful in quenching the thirst for spiritual realization of the few, who seek God here and now. But Islam has never considered simple curiosity or intellectual pas-

sion either a virtue or a basic need of man and for this reason has never legitimized a science based only on curiosity.5 The desire of natural historians

3 But in this chapter we are concerned only with botany and zoology.

4 The medieval Christian scientists had a similar aim in view when they sought to observe the vestigia dei in nature.

5 Our argument does not seek to make knowledge subservient to action. Know-

ledge is always superior to action in the Islamic perspective as is indicated by such sayings of the Prophet as “One hour of meditation is better than a thousand works of charity,” or “The ink of the scholar is more valuable than the blood of the one who fights the Holy War.” What we wish to show is that in Islam a mental activity for its own sake, divorced from the spiritual and religious needs of man on the one hand and from his social needs on the other, has never been encouraged.