

But as the sons of kings and priests were the only ones permitted to learn the art [alchemy was then fostered by the priesthood as a sacred art] all its processes were kept secret. The laboratories were attached to the temples and were never entered except by the chosen few. Alchemy was honored as a divine art, and the estimation in which it was held rose in proportion with the belief that it was to alchemy that Egypt owed its riches.

From the beginning of the fifth century of our era the records of the study of alchemy rapidly increased. One of the most voluminous writers of the period was the Alexandrian, Zosimos who was looked upon as one of the greatest authorities among alchemists both of his own and subsequent times. He is said to have written twenty-eight books on the subject, of which, however, but small fragments remain. But all alchemist writers of the time are alike in this; their works are quite unintelligible. Their mythical recipes, pictorial representations, and inflated diction combine to seal the knowledge of the processes of the holy art employed by them, not only from the understanding of their uninitiated fellows, but even from one another.

We shall now have to turn our attention for a moment to political affairs, for owing to these the keeping of science was given into the hands of another people, a people who, strange it may seem, cultivated the young plant of science with a care never before exercised.

The Western Roman Empire had fallen shattered beyond recovery. The northern barbarians were trampling the effete civilization of Rome in the dust. They were paying no respect to learning and culture. People were sinking deeper and deeper in ignorance. And now in the East the half-civilized Arab tribes are preparing to finish the work of the northern hordes. United by the bands of religious enthusiasm, fused as a consequence into a powerful nation, the Arabs, under Moslem banners, begin to march west to offer to their opponents the choice of the Koran tribute or sword. Egypt is overrun and conquered in 640. The western march is continued and finally northern Africa and Spain are brought under Moslem dominion. The Arabs seem determined to carry destruction wherever they go. The magnificent library of Alexandria becomes a thing of the past, and it seems that learning is to receive its death blow. But no; in the darkest hour a sudden light bursts forth. The conquerors all at once change front; they immediately advance and rescue learning from its impending fate. With alacrity these strangers to science become ardent patrons of learning. They soon establish schools in all their towns, and some of the more important cities boast of universities. Twenty-five years after the death of Mohammed the patronage of learning, Draper tells us, had become a fixed policy with the caliphs.

Though it appears almost marvelous, while most Europeans were descending lower and lower in the scale of learning these previously untutored Arabs were devoting themselves assiduously to the mastery of the arts and sciences of the people whom they conquered, and with whom they came in contact. But they were not satisfied with what they

received; they went on developing and extending the knowledge they gained from their teachers. Mathematics and philosophy, medicine and optics were the favorite studies. But not the least attractive subject was chemistry. The germs of chemical knowledge, which had laid hidden in the brains of a few philosophers, attained to a marvelous growth among them. They greatly improved the crude chemical processes taught, and advanced chemical knowledge in the same proportion.

Though the Koran put an interdict upon magic and alchemy, yet they gave themselves up to an eager pursuit of the latter. However, they soon stripped the subject of the mystical and supernatural nonsense with which it had always been involved, thus thoroughly materializing the art.

Their medical tendencies led them simultaneously to cultivate another ancient delusion, the discovery of a universal panacea, an elixir which would cure all diseases and prolong life for ever. To find this elixir all kinds of substances were submitted to all kinds of operations. It was subsequently believed that in the same preparation would be found the philosopher's stone or the substance which would transmute the base metals into the noble.

The Arabian universities of Spain and the East became the centers of learning during the middle ages. France, Germany, and Italy sent thither crowds of anxious students. One of the important subjects taught at these institutions was alchemy. Hence, naturally, the doctrines of this enchanting subject [i. e. enchanting at that time] were spread over the whole of Europe, and were almost universally accepted. As a consequence, practical alchemists, without number, were found in every country of Europe as early as the thirteenth century, and they continued the practice of their illusory art until the death knell of alchemy was sounded but little more than a hundred years ago.

Let us now turn our attention for a short time to a few men, the apostles of alchemy, whose sincerity and desire to arrive at the truth cannot be questioned.

The first man to engage our attention, by reason of the time in which he lived and the influence he exerted, is the celebrated Arabian physician Geber, who was both physician and alchemist, and was recognized as the highest authority in each. Of his life but little is known save that he lived in the latter half of the eighth century. Even the country of his birth and the exact place of his mortal activity are unknown. Notwithstanding this, he was held in the highest regard by his contemporaries and by scientific men during the whole of the middle ages. From his numerous writings which come down to us through Latin translation, the original Arabic manuscripts never having been published, we recognize in him a man of broad culture and of widest chemical knowledge such as has never before been pictured in previous writings. Many of the numerous works ascribed to him are evidently spurious, but the authorship of several cannot be questioned as to their genuineness. In sharp contrast to the older Alexandrian alchemists, Geber describes with refreshing clearness definite chemical processes for the making of preparations, many of which are prepared by

him for the first time. He also describes many pieces of apparatus and chemical operations which have since come into general use. Thanks to such aid the chemical art was greatly developed during Geber's time, and the number of material facts pertaining to chemistry was largely increased.

Geber himself states that the aim of the art of which he treats is the artificial production of gold and silver. But he also sought to find the universal panacea previously spoken of. As to gold many fictitious excellencies had been gathered round this metal in addition to its real values. The belief had for some time been fixed in the Arabic mind that in some preparation of this metal would be found the panacea or *elixir vite*. It was thought that if gold could be obtained in solution the much desired result would be obtained. Geber, being both physician and alchemist, no doubt gave his days and nights to finding the means of making potable gold, in the efficacy of which he truly believed. To find a medicine that would cure all the ills mortal flesh is heir to and prolong life indefinitely—was not this a result worth any cost? At last he succeeded in making *aqua regia*, the king of liquids, a solvent for gold. But how great must have been his disappointment when he painfully observed that potable gold did not produce the desired results?

His faith in alchemy, however, never wavered. He regarded the transmutation of metals as a fact beyond question. He was aware that when copper was melted with tutty, an impure oxide of zinc, the golden yellow brass was obtained. Further, he knew that when copper was fused with arsenic a silver white alloy resulted. Hence had not much been done towards making gold and silver from copper? With many alchemists, especially those of a later date, a change in the color of a metal was regarded an identical with its transmutation. Again, Geber succeeded in making an amalgam of lead and mercury which so closely resembled tin that he firmly believed he had made tin. Therefore, if it is possible to make tin from other metals, why cannot gold and silver be made? To Geber and his successors but one answer came in the question—gold and silver can be made from other metals.

When the human mind observes results, apparent or real, the question at once comes up, "What is the cause of the results?" or "Why can this or that be done?" The same question was suggested to Geber in regard to transmutation. Of what are the metals composed that they may be changed one into another? In answering this question, Geber was the first to compound a chemical theory embracing all the metals. And though this theory was very far from the truth, it held sway in some form as long as alchemistic ideas were entertained by scientific men.

Geber assumed that all metals are composed of mercury and silver in different proportions and in different states of purity. Though at times he is silent as to whether these compounds are identical with the common substances which bear these names, at other times, to meet obvious objections, he states that they are not identical, but that they are of an abstract nature. According to this theory, mercury confers the properties of glasse, malleability, fusibility, and what we regard as metallic properties generally; while sulphur, on account