

Alchemists, ancient and modern from The Economist (<http://www.economist.com/node/18226821>)

This year's meeting of the American Association for the Advancement of Science looked at, among other things, the history of alchemy, deep carbon, the health of lonely people, tracking individuals in swarms and stuttering

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IN CERTAIN southern English universities of medieval foundation it is still common for those students and academics whose disciplines require no more than lots of books, brains and a means of writing to sneer at the activities of a certain tribe who are known as “northern chemists”. Such troglodytes, as their nickname suggests, often come from unfashionable parts of the country. Worse, they think nothing of engaging in actual manual labour in their pursuit of knowledge. That sort of chap is not, my dear, you know, really quite one of us...

In the view of Lawrence Principe of Johns Hopkins University, in Baltimore, such thinking was also around in the 17th and 18th centuries. And it was, as he told this year's meeting of the American Association for the Advancement of Science (AAAS) in Washington, DC, one of the main reasons why modern minds equate the word “alchemist” with “charlatan”.

Dr Principe wants to rehabilitate alchemy. He believes that most alchemists were respectable seekers after knowledge and that they were working with well constructed (if ultimately misguided) theories. The reputation of the alchemists, he reckons, was deliberately undermined by gentleman amateurs who were trying to give the emerging science of chemistry the social respectability it needed to sit at the academic high table.

The work of Dr Principe, though, also serves as a useful reminder to modern scientists that even the most cherished theories need to be treated with constant scepticism. This is because, as the alchemists found out, it can be all too easy to see in your results what you want to see, rather than what is actually there.

The philosopher's song

Alchemy's roots lie in Hellenistic Egypt. It was compounded from a mixture of practical knowledge of things like metallurgy, pharmacy and glassmaking with the Greek practice of analysing and theorising about the world that is known as philosophy. These Hermetic ideas (Hermes was the legendary founder of alchemy) were picked up and developed by Arab scholars when Egypt fell to the armies of Islam in the seventh century, and then transmitted to Europe during the scholastic renaissance of the 12th century.

For the next five centuries, Dr Principe thinks, alchemists were the “northern chemists” of Europe. Their discipline, tinged with philosophy though it might have been, was not quite philosophical enough for the intellectuals who were creating the network of universities that spread from Bologna, via Paris, to Oxford, Cambridge and elsewhere. Though it brought practical benefits, and even attracted the attention of eminent scholars like Thomas Aquinas, alchemy was not granted admission to the curriculum.

Moreover, the most famous alchemical pursuit, chrysopoeia (the transmutation of base metals into gold), was viewed with a mixture of greed and terror by the political authorities of the time. Such knowledge might bring enormous wealth to those who had it, but it had the ability to destroy the currency. Many countries passed laws forbidding the transmutation of metals, even as their kings secretly patronised alchemy hoping to gain an advantage over other monarchs. Alchemists, to borrow a phrase from Winston Churchill, were to be on tap, not on top.

And thus it might have remained, but for Robert Boyle, a rich well-connected Englishman, who was interested in alchemy but embarrassed by his interest. In an essay written in 1663 he apologised for his curiosity about this “empty, vain and deceitful study”. Similarly, Herman Boerhaave, a famous Dutch scholar born in 1668, faced colleagues who described his interest in the field as “vulgar”. To distinguish themselves from the riff-raff Boyle, Boerhaave and their fellow gentlemen-scientists took to describing themselves as “chymists”. Indeed, Boyle's most famous book, “The Sceptical Chymist”, was published exactly 350 years ago, in 1661.

Over the next few decades, according to Dr Principe's analysis of their letters and publications, chymists in England, France and elsewhere deliberately distanced themselves from the alchemists, casting themselves as intellectuals, the alchemists as charlatans, and the two activities as distinct. They did not always think alchemical theory was wrong. Dr Principe can find no essays or papers from the period that attempt to refute the idea of metallic transmutation, and some socially respectable chymists were still looking for the secret of chrysopoeia as late as 1760. It was merely that the chymists thought alchemy unrespectable. They did, indeed, succeed in getting chymistry into the academy—even if it is still not quite top-table in the views of some. And they did so, in the end, by being right when the alchemists were not.

The real problem with alchemy—as the title of Boyle's book points out—was not that it was lower-class, but that it was not sceptical enough. Alchemical theories were not stupid. For instance, lead ore often contains silver and silver ore often contains gold, so the idea that lead “ripens” into silver, and silver into gold, is certainly worth entertaining. The alchemists also discovered some elements, such as phosphorous. But in the end, too many alchemists would not let go of their theories, even as knowledge advanced.

The ripening of knowledge

To illustrate how alchemists were thus bamboozled, Dr Principe conducted an alchemical experiment using the notebooks of George Starkey, an alchemist who was born in Bermuda, educated in Massachusetts and then lived in England, where he worked alongside Boyle. The experiment which Dr Principe reconstructed showed just how alchemists might truly have believed they were thinking the right way about the transmutation of metals.

Following Starkey's recipe, a formula that took weeks to prepare, Dr Principe made what Starkey had believed was philosophical mercury—a crucial ingredient of the Philosopher's Stone that would ripen lead into gold. Alchemical theory was rife with botanical analogies of ripening, growth and seeding. When Dr Principe prepared philosophical mercury (actually an amalgam of mercury, gold and a small amount of antimony) according to Starkey's instructions, a strange thing happened. As it solidified, it grew into a treelike structure. For someone primed by his theory to see transmutation as akin to a biological process, this must have been a wonderful confirmation that he was on the right line, and that the Philosopher's Stone was just around the corner.

It was not, of course. What was actually round the corner was disgrace and opprobrium at the hands of the chymists. But there is no shame in honest error. Those who believed, before Copernicus, that the sun goes round the Earth are not regarded as charlatans, even if the clerics who subsequently tried to stop the newer idea being accepted are usually consigned to intellectual purgatory. The pre-Copernicans were merely wrong, not foolish—as, no doubt, many dearly held theories of modern science will turn out to be wrong. Time, then, to rehabilitate the alchemists. They may not have been right. But they were wrong in interesting ways.