
Speaking About the Other Ones: Swedish Chemists on Alchemy, c. 1730-70

*Hjalmar Fors**

On the seventh of June 1766 a prominent Mine Councillor, and leader of the Swedish Board of Mines, faced a difficult task. His name was baron Daniel Tilas, and he was standing in front of the Royal Swedish Academy of Sciences, in the main assembly room of *Riddarhuset*, the Swedish House of Lords. Tilas' problem was that he was to give an oration to the memory of Count Gustav Bonde, a recently deceased Fellow of the Academy. Bonde had been one of Sweden's most influential politicians. In the 1730's he had been the second most influential man in the country, and he was the twentieth generation of his family to hold the highest position that a Swedish nobleman could aspire to, namely, that of Councillor of the Realm. Tilas had probably been given the task because of his deep insight into the sciences, his noble rank, and his well known diplomacy and tact. The problem was that Count Bonde had been a practicing alchemist and hermetic philosopher. This meant that his views on science in general, and chemistry in particular, were quite different from what Tilas and most of the assembled Fellows of the Royal Swedish Academy of Science believed to be true.¹

There can be little doubt, that by the time of Bonde's death, young chemists had little more than ridicule for his alchemical views. In the words of the famous chemist and mineralogist Axel Fredrik Cronstedt, from a 1758 manuscript:

"[Alchemists,] how should they be known? Answer: [—] one should not search for them among such, who have learnt the operations and basics with mechanical chymists. Mineralogy is even less needed."²

Cronstedt also made public attacks on alchemy. In 1760, he gave an oration to the memory of Henrik Teophil Scheffer at the Royal Swedish Academy of Sciences. Scheffer had been the chief assayer of the Board of Mines and also one of Cronstedt's teachers. Cronstedt used the occasion to attack alchemy and its goals, calling them mystical fancies. He said that, "[d]owsing-rods, amulets, the philosopher's stone and potable gold are the fabrications of [catholic] Monks, without

* Division of History of Science and Technology. Royal Institute of Technology, Stockholm. hjalmarf@kth.se

doubt to mimick similar things, that the pagans bragged about.”³ Cronstedt was later echoed by Torbern Bergman, Professor of Chemistry at Uppsala, and an influential chemist of great international renown. In his 1769 oration to the memory of mining expert and chemist Anton von Swab, he called alchemical theorising “fancies, that usually have the bad luck to, when closely examined, turn into unfounded figments of the imagination.”⁴ Sentiments like these were common among chemists in Sweden in the 1760’s and often expressed in public at the gatherings of the Royal Swedish Academy of Sciences.

In his oration, Tilas first talked about Bonde’s youth and his political achievements. He then proposed to his listeners, that they would join him on a visit to the Count, to see what he did in his spare time. Tilas now switched style, and painted the picture of inviting his listeners into the home of count Bonde:

“But where does our Count go now? We see him hurry into his Cabinet, to throw off his scarlet robes [...]. Let us follow! We find him at work in his Laboratories, preparing assaying furnaces, muffles and crucibles [...] preparing all kinds of mineral samples to find out their contents. All of this I can reasonably recognize.”⁵

And that he would, as Tilas was an expert mineralogist and metallurgist.

After this visit to Bonde’s chamber of assaying, Tilas followed the Count into an inner chamber, his chemical laboratory. He continued:

“... and I can also reasonably understand, what the meaning of the inner chamber is, where [he] works with various other kinds of furnaces, retorts and recipients, conducting chemical investigations.”⁶

Here Tilas recognised what was happening, but since he did not claim to be an expert chemist, he held a low profile. But behind Bonde’s chemical laboratory, there was another door, and now Tilas did not understand anything anymore:

“...furthest in I see another room, intended for deeper reflections, that I in my ignorance, do not dare to describe, and now I notice, although too late, my own lack of ability to explain to you, Gentlemen, [...]the deep insight into the hidden secrets of nature possessed by our Count.”⁷

Tilas then sneaks into the inner room, and from behind the chair of the Count, he steals a look at the papers on his table, and sees a printed treatise: *Clavicula Hermeticae scientiae* or, the Lesser Key of Hermetic Science, from 1732.⁸

In this way, Tilas could both praise Bonde for his achievements as a public man, and reveal his secret life as an hermetic philosopher. The device he used was a stroke of inspiration. Bonde had led a public life in service of his country. He had

been one of the heads of the Cap party. Furthermore, he was one of the few leaders of the Caps who was also widely respected by their main opponents in politics, the Hats.

Scarlet was the ceremonial colour signifying a Councillor of the Realm. When Bonde, in Tilas's account, "threw" off his robes, he left the public life behind and entered a private sphere that was, implicitly, disconnected from his high office. By talking about the three rooms of Bonde's laboratory, Tilas was able to distance Bonde the public man, from Bonde, the secret hermetic. The first room, the chamber of assaying, had its door open to the outside world, and the world of public utility. Hence, it was the closest room to Bonde's life as one of the country's leaders. It was dedicated to utilitarian purposes and connected Bonde with his time as a President of the Board of Mines. The middle chamber, or chemical laboratory, was partly dedicated to utilitarian purposes, and partly to the lofty realms of chemical theory and speculation. The third, hidden room, was pictured as Bonde's secluded refuge, and as such, it did not really harm anyone that it was there, did it?

Tilas extremely clever oration did not save Bonde's face for posterity. His latter day biographers have described him as cloven in two. On the one hand the rational politician, on the other hand a scientific dilettante and weirdo - a recent researcher has even described him as "monstrous".⁹ But such descriptions tend to forget that his political work intersected with his alchemical interests: exactly the fact that Tilas had attempted to gloss over. Bonde was a learned man, and a steady supporter for science. It was during his time as President of the Board of Mines (1721-1727) that the chemical laboratory of the Board had been re-established after a long period of decay. At the Board, Bonde also supported attempts to convert iron to steel without loss of weight (a form of transmutation). Furthermore, as Chancellor of Uppsala University in the 1730's, he had proposed that the University should establish a chemical laboratory, although this did not happen until the 1750's.¹⁰ Hence, Bonde's support for chemistry should not be underestimated, especially since he was part of the innermost circle of the Swedish government until 1738, and a well respected figure even among his political opponents after his and his party's fall from power that year.¹¹

However, the re-establishment of the *laboratorium chymicum* of the Board of Mines coincided with what would become a permanent split in the previously unified "chymical" tradition.¹² What from now on would be called **alchemy**, or the Paracelsian and Hermetic philosophy and its associated practice of gold-making, would never again find a place at the Board's laboratory. Instead, the laboratory of the Board, and the new Chair of Chemistry at Uppsala would become

strongholds for mechanical **chemistry**. This new “chemistry” was viewed as a part of the new experimental physics in the tradition of the Dutch teacher of chemistry, Herman Boerhaave. Georg Brandt, the leader of the laboratory of the Board from 1727, was a student of Boerhaave’s. Johan Gottschalk Wallerius, Uppsala’s first Professor of Chemistry from 1750, based his courses and his main textbook on Boerhaave’s *Elementa Chemiae* of 1732. The work can thus be regarded as the *ur-text*, or ultimate source, for much of the later Swedish eighteenth century chemistry.¹³

Yet, Boerhaave’s criticism of Paracelsianism is absent from the published works of both Wallerius and Brandt, and both have been portrayed as old-fashioned alchemists, but for different reasons. Nevertheless, neither of them really followed Bonde all the way into the last alchemical room, in Tilas’s metaphor. There is however some evidence that Brandt conducted alchemical experiments in his old age. Torbern Bergman, in his oration to the memory of Georg Brandt, claimed about the older chemist that: “Brandt was not completely free from Alchemical trials the last years of his life; but He set them up and completed them from another foundation and urge, than the so called Gold-makers.” Cronstedt, too, makes a similar remark to this effect.¹⁴ Passages like these have been interpreted as an indication that Brandt was an alchemist. It is also possible to interpret Brandt’s interest in gold-making as a part of a Boerhaavian program of “experimental history.” That is, to collect and repeat the operations of the arts and crafts, including those of the chymical tradition, to evaluate them and make the useful processes public.¹⁵ Furthermore, in the relatively private forum of his chemical lectures, Brandt was disdainful of seekers of the philosopher’s stone, and attempted to disprove Paracelsian matter theory.¹⁶ Therefore the lack of public criticism of alchemy in Brandt’s work, should rather be taken to indicate that such a public stance would have been inopportune before the 1760’s. And given Bonde’s reputation and influence, it might also have been a really bad career move.

In the case of Wallerius the issue is more complex. Historians of science Sten Lindroth and Tore Frängsmyr have gone to some length to portray Wallerius as a kind of scientific misfit, and as an old-fashioned chemist.¹⁷ Frängsmyr has even presented the view that Wallerius was an alchemist, and as such, a deviant in his own scientific culture and time. This latter view, however, is neither supported by any eighteenth-century documents, nor by any other scholar who has studied Wallerius’s chemistry. Quite to the contrary, Wallerius was one of the most internationally well-respected Swedish chemists and mineralogists throughout the eighteenth-century.¹⁸ Let us return to the already quoted passage from

Cronstedt's critique of alchemy, to hammer home this point, since the passage continues with a reference to Wallerius:

"[Alchemists,] how should they be known? Answer: [—] one should not search for them among such, who have learnt the operations and basics with mechanical chymists. Mineralogy is even less needed: For as I have heard from [the alchemist] Baron Hendrich Wrede, all of the printed works of Wallerius were of no use [for alchemy] except some remarks, about the solidification of water into earth or rock and on the mercurification of metals. Therefore when You see nothing of the chemistry of these times — You are in the right company."¹⁹

It is left to the readers to decide for themselves, if they want to trust Wallerius's former student Cronstedt's judgement, or Frängsmyr's. However, Wallerius differed from Cronstedt insofar as he refused to disown alchemy. In a letter to Torbern Bergman, Wallerius criticised Bergman's dismissal of alchemy, (quoted above), saying that: "Even if alchemical trials have failed for many who are less knowledgeable about the properties of metals, never the less, chemistry have mostly to thank alchemy for important discoveries. Maybe, for that reason, [alchemical trials] should not rightfully and without exception, be called *fancies*."²⁰ This was a much more cautious position than Bergman's, but by no means an alchemical one. It can by the way be noted, that Bergman in his later years developed an appreciation for, and a more positive attitude to, the "alchemical" trials found in the older chymical literature.²¹

Conclusions

Chemists' views about their colleagues and their predecessors have long been used to separate the bad guys from the good guys in the history of chemistry. This is considered to be a faulty practice, which obscures the development of chemistry in the eighteenth century. Many of the views on alchemy quoted in this paper, have been taken from orations written by Swedish chemists active in the 1760's, and celebrating the memories of older, recently deceased, colleagues.

As the historical records of the views of the older chemists, they have often been taken at face value, while they really should be treated with much caution. They often contain attempts to rescue the reputation of beloved teachers and friends by emphasising that their work proceeded from mathematics, physics and Newton, rather than theoreticians internal to the chemical tradition, who were now branded as alchemists, and hence as "bad influence". To some extent, they may also con-

tain attempts to make irritating and formerly or presently influential oldsters suspect: such may for example have been the case for Tilas's oration on Bonde.

That the story was not as simple as the victory of the "good" chemists over the "bad" alchemists, should however be clear from the fact that mechanical chemistry gained its first foothold in Sweden at the Board of Mines when Bonde was its president in the 1720's. That said, all of the chemists discussed in this paper, Bonde excepted, pursued mechanical chemistry. That is, they sought to explain chemical transformations in mechanical terms, and they distanced themselves from the Paracelsian tradition to a lesser or greater degree. Yet they choose different strategies to deal with their alchemical heritage.

Before the 1760's, Swedish chemists did not produce any public criticism of alchemy. In the case of Brandt, Cronstedt and others at the Board of Mines, there is clear indication that they really were very critical of Paracelsianism and the quest for the philosophers' stone. This critique remained in manuscripts, private correspondences, and lectures held before small groups of students. One explanation for this cautious attitude was probably the prominent position and influence of Gustav Bonde, but there were most likely also other reasons. In the case of Johan Gottschalk Wallerius, the Professor of Chemistry in Uppsala, it was somewhat different. Wallerius had a positive view of his discipline's past, and was not afraid of saying so. Due to the lack of critique of alchemy in Swedish public life, it may also have bolstered chemistry's to connect to the discipline's history. In the 1760's all this changed. As the older generation was leaving the scene, it became safe and fashionable to slash the connection of chemistry to alchemy altogether. But how this shift interacted with other changes that took place in Swedish scientific and public life in the 1760's is another story, one which remains to be investigated.

Notes

¹ Daniel Tilas, *Åminnelse-tal öfver... Gustav Bonde... Hållit i Stora Riddarhus-Salen Den 7. Junii 1766* (Stockholm: Lars Salvius, 1766) 1-47. On Bonde see G. Carlquist "Gustav Bonde" in *Svenskt Biografiskt Lexikon* vol. 5, 362 -377, and Carl Michael Edenborg, *Gull och mull* (Lund: Ellerströms, 1997) for an interpretation of his alchemy.

² [Axel Fredrik Cronstedt] *Herr Geschwornen Axel Fredrik Cronstedts Bref til Hr om den mystiska naturkunnogheten. Stockholm den 20 Maj 1758*. Bergskollegiums arkiv, huvudarkivet D VI:3, Riksarkivet (National Record Office) Stockholm, 103. This and all following quotations are translations made by the author from Swedish originals.

³ Axel Fredrik Cronstedt, *Åminnelsetal Öfver ... Henric Teophil Scheffer ... Hållit i Stora Riddarhus-Salen, Den 17. September 1760* (Stockholm: Lars Salvius, 1760) 1-31, on 14.

⁴ Torbern Bergman, *Åminnelsetal öfver ... Anton von SwabHållit i Stora Riddarhus-Salen Den 29 Junii 1768* (Stockholm: Lars Salvius, 1768) 1-54, on 27.

⁵ Tilas, *Åminnelse-tal öfver Gustav Bonde*, 30.

⁶ Tilas, *Åminnelse-tal öfver Gustav Bonde*, 30.

⁷ Tilas, *Åminnelse-tal öfver Gustav Bonde*, 30-31.

⁸ Tilas, *Åminnelse-tal öfver Gustav Bonde*, 31.

⁹ Edenberg even includes the word “monstrous” in the full, (baroque-length) title of his alchemical biography of Bonde. See Edenberg, *Gull och mull*.

¹⁰ Svante Lindqvist, *Technology on trial: The introduction of steam power technology into Sweden* (Uppsala: Almqvist & Wiksells, 1984) 136-37.

¹¹ For a source that indicates that Bonde also made informal approaches to other politicians, trying to convince them of the utility of chemistry, see Fr. Wilh. Ehrenheim (ed.), *Tessin och Tessiniana* (Stockholm: Johan Imnelius, 1819) 382.

¹² For these distinctions, see William Newman and Lawrence Principe, “Alchemy vs. Chemistry: The etymological origins of a historiographic mistake” *Early science and medicine* 3:1 (1998) esp. 38-41, and Principe, *The aspiring adept: Robert Boyle and his alchemical quest* (Princeton, 1998) 8-10.

¹³ Hjalmar Fors, “Kemi, paracelsism och mekanisk filosofi: Bergskollegium och Uppsala cirka 1680-1770” *Lychnos* (2007): 211-44 on 175-76, 183, and Fors, “Occult Traditions and Enlightened Science: The Swedish Board of Mines as an Intellectual Environment 1680-1760” in, *Chymists and chymistry: Studies in the history of alchemy and early modern chemistry* ed. L. Principe (Sagamore Beach: Science History Publications/USA, 2007) 239-52.

¹⁴ [Cronstedt], *Bref om mystiska naturkunnogheten*, 101.

¹⁵ Torbern Bergman *Åminnelse-tal öfver framledne Bergs-rådet och medicinae doctoren, samt K. Vetenskaps sällskapets i Upsala, och Kongl. Academiens i Stockholm ledamot, Herr GEORG BRANDT*, (Stockholm: Lars Salvius, 1769). On Boerhaave and experimental history, see, Ursula Klein, “Experimental History and Herman Boerhaave’s Chemistry of Plants,” *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, 34, (2003):533-567 on 537.

¹⁶ [Georg Brandt] *Föreläsningar i kemi* D 1450a, Uppsala Universitetsbibliotek (Uppsala University Library) henceforth UUB, [pp. 135-137, 180-193].

¹⁷ Sten Lindroth, *Svensk Lärdomshistoria: Frihetstiden* (Stockholm: Norstedt, 1975) 402-3. Tore Frängsmyr, *Sökandet efter upplysningen: En essä om 1700-talets svenska kulturdebatt* (Höganäs: Wiken, 1993) 105. For a more exhaustive critique of the positions of these two scholars, see Fors, “Kemi, paracelsism”, note 72.

¹⁸ See f. ex. Fors, Vetenskap i alkemins gränsländ: Om J. G. Wallerius *Wattu-riket*”, *Svenska Linnésällskapets Årsskrift* (1996/97): 33-60. Christoph Meinel, “Theory or practice?: The eighteenth-century debate on the scientific status of chemistry” *Ambix* (1983): 126-9, J. R. Partington, *A history of chemistry* vol.3 (London, 1962) 169-172, Henry Guerlac “Some French antecedents of the chemical revolution” *Chymia: Annual studies in the history of chemistry* 5 (1959): 100-1, Hugo Olsson, *Kemiens historia i Sverige intill år 1800* (Uppsala, 1971) 108-115, esp. 113-4. Nils Zenzén, “Johan Gottschalk Wallerius 1709-1785 and Axel Fredrik Cronstedt 1722-1765” in, *Swedish men of science 1650-1950* ed. S. Lindroth (Stockholm, 1952) 92 –97.

¹⁹ [Cronstedt] *Bref om den mystiska naturkunnogheten* 103.

²⁰ Letter from [J. G. Wallerius] to Torbern Bergman in *Svensk brevväxling till Torbern Bergman* G21 UUB, 675.

²¹ This is evident from Bergman’s *Manuscripta T. Bergman vol. 4. (Biografiska och litteraturhistoriska anteckningar om kemister m. m.)* D 1459 d UUB.

