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From 20 to 22 November 2019 the International Conference “Alchemy and University – Alchemie und Universität” took place at the Herzog August Bibliothek Wolfenbüttel. It was organized by Ute Frietsch (HAB Wolfenbüttel, Humboldt Universität zu Berlin), as part of the project “Epistemic Change: Stages of Early Modern Alchemy”, funded by the DFG (German Research Foundation), and in cooperation with Volkhard Wels (Freie Universität Berlin).

Johann Hartmann apparently was the first and only professor of alchemy. The history of alchemy, alchemical teaching and the university however is far more complex than it may seem. More detailed research shows that a profound transformation of knowledge, teaching structures and scientific methods was necessary, to slowly adapt alchemy to the norms and traditions of early modern university as well as vice versa. Alchemically interested people in different social positions and networks exchanged and transformed this knowledge. Universities and rulers however often had a hard time in finding a way to deal with alchemy and its proponents. These processes of acceptance and denial were topics of the International Conference on “Alchemy and University” at the Herzog August Bibliothek Wolfenbüttel.

The public opening lecture to the conference was given by Bruce T. Moran (University of Nevada/USA) on “The Experience of Things in the Making and the Abstractions of the Made Thing: Networks, Recipes, and the Contradictions of Alchemy between the Kassel Court and the Marburg Classroom”. Moran focused on the relevance of alchemical "maker's knowledge" in different networks. That in Marburg 1609 lectures in Chymiatria were established, was a result of the collision of courtly and university networks: In the beginning, the university disfavoured the courtly enthusiasm for alchemical practices, because these practical experiences (e.g. glass production) were embedded into a context of Paracelsism and myths. After court physicians turned to alchemy, there was an exchange of recipes from Basel to Kassel. It was Jacob Mosanus, who linked the court network with the university. In the university’s tradition however, it was not enough to know, what a thing did, but also necessary to know, why it did, what it did. The first chymiatric professors Johann Hartmann and Heinrich Petraeus tried to find compromises between their Hermetic alchemy and the Galenic medicine, thus subordinating alchemy into the medical faculty. It is not clear, if calling them the first professors of chemistry is correct: As Andreas Libavius stated, the making of things alone does not make a discipline.

The second day of the conference started with the introductory lecture “A Desideratum of Research: The Relationship between Alchemy and University” by Ute Frietsch, who gave a brief overview of current research issues. In the following she discussed these issues by focusing on the local university of Helmstedt. In its

beginning, Helmstedt was a place for Aristotelian ‘Philosophia Dogmatica’, where protestant students were educated. Despite the execution of some alchemists, its founder Duke Julius however collected alchemical books (later becoming the basis of the Wolfenbüttel Library). His son and Helmstedt University’s first rector, Duke Heinrich Julius, was even more interested and practically involved in alchemy. Since the beginning, alchemy was covertly and sometimes even openly present at this University. After Giordano Bruno left Helmstedt, Duncan Liddel became professor of mathematics and later of medicine. Despite criticizing Jakob Horst, whom he identified as a Paracelsian, Liddel himself was not a strict adversary to Paracelsism, as the annotations in his library books show. In the course of the 17th century, chymical exercise became more and more accepted at the ‘Juliana’. When Hermann Conring had a dispute with the Danish professor of medicine Ole Borch about the existence and relevance of Hermes Trismegistos, he argued philologically. Nevertheless, he recommended practical experiments, as it came to disproving Paracelsism. Conring’s goal was to abolish the influence of old authorities he thought of as obstructive for scientific work. In 1669, Heinrich Meibom started to teach alchemical exercises in private lectures, in 1681 he rebuilt his private laboratory for this purpose. In the same year Johann Andreas Stisser joined the faculty of medicine, who later on became its first professor of chemistry. The time of Helmstedt University and its prominent (al-)chemists ended with Gottfried Christoph Beireis, who – due to his self-fashioning as a possessor of the philosophers' stone – became a symbol for the secretive ‘magical’ alchemist, but also for the ruin of this university.

In the following paper “Formatting chemical knowledge. Some introductory remarks” Volkhard Wels talked about the conversions, chemical knowledge had to undergo, before it could be taught at a university. These formations of knowledge can be divided into four kinds: logical vs. experimental, textual vs. craft, written vs. oral, public vs. private. In premodern times, a logical structure was an essential part of an art or science. While universities were organized in logic forms of knowledge, alchemy created knowledge in an experimental way, whereas Paracelsus despised the academy and saw experience as the main factor of gaining knowledge. Premodern professors typically worked with knowledge in texts they commented on, which was problematic for alchemy with its lack of ancient authorities, and led to the invention of Basilius Valentinus. In alchemical tradition, knowledge was passed on orally by master to apprentice. Short texts, florilegia, and metrical forms were used for memorization. Arcane images could have been used as memo-technical help, because images are easier for memorising than orally learned knowledge. At many courts, alchemists were financed as physicians and for the improving of mining. Their knowledge had economic value, so it had to be kept secret. Johannes Kunckel is an example for this, as he regretted not to be able to tell how he made Gold-ruby glass. University texts on the contrary had to be clear and open, in order to be used for teachings and exams.

“The first public/private courses of chemistry in Paris up to William Davisson” were the topic of Didier Kahn (CNRS, Paris). The history of chemistry at French

universities started with Pierre Paulmier, who became doctor of the faculty of medicine in Paris in 1596. He might have given the very first lectures on chemistry in France. When it became known, that he was interested in chemistry, he was dismissed. At the court however, there were chemical physicians, such as Jean Ribit de la Rivière, Joseph Du Chesne or Theodore Turquet de Mayerne. Jean Beguin, who might have attended chemical teachings in Sedan, began to give his first lectures in 1608, either to stop the war between Mayerne, Du Chesne and the academy or to meet requests from students and friends. In this context he also wrote his famous book “Tyrocinium Chymicum”. Étienne De Clave defended the 14 theses against Aristotle and gave 25 courses about them. After he was arrested and exiled for backing the 14 theses, he was forbidden to teach anything against old authorities or theology. There is solid proof, that he taught chemistry, because of his students, who carried on his work. After his death, they credited him with the “Cours de Chimie”. Other important figures were William Davisson and Annibal Barlet, who taught chemistry in France in the 1630s to 1650s. The “Affair of the Poisons” and the following necessity to license chemical furnaces led to a strong request for chemical courses, making chemical teaching in France popular.

The following paper by Thomas Hofmeier (Historisches Museum Basel) was about “Basel, The Capital of Alchemy”. He explained that 16th century Basel – have had good foundations for research, while its inhabitants felt not much obligated to follow official rules impeding their work. Johannes Oporin, despite being Paracelsus’ former famulus, became a very successful printer. He was the first to print alchemical texts and usually hired supporters to influence the censors, when they wanted to forbid a publication. His many influential friends helped him out of prison, after he had been arrested for publishing the first Latin translation of *Alcoran*. The professor of medicine Felix Platter, son of Oporin’s collaborator Thomas Platter, became the most important figure of medicine in Basel, when he married his daughter to the son of the surgical guild-master Fritz Jeckelmann, bringing surgery and medicine, guild and university together; a tradition, that went on for three generations. Felix Platter did many autopsies, although only very few were public and official. When he was unhappy with the description of a death course and was not allowed to do an autopsy, he secretly dug out the grave at night and brought the body home for autopsy. When it came to anatomy, Platter’s rival was Leonhard Thurneysser, alchemist and strenuous printer. Both might have copied from one other. Theodor Zwinger was the professor of medicine, who made alchemy popular at the university. Pietro Perna took over Thomas Platter’s printing shop and next to working as unofficial university editor he tried to publish complete editions of texts by old alchemists, again not undisputed.

Elisabeth Moreau (Princeton University) gave a paper on “Physiology and the University of Marburg” about theory and practice of alchemical medicine. Johann Hartmann and Heinrich Petraeus were the very productive first professors of medicine. In Petraeus’ disputation for gaining a professorship, published in the compilation “Disputationes Medicae”, his way of hermetic medicine is shown. Petrus Severinus had formulated similar concepts about “The Idea of Philosophical

Medicine” in his book before. Petraeus integrated Paracelsian ideas like his concept of balsam into a Galenic view of the body, connecting vital sulphur to inner heat. This led Andreas Libavius to criticise Hartmann for inconsequently adopting Paracelsism to Galenic ideas, even if Petraeus was the actual target. The text of Petraeus’ disputation mainly fits in a Paracelsian framework, based on ideas by Daniel Sennert. However, the disputation is neither didactically nor structurally understandable without the knowledge of Sennert’s texts. In his disputation, Petraeus wanted to show a new compromise in the battle between existing positions in alchemy by only including some ideas of the Galenic school. This should show his qualification for becoming a professor.

The following lecture was given by Hiro Hirai (Columbia University) on “Daniel Sennert and theological debates at Wittenberg University”. Daniel Sennert was one of the first professors of medicine, who also published chemical works. He focused on working with metals, dissolving and transforming, and used experiments to prove his theories. He criticized Paracelsus for foolish ideas and imperfect knowledge, Paracelsians for acting like a sect, and both for confusing the terminology. Sennert’s ideas caused some theological debates: He became the prime target of criticism in Johannes Freytag’s book “De Formarum Origine”. In his polemic against Sennert, Johannes Freytag collected contradictions which he published under the title “Detectio et solida refutation novae sectae Sennerto-Paracelsiae”, calling Sennert and the Paracelsians heretics, while denouncing metempsychosis and palingenesis. In “De origine animarum in brutis” he argues, that Sennert’s theory would lead to animals having souls, which was theologically impossible. Although the dispute with Freytag damaged Sennert’s reputation, he could keep his position.

Kaspar von Greyerz (Universität Basel) dealt with Sennert’s heritage in England and specific connections between academia and non-Latin publishing in his lecture on “Seventeenth-century English translations of Daniel Sennert’s works”. In the 1650s and 1660s numerous English translations of Sennert’s texts were published for a broader English public. Nicholas Culpeper is an important figure, as he was responsible for many (mostly direct) translations of Sennert’s text, where he claimed co-authorship or even authorship. The book “Chymistry made easie and useful”, which he edited, was no direct translation. As it turns out, Culpeper’s book with 160 pages is a condensed version of another version Claude Bonnet made from Sennert’s 670-sided original: an interesting example of the way, texts spread in Europe. After Culpeper’s death, printers used his good name as a selling point; also press piracy occurred in the context of Sennert-translations. The background of why Daniel Sennert was a bestselling author in 17th century England may have been an overall occult interest. When around 1700 the public turned to a mechanistic view on nature (Newton), the interest in Sennert subsided. When in 1704 the last English translation of a book by Sennert was published, most of his works had been translated.

Georgiana Hedesan’s (Oxford University) paper was about “The Alchemical Philosophy of Jan Baptist Van Helmont in the Context of University Teaching in

Leuven/Louvain", revisiting van Helmont's youth in Leuven and how the university of Leuven influenced him. In Helmont's time, Leuven was the place of a very important university, the catholic competitor of the Protestant University of Leiden. It was a hotspot for Augustinus-studies, which became a problem in the counter-revolution, when the Catholic Church started to turn against Augustinus, while Leuven with its professor Michael de Bay wanted to intensify these studies as reaction to reformation. De Bay however was so popular, that even a direct condemnation by the Pope did not stop the university from promoting him. The other religious faction in Leuven was that of the Jesuits, who wanted to undermine the university, but were rather weak. Van Helmont came to Leuven very early and finished his studies at the age of 17. He wanted to become a monk, but his stoicism was in conflict with this wish. So he began to study theology at Leuven's strongest faculty, but then also started to visit courses in medicine by the Hippocratic Cornelius Germer, where he first disliked Paracelsian ideas. Van Helmont disagreed with Martin Delrio, the famous expert on witchcraft and magic, on all magic being daemonic and attended optical and alchemical experiments led by Jesuits, where he learned about alchemy. Because he found too less information on medicine and because his theology clashed with the Jesuits', van Helmont turned to Paracelsism, which he probably encountered at Leuven. His pseudo-religious enthusiasm therein, as well as critique against catholics and protestants became a problem for van Helmont, as he was denounced to the Spanish Inquisition, which put him to house arrest for three years. After he was released by the bishop with help from Jacobus Boonen, van Helmont moved from Leuven to Leiden, but stayed catholic.

The topic of Anette Marquardt and Bettina Wahrig (Universität Braunschweig) was „The Schneider Collection", which is located at the TU Braunschweig. More than 1200 historical remedies and apothecary products from 17th to 20th century were collected from museums, historic inventories of pharmacies and other sources by Professor Dr Wolfgang Schneider (1912-2007) between 1950 and 1970 for research purposes. Schneider, pharmacist, chemist, and pharmacy historian established the first institution for "History of Pharmacy" at a German University in 1958. Central focus of his work was the "history of pharmaceutical-chemical substances". Obtained information from years of work are published in Schneider's "Lexikon zur Arzneimittelgeschichte" (7 volumes, 1968-1975, Encyclopaedia on history of medicinal substances) and "Geschichte der pharmazeutischen Chemie" (1972, History of pharmaceutical chemistry). Following the lecture, selected products from the 17th and 18th century were passed around and a collection overview was given. These substances demonstrate that the development of pharmacy is closely linked to the development of metallurgy and alchemy. Metallurgical raw materials and by-products have also been used pharmaceutically. Important innovation of pharmaceutical alchemy in the 13th century was the production of mineral acids. Residues and by-products of the production processes have enriched pharmacopoeias since the 17th century and are part of the "Schneider Collection". It was not until the 16th century that internal metal therapy began in Europe. Since Paracelsus, pharmaceutical-chemical products from the alchemical tradition found

their way into pharmacopoeias. The Rammelsberg mine near Goslar (Germany) was one of the sources for these minerals and metals.

Friday started with a lecture on “The Changing Visions of Chymistry at Seventeenth-Century Jena: Brendel, Rolfinck, Wedel, and Others”. While Hartmann’s first professorship has already been contextualized in research, Lawrence M. Principe (Johns Hopkins University) investigated the position of chemistry at the university in Jena, and the image of chymistry under its different professors. Interestingly, the whole spectrum of views about the idea of transmutation was present there over the years. Zacharias Brendel became professor of chymistry and botany in 1627. He wrote the book “Chimia in Artis Formam Redacta” in the context of his teaching. In his book, he describes chymistry as the most holy and unstained art, which has its destructors and profaners. Although he deals with the medical use of chymistry, he praises the names of many transmutational alchemists. Brendel might have worked on transmutational chymistry in private. His book shows detailed instructions for experiments and practical work. His successor Werner Rolfinck revised the book in 1641, leaving out the historical part and subordinating chymistry among other arts. Twenty years later, Rolfinck wrote a new book under the same title, where he turned chymistry into a theoretical art, changing experiments for scholastic questions. In his book, Rolfinck denies transmutation, Paracelsus’ spagyria as well as Paracelsus’ concept of mercury. Rolfinck’s private main interest was anatomy. His successor in 1673, Georg Wolfgang Wedel, was more interested in pharmacy, thus naming his book “Pharmacia in Artis Formam Redacta” (1677). This book was more practical and – despite the title – also deals with different up-to-date topics in an experimental way, not rejecting the idea of transmutation. Wedel also wrote “Introductio in Alchimiam”, where he showed himself as an advocate of an institute for alchemical investigations. He also commented on the “Tabula Smaragdina”. That the latest figure of alchemy in Jena was also the strongest supporter of transmutation, disproves the concept of a linear history of the idea of transmutation, so the role of rejection of the philosopher’s stone in the history of chemistry should be problematised.

Marieke Hendriksen (Utrecht University) gave the following lecture, entitled “Alchemy in the kitchen: Blankaart’s ‘Borgerlyke Tafel’ (1683)”. In the Netherlands, alchemy focused more on plants than on metals. Herman Boerhaave, professor of medicine in Leiden, wanted alchemy to get rid of its mystical background. He did not believe in the philosopher’s stone, yet stayed open-minded about it in his book “Elementa Chemia” from 1724. However, he and other academics wrote against the possibility of transmutation. The background was, that public had become attentive about these questions, after a German impostor healer and gold maker had tried his luck in the Netherlands. The image of the transmutational alchemist became a topic in popular culture, as plays like “De bekeerde Alchimist” show. Thus, academics were asked to officially disprove alchemy. The German alchemical way of metals as medicine was very strange to the Dutch tradition of using plants as basic elements of medicine, which was also Boerhaave’s main interest. In the Netherlands, the idea of prolonging

life by the right nutrition was the focus of discussions in medicine. Next to Boerhaave, who was very influential for Dutch chemical practise, the older author Steven Blankaart, a Cartesian and iatrochemist, was very influential too. He wrote books aimed at his followers, but also books about a healthy diet for a broader public like “Borgerlike Tafel” with recipes advising a moderate, seasonal and clean diet based on ideas of humoral pathology, as well as table manners and cultural taste, as important factors for wellbeing. To understand the important factor of taste in early modern Dutch medicine, it will be essential for future investigations to re-cook and taste, what is described in these recipes. Taste cannot be concluded from reading the names of the ingredients and – as a comparison of the first recipe for liqueur by Blankaart with today’s liqueur has shown – can deviate a lot from what might be expected.

“From University to Court: The Shift of Stahl’s Positions on Alchemy” was the title of the lecture by Kevin Chang (Taipei University). He explained Stahl’s change of mind concerning transmutation. In 1694, Georg Ernst Stahl, who had studied under Krauß and Wedel in Jena, became second professor of medicine in Halle. In the time around 1700 he still believed in transmutation. In 1705, Domenico Manuel Caetano came to Berlin and showed transmutations to the Prussian king. After it turned out, that he was an impostor, he was executed and the toleration of alchemy was discussed. Johann Franz Buddeus delivered a popular moral and economical argumentation: True alchemists could be tolerated, if they did not do harm to the community, as they had divine recipes of knowledge. Furthermore, the fact, that medieval jurists supported alchemy, as long as it did not involve daemonic magic, was positive for alchemy. In “De Metallorum Emendatione Fructu Profutura”, Stahl proposed paying alchemists, so that they could research and did not feel the need for fraud to make their living. However in 1726, Stahl rejected all possibilities of transmutation and the concept of mercury in “Bedencken von der Goldherstellung”. His rejection had two reasons: Stahl did no longer need Paracelsian mercury, as he assigned its function to phlogiston. While the Paracelsians never were able to experimentally prove metallic mercury, Stahl, with his vital philosophy, could show in an observable and repeatable experiment, that he could turn metals into their ‘calces’ and back. The other factor was that Stahl was now court physician of the ‘Soldier King’ Friedrich Wilhelm I., who openly disliked alchemy. Together with the memory of an impostor alchemist executed, this motivated Stahl to be careful, when it came to working on transmutation.

Christopher Halm (Universität Regensburg) gave the last lecture of the conference. He treated “Wallerius and the conception of agricultural chemistry at Uppsala University”. Johann Gottschalk Wallerius wrote the first book about agricultural chemistry, the Latin/Swedish “Agriculturae Fundamenta Chemica”. His good reputation in this field made many students graduating under him in Uppsala. Before him, all over Europe during the 18th century, the topic of using chemistry in agriculture had already been discussed. While Jethro Tull preferred long field trials, this seemed too expensive and long lasting to many state officials. Johann Adam

Külbel won a competition about soil fertility by Bordeaux academy with a treatise on the fertility-principle in the ground, which was the main inspiration for Wallerius. In Sweden, after an exhausting war with Russia and the preparation of another one by parts of the oligarchy, the need to secure nutrition and to increase the population made better methods in agriculture essential. Wallerius spent ten years on research and became a praised scholar. Next to recording plant growth, he also sorted metals according to their inner properties – in contrast to his adversary Linné. His idea was that plants take up fertile soil by their roots. He also believed, that water transmutes into earth. In 1749/50, Wallerius became professor of agriculture, chemistry and mining. After Uppsala and the institute had burned in 1765, Wallerius got problems with hearing. His performances of soil analysis and the use of chemical knowledge to modernize agriculture outlasted. Wallerius supposed similar patterns in medicine and soil, although he had no detailed concept of disease. His agricultural chemistry and mechanical view on nature ignored all ideas of 'life'. Insects for instance were considered as superfluous. Agricultural chemists now believed that they only needed to chemically construct the perfect soil for optimal plant fertility.

The conference enabled an exchange on current desiderata and results of research concerning the relationship between alchemy and university. Further events and publications on this and related topics are planned.