Daniel Sennert's Dissertations and the Furthering of Knowledge in Seventeenth-Century Medicine

Anja-Silvia Goeing

1. INTRODUCTION

This article uses university dissertations and their arrangement in series to examine how new medical knowledge was developed.[1] My aim is not only to map the geographical distribution of persons and ideas around Daniel Sennert, a professor of medicine at the university of Wittenberg in the first third of the seventeenth century, but also to identify new ways of assimilating and transmitting information in early modern Europe.

Originating from medieval disputations—oral exams that were established in all four faculties of medieval universities in the 13th century—, dissertations were developed into exercises and exams in early modern universities.[2] While their oral and ritualistic form (the disputation) invited

[1] My research on medical disputations and dissertations has been sponsored from June 2018 to June 2019 by a Harvard-Milton scholarship. For discussions of early papers on the topic, I thank the members of our sessions at HSS (History of Science Society) and SHARP (Society for the history of authorship, reading, and publishing), both in 2019. Many thanks go to Ku-Ming (Kevin) Chang, Hal Cook, Joel Klein, and Hanspeter Marti for their specialist input, and to Ann Blair and John Brewer, who helped editing the final version of the text.

[2] About the history of disputations and dissertations in Central Europe see Werner Allweis, 'Von der Disputation zur Dissertation', in Rudolf Jung and Paul Kaegbein (eds.), *Dissertationen in Wissenschaft und Bibliotheken* (Munich, 1979), 13–27; Ku-Ming (Kevin) Chang, 'From Oral Disputation to Written Text. The Transformation of the Dissertation in Early Modern Europe', *History of Universities* 19, no. 2 (2004), 129–187; Meelis Friedenthal, Hanspeter Marti, and Robert Seidel, 'Introduction', in Meelis Friedenthal, Hanspeter Marti, and Robert Seidel (eds.), *Early Modern Disputations and Dissertations in an Interdisciplinary and European Context* (Leiden, Boston, 2021), 1–33; Marion Gindhart and Ursula Kundert (eds.), *Disputatio 1200–1800: Form, Funktion und Wirkung eines Leitmediums universitärer Wissenskultur* (Berlin, Boston, 2010); Marion Gindhart,

Anja-Silvia Goeing, *Sennert's Dissertations and the Furthering of Knowledge in Seventeenth-Century Medicine*
In: *History of Universities XXXVI/1*. Edited by: Robin Darwall-Smith and Mordechai Feingold, Oxford University Press.
 DOI: 10.1093/oso/9780198883685.003.0004

colleagues at university to participate at a specific event, after the advent of printing professor and student often published a written text, what we henceforth call a 'dissertation'. This consisted of theses and argumentations and also specified the date at which the disputation occurred.[3] Both professor and student respondent sent the dissertation to friends and colleagues before the event took place to invite them for discussion. At the event itself they were the written basis for the oral disputation. They were also circulated after the disputation to potentially interested parties, some far distant from the location of the disputation.[4] Some dissertations listed the arguments briefly, containing only a couple of pages, others were more elaborate, and we know of dissertations of fifty pages and more full of research quotes to back up subtopics and arguments. Dissertations went under different titles, and were called disputatio, theses, dissertatio, or quaestiones. Since there was no distinguishing feature for any of these terms, we will use here the most common term 'dissertation' for all of them.

Dissertations have been overshadowed by scholarly treatises that have been viewed as the more important source in reconstructing how the history of science developed.[5] Only recently have dissertations become a subject for investigation, and they have usually been treated as exams that help reveal learning practices at university. They are also seen as closely

Hanspeter Marti, and Robert Seidel (eds.), *Frühneuzeitliche Disputationen. Polyvalente Produktionsapparate gelehrten Wissens* (Köln, Weimar, Wien, 2016); Ewald Horn, *Die Disputationen und Promotionen an den deutschen Universitäten vornehmlich seit dem 16. Jahrhundert* (*Centralblatt für Bibliothekswesen, Beiheft 11*. Leipzig, 1893); Rainer Christoph Schwinges (ed.), *Examen, Titel, Promotionen. Akademisches und Staatliches Qualifikationswesen vom 13. bis zum 21. Jahrhundert* (*Veröffentlichungen der Gesellschaft für Universitäts- und Wissenschafisgeschichte 7*. Basel, 2007); see for the 13th and fourteenth century especially Olga Weijers, *In Search of the Truth. A History of Disputation Techniques from Antiquity to Early Modern Times* (*Studies on the Faculty of Arts. History and Influence 1.* Turnhout, 2013).

[3] We use the anglophone separation into dissertation (the written text) and disputation (the oral event). See 'Introduction', in Friedenthal, Marti, Seidel, *Early Modern Disputations*, 1–33 for the use of terms. That way, the term dissertation as used here comprises exercise and inaugural dissertations, and does not indicate a degree at university. Compare on the oral performance of university disputations: Marian Füssel, 'Die Praxis der Disputation. Heuristische Zugänge und theoretische Deutungsangebote', in Gindhart, Marti, Seidel, *Frühneuzeitliche Disputationen*, 27–48.

[4] See for example the letter that the medical professor Ernst Soner wrote in 1610 from Altdorf Academy to the personal physician of the Prince-Bishop in Bamberg, Siegmund Schnitzer, sending one new disputation in manuscript that was to be printed in a couple of days, and two older printed disputations for discussion. https://www.aerztebriefe.de/id/00000475, accessed 8 July 2022. An indicator of the student network in the dedication letter is added as the verso of the title page. An early example is https://www.aerztebriefe.de/id/00053443, accessed 8 July 2022, a dedication letter to Duke Wilhelm of Bavaria that the medicine student Lorenz Grill included in his 1589 disputation print at the University of Ingolstadt. The presiding professor at Ingolstadt was the Englishman Edmund Hollings.

[5] See for the field of philosophy, Anja-Silvia Goeing, 'Treatise, Renaissance', in Marco Sgarbi (ed.), *Encyclopedia of Renaissance Philosophy* (Cham, 2019), https://link.springer.com/referenceworkentry/10.1007/978–3-319–02848-4_245–2, accessed 19 July 2022.

connected to the teacher and what he taught, much less so to the student, whose task has been viewed as that of defending the teacher's theses. The student's task was to achieve a mastery over an important topic in the field, demonstrated orally in a dispute conducted according to rules set by the university.[6]

A diagram taken from the website of the Universal Short Title Catalogue covering the period 1450 to 1650 (Figure 4.1) shows that printed editions of disputations began in the mid-fifteen hundreds and grew rapidly from about 1590 onwards reaching a peak at the end of the 1640s, with 4,475 known editions of disputations.[7] The Union Catalogue of books printed in the German speaking countries in the seventeenth century (VD 17) shows that the rapid growth continued far into the eighteenth century.[8] These printed pamphlets are important, because they preserve information from the oral disputations and are searchable today in libraries and archives.

The most recent scholarship on disputations and dissertations covers not only the German speaking lands including the Holy Roman Empire,

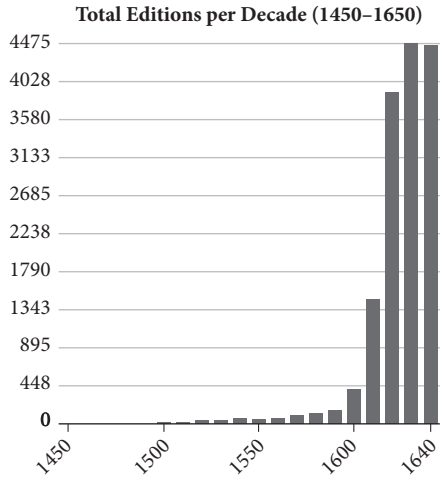


Figure 4.1 USTC keyword search 'dissertatio, disputatio, or theses', total editions per decade (1450–1650). The diagram shows the rise of printed dissertations to 1650.

[6] On the oral disputation see the recent: Marian Füssel, 'Die Praxis der Disputation. Heuristische Zugänge und theoretische Deutungsangebote', in Marion Gindhart, Hanspeter Marti, and Robert Seidel (eds.), *Frühneuzeitliche Disputationen. Polyvalente Produktionsapparate gelehrten Wissens* (Köln, Weimar, Wien, 2016), 27–48.

[7] https://www.ustc.ac.uk/, accessed 26 May 2022.

[8] http://www.vd17.de, accessed 26 May 2022.

but also Scandinavia, the Baltic, Britain, and France. It points to the difficulty of charting 'the diffusion, development, form and function of the dissertation from a pan-European perspective'.[9] It also adds that it is not 'possible to bring the entire hand-written and printed source-material into a systematic order'. It is only through case studies that we can reconstruct in any detail the processes by which new knowledge was constituted.[10]

In what follows I emphasize the use of dissertations as a collective artifact for making *medical* knowledge.[11] In recent historical writing, medicine, treated as a matter of health rather than scientific truth, has featured only marginally in the discipline of the history of science.[12] The university study of medicine consisted of the main branches of practical and theoretical medicine, together with anatomy (often including botany and surgery), all of which subdisciplines had their own professor at larger universities such as Basel.[13] According to the historian of medicine John Ferguson, practical medicine in early modern times usually consisted of treating diseases, putting together and selling prescriptions, casting horoscopes and studying alchemy.[14] Treatises and handbooks written in the sixteenth and seventeenth century on practical medicine, such as one of the most famous handbooks of the time, Girolamo Mercuriale's *medicina practica* in five volumes, emphasized the description of illnesses and methods for their treatment.[15] Theoretical medicine consisted of the teaching of classical texts, such as Aristotle and Galen and commentaries on them. In the Holy Roman Empire anatomy and botany were at first taught through the study of books, but later followed the practice of Italian universities like Padua, including hands-on experience in the anatomy theatre and the cultivation of botanical gardens.

[9] Friedenthal, Marti, Seidel, *Early Modern Disputations,* 6.

[10] Friedenthal, Marti, Seidel, *Early Modern Disputations,* 6.

[11] See note 4 for more literature on the topic. The most recent publication spanning Europe in early modern times by providing significant case studies is Friedenthal, Marti, Seidel, *Early Modern Disputations*.

[12] See Nancy G. Siraisi, 'Medicine, 1450–1620, and the History of Science', *Isis* 103.3 (2012): 491–514.

[13] See Ulrich Schlegelmilch, 'Surgical Disputations in Basel at around 1600', in Friedenthal, Marti, Seidel, *Early Modern Disputations*, 255–287, here 263: in 1583 the University of Basel created a professorship in anatomy and botany, as a third chair of medicine complementing the existing two chairs for theoretical and practical medicine.

[14] John Ferguson, 'Salmon (William)', in John Ferguson, Bibliotheca chemica: a catalogue of the alchemical, chemical and pharmaceutical books in the collection of the late James Young of Kelly and Durris. (Glasgow, 1906), 318–321.

[15] Girolamo Mercuriale and Petrus de Spina, *Medicina practica, sev de cognoscendis, discernendis, & curandis omnibus humani corporis affectibus, earumque causis indagandis, libri V. In Patavino gymnasio, olim ab ipso pvblice praelecti, et thesavri instar a qvibvsdam hactenus reconditi, plurimorumque votis & desiderio summè expetiti* (Frankfurt am Main, 1602). See Nancy G. Siraisi, 'Medicina Practica: Girolamo Mercuriale as Teacher and Textbook Author', in Emidio Campi, Simone De Angelis, Anja-Silvia Goeing, Anthony Grafton (eds.), *Scholarly Knowledge. Textbooks in Early Modern Europe*, (*Travaux d'Humanism et Renaissance*, 447, Geneva, 2008), 287–305.

Teaching on the whole was conservative, relying on the values and canons of the past that were often prescribed by the university authorities. Humanism left its mark on medical education as professors taught from new translations and commentaries of Greek texts, such as the works of Galen.[16] Depending on the lecturers' special interests, lectures took up more innovative ideas and methods. These included a new emphasis on surgical training spreading from the University of Padua in the late sixteenth and early seventeenth century. At the beginning of the seventeenth century, chemical medicine entered university curricula, while Cartesian approaches were adopted from the mid-seventeenth century.[17]

Early modern medical science thrived on the lively exchange of information and materials among centers of higher learning, such as European universities and academies.[18] Key players were not only the teaching professors of medicine but students (Figure 4.2, illustration from one

[16] See Nancy G. Siraisi, *Avicenna in Renaissance Italy* (*Course Book*, vol. 789, Princeton, 2014); Fabio Zampieri, 'The University of Padua Medical School from the Origins to the Early Modern Time: A Historical Overview', in Fabrizio Baldassarri, Fabio Zampieri (eds.), *Scientiae in the History of Medicine* (*Storia della Medicina*, 4, Rome, 2021), 23–68; Vivian Nutton, 'From the Aldine to the Basle Galen', in Vivian Nutton, *John Caius and the Manuscripts of Galen* (*Cambridge Philological Society*, 13, Havertown, 2020), 38–49.

[17] See for the university of Basel and the teaching of Andreas Vesalius and Felix Platter: Balder P. Gloor, 'The Basle Environment at the Time when the Anatomies of Andreas Vesalius and Felix Platter were Printed in Basle 1530–1600', *Historia Ophthalmologica Internationalis* (2019), https://doi.org/10.5167/uzh-186462; Ulrich Schlegelmilch, 'Surgical Disputations in Basel at around 1600', in Friedenthal, Marti, Seidel, *Early Modern Disputations*, 255–287 (for anatomical studies); Davide Cellamare, 'Chapter 9: Medicine and the Mind in the Teaching of Theodoor Craanen (1633-1688)', in Davide Cellamare and Mattia Mantovani (eds.), *Descartes in the Classroom: Teaching Cartesian Philosophy in the Early Modern Age* (Leiden, 2023), 199–230; Sabine Schlegelmilch, 'The Scientific Revolution in Marburg', in Friedenthal, Marti, Seidel, *Early Modern Disputations*, 288–311 (for examples of including Descartes); and the latest work on early modern chymistry in university settings: Lawrence M. Principe, 'The Changing Visions of Chymistry at Seventeenth-Century Jena: The Two Brendels, Rolfinck, Wedel, and Others', *Ambix* 68, no. 2–3 (2021): 180–97; Elisabeth Moreau, 'Learning the Chymical Compromise: Paracelsian and Galenic Medicine in Marburg Disputations on Chymiatria', *Ambix* 68, no. 2–3 (2021): 154–79; Didier Kahn, 'The First Private and Public Courses of Chymistry in Paris (and Italy) from Jean Beguin to William Davisson', *Ambix* 68, no. 2–3 (2021): 247–72; Hiro Hirai, 'Daniel Sennert, Chymistry, and Theological Debates', *Ambix* 68, no. 2–3 (2021): 198–213; Georgiana D. Hedesan, 'The Influence of Louvain Teaching on Jan Baptist Van Helmont's Adoption of Paracelsianism and Alchemy', *Ambix* 68, no. 2–3 (2021): 231–46; Ute Frietsch, 'Making University Fields for Chymistry: A Case Study of Helmstedt University', *Ambix* 68, no. 2–3 (2021): 273–301; Ute Frietsch, 'Alchemy and the Early Modern University: An Introduction', *Ambix* 68, no. 2–3 (2021): 119–34.

[18] For the general history of medical studies and their historiography in the sixteenth and seventeenth centuries (with bibliographies) see: Cynthia Klestinec, 'Medical Education in Padua: Students, Faculty and Facilities', in Ole Peter Grell (ed.), *Centres of Medical Excellence?: Medical Travel and Education in Europe, 1500–1789* (*The History of Medicine in Context*, Farnham, Surrey, England, 2010), 193–220; Nancy G. Siraisi, *Medieval & Early Renaissance Medicine: an Introduction to Knowledge and Practice* (Chicago, 1990); Michael Stolberg, *Learned Physicians and Everyday Medical Practice in the Renaissance* (Munich, Wien, 2021), 1–115.

Figure 4.2 Drawing of a riding gentleman, from the friendship book (album amicorum) of Daniel Rindfleisch (Bucretius, 1562–1621). Bucretius originated from Breslau in Silesia (today Wrocław, Poland). He studied in Rostock, Bologna, and Padua, where he passed his doctoral degree in 1593. He returned to his home town as a city physician in 1603. His biography is published in Claudia Zonta, Schlesier an italienischen Universitäten der Frühen Neuzeit 1526–1740, Ph.D. thesis (Stuttgart, 2000), 300, no. 1176.

travelling student's friendship book), physicians, and non-affiliated scholars. Travelling scholars who migrated from place to place carried lists of subjects for scholarly disputes, transcriptions of lectures, and printed books for reference, as well as letters of introduction. We need to know whether they brought and distributed miscellaneous bits of know-how, transforming ways of categorizing and structuring their field of knowledge, methods of bodily dissection, experimental practices, and ways of mixing potions and medications. What role did student dissertations play in transmitting knowledge?

In spite of their traditional context, inaugural and exercise dissertations have come to be recognized as potentially innovative, not least because they were small and quick to produce, print, and distribute.[19] The content of dissertations was contested long after the official disputation took place, showing that they had an impact on medical doctrine.[20] But they have been seen as containing preliminary results that were later published in one or more treatises, rather than as making definitive contributions to the field. What we need to investigate is the degree to which empirical knowledge, gained through observation and experimentation became part of the dissertation, and how, through the dissertation it became more widely disseminated.[21]

The work of Daniel Sennert and his students in Wittenberg provides some answers to these questions. Professors of practical medicine such as Sennert broke knowledge down into generic topics such as 'the art of healing' (*De Methodo Medendi*, 1603/1604) or 'fevers' (*De Febribus*, 1628), and had their students research one specific item at a time to get as much information from the canonical books, but also from empirical observation and experimental results.[22] Forming a series, these dissertations on very specific topics affected the formulation, content and shape of the overall subject because the itemization enabled the researcher to explore specifics and details: Sennert, for example, became famous for a description of scarlet fever in the thirteenth dissertation in the series on fevers that his student Zacharias Polnerus (never

[19] See Hanspeter Marti, 'Die Disputationsschriften - Speicher Logifizierten Wissens', in Frank Grunert, Annette Syndikus (eds.), *Wissensspeicher der Frühen Neuzeit* (Berlin, 2015), 203–241.

[20] Compare note 4 above.

[21] On empirical knowledge in early modern times medicine, see the synthetic timeline for anatomical methods in use in Sanjib Kumar Ghosh, 'The Evolution of Epistemological Methodologies in Anatomy: From Antiquity to Modern Times', *Anatomical Record*, vol. 305, no. 4, (2022), 803–817.

[22] For Sennert's eleven supervised dissertations on the art of healing, and his fourteen supervised dissertations on fevers, see Appendix A.

mentioned in the later secondary literature) defended on 1 November 1628.[23]

The disputations connected Sennert to his students. They did not constitute the only method used in teaching and learning at the medical school or at the university of Wittenberg. While we do not yet have enough data from Wittenberg to understand the whole teaching process or how the different teachers in medicine worked together, we have a good understanding of these processes at other universities, especially at the university of Padua, which served as the model for medical teaching in Europe. Prosopographical research is underway to identify medical students, teachers, and their networks in Wittenberg, using letters, manuscripts, and prints, a project funded by the German Science Foundation and led by Michael Stolberg.[24] The following discussion, focusing on dissertations, is intended to contribute to the study of medicine at Wittenberg and in early modern Europe.

The practice of clustering specific dissertations around a general theme can be found in other disciplines. Legal dissertations defended at universities within the Holy Roman Empire were sometimes organized together to address specific issues of law.[25] But these were never published as collections. In theology, Theodore Beza and Antoine de La Faye published a collection of student dissertations ('theses') on a series of loci communes in 1586, and in a second enlarged edition, 1591. In both volumes, they identified the individual student respondents.[26]

[23] Zacharias Polnerus from Breslau studied in Wittenberg and Basel, and cannot be traced after 1633, see his entry in CERL Thesaurus, http://thesaurus.cerl.org/record/cnp00437591, accessed 8 July 2022. The dissertation that made Sennert famous, is Daniel Sennert and Zacharias Polnerus, *De Febribus Disputatio XIII. De Variolis, Morbillis, Febre Petechiali Et Sudore Anglico* (Wittenberg, 1628). Even today, Sennert's contribution is mentioned in medical entries under his sole name. See for example in J. D. Rolleston, 'The History Of Scarlet Fever', *The British Medical Journal*, vol. 2, no. 3542 (1928): 926–929. *JSTOR*, http://www.jstor.org/stable/25330656, accessed 11 July 2022; and more recently, Josef Ferretti, Werner Köhler, 'History of Streptococcal Research, Feb 10, 2016', in Josef Ferretti, Dennis L. Stevens, Vincent A. Fischetti (eds.), '*Streptococcus pyogenes': Basic Biology to Clinical Manifestations* (Oklahoma City (OK), 2016, https://www.ncbi.nlm.nih.gov/books/NBK333430/, accessed 19 July 2022.

[24] Michael Stolberg, 'Medicinae Alumni Vitebergenses (MAV)', https://gepris.dfg.de/gepris/projekt/454652552 , accessed 30 July 2022.

[25] A word search 'disputatio' at USTC brought disputations in jurisprudence organized by numbers. An early one in a bundle of at least twenty disputations was Andreas Cludius, Albert Juncker, Disputatio XX,…propositiones de heredum qualitate et differentia, (Helmstedt, 1585). Compare in general about disputations in Jurisprudence M. J. Ahsmann, *Collegium und Kolleg*, (Frankfurt am Main, 2000).

[26] Anja-Silvia Goeing, 'Chapter 12: The Genevan Academy: Scrutinizing European Connections in the Time of Theodore Beza', in Jon Balserak (ed.), *A Companion to the Reformation in Geneva* (Leiden, 2021), 277–299, here 279; Theodore Beza and Antoine de La Faye (eds.), *Theses theologicae in Schola genevensi ab aliquot sacrarum literarum studiosis*

In medicine, in 1585 the student Joachim Jungermann reported in a letter from Nuremberg to his uncle, the famous humanist and medical doctor Joachim Camerarius the Younger, that the renowned medical professor Johann Schenck von Grafenberg wanted to publish two volumes on theoretical and practical medicine by elaborating a series of loci communes with the help of disputations.[27] But this scheme did not lead to a publication. However, from 1591 the Scottish polymath Duncan Liddel and his students at the University of Helmstedt published dissertations in mathematics, physics and practical medicine, organized by numbers and general topics.[28] Liddel was a professor of mathematics, appointed in 1591, but he also taught natural philosophy and medicine. In 1605, he published a collection of the medical disputations that he had supervised between 1591 and 1605, a volume that was reprinted in 1720.

In 1599/1600, Daniel Sennert adopted a similar general scheme to Liddel's with a series of twenty-six numbered disputations on topics in natural history. Four years later he published a new series of eleven numbered disputations on the art of healing. Sennert's preface to the first collection of 1599/1600 explains that he deliberately bound together a group of published dissertations that he had organized and conducted around a general theme. Sennert published this collection of dissertations in 1600 under the title *Epitome Naturalis Scientiae*.[29] He then published it again in expanded form in 1618, 1624, 1633, and 1650.

The changes he made between 1600 and 1618 are significant: They made the Epitome appear as if it were a stand-alone publication produced by a single author. He wrote a new dedication to Severin Schato von Schattenthal, a friend of his who was also first physician of the Bohemian government, and he also personally addressed his readers. He expanded

sub DD. Theod. BEZA et Anton. FAYO S. S. Theologiae professoribus, propositae et disputatae. In quibus methodica locorum communium ss. theologiae epitome continetur (Geneva, 1586); and in an extended second edition: Theodore Beza and Antoine de La Faye (eds.), *Theses theologicae in Schola genevensi ab aliquot sacrarum literarum studiosis sub DD. Theod. BEZA et Anton. FAYO S.S. Theologiae professoribus, propositae et disputatae. In quibus methodica locorum communium ss. theologiae epitome continetur. Altera editio emendatior et auctor priore* (Geneva, 1591). These dissertations had never been published on their own.

[27] See www.aerztebriefe.de/id/00001377, accessed 12 July 2022. On Johann Schenck von Grafenberg see Julius Pagel, 'Schenck von Grafenberg, Johannes', in *Allgemeine Deutsche Biographie* (*Historische Kommission bei der Bayerischen Akademie der Wissenschaften*, 31, Munich 1890), 58, https://de.wikisource.org/w/index.php?title=ADB:Schenck_von_Grafenberg,_Johann&oldid=-, accessed 20 July 2022.

[28] On Liddel's life and work see the individual chapters in: Pietro D. Omodeo (ed.), in collaboration with Karin Friedrich, *Duncan Liddel (1561–1613): Networks of Polymathy and the Northern European Renaissance* (Leiden, 2016).

[29] Christoph Lüthy and William R. Newman, 'Daniel Sennert's Earliest Writings (1599–1600) and their Debt to Giordano Bruno', *Bruniana & Campanelliana vol.* 6, no. 2 (2000): 261–279, here 264 (with thanks to Joel Klein).

the number of chapters in 1618 to a total of forty-seven, including additional material on chemical ingredients. In book five, for example, he wrote about bitumen and sulfur, which he had not mentioned in 1600. He included a table of contents, where the chapters were grouped into eight books, together with an index.

It is difficult to discern the intellectual contribution made by Sennert's students. Sometimes he acknowledged them individually, but in his later editions of the *Epitome Naturalis Scientiae*, even though he reproduced the dissertations verbatim, he no longer mentioned them by name. The co-authorship of the individual chapters is therefore unacknowledged. He also erased both the dedications that the students put in front of their individual dissertations and the dates of the public defenses. In this way by 1618 Sennert had incorporated the dissertations completely into his oeuvre.

Constituting dissertations in the form of a series could lead to novel results in comparative anatomy and the diagnosis of illnesses and could help new branches in university medicine such as pharmacology to bear fruit. To my knowledge only Sabine and Ulrich Schlegelmilch think of series of dissertations as more than the sum of their parts, and try to understand why dissertations were bundled together in series.[30] Ulrich Schlegelmilch's research groups together fourteen surgical dissertations at the University of Basel that were published between 1583 and 1609. He shows that they were not connected to the Basel university curriculum. At the time Basel did not have a program in surgery or professors with special training in surgery. Thirteen of the fourteen theses do not show the name of the presider in their title.[31] Schlegelmilch proposes that they derive from extracurricular teaching activity.[32] But their topics were unrelated, and there is no hint that the dissertations looked at small topics under a general rubric.

In her chapter 'The Scientific Revolution in Marburg', Sabine Schlegelmilch explains how at the end of the seventeenth century a professor used a series of dissertations to introduce Cartesian thought into the medical world of his university. Professor Johann Jakob Waldschmidt (1644–1689) first introduced new ideas without identifying their origin, and only gradually revealed that the new content was part of Cartesian philosophy.[33] But this was not a coherent collection of dissertations directed to solving empirical problems.

We need to think of a series as a means of accumulating detailed empirical knowledge, in which both students and their teachers contributed to

[30] Ulrich Schlegelmilch, 'Surgical Disputations in Basel'; Sabine Schlegelmilch, 'The Scientific Revolution in Marburg'.
[31] Ulrich Schlegelmilch, 'Surgical Disputations in Basel', 263.
[32] Ulrich Schlegelmilch, 'Surgical Disputations in Basel', 272–274.
[33] Sabine Schlegelmilch, 'The Scientific Revolution in Marburg', 306.

the production of new forms of understanding. The work of Kevin Chang on Albrecht von Haller (1708–1777) and his students' dissertations is relevant here: Chang showed that Haller identified favorite students as the authors of their disputations, thus giving them full credit for their detailed research.[34] This phenomenon started quite early in medicine. Daniel Sennert acknowledged one of his students, the brilliant Konrad Victor Schneider—known today for his anatomical work discovering the 'Schneiderian membrane' that lines the nasal cavity in the human nose. In 1635 Schneider published an exercise dissertation as 'author and respondent'. Sennert presided over its disputation 'Decas Quaestionum Medicarum' at the University of Wittenberg.[35]

2. DATABASES OF STUDENT MIGRATION IN EUROPE: CAC AND RAG

The development of medical knowledge depended upon the intersection of two movements. The first, intimately connected to the second, was the movement of intangible goods such as skills, ideas, information, knowledge, and techniques that was part of academic work. What sorts of learning and practices had medical students absorbed before they embarked on their travels and how did they use them in their new environments? The disputations that they had performed and published regularly once or twice a year during their studies reveal what some of these intangible goods or practices might have looked like. Printed by local printers, we find them bound together as pamphlet literature or lumped together in a box, often poorly catalogued, in rare book sections of public and university libraries and in some private collections.

[34] Ku-Ming Chang, 'Collaborative Production and Experimental Labor: Two Models of Dissertation Authorship in the Eighteenth Century', *Studies in History and Philosophy of Biological & Biomedical Sciences* 41, no. 4 (2010): 347–355. To my knowledge, a systematic search into explicitly authored dissertations has not yet been conducted. The many online library catalogues have only very recently (and are still building up content) started to catalogue dissertations under both names, the presiding professor and the responding student. But they have abbreviated titles of early modern dissertations, regularly leaving out details such as 'autor et respondens'. If the dissertation is not digitized (and not all of them are), there is no way to find out the author-status of the respondent without a library visit.

[35] Daniel Sennert and Konrad Viktor Schneider, *Decas Quaestionum Medicarum, Quas Praeside… Daniele Sennerto… Publice discutiendas proponit Conradus Victor Schneider, Betterfeldensis, Autor & Resp: In Auditorio Medicorum Wittemb: horis: matur: Ad d. XX.I. Mart.* (Wittenberg, 1635). Schneider's work on the nasal membrane was included in Konrad Victor Schneider, *Conradi Victoris Schneideri, Philos. Ac Medic. D. Profess. P. in Academia Wittebergensi… Liber… De Catarrhis*. 5 vols (Wittenberg, 1660–1662), passim, see Karl Friedrich Heinrich Marx, *Konrad Victor Schneider und die Katarrhe*. (*Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen* 19, Göttingen, 1873), 1–30.

The second movement is that of medical students travelling back and forth between their homes where they grew up and a range of universities. Later, they worked in different locations, practicing as doctors and professors. The individual scholar came from a centre of learning and carried with him a body of knowledge that, according to his education, he saw as valuable and true. How was it deployed, and what effect did it have if he were employed as a teacher, practiced as a doctor or served as a courtier?

In recent years there have been a number of freely accessible databases on the Internet that follow the migration paths of scholars from the late Middle Ages and the early modern period. I will focus on two: a smaller database dealing with the members of a single university and a larger one dealing with members of many different universities, though it unfortunately ends in 1600. I begin with the smaller database.

Corpus Academicum Cracoviense (CAC) is a database of the academic community of the University of Kraków for the period 1364–1780.[36] I quote the summary of its purpose: 'The database contains information on students, professors and other people associated with the college. They are not just a part of the history of the University of Kraków - the oldest higher education institution in Poland (and one of the oldest in Europe). It is also the story of scholars from different milieus: clergy, bourgeoisie, nobility, peasantry, who belonged to the intellectual and cultural elite or practiced various professions in their homeland based on knowledge and writing'.[37] The scientific project was based at the History Faculty of the Jagiellonian University in Kraków in 2013–2018 and was funded by the Polish Ministry of Science and Higher Education under the National Humanities Development Program (Narodowy Program Rozwoju Humanistyki, 11H 12 0264 81).[38] A screenshot (Figure 4.3) shows how it works.

In June 2022 there were 67,245 entries under the rubric 'stages of life', each person having several entries according to the university degrees and travels that they conducted. For example, the student Wojciech Oczko from Warsaw has thirteen entries on school and university education and another sixteen entries on his offices and occupations. Under the heading 'school and university education' we learn that Oczko enrolled as a student of philosophy in Kraków in 1553 and was documented as taking a bachelor's degree there in 1562 and 1563. He then went to study in Italy, using his time there to study medicine. He is documented as being in Rome, Bologna, and Padua, and in 1568 he completed his doctorate in medicine

[36] Corpus Academicum Cracoviense, https://cac.historia.uj.edu.pl, accessed 1 June 2022.
[37] Corpus Academicum Cracoviense, https://cac.historia.uj.edu.pl, accessed 1 June 2022, landing page.
[38] Corpus Academicum Cracoviense, https://cac.historia.uj.edu.pl, accessed 1 June 2022, landing page.

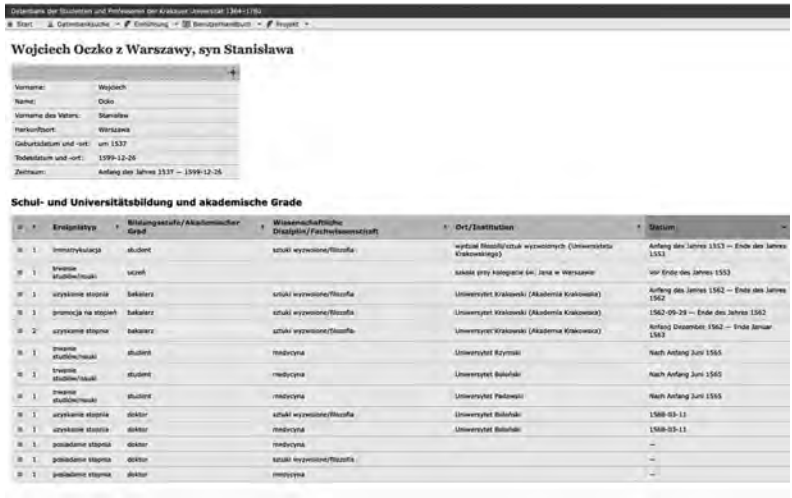


Figure 4.3 CAC Data of Wojciech Oczko from Warszaw, Screenshot. From: Corpus Academicum Cracoviense, https://cac.historia.uj.edu.pl, accessed 1 June 2022, search 'Wojciech Oczko'.

at the renowned University of Bologna. He then returned to his native city of Warsaw where he worked as a doctor. Though Oczko took his degree in Bologna, students went to other destinations in Italy: while Bologna was a major student destination in the late Middle Ages, Padua was the most frequently mentioned destination in the early modern period.

After completing their doctorates, students like Oczko often returned home to take up a medical practice or to teach at the university themselves, or to work as a personal physician for an aristocrat or high-ranking official. We know this from matriculation books kept by each university and from letters that survive in libraries and family archives such as the physician letter database managed by Prof. Michael Stolberg in Würzburg that collects and records letters from doctors in the early modern period.[39]

The CAC database records 137 students studying medicine in Kraków between 1500 and 1600. Fifty-one of these also studied abroad for at least part of their education. A majority, thirty-four of them, went to Padua. Other destinations included Bologna (seven students), Paris (three students), Rome, Basel, Ingolstadt (two students respectively), and Tübingen. (See Appendix B for more information)

[39] Frühneuzeitliche Ärztebriefe des deutschsprachigen Raumes (1500–1700), https://www.aerztebriefe.de, accessed 1 May 2022.

The journey from Kraków to Padua followed a route of almost 1,000 kilometers over what was relatively impassable and scenically spectacular terrain on the fringe of the Alps (Figure 4.4). The young men, some of them still in their teens, undertook the journey in small groups. Depending on the wealth of the family, they traveled with private tutors and carriages, or wandered on foot and begged. In addition to self-financing, there was also the possibility of princely, church or city scholarships, which were used in individual cases if one of the boys proved to be particularly worthy of support.[40]

The Kraków database shows that the university of Padua established itself as a regular foreign destination for Kraków medical students. Over 60% of those who studied abroad went there. Padua was an attractive destination because anatomical and other empirical studies were part of the curriculum.

In order to compare the Kraków figures with other universities we turn to our second database, the Repertorium Academicum Germanicum.[41] This has been run as a joint German-Swiss project since 2001 and is now based at the University of Bern. This database captures a different cohort than the Kraków database. It does not record the scholars who were affiliated with a certain university (as students, doctoral students, teachers), but rather includes the scholars of eighteen universities in the Holy Roman Empire between about 1250 and about 1600 who had a master's or a doctor's degree.[42] The database is still under construction. The figures given here are therefore to be regarded as provisional estimates. Its geographical borders are those of the Holy Roman Empire of the German Nation, which we call the 'Old Empire' for short. They include (until the peace of Westphalia in 1648) those parts of Switzerland, such as Zurich and Basel, that nominally were still part of the Old Empire, but gained recognition as being independent from 1499 with the peace of Basel.[43]

How many students of the Old Empire (who later graduated as masters or doctors) can be counted in Padua, which did not belong to the Old

[40] For general information on early modern travel scholarships see Anja-Silvia Goeing, 'Bursary', *Encyclopedia of Early Modern History Online* (Leiden, 2015), https://doi.org/10.1163/2352–0272_emho_COM_028312.

[41] https://rag-online.org/, accessed 8 July 2022.

[42] The universities included are Basel, Erfurt, Frankfurt, Freiburg, Greifswald, Heidelberg, Ingolstadt, Cologne, Kraków, Leipzig, Loewen, Mainz, Marburg, Prague, Rostock, Tübingen, Wien, Wittenberg. While the database search function allows searches 1500 to 1600, the official year of cut-off for this database is 1550, so that not all of the students with degrees are recorded in the database, which only includes those who were born in or before 1550 and have biographical data after 1550.

[43] Claudius Sieber-Lehmann: 'Basel, Frieden von (1499)', in: *Historisches Lexikon der Schweiz (HLS)* (version of 6 October 2004). Online: https://hls-dhs-dss.ch/de/articles/008892/2004–06-10/, accessed 20 May 2022.

Figure 4.4 Map with travel journey from Kraców to Padua. The map is based on the political outline of Europe from 2022, provided by http://www.freeworldmaps.net/printable/europe/.

Empire? Of a total of 71,049 entries between 1250 and 1600, 1,452 students attended the university of Padua. This represents about 2% of the total, of which roughly one third (416) were students with medical degrees. If we limit the databases' timeline to between 1500 and 1600, it contains a total of 1,487 entries for medical scholars from the Old Empire, of whom 207 traveled to Padua. Medical travellers to Padua came from many places of different faiths, among them Antwerp, Basel, Cologne, and Zurich. Padua was not the only university that attracted large numbers: the most popular university for physicians in the Old Empire in 1500–1600 was the University of Montpellier in France, with 221 visiting students from the Old Empire.

The entries of students from the Old Empire reveal that itinerant medical students often studied at more than one destination. Take for example the entries of one Zurich physician of the second half of the sixteenth century, Kaspar Wolf. As we know from his correspondence, Wolf was a medical student from 1552 in Basel, from 1553 in Paris, from 1555 in Montpellier, became a doctor of medicine in Orleans in 1557, and studied in Padua the following year. In 1566 he became the successor of Conrad Gessner in the office of town physician in Zurich and professor of natural philosophy at the Zurich Lectorium.[44]

The RAG database not only reveals the prevalence of medical student travel but also the growing diversity of destinations, as more and more medical institutions offered a curriculum that included empirical studies. At the beginning of the seventeenth century, Wittenberg under Sennert had developed as one such place.

3. STUDENTS AS AUTHORS: DISSERTATIONS AND THE TRANSFER OF KNOWLEDGE

How did scholarly knowledge reach a larger public? This was achieved by distributing the results of scholarly research and thinking beyond universities and colleges, converting them into pieces readable by Latin-speakers outside the universities and non-Latin-speakers such as women at court. Such knowledge was understandable in circles where people did not study ancient and modern treatises as part of their profession. Scholars or their intermediaries made their medical ideas available as manuscripts or in the form of letters and print. These were often in response to actual problems

[44] Karin Marti-Weissenbach, 'Wolf, Kaspar', in *Historisches Lexikon der Schweiz (HLS)* (version of 9 October 2013). Online: https://hls-dhs-dss.ch/de/articles/025307/2013–10-09/, accessed 12 April 2022.

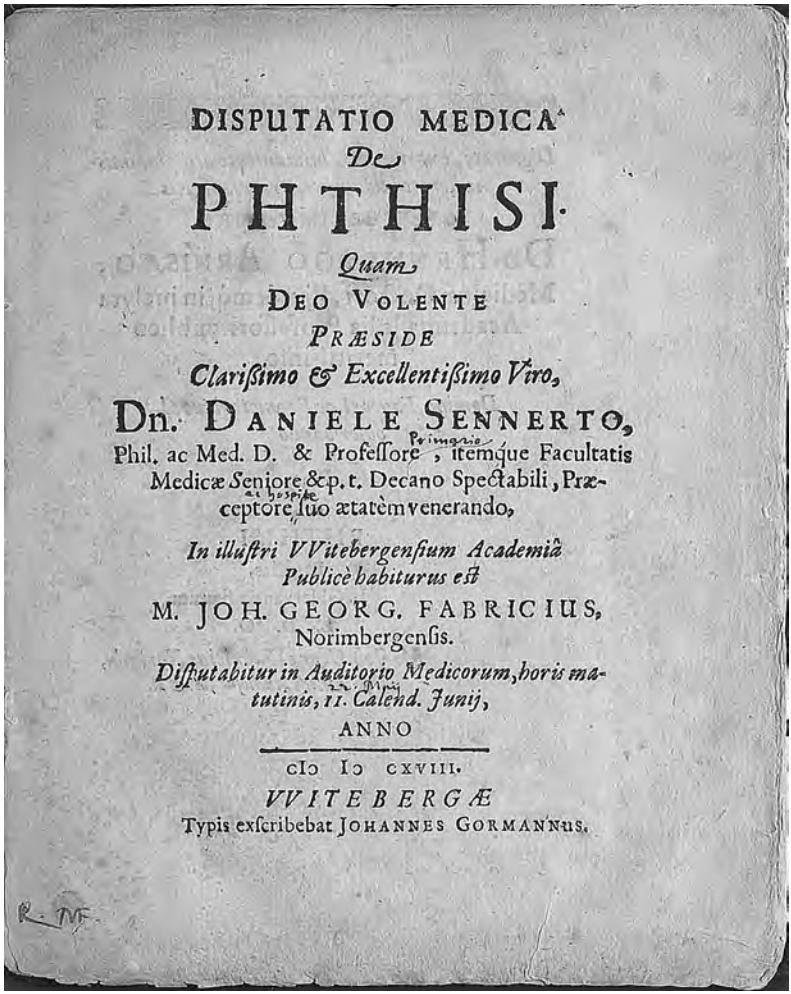
such as an outbreak of the plague. Privately curated cabinets of curiosity and libraries with limited or full public access offered information about science to the curious. The printing trade published medical information in a variety of forms: encyclopedias and other reference books; collected volumes containing recipes and other useful advice; series or single pamphlets containing more or less elaborate oral disputations and dissertations; as well as lecture transcripts of professorial courses that students published.

One way to address the question of knowledge dissemination is through an examination of how academic dissertations generated medical knowledge. By examining how the contents of disputations and dissertations changed as they migrated between universities and from one generation of students to the next we can uncover an important process by which medical knowledge changed and developed. By looking into how these university exams and their medical content featured in the scientific biography of these individuals as they became medical practitioners, personal physicians or professors, we can see how the initial academic information spread out through personal networks, publications, and into society.

Academic disputations required cooperation and coordination between the supervising professor and the disputing student. Presiding over the event, the professor was allowed to step in if the student faced difficulties. Both needed to know about the content and theses that the student would defend.

Printed versions of the disputations (Figure 4.5a) were written by either the supervising professor or in a collaboration between professor and performing student. By the beginning of the seventeenth century students occasionally wrote theses on their own. The printed dissertations were distributed among the audience, and also later sent to friends of the professors and the student. We can see this in a cost calculation written on the last page of a dissertation (Figure 4.5b). It points to an organizer, possibly the student himself, who was actively involved in the creation of the pamphlet. The costs also mention the beadle who was to distribute the copies of the printed text among the audience of the disputation.

Dissertations were often bundled up together, stitched and bound as collective volumes arranged thematically or by the name of the university at which they were held. Such bundles survive in university libraries and in the collections of private individuals. Prince August the Younger of Brunswick-Wolfenbüttel (1579–1666) for example (or possibly his successor Prince Anton Ulrich of Brunswick-Wolfenbüttel, who shared the library signature 'A') collected a representative selection of dissertations and treatises about combatting and curing the plague. He bound them together as a convenient encyclopedia, consolidating the dissertations into



DISPUTATIO MEDICA
De
PHTHISI.
Quam
DEO VOLENTE
PRÆSIDE
Clarißimo & Excellentißimo Viro,
Dn. DANIELE SENNERTO,
Phil. ac Med. D. & Profeſſore Primario, itemque Facultatis Medicæ Seniore &c. p. t. Decano Spectabili, Præceptore ſuo ætatem venerando,
In illuſtri VVitebergenſium Academiâ
Publicè habiturus eſt
M. JOH. GEORG. FABRICIUS,
Norimbergenſis.
Diſputabitur in Auditorio Medicorum, horis matutinis, 11. Calend. Junij,
ANNO
cIↃ IↃ CXVIII.
VVITEBERGÆ
Typis exſcribebat JOHANNES GORMANNUS.

Figure 4.5a Daniel Sennert and Johann Georg Fabricius, *De Phthisi* (Wittenberg 1618), Title page. http://diglib.hab.de/drucke/xb-9069/start.htm?image=00001.

a database of information about the treatment of the plague.[45] This shows that printed disputations were more than ephemeral publications; they

[45] Wolfenbüttel collection of disputations on plague, Herzog August Library Wolfenbüttel, A: 45.12 MED. See for more examples Marti, 'Die Disputationsschriften – Speicher…', 206–207.

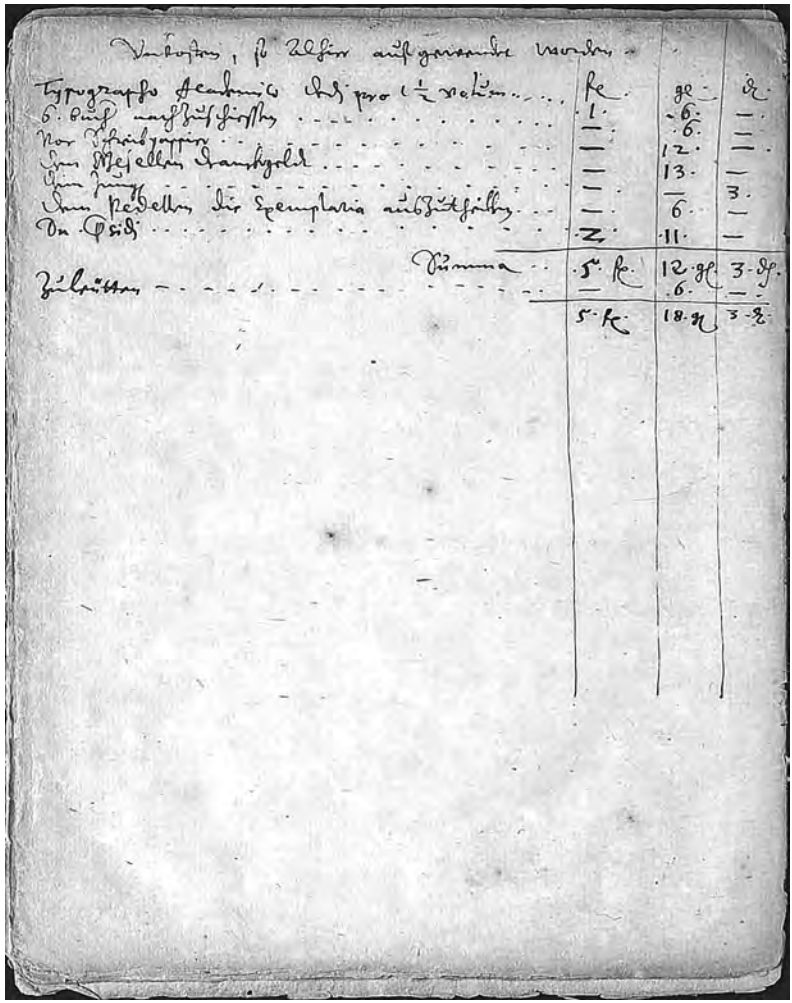


Figure 4.5b Daniel Sennert and Johann Georg Fabricius, *De Phthisi* (Wittenberg 1618), Cost calculation on the last page. http://diglib.hab.de/drucke/xb-9069/start.htm?image=00032.

were information, the early modern equivalent of what is now referred to as the 'grey literature' of scientific research.[46]

[46] See for further examples of grey literature: http://www.greynet.org/greysourceindex/documenttypes.html, accessed 26 December 2021. Their working definition is: 'Grey Literature is a field in library and Information science that deals with the production,

4. LUCAS SCHROECK'S DISSERTATION ON MUSK AND ITS AFTERLIFE IN THE OLD EMPIRE

Dissertations, particularly those published in a series based on narrow topics that incorporated experiments and observations, played a role in the transformation of knowledge about nature and medicine in early-modern times. They went beyond the early printed encyclopedias and handbooks that had grown out of a tradition based on commentaries on Aristotle and commonplace books, combining the authority of the ancients with a certain amount of new knowledge based on empirical observation. They not only constituted a new sort of knowledge, but reached an audience outside the scholarly community.

The processes by which the academic knowledge in a dissertation could be transformed into a more accessible format is revealed in writings on musk. Musk, or moschus, its Latin name, was a secretion obtained from the gland of the Asian musk deer (Figure 4.6).[47] It had been used as a fragrant ingredient since ancient times in many recipes designed to improve health and well-being.[48]

The natural philosopher and medical doctor Conrad Gessner included a study of musk in his Latin encyclopedia on four-footed animals in 1551, targeting well-off collectors interested in nature, but not necessarily professional naturalists.[49]

His entry found its way into the world of academia, going through the needle's eye of a medical exercise-dissertation defended by Lucas Schroeck at the university of Jena in the Duchy of Saxe-Weimar in the mid-seventeenth century (1667, Figure 4.7).[50]

distribution, and access to multiple document types produced on all levels of government, academics, business, and organization in electronic and print formats not controlled by commercial publishing i.e. where publishing is not the primary activity of the producing body'. http://www.greynet.org/home.html, accessed 26 December 2021.

[47] Cf. http://www.wwf.at/de/menu24/arten120/, accessed 10 July 2022.

[48] David Rowe, *Chemistry and Technology of Flavours and Fragrances* (Hoboken NJ, 2009), 143–165.

[49] Conrad Gessner, *Historiae Animalium Lib.I. de Quadrupedibus Uiuiparis* (Zürich, 1551), 786–793 (Capreolus moschi: Musk deer), 948–949 (Feles Zibethi (Zibeth cat). Further places, where Gessner inserted information about musk: Juan Luis Vives, et al. *Ioannis Lodovici Vivis Valentini de Anima & Vita Libri Tres. Eiusdem Argumenti Viti Amerbachii de Anima Libri IIII. Philippi Melanthonis Liber Vnus. His Accedit Nunc Primùm Conradi Gesneri De Anima Liber, Sententiosa Breuitate, Velutiq́ue per Tabulas & Aphorismos Magna Ex Parte Conscriptus*…(Zürich, 1563), 846, 854; Conrad Gessner, *Thesaurus Evonymi Philiatri, de remediis secretis, liber* (Zürich, 1554), 174–175 (Amber, musk, and camphora are mixt for a medication), 266–269 (rose water with musk), and other places. Compare Anja-Silvia Goeing, Objects of Medical Collections: Musk, https://scholar.harvard.edu/goeing/objects-medical-collections-musk-asg, accessed 25 December 2021.

[50] Johann Theodor Schenck and Lucas Schroeck, *Exercitationem Academicam De Moscho, Illustris Medicorum Ordinis in Florentissima Salana Consensu, Sub Praesidio*…*Dn.*

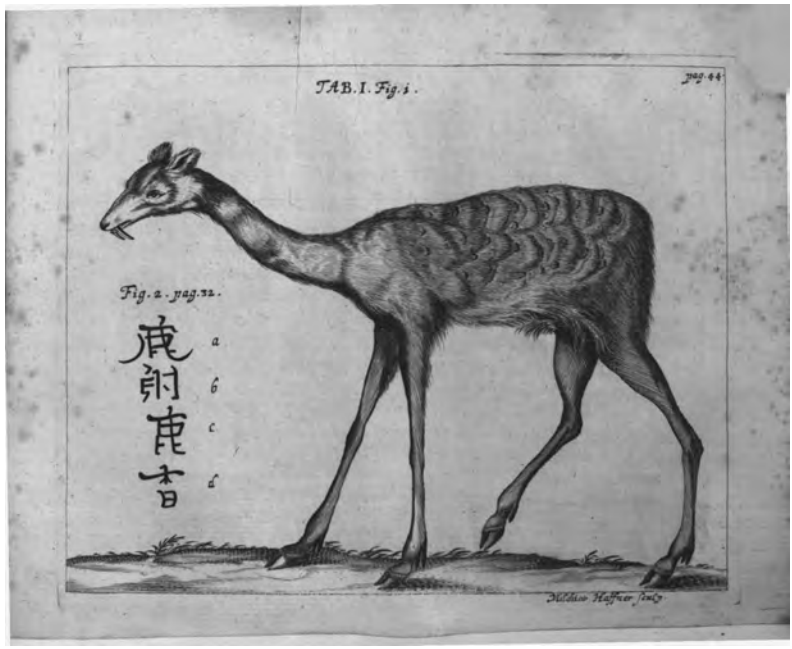


Figure 4.6 Melchior Haffner (engraver): Copper engraving of an Asian musk deer, from Schroeck, *Historia Moschi*, 44 (tabula I), Munich, Bavarian State Library, signature 4 M.med. 215.

Schroeck's thesis consists of a title page, ninety pages of text and an additional three woodcuts of the musk deer and its gland. Not many dissertations of the time contained woodcuts, and the length of the average dissertation was roughly between sixteen and fifty pages. From there Schroeck, now qualified as a medical doctor, developed his thesis into a monograph *Historia Moschi* (Figure 4.8).[51] In 1682 he published this much more user-friendly discussion of musk, clearly derived from Gessner's encyclopedia and his own dissertation, but targeting a readership outside the university at the Academia Naturae Curiosorum, an institution that was mostly concerned with practical knowledge about pharmaceuticals.[52]

Johannis Theodori Schenckii . . . Publicae Disquisitioni Submittit Lucas Schroeckius, Augustanus. Autor & Respondens, Ad Diem Octobris. A.S.R. MDCLXVII (Jena, 1667).

[51] Lucas Schroeck, *Historia Moschi* (Augsburg, 1682).

[52] The Academia Naturae Curiosorum would later become the National Academy of Sciences Leopoldina in Halle in Prussia. As the Leopoldina, the academy remained there during the nineteenth century and was promoted in 2008 to be a National Academy of Sciences. Today, its full title is Deutsche Akademie der Naturforscher Leopoldina – Nationale

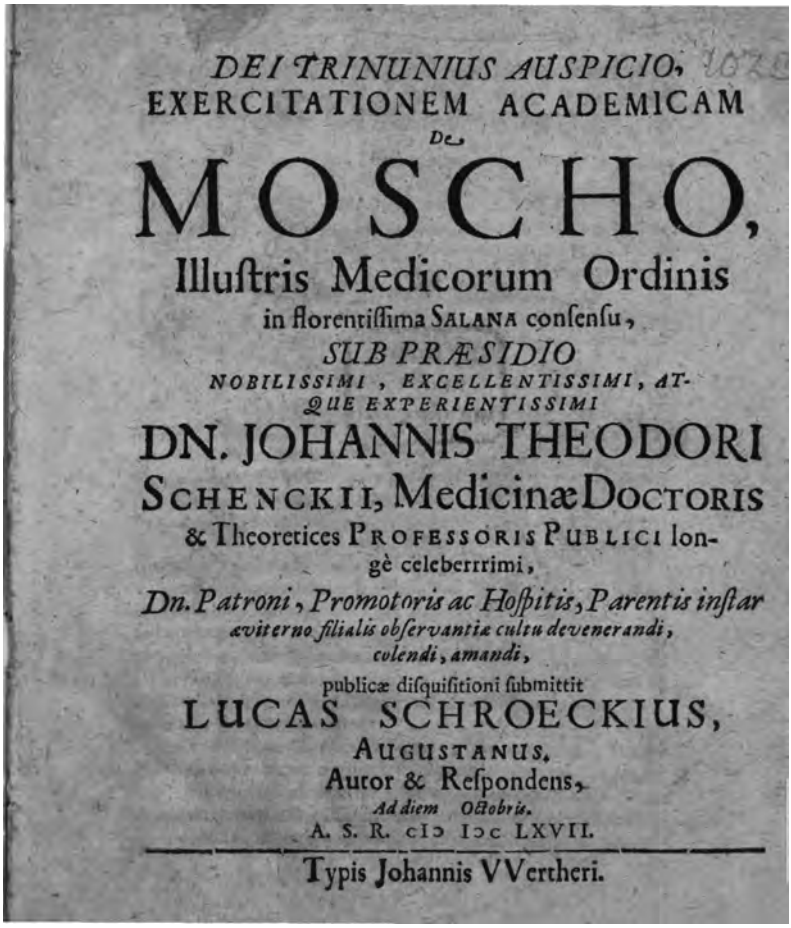

DEI TRINUNIUS AUSPICIO,
EXERCITATIONEM ACADEMICAM
De
MOSCHO,
Illuſtris Medicorum Ordinis
in florentiſſima SALANA conſenſu,
SUB PRÆSIDIO
NOBILISSIMI, EXCELLENTISSIMI, ATQUE EXPERIENTISSIMI
DN. JOHANNIS THEODORI
SCHENCKII, Medicinæ DOCTORIS
& Theoretices PROFESSORIS PUBLICI longè celeberrimi,
Dn. Patroni, Promotoris ac Hoſpitis, Parentis inſtar
æviterno filialis obſervantiæ cultu devenerandi,
colendi, amandi,
publicæ diſquiſitioni ſubmittit
LUCAS SCHROECKIUS,
AUGUSTANUS,
Autor & Reſpondens,
Ad diem Octobris.
A. S. R. CIↃ IↃC LXVII.
Typis Johannis VVertheri.

Figure 4.7 Johann Theodor Schenck and Lucas Schroeck, *Exercitationem Academicam De Moscho* (Jena, 1667), title page. Munich, Bavarian State Library, signature 4 Diss. 3521,5

This Latin text was, in turn, used by Johann Heinrich Zedler in his Universal Lexicon published in the German vernacular in Halle and Leipzig in 1731–54. It was intended as an encyclopedia of knowledge for

Akademie der Wissenschaften. In 1693 Lucas Schroeck was elected as president of the then Academia Naturae Curiosorum and held the title until his death in 1730. His society name was Celsus I. See for more details Johann Ferdinand Neigebaur, *Geschichte der Kaiserlichen Leopold Carolinischen Deutschen Akademie der Naturforscher während des zweiten Jahrhunderts ihres Bestehens* (Jena, 1860), 14.

Figure 4.8 Lucas Schroeck, *Historia Moschi* (Augsburg, 1682), frontispiece. Munich, Bavarian State Library, signature 4 M.med. 215.

general use, and contained a three-page entry on musk in German, citing Schroeck's original monograph.[53]

As the material on musk took new forms its content and purpose were reshaped. Gessner treated musk as one item of a collection of specimens or objects under several different headers: zoology, general physics, and

[53] 'Bisam', in Johann Heinrich Zedler, *Großes vollständiges Universallexicon aller Wissenschaften und Künste* (Halle and Leipzig, 1731–1754), vol. 3 (1733), cols 1929–1933.

research into ancient perfumery. In his dissertation, Schroeck examined the secretion on its own, and expanded his entry to include all known details about it. Schroeck's dissertation was one of the very few that his supervisor, the Jena professor of practical medicine and botany Theodor Schenck, acknowledged as the sole work of the student. This was a privilege printed on the title page of the dissertation, rarely seen in medical dissertations of the time.

A comparison of Schroeck's book addressed to the Academy with his thesis on musk shows that the former expanded the information given in the dissertation: While the dissertation had ninety-three pages, the book numbered 229 pages. Both contained three images, but the images in the book for the Academy were engravings of higher quality, containing more detail than the three woodcuts of the dissertation (Figure 4.6). The presentation of the gland, for example, was now detailed and much easier to identify.

Both Schroeck's dissertation and monograph quoted Conrad Gessner's *Historia Animalium*. While the dissertation presents its subject in a similar manner to Gessner's *Historia Animalium*, placing the animal and its habitat at the beginning of the discussion, the book is reorganized to focus on the extraction of musk, and to include not only the gland of the musk deer, but also other animals producing similar smells. It also points to many pharmaceutical uses of musk, which Gessner and Schroeck's dissertation had not specified, identifying and examining the different ways it could be put to human use. However, the greatest difference in Schroeck's book from both his dissertation and Gessner's writings lay in the status of experiments included in the written record. The book cites not just the ancient authors, but especially those colleagues who had recently explored and tested musk experimentally, such as the anatomist Johann Rudolph Salzmann, who brought out his work *Varia observata anatomica hactenus inedita* in 1669.[54]

Johann Heinrich Zedler's vernacular universal lexicon cited Schroeck's work and pointed to Schroeck's illustrations, which are presented as the ones with the greatest veracity, because Schroeck had had a skin of the musk deer sent from India (compare Figure 4.6).[55] Unlike Schroeck's monograph, the entry adopts the perspective of a German-speaking lay user of musk (and not the one of a professional medical practitioner). Its emphasis is on the correct appearance of musk on the market. It explains the different uses of musk and how to distinguish the genuine product from a fake. The reader learns about musk's medical and recreational benefits. The odor

[54] Schroeck, *Historia Moschi*, 19. Johann Rudolph Saltzmann and Theodorus Wynants, *Varia observata anatomica hactenus inedita* (Amsterdam, 1669).

[55] 'Bisam', in Johann Heinrich Zedler, *Großes vollständiges Universallexicon aller Wissenschaften und Künste* (Halle and Leipzig, 1731–1754), vol. 3 (1733), cols 1929–1933.

of musk is generally referred to as pleasant and strong. This differs from an earlier discussion in Gessner's *De Anima* commentary, where musk was named as one of a few ambivalent smells, that could sometimes be perceived as pleasant, but also as awful.[56] This example shows how dissertations played a role in a multi-layered process of transferring knowledge and skills from public to academy and back, which added and shaped the content according to interest, reason, norm, custom and readership.

In writing and defending his dissertation about musk, the student Schroeck used materials from earlier encyclopedias and the world of natural history. He and his supervisor collaborated on the thesis disputation, but Schroeck was sole author of the published dissertation. He entered its content into the university canon, with its new focus on detailed and empirically observable knowledge. And Schroeck alone used his research to write an enlarged and updated monograph for the Academia Naturae Curiosorum. This in turn, was taken up by the vernacular encyclopedists.

5. PROFESSORS, STUDENTS, AND SERIES OF DISSERTATIONS

By focusing on the contribution of students in seventeenth-century medical disputations, we can see how the strategies of disputation and dissertation changed and migrated from one generation of students to the next. Reviewing a set of dissertations written by a group of people coming from the same academic institution and supervised by the same professor has the advantage of reduced complexity.

My case study is the prolific thesis writer and supervisor Daniel Sennert (1572–1637, Figure 4.9), professor of medicine and alchemist at the University of Wittenberg.[57] Originally from Breslau in Silesia (today Wrocław in Poland), Daniel Sennert studied Medicine at the University of Wittenberg, where he defended his dissertation in 1601.[58] In September 1602, he succeeded Johann Jessen, who departed for Prague, as professor of anatomy

[56] Anja-Silvia Goeing, 'Reading Books in Natural Philosophy: How Conrad Gessner's Commentary on "De Anima" (1563) Was Annotated and Interpreted'. *Bulletin of the John Rylands Library* 93, no. 2 (2017): 69–89.

[57] The bibliography at https://sennertcollab.omeka.fas.harvard.edu/bibliography on literature about Sennert is regularly updated. Sennert's recent biographies are concise: Andreas Lesser, *Die albertinischen Leibärzte vor 1700 und ihre verwandtschaftlichen Beziehungen zu Ärzten und Apothekern* (Petersberg, 2015), 160–163, and Hans Kangro, 'Sennert, Daniel', in *Complete Dictionary of Scientific Biography*, vol. 12 (Detroit, MI, 2008), 310–313. The most revisionist biography of Sennert's early studies is Christoph Lüthy and William R. Newman, 'Daniel Sennert's Earliest Writings (1599–1600) and their Debt to Giordano Bruno', *Bruniana & Campanelliana vol.* 6, no. 2 (2000): 261–279.

[58] Lüthy and Newman, 'Daniel Sennert's Earliest Writings', 263.

Figure 4.9 Daniel Sennert. Line engraving by M. Merian, 1628. Wellcome Collection. https://wellcomecollection.org/works/mwqt3b9p Public Domain Mark.

at the University of Wittenberg.[59] Among the more than one hundred graduate students he supervised several went on to become professors who supervised theses in turn. Students came to study with him for two reasons: first, his Silesian origins drew fellow countrymen and second, he reformed the curriculum, replacing an earlier emphasis on Aristotelian thinking by a more experimentalist medicine. He remained famous until long after his death for his early corpuscular theory, for his experiments with chymistry to produce medications, and for his large handbooks comprehending the entire discipline of practical medicine and its most pressing issues.[60] But he was also an innovator in other ways, following up on earlier work of Duncan Liddel and others in how he organized his students and their theses into teams of scholars who worked on large 'umbrella' projects.[61] His large number of students, and the traces they left—their names, origins and studies via disputations and dissertations—provide an especially rich body of evidence to study the dynamics of the spread of medical knowledge. These are the basis of a database I am constructing with the initial help in 2019 of the bibliographer Laura Krueger.[62]

The completed database will cross-reference every copy of the dissertations that is still available. It will also include biographies of their authors, focusing on their work, both at Wittenberg and elsewhere. The aim is to create a complete picture of Sennert's and his students' work. At present we have identified 137 disputations supervised by Sennert between 1599 and 1637, the year of his untimely death from the plague, of which fourteen dissertations are clearly marked as leading to a degree. We also included Sennert's own four disputations written between 1594 and 1599, as well as his eventual doctoral dissertation in 1601 when Sennert was a responding student at the university of Wittenberg in Aristotelian Physics and Medicine.[63]

[59] Lüthy and Newman, 'Daniel Sennert's Earliest Writings', 266.

[60] Se especially Joel A Klein, Chymical Medicine, Corpuscularism, and Controvery: A study of Daniel Sennert's Works and Letters, PhD thesis (Bloomington, IN, 2014); Joel A Klein, 'Daniel Sennert and the Chymico-Atomical Reform of Medicine', in Ole Grell and Andrew Cunningham (eds.), *Medicine, Natural Philosophy and Religion in Post-Reformation Scandinavia.* London, 2017, 30–47; William R. Newman, *Atoms and Alchemy: Chymistry and the Experimental Origins of the Scientific Revolution*, (Chicago, 2006).

[61] See the context of note 29 above, describing the first of these 'team'-projects that he developed after eighteen years into a handbook, omitting the students' names and adding more chapters.

[62] Anja-Silvia Goeing, Sennert Collaborators, https://sennertcollab.omeka.fas.harvard.edu/about

[63] His Wittenberg disputation supervisors were Jakob Martin in Aristotelian Physics (1594), Martin Hilwig in Philosophy (1597), and Johann Jessen in Aristotelian Physics and Medicine (1596 and 1599), finally Ernst Hettenbach in Medicine (1601), all professors at the University of Wittenberg.

Neither Sennert nor the students reprinted their disputations in his or their lifetime, but examples show that Sennert used entire series or parts of them (without citing the work of the students) in his treatises.[64] We have many editions (some published long after his death) of his treatises on practical medicine and handbooks on the discipline of medicine itself. These works ranged from the description of the human body and its organs, with their functions and malfunctions via known illnesses, to methods of diagnostics to trace and determine symptoms and causes of illnesses in the body. They concluded with methods to heal the patient, emphasizing the importance of medication. After his death, the encyclopedic volumes were translated from Latin into English and Dutch.[65] While Sennert and his treatise work were not forgotten by printers and often reprinted up to the eighteenth century, his dissertations had a different fate—they were not generally reprinted— and became collectors' items, as we know in the case of the Princes of Brunswick-Wolfenbüttel's collection of plague disputations.[66]

Sennert's students came and went from Wittenberg for their study—mostly from the eastern regions of the Old Empire, such as Silesia, where Sennert was born, and from Protestant parts of the Kingdom of Poland, though we also find students from Hamburg, from Nuremberg in Bavaria and Helsingor near Copenhagen in Denmark, that is, south, north, or west from Wittenberg.

Why did students go to Sennert? The obituary of one of Sennert's former students, the physician and Imperial Count Palatine Johann Georg Fabricius, maintained that what drew flocks of students to Sennert was the opportunity they had to work with him in his chemical course.[67]

Alchemical laboratories, used by professors for study purposes, are known from the late medieval times, but their official inclusion in teaching was a later development (Figure 4.10). One of the first official curricula

[64] See note 29 above. While both, Joel Klein and William Newman found evidence of Sennert using the material collected via the disputations in his treatises, a systematic and thorough analysis is still wanting.

[65] Some of the last editions that the library catalogs offer, are Daniel Sennert, *Practical Physick, or, Five Distinct Treatises of the Most Predominant Diseases of These Times the First of the Scurvy, the Second of the Dropsie, the Third of Feavers and Agues of All Sort, the Fourth of the French Pox, and the Fifth of the Gout, Wherein* (England: Printed for William Whitwood .., 1676); Daniel Sennert and Philippe Cestan, *Epitome institutionum medicinae, et librorum De febribus* (Padua, 1684). A Dutch translation is for example Daniel Sennert, Jasper Goris, and Daniël Jonctijs, *Verhandelingh der toover-sieckten met een Geschil vande schôot- en steeck-vrije ; Geschil van de wapen-salve; Paracelsi vrije-konst* (Dordrecht, 1638).

[66] See note 45 above.

[67] Sebastian Jakob Kraus, *Der Sünden Macht, und der Gnaden Krafft: Auß dem V. Cap. der Epistel St. Pauli an die Römer, Vers. 20/21. Bey hochansehentlicher Leich-Begängnus deß Edlen/ Ehrenvest- und hochgelehrten Herrn Johann Georg Fabricii, Philosophiae & Medicinae Doctoris …* (Altdorff, 1668), 30–86 (Curriculum vitae of J. G. Fabricius), here p. 44.

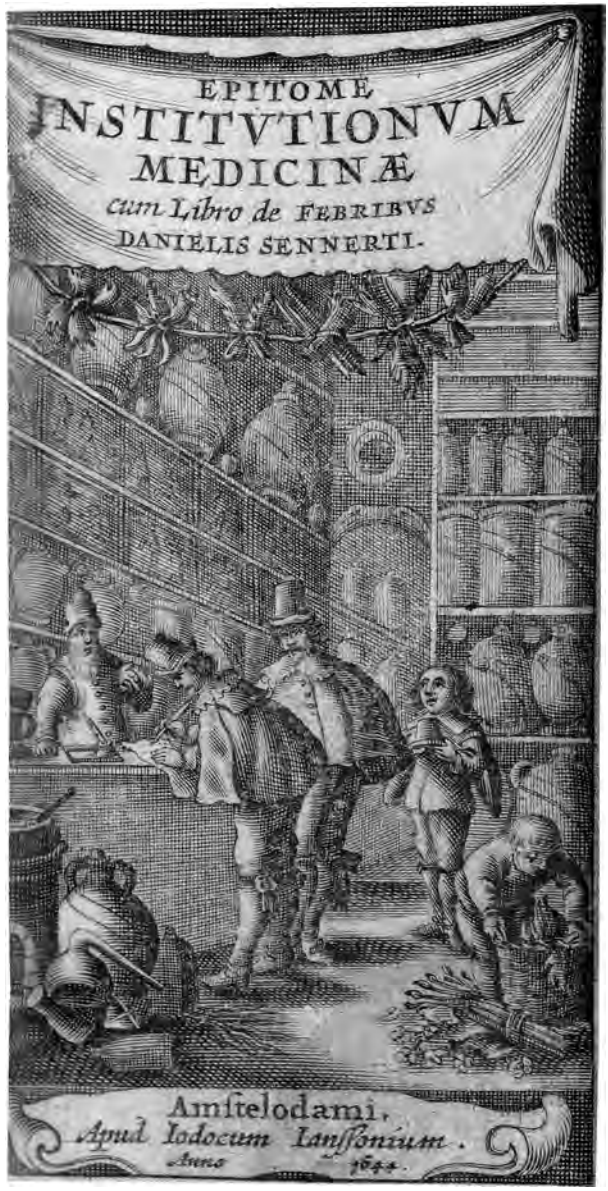


Figure 4.10 Apothecary scene with distillery equipment, by unknown engraver, from Daniel Sennert, *Epitome institutionum medicinae, et librorum de febribus*, posthumously published in Amsterdam 1644 by Jodocus Janssonius. Wellcome Collection, https://wellcomecollection.org/works/fzq7nt7r Attribution 4.0 International (CC BY 4.0).

of chymistry was at the University of Marburg in 1609, where the polymath Johann Hartmann had his chemical laboratory.[68] But, according to the research of Joel Klein, Daniel Sennert was probably one of the first teachers in Europe to officially integrate the subject of chymistry into the medical curriculum at Wittenberg as early as the beginning of the seventeenth century.[69]

Johann Georg Fabricius worked from June 1617 for half a year in Sennert's course, the so-called 'Collegium Chymicum', together with twenty-three other candidates of medicine. (As his obituary put it, 'He labored diligently and created many beautiful things'.[70]) He then went on to take a course in practical medicine with Sennert's collaborator Wolfgang Schaller, which ended in March 1618 with a private disputation on the term, symptoms and healing of dizziness ('De Vertigine').[71] He followed this with a public disputation with Sennert on consumption ('De Phthisi', Figure 4.5a and 4.5b)--today called tuberculosis—on 22 May, and another with Sennert on 25 September on the use of the kidneys ('De Renum Usu').[72] Fabricius's account shows how practical work in the laboratory and disputations followed on from one another without necessarily overlapping.

Fabricius' obituary also recorded his travels, typical of many students at the time. It makes clear that he decided where to go and what to study

[68] See www.aerztebriefe.de/id/00034790, a petition by the medical faculty of the university of Marburg in 1613 to the Landgraf Moritz von Hessen-Kassel. The letter describes the great interest that students had in Johann Hartmann's course on 'Chymiatry' in Marburg from its beginnings in 1609. See Guido Jüttner: Wilhelm Gratarolus, Benedikt Aretius. Naturwissenschaftliche Beziehungen der Universität Marburg zur Schweiz im sechzehnten Jahrhundert, Diss. masch. Marburg 1969, 24–26 (extracts).

[69] Compare the remains of a comprehensively equipped alchemist's workshop from the second half of the sixteenth century, which was discovered in 2012 during excavations in Lutherstadt Wittenberg: Joel A Klein, 'Alchemical Histories, Chymical Education, and Chymical Medicine in Sixteenth- and Seventeenth-Century Wittenberg', in: Harald Meller, Alfred Reichenberger, and Christian-Heinrich Wunderlich (eds.), *Alchemie und Wissenschaft des 16. Jahrhunderts: Fallstudien aus Wittenberg und vergleichbare Befunde: International Conference in Halle (Saale). (Tagungen des Landesmuseums für Vorgeschichte Halle 15,* Halle (Saale), 2016), 293–302.

[70] Kraus, *Der Sünden Macht*, 44: 'Im welchem Monat (June 1617) Er sich auch in Herrn Sennerti Collegium Chymicum begeben / und in demselben / mit anderen 23. Candidatis Medicinae von dato an / biß auf folgend Michaelis / fleissig laborirt / auch viel schöne Sachen zuwegen gebracht hat'.

[71] Wolfgang Schaller and Johann Georg Fabricius, *Decadis Primae Disputatio VI, De Vertigine* (Wittenberg, 1618).

[72] Daniel Sennert and Johann Georg Fabricius, *Disputatio Medica De Phthisi* (Wittenberg, 1618); Daniel Sennert and Johann Georg Fabricius, *Hoc De Renum Usu Paradoxum, Sub Praesidio . . . Dn. Danielis Sennerti, . . . Publice Defendere Conabitur M. Joh. Georg. Fabricius, Norimbergensis . . .* (Wittenberg, 1618).

next, without pressure from the supervising institution. When Fabricius wanted to leave Wittenberg after one and a half year of studies, Sennert wrote him a 'magnificent testimony' and let him go.[73] Fabricius then went via Jena to Basel where he took his doctoral exam in 1620 with the renowned Caspar Bauhin, whose obituary described him as a world-famous professor in medicine and who was highly esteemed by Sennert.[74] Lack of money prevented Fabricius from making a short visit to Padua in Italy, still the capital of medical studies in Europe, and he returned home to Nuremberg in September 1620, where he sought and received admission to the medical college and opened a private practice.[75] He died in Altdorf near Nuremberg in 1668, after 48 years in his profession.

We can identify 109 students from the period 1599 to 1637 who, like Fabricius, studied and did disputations with Sennert. But not all have such rich histories. So far we have been able to trace the professional lives of thirty-eight of the 109 students, i.e. about 36%.

We know from the matriculation lists (Figure 4.11) and the disputation prints where all 109 students came from: like Sennert, exactly one third (33% or thirty-five students) had their origin in the protestant eastern provinces of the Old Empire and the protestant parts of Poland. This is not a coincidence: During and after the Reformation, Wittenberg had built up strong religious connections with the east of the Habsburg Empire and the Baltic region, following merchants' routes up to Gdansk and into the Livland territories.[76] Protestant pamphlets and other information about the new confessions and politics found their way into many eastern markets and attracted many households. Families in the

[73] Kraus, *Der Sünden Macht*, 45. The printed testimony is stored together with an interleaved and annotated copy of Fabricius's *De Phthisi* at Herzog August Library Wolfenbüttel: Daniel Sennert, *Decanus Collegi[i] Medici In Academia Witebergensi Daniel Sennertus, D. Medicae Facultatis Professor & Senior Omnibus Has Literas Lecturis, Cum Debita Cuiq[ue] Honoris Praefatione, S.D.* ([Wittenberg], 1618), signature Xb 9069.1.

[74] Kraus, *Der Sünden Macht*, 44; Caspar Bauhin, *Hygiae Et Panaceae Parente Annuente Ad Thesmophoria Aperta Sacraq Asclepiadea Athenis Helvetior. Ad d. XXIX. Augus. Indicta Casparus Bauhinus Basileens. Archiatros Praxeos Profess. Ord. Amplissimi Medicor. Colleg. Volunt. & Decret. Mystagogos Rite Lectus Dictusq… D. M. Gregorio Queccio Altorphino-Norico D. M. Ioh. Georgio Fabricio Norimbergensi D. Paulo Dasero Stutgardiano Wirtenbergico D. M. Georgio Magiro Hatneggensi Westphalo D. Ieremiae Stellae Augustano Vindelico… Asclepiadeam Solemnem Coronam Princip. Auctor. in Choragio Academ. Impositurus Ad Panegyrin Hanc Omnes Omnium Ord. Academ. Prostatas Epistatas Parastatas & Hypostatas Ex Gratiosa Talionis Lege Auditum Spectatum Invitat Vocat Evocat*, ed. Gregor Fabricius Queccius (Basel, 1620); Johann Georg Fabricius, *Disputatio Medica De Phrenitide* (Basel, 1620).

[75] Kraus, *Der Sünden Macht*, 57–58.

[76] Cf. Michael North, *Geschichte der Ostsee: Handel und Kulturen* (Munich, 2011), 104–135.

Figure 4.11 University of Wittenberg, sketch from matriculation book, cropped, Wittenberger Matrikel, Universitäts- und Landesbibliothek Sachsen-Anhalt, vol. 6, 1645–1675, urn:nbn:de:gbv:3:3–55841.

sixteenth and seventeenth centuries would send their sons to study at the protestant university in Wittenberg. Eastern cities and courts actively attracted former Wittenberg students to work as medical practitioners and professors.

The diagram in figure 4.12 reveals a tendency for Sennert's students to end their working life close to their origins, even when they had earlier held posts in many different places. They returned to positions close to home, some of them in the academy, after their reputations had been made. The horizontal axis shows the dates of first disputations with Sennert as a means of identifying individual students, the vertical axis shows the distance of their last held position in life in relation to their point of origin.

To make the diagram and the data clearer, we have omitted two outliers. The first is Georg Marggraf (1610–1644), a respondent of Sennert in 1634, who traveled to Brazil as a geographer, cartographer, astronomer and meteorologist and remained there, six thousand miles from his town of

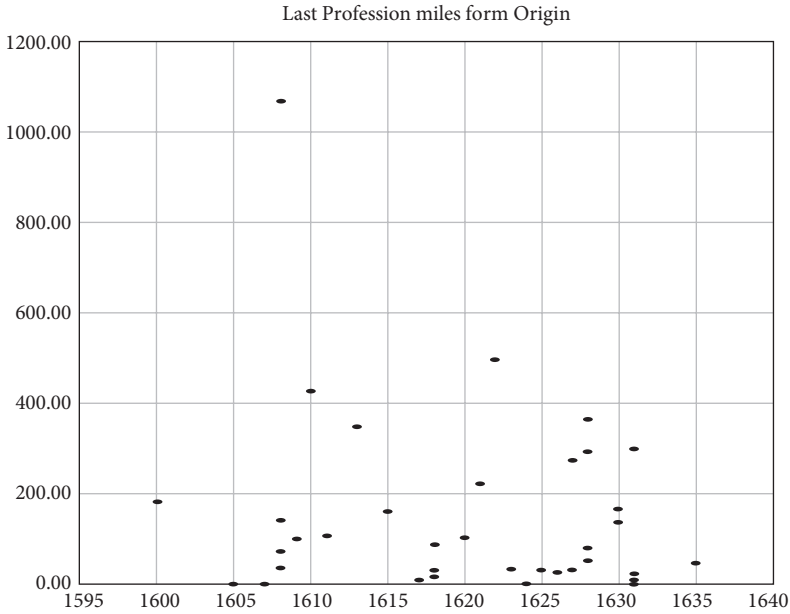


Figure 4.12 Distance of place of last profession from the place of origin, group of Sennert's students. Vertical axis: distance in miles; horizontal axis: year of first disputation with Sennert (as identification marker).

origin, Liebstadt in Saxony (Figure 4.13).[77] The second was Johannes Raicus (ca. 1580–1632) from Bohemia (the modern-day Czech Republic) who finished his disputation with Sennert in 1608, and then found work first in Uppsala and then at the university of Dorpat in Lithuania (both in present-day Sweden).[78]

With the exception of these two cases, most alumni retired within about 50–60 miles of their place of origin. Probably family ties drew them back to their home town, or they returned because connections to the local church and city council were professionally useful. This pattern

[77] On Georg Marggraf's dissertation with Daniel Sennert see https://sennertcollab.omeka.fas.harvard.edu/items/show/3169. He died in 1644 in São Paulo de Loanda, Brazil. For more information on Marggraf see Neil Safier, 'Beyond Brazilian Nature: The Editorial Itineraries of Marcgraf and Piso's Historia Naturalis Brasiliae', in Michiel Van Groesen (ed.), *The Legacy of Dutch Brazil* (New York, 2014), 168–186.

[78] On Johannes Raicus's dissertation with Daniel Sennert, see https://sennertcollab.omeka.fas.harvard.edu/items/show/2590. For more information on Raicus see Kaarina Rein, 'Tartu as the Eastern Outpost of European Medicine in the First Half of the seventeenth Century', *Acta Baltica Historiae et Philosophiae Scientiarum*, 2, no. 1 (2014): 37–52, here p. 40.

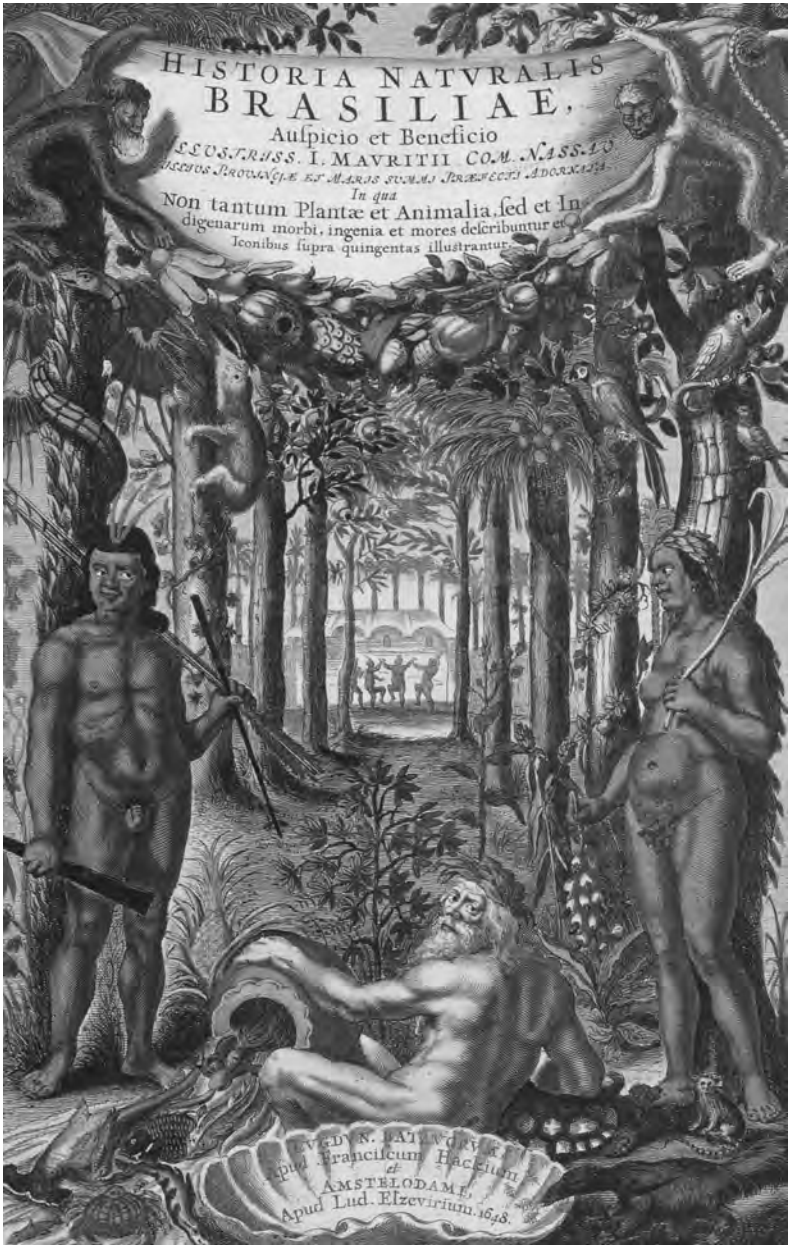


Figure 4.13 Marggraf's publication from his field trip to Brazil: Willem Piso, Johannes de Laet, and Georg Marggraf, *Historia Naturalis Brasiliae… :In qua Non Tantum Plantae et Animalia, Sed et Indigenarum Morbi, Ingenia et Mores Describuntur et Iconibus Supra Quingentas Illustrantur* (Leiden and Amsterdam, 1648), title page. Wikimedia Commons, https://commons.wikimedia.org/wiki/File:Historia-Naturalis-Brasiliae.jpg.

of behavior affected the transmission of learned knowledge, because what Sennert's students had learned and wanted to keep for their own practice went back with them. Although we cannot speak for any of the individual cases, we expect to find more of Sennert's legacy and practices applied in the geographical homelands of his students than elsewhere. Seventeen former students of Sennert (sixteen of whom wrote a dissertation with him and one, Werner Rolfinck, without a traceable disputation) became academics in places more or less close to their homes.[79] While most of Sennert's students worked as medical practitioners, town or court physicians or personal physicians outside academia, these seventeen were professors in universities and gymnasia, and one of them, Sebastian Meier from Lübeck, ended up as a school director in Lübeck.[80] Of these academics, six can be identified as having supervised printed dissertations.[81]

In Wittenberg under Sennert's supervision, students were assigned small and specific topics that were part of a cluster on a general theme or under general header questions. Already very early in his teaching career, Sennert habitually grouped six or more micro-topics together, for example in his study of different aspects of healing in 1603–1604 or on fevers in 1628.[82] This way of organizing research and ordering knowledge was later used by five of Sennert's students, each of whom had a different response to Sennert's teaching.[83]

Wolfgang Schaller from Freiberg in Saxony worked closely with Sennert as a professor of anatomy in Wittenberg from 1616 until his untimely death in 1626.[84] Daniel Beckher (1594–1655), from Gdansk in Royal Prussia, a province of Poland, grew up bilingual in German and Polish and became a professor of medicine at the Brandenburg-Prussia university of Regiomontanus or Königsberg (now Kaliningrad in Russia), on the Baltic, close to his city of origin (Figure 4.14).[85] The third professor Werner Rolfinck (1599–1673) was from Hamburg, and in 1629 became professor of anatomy and botany (later also chemical medicine) at the university of Jena in the

[79] See the list of Sennert's students with biographical data at https://sennertcollab.omeka.fas.harvard.edu/exhibits/show/3danielsennertsstudents/respondents-that-we-can-trace-.

[80] See https://sennertcollab.omeka.fas.harvard.edu/items/show/2580.

[81] See below for the names.

[82] See the lists of Sennert's disputations on 'the art of healing' and 'fevers' in appendix A below.

[83] The sixth professor, Lorenz Eichstaedt, professor for mathematics, medicine, and physics at the Gymnasium of Gdansk after a long period as medical practitioner, did not follow Sennert's approaches. For his biography, see Peter Cruger, 'Eichstaedt, Lorenz', in *Bio-bibliographisches Handbuch der Kalendermacher*, at https://www.presseforschung.uni-bremen.de/dokuwiki/doku.php?id=eichstaedt_lorenz, accessed 8 July 2022.

[84] See 'Schaller, Wolfgang', index entry: *Deutsche Biographie*, https://www.deutsche-biographie.de/pnd12212331X.html, accessed 30 July 2022.

[85] See August Hirsch: *Beckher, Daniel.* In: *Allgemeine Deutsche Biographie* (ADB). Band 2, (Leipzig, 1875), 236–237.

Figure 4.14 Königsberg (Kaliningrad), Albertus University (the old university), ca. 1850, drawing by Ludwig Clericus. Protestant cities and regions had built and would further build their own gymnasia and universities, such as Königsberg, today Kaliningrad, that we mostly know as alma mater of Immanuel Kant, the great philosopher. Königsberg university existed from 1544 until shortly after World War II in 1946.

Source: https://de.academic.ru/dic.nsf/dewiki/47548.

Duchy of Saxe-Weimar in the Old Empire.[86] Fourth, in 1539, Johannes Löselius from Brandenburg, a small town near Königsberg, became professor of anatomy and botany at the University of Königsberg, working as a colleague of Daniel Beckher.[87] Finally, in the same year, Konrad Victor Schneider from Bitterfeld in Saxony, thirty miles southwest of Wittenberg, became professor of anatomy and botany in Wittenberg, two years after Sennert's death.[88]

Wolfgang Schaller and Konrad Victor Schneider both stayed at Wittenberg for most of their studies. The other three were at Wittenberg for only a short period of time. Daniel Beckher studied at Wittenberg for two years 1618–1620; Rolfink for one year from 1617 to 1618, and Löselius came for one semester in 1630–1631.

[86] See Claus Priesner, 'Rolfin(c)k, Werner' in: *Neue Deutsche Biographie* 22 (2005), 9–10 [Online]; URL: https://www.deutsche-biographie.de/pnd116600705.html#ndbcontent, accessed 30 July 2022.

[87] See Dietrich von Engelhardt, *Biographische Enzyklopädie deutschsprachiger Naturwissenschaftler*, vol 1, (Munich, 2003), 539.

[88] Compare Dietmar Seifert, 'Konrad Victor Schneider - Ein bedeutender Schüler des Anatomen Werner Rolfinck: Eine Würdigung zu seinem 400. Geburtstag', *Ärzteblatt Thüringen: Offizielles Mitteilungsblatt der Landesärztekammer Thüringen und der kassenärztlichen Vereinigung Thüringen / Landesärztekammer Thüringen* 25, no. 9 (2014): 507–509.

Wolfgang Schaller, Daniel Beckher and Werner Rolfinck all organized their later researches using the collaborative approach that Sennert had developed in Wittenberg in which the canon of knowledge was compartmentalized, and graduate students were given small specific topics to investigate.

Wolfgang Schaller's first disputation with Sennert in 1609 was the twelfth and last part of Sennert's series 'Quaestiones Medicae Controversae'. In 1612, he did his disputatio 'pro licentia doctoris in arte medica gradum consequendi' (to receive the medical licence) with Sennert on medical views about kidney and bladder stones ('Positiones Medicae De Calculo Renum Et Vesicae'.[89] When he started as a professor of anatomy in Wittenberg in 1616, he supervised ten disputations as a 'first decade' between 6 December 1617 and 11 April 1618 (among them the disputation of Johann Georg Fabricius on dizziness).[90] All were loosely connected to illnesses of the head, from headache and inflammation of the brain to catarrh and melancholy. His 'second decade' that he supervised in 1622 focused on illnesses of the middle part of the body. Among the select disputations were topics such as pleurisy, asthma, consumption and spitting of blood.[91]

In 1620 Daniel Beckher had prepared a disputation with Sennert on 'hair' ('De Pilis', Figure 4.15), a topic that had not previously been treated on

[89] Daniel Sennert and Wolfgang Schaller, *Quaestiones Medicae Controversae Quinque, pro Disputatione Duodecima Propositae* (Wittenberg, 1609); Daniel Sennert and Wolfgang Schaller, *Positiones Medicae De Calculo Renum Et Vesicae* ([Wittenberg], 1612).

[90] Wolfgang Schaller and Joachim Reichard, *Decadis Primae Praecipuas Capitis Affectiones Continentis Disputatio I. De Dolore Capitis* (Wittenberg, 1617); Wolfgang Schaller and Moritz Blum, *Decadis Primae Disputatio II. De Phrenitide* (Wittenberg, 1617); Wolfgang Schaller and Caspar Stein, *Decadis Primae Disputatio III. De Lethargo* (Wittenberg, 1617); Wolfgang Schaller and Balthasar Schubart, *Decadis Primae Disputatio IV. De Melancholia* (Wittenberg, 1618); Wolfgang Schaller and Florian Gerstmann, *Decadis Primae Disputatio V. De Epilepsia* (Wittenberg, 1618); Wolfgang Schaller and Johann Georg Fabricius, *Decadis Primae Disputatio VI, De Vertigine* (Wittenberg, 1618); Wolfgang Schaller and Jacobus Frisius, *Decadis Primae Disputatio VII, De Apoplexia* (Wittenberg, 1618); Wolfgang Schaller and Johann Etscher, *Decadis Primae Disputatio VIII, De Paralysi* (Wittenberg, 1618); Wolfgang Schaller and Peter Heige, *Decadis Primae Disputatio IX, De Catarrho* (Wittenberg, 1618); Wolfgang Schaller and Matthaeus Brengger, *Decadis Primae Disputatio Ultima. De Ophthalmia* (Wittenberg, 1618).

[91] VD 17 does not show the full collection. Wolfgang Schaller and Michael Friderici, *Decadis II. Disputationum Medicarum Selectissimarum Medii Ventris Tertia, De Asthmate*, Disputationes Medicae (Wittenberg, 1622); Wolfgang Schaller and Florian Gerstmann, *Decadis II. Disputationum Medicarum Selectissimarum Medii Ventris Quarta, De Sputo Sanguinis* (Wittenberg, 1622); Wolfgang Schaller and Laurentius Bapst, *Decadis II. Disputationum Medicarum Selectissimarum Medii Ventris Quinta, De Phthisi* (Wittenberg, 1622); Wolfgang Schaller and Michael Friderici, *Decadis II. Disputationum Medicarum Selectissimarum Medii Ventris Sexta, De Pleuritide*, Disputationes Medicae (Wittenberg, 1622); Wolfgang Schaller and Laurentius Bapst, *Decadis II. Disputationum Medicarum Selectissimarum Medii Ventris Nona, De Palpitatione Cordis* (Wittenberg, 1622).

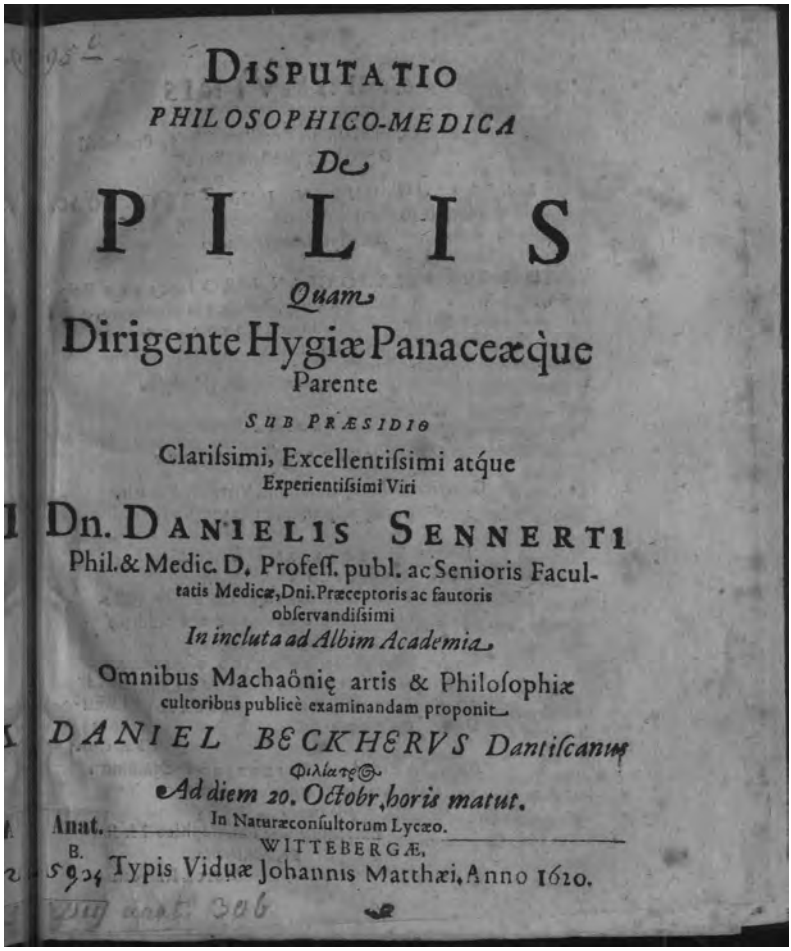
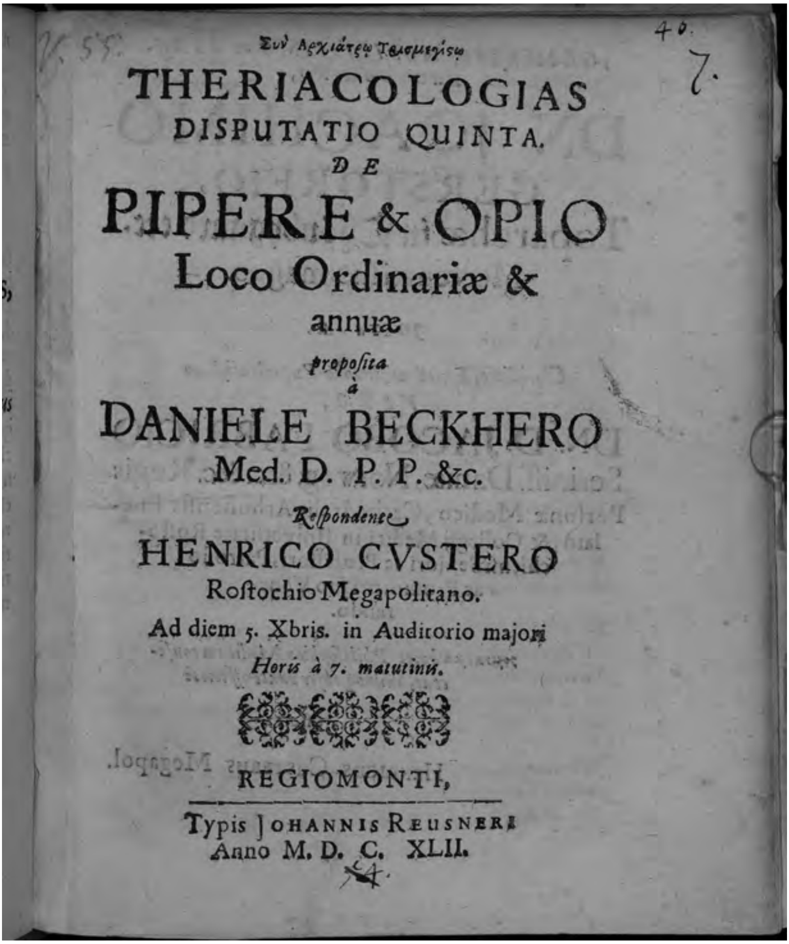

DISPUTATIO
PHILOSOPHICO-MEDICA
De
PILIS
Quam
Dirigente Hygiæ Panaceæque
Parente
SUB PRÆSIDIO
Clarissimi, Excellentissimi atque
Experientissimi Viri
Dn. DANIELIS SENNERTI
Phil. & Medic. D. Profess. publ. ac Senioris Facultatis Medicæ, Dni. Præceptoris ac fautoris
observandissimi
In inclyta ad Albim Academia
Omnibus Machaônię artis & Philosophiæ
cultoribus publicè examinandam proponit
DANIEL BECKHERVS Dantiscanus
Φιλιατρ.
Ad diem 20. Octobr. horis matut.
In Naturæconsultorum Lycæo.
WITTEBERGÆ,
Typis Viduæ Johannis Matthæi, Anno 1620.

Figure 4.15 Title of Sennert's and Beckher's *De Pilis* (Wittenberg, 1620), SLUB Dresden, signature Anat.B.250,34 http://digital.slub-dresden.de/id356862968>.

its own as a full disputation. Between 1637 and 1642 he organized his students in Königsberg in disputation groups that he called 'centurias'. He ran four centurias with a maximum of ten disputations each and one special topic group of disputations that he called 'Theriacologias' (Figure 4.16) on the Galenic history and ingredients of the then famous antidote 'theriac' that was believed to cure a great many diseases.[92]

[92] Daniel Sennert and Daniel Beckher, *Disputatio Philosophico-Medica De Pilis* (Wittenberg, 1620). For the centurias see a word search on VD 17; and of his Theriacologias we found



THERIACOLOGIAS
DISPUTATIO QUINTA.
DE
PIPERE & OPIO
Loco Ordinariæ &
annuæ
proposita
à
DANIELE BECKHERO
Med. D. P. P. &c.
Respondente
HENRICO CVSTERO
Roſtochio Megapolitano.
Ad diem 5. Xbris. in Auditorio majori
Horis à 7. matutinis.
REGIOMONTI,
Typis JOHANNIS REUSNERI
Anno M. D. C. XLII.

Figure 4.16 Daniel Beckher and Henricus Custerus, *Theriacologias, disputatio quinta: De Pipere & Opio Loco* (Königsberg, 1642), title page. http://resolver.sub.uni-goettingen.de/purl?PPN81256006X.

Similarly, when Werner Rolfinck started as a professor in Jena in 1629, he organized series of disputations, using a method like Sennert's to lay out a general rubric for disputation. Three series of disputations on chymistry

only the first and the third, Daniel Becker and Ahasver Schmidtner, *Theriacologias Disputatio Prima qua est de Theriaca in Genere* (Königsberg, 1638); Daniel Beckher and Bernhard Fossius Dantiscanus, *Theriacologias Disputatio Tertia de Trochiscis Scilliticis et Viperinis* (Königsberg, 1639).

(disputationes chimicae) are especially noteworthy as the first series of disputations on chymistry. Rolfinck supervised a group of five disputations in 1637–1638 on fossils and metals, and a group of six disputations in 1660 on antimony, tartaric acid, perfect and imperfect metals, and sulphur. He repeated the topics of 1660 in his last series of six disputations in 1678.[93]

Konrad Victor Schneider at Wittenberg, and other colleagues of Rolfinck at Jena, such as Theodor Schenck, professor of anatomy and botany, used an alternative approach. They did not organize dissertations as a collectivity, but students continued to work on specific, narrow topics. Schenck was the supervisor of Lucas Schroeck when the latter worked on his thesis about musk which we have already examined in our account of how medical knowledge was disseminated.

5. CONCLUSION

I hope to have shown in this paper that we need further investigation of three overlooked developments in the organization and spread of medical knowledge in the early modern period. First the ways in which teaching and research within the university were organized affected the (new) forms that knowledge took. Specifically, and notably in the case of Daniel Sennert and his students, team and collaborative work was organized through a division of labor in which series of dissertations facilitated detailed empirical work on particular topics to provide a large body of information, some of it derived from laboratory investigation. Secondly, as we have seen in the case of Schroeck's dissertation on musk, dissertations could be an important link in a chain of knowledge that extended beyond the academy. Thirdly, students had an important and yet undetermined part in the transmission of information. Not only did they contribute to new knowledge through their written disputations, but their travels and geographical dispersal meant that they had the opportunity to deploy their knowledge in new and very different contexts.

[93] This bibliographical information is collected from VD 17. As an example, here is the dissertation series from 1637–1638: Werner Rolfinck and Johann Chemnitz, *Disputatio Chimica prima, de Chimia in genere, eius natura, obiecto principiis, operationibus, et fine* ([Jena], 1637); Werner Rolfinck and Jacob Haberstroh, *Disputatio Chimica secunda, de obiecto Chimiae, Et I. metallis perfectis, sole et luna* (Jena, 1637); Werner Rolfinck and Gottfried Möbius, *Disputatio Chimica tertia de metallis imperfectis, Et I. duris Marte et Venere* ([Jena], 1637); Werner Rolfinck and Johann Dammenhan, *Disputatio Chimica quarta, de metallis imperfectis et II. mollibus, Iove, Saturno, Et Mercurio* ([Jena], 1638); Werner Rolfinck and Gottfried Vogel, *Disputatio Chimica quinta, de fossilibus in genere et in specie, de aqueis seu salibus, communi, Nitro, Armeniaco, Vitriolo* ([Jena], 1638).

I hope eventually to connect developments in medical knowledge and information practices to geographical movement, particularly in the eastern provinces and the Baltics, and thus address the issue of developmental disparities in medical education across Europe.

6. APPENDICES

A Examples of Sennert's disputation series:

A.1 DE METHODO MEDENDI:

Sennert, Daniel, and Wolfgangus Weis. *De Methodo Medendi Disputatio Prima : De Methodo Et Indicationibus*. Wittenberg: Officina Cratoniana, 1603.

Sennert, Daniel, and Godefridus Viebingius. *De Methodo Medendi Disputatio II : De Indicantibus*. Wittenberg: Officina Cratoniana, 1603.

Sennert, Daniel, and Joachim Köppe. *De Methodo Medendi Disputatio III : De Indicantium Consensu Ac Dissensu, Et De Indicatis*. Wittenberg: Officina Cratoniana, 1604.

Sennert, Daniel, and Godefidus Viebingius. *De Methodo Medendi Disputatio IV : De Caussis Morborum, Quatenus Toto Genere Praeter Naturam Sunt, Tollendis, Et de Sanguinis Abundantia Hirudinibus, Cucurbitulis, Scarificatione &c. Minuenda*. Wittenberg: Officina Cratoniana, 1604.

Sennert, Daniel, and Timotheus Ulricus. *De Methodo Medendi Disputatio V : De Venae Sectione*. Wittenberg: Officina Cratoniana, 1604.

Sennert, Daniel, and Conradus Schattenbergius. *De Methodo Medendi Disputatio VI : De Purgatione*. Wittenberg: Officina Cratoniana, 1604.

Sennert, Daniel, and Jacob Coler. *De Methodo Medendi Disputatio VII : De Morbi Tempore Purgationi Apto*. Wittenberg: Officina Cratoniana, 1604.

Sennert, Daniel, and Jonas Pesserl. *De Methodo Medendi Disputatio VIII : De Humorum Coctione Et Praeparatione*. Wittenberg: Officina Cratoniana, 1604.

Sennert, Daniel, and Christian Hartwig. *De Methodo Medendi Disputatio IX : De Purgationis Quantitate, Et Loco, Per Quem Fieri Debet: Atq[ue] de Evacuatione per Urinam & Sudores*. Wittenberg: Officina Cratoniana, 1604.

Sennert, Daniel, and Franciscus Omichius. *De Methodo Medendi Disputatio X : De Revulsione Et Derivatione*. Wittenberg: Faber, 1604.

Sennert, Daniel, and Conrad Schattenbergius. *De Methodo Medendi Disputatio XI : De Repellentibus, Intercipientibus, Discutientibus, Mollientibus, & Suppurantibus*. Edited by Johannes Klöker, Heinricus a Meerfeldt, Laurentius Ubbingius, and Hilerus von Lutten. Wittenberg: Faber, 1604.

A.2 DE FEBRIBUS:

Sennert, Daniel, and Christoph Meisner. *De Febribus Disputatio I. De Febris Natura*. Wittenberg: Auerbach, 1628.

Sennert, Daniel, and Zacharias Polnerus. *De Febribus Disputatio II. De Febre Ephemera*. Wittenberg: Auerbach, 1628.
Sennertus, Daniel, and Victorinus Gregorius. *De Febribus Disputatio III. De Febrium Putridarum Natura, Causis & Signis in Genere*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Christoph Maius. *De Febribus Disputatio IV. De Curatione Febris Putridæ In Genere*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Michael Stössel. *De Febribus Disputatio V. De Febre Synocha Putrida, Et Ardente*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Johannes Henricus Helmannus. *De Febribus Disputatio VI. De Continuis Periodicis*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Martin Weise. *De Febribus Disputatio VII. De Febribus Symptomaticis*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Christoph Meisner. *De Febribus Disputatio VIII. De De Febribus Intermittentibus in Genere*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Victorinus Gregorii. *De Febribus Disputatio IX. De Febribus Intermittentibus in Specie*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Georg Selsma. *De Febribus Disputatio X. De Febribus Compositis Et Hectica*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Christoph Maius. *De Febribus Disputatio XI. De Pestilentia*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Johann Heinrich Helmann. *De Febribus Disputatio XII. De Febribus Pestilentibus Ac Malignis In Genere*. Wittenberg: Auerbach, 1628.
Sennert, Daniel, and Zacharias Polnerus. *De Febribus Disputatio XIII. De Variolis, Morbillis, Febre Petechiali Et Sudore Anglico*. Wittenberg: Auerbach, 1628.

Appendix B: CAC Detail: Number of medical Students migrating from Kraków

1) Period from 1500 to the far-reaching university reforms in 1522, which were caused by the Reformation in the Old Empire: The University of Kraków had twenty-seven medical students whose names were recorded in the database. Three of them went to Bologna, three to Padua, among them the medical student Nicolaus Copernicus.
2) Period from 1523 to the consolidation of the Reformation, which is generally given as around 1560: Fifty medical students were recorded, nine of them went to Padua. Combined with Padua: one student went to Padua and Rome, one student went to Padua and Bologna, one student went to Padua, Bologna, Florence, Venice, and Rome. Four students went only to Bologna, one student went to Basel, Tübingen, and Paris each.
3) Period from 1560 to 1600: The University of Kraków had sixty medical students, of which seventeen only went to Padua; one student went to Padua, Venice, and Bologna; one student went to Padua, Bologna, and Rome; one

student went only to Rome; three students went only to Bologna; one went to Basel, Ingolstadt, and Paris each.

4) Period from 1600 to 1650: The University of Kraków had 105 medical students, of which twenty-seven went to Padua; two students went combined to Padua and Rom; one student went combined to Padua and Bologna; two only went to Bologna; one went to Ingolstadt; one student went to Paris.

Department of History
Harvard University