

Patterns of the Circulation of Scientific Knowledge in Hungary, 1770–1830

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Abstract. During the past six years (2016–2020, including a nineteen-month extension due to the COVID-19 pandemic, lasting until the end of 2022), the project team has been working on seven fields of knowledge (history; classical philology/aesthetics; philosophy; statistics; anthropology; medicine; agricultural sciences), investigating how and through which personal, institutional, and media channels different types of knowledge have been transformed into scientific disciplines. Each researcher sought to model the respective patterns of knowledge through an analysis of hitherto unknown manuscripts and printed texts of various genres characteristic of Hungary’s scientific life between 1770 and 1830 involving epistemic arenas, the technologies of ‘making sciences’, and media tools.

As many as seventy-one publications appeared during the course of the project. These include a monograph and a publication that comprises historical sources in the field of agricultural sciences, and an online publication that consists of a substantial number of sources associated with the above-mentioned disciplines. The proceedings of two international conferences in Hungarian and English, a collection of papers in English, and two in Hungarian should also be noted. All these should be accessible in print and open-access format at the end of 2022.

The synthesis volumes on the processes of development of the seven fields of knowledge into independent disciplines may be utilized as university textbooks or as manuals for researchers. The digital edition of sources (comprising forty-five author’s sheets) was created using open-source Wikibase™ software that can support both text publication and provide the backend database that is needed for data enrichment. It is in an open-source format, making it possible to explore personal names, toponyms, and subject headings according to main and subcategories. We intend to build a network of Hungarian and foreign researchers to extend the system both horizontally and vertically.

Keywords: models of knowledge circulation, transmission and reception of knowledge, the scientific paradigm of Göttingen, *respublica litteraria*, scientific agents, scientific scenes, scientific practices, scientific media, digital anthology of sources

Research purposes, problems, notions, and time span

In the past four decades, the multi-scope study of the internal relationship between the sciences and culture associated with different turns (cultural, practical, linguistic, and critical) has led to a fundamental change in the approach to understanding the spatial and temporal patterns of scientific knowledge production and circulation. In the new historiography of science that has emerged in the wake of these turns, which has increasingly mediated between the humanities and the natural sciences, the concepts employed to interpret goals, causes, intentions, and results—hitherto embedded in the dominant paradigm of development—have been replaced by models that interpret and relativize the complex processes of knowledge production, distribution, and authorization, as well as the phenomena of ruptures, disruptions, upswings, and reversals. Due to this shift in perspective regarding the early modern and modern periods, historians of science have focused on the spatial diffusion and reception of scientific knowledge, its associated social and cultural practices, and abstract content with the use of metaphorical concepts (diffusion, dissemination, transport, export, exchange, flow, circulation, translation, traveling knowledge, and knowledge in transit) when describing the structural characteristics of primarily the Western European region.¹

Our project, which was launched in October 2016 with the participation of five senior researchers, one research fellow, and a PhD student,² aimed to join this

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- 1 Models based on the dichotomy between the European center and the colonial periphery that emerged in the 1960s and 1970s interpreted the spread of scientific knowledge as a linear process; i.e., as a simple export of knowledge from Europe to the colonies; on this, see: Basalla, “The Spread of Western Science”; Said, *Orientalism*. In contrast to these linear models, from the 1980s onwards alternatives emerged that seemed to be well suited to explaining the concepts of knowledge production, diffusion, and acquisition as reciprocal processes, interactions running in parallel, or as dynamic, complex processes that also include local contexts: Werner and Zimmermann, “Vergleich, Transfer, Verflechtung”; Latour, “Visualisation and Cognition”; Latour, *Science in Action*; Ash, “Wissen- und Wissenschaftstransfer”; Espagne, *Les transferts culturels*; Withers, “The Geography of Scientific Knowledge”; Livingstone, *Putting Science in Its Place*.
 - 2 The members of the project team: Piroska Balogh (literary historian/senior researcher, Institute of Hungarian Literature and Cultural Studies, Department of 18–19th Century Hungarian Literature, Eötvös Loránd University); Tibor Bodnár-Király (political scientist/research fellow, Institute of History, Department of Early Modern History, Eötvös Loránd University); Dezső Gurka (philosopher, historian of science/senior researcher, Faculty of Pedagogy, Gál Ferenc College, Szarvas), Ildikó Sz. Kristóf (anthropologist/senior researcher, Eötvös Loránd Research Network, Research Centre for the Humanities, Institute of Ethnology), Lilla Krász (historian/principal investigator, Institute of History, Department of Early Modern History, Eötvös Loránd University); György Kurucz (historian/senior researcher, Institute of Historical Studies, Department of Early Modern Economic and Education History, Károli Gáspár University

European discourse. Within the framework of this project, we explored how and through which personal, institutional, and media channels individual scientific disciplines were formed from different fields of knowledge (history; classical philology/aesthetics; history of philosophy; political sciences/statistics; ethnology/anthropology; medicine; economics/agricultural sciences). At the turn of the eighteenth and nineteenth centuries, the academic discipline emerged throughout Europe as a new scheme that presupposed common assumptions and ideological foundations, common (specialized) linguistic codes, independent publishing activity capable of representing disciplines within the well-definable network of literates known as the *respublica litteraria*, or in institutionalized form as independent professorships, methodologies, textbook programs, and specialized journals at universities. The general aim of the project was to identify where, what, and how knowledge was produced; by whom and for whom; by which means it was read, compiled, and collected; what this knowledge was used for, and to whom and by what means it was transmitted.

Our research was further enriched by a large number of studies that have appeared in the past two decades primarily in the fields of cultural studies and the history of knowledge and science that focus on the functioning of various early modern and modern European knowledge cultures and the systematization of knowledge, as well as the practices of knowledge production, acquisition, and distribution, the changing uses of its material instruments, the integration of new elements of knowledge and the conscious exclusion or submergence of old ones, and, in general, the different means of preserving traditional knowledge through creating myths.³

The fields of knowledge examined during the project were defined along the lines of the narrative of the *Wissenschaft vom Menschen*, derived from Göttingen.⁴ The narrative seemed to be suitable for capturing a tradition in the history of

of the Reformed Church in Hungary), and Janka Kovács (PhD student, Doctoral School of History, Eötvös Loránd University, who earned her PhD in 2022). Máté Szentkereszti (MA Student, Institute of History, Eötvös Loránd University) also joined the project in 2021, during the extension period.

3 See: Bödeker, Reill, and Schlumbohm, eds, *Wissenschaft als kulturelle Praxis*; Burke, *A Social History of Knowledge*; Frasca-Spada and Jardine, eds, *Books and the Sciences*; Becker and Clark, eds, *Little Tools of Knowledge*; Zedelmaier and Mulsow, eds, *Die Praktiken der Gelehrsamkeit*; Gierl, “Kompilation und die Produktion von Wissen”; Stagl, *Eine Geschichte der Neugier*; Heesen and Spary, eds, *Sammeln als Wissen*; Stammen and Weber, eds, *Wissenssicherung*; Collin and Horstmann, eds, *Das Wissen des Staates*; van Dülmen and Rauschenbach, eds, *Macht des Wissens*; Clark, *Academic Charisma*; Brendecke, Friedrich, and Friedrich, eds, *Information der Frühen Neuzeit*; Brockliss, “Science, the Universities”; Steiner, *Die Ordnung der Geschichte*; Holenstein, Steinke and Stuber, eds, *Scholars in Action*.

4 On the concept of “Wissenschaft vom Menschen” see: Bödeker, Büttgen, and Espagne, eds, *Die “Wissenschaft vom Menschen” in Göttingen*, 11–20.

science—, the ‘anthropological turn,’—which facilitated a remarkable change in which the fields of knowledge that display ‘secularized, naturalized, and historicized’ man, the latter’s life-worlds, spaces of action, and the structures thereof were gradually organized into a new system. As we assumed beforehand based on Hungarian secondary literature that deals with narrower segments of the topics,⁵ the Hungarian adaptation of the special educational, research, and methodological program of the University of Göttingen contributed significantly to the spectacular transformation of the system of knowledge: namely, to the division, the approach to science, the conceptual basis, the methodological guidelines, the discourses, and the self-reflection of the seven fields of knowledge studied by the project. The research team therefore identified as a priority the systematic examination of the transfers of varying intensity between the Göttingen ideals of knowledge and scientific practices in the context of the seven fields. What is more, the research also included reconstruction of the processes of the local adaptation, embedding, and appropriation of other influences from different European (Viennese, German, and English) educational centers and other discourse communities that existed either in parallel with or as alternatives to the influence of Göttingen. The mapping of these discursive contexts and the multidirectional and in many cases reciprocal processes of transfer of varying length and breadth—which we consistently refer to as the ‘circulation of knowledge’—helped the research team to describe the hitherto unexplored complexity of a tradition in the history of science that within the framework of the Habsburg Monarchy served as a direct precursor to *and* laid the foundations of modern Hungarian science that was to operate independently and autonomously by the end of the nineteenth century.

The time span of our research was defined according to the goals outlined above, taking into consideration some significant (and symbolic) events: the University of Nagyszombat, which later moved to Buda and then Pest, was completed with the establishment of a medical faculty; the first scientific journals published in Hungary appeared in the first decades of the nineteenth century; and the scientific departments of the Hungarian Academy of Sciences were established by 1830. Although the period between the last third of the eighteenth century and the first decades of the nineteenth century is regarded by most historians as the late Enlightenment, associated with its closed system of philosophy and the beginning of modernity, it became clear during our

5 On the reception of the Göttingen ideal of knowledge that informed our research, see: Borzsák, *Budai Ézsaiás*; Dümmerth, “Göttinga és a magyar szellemi élet”; H. Balázs, *Berzeviczy Gergely*; Futaky, *Göttinga*. On the points of contact between the Neohumanism of Göttingen and Hungarian literature see: Csetri, *Egység vagy különbözőség?*; Fried, “Schedius Lajos”; Fórizs, “*Álpeseken Álpesek emelkednek.*” On the elaboration of the Göttingen paradigm, see: Békés, *A hiányzó paradigma*.

research that it is more appropriate to view the latter as a period of transition between paradigms, during which time new discourse communities, new identities, new ways of speaking, and new patterns of cognition driven by curiosity emerged.

The process of implementation: the dissemination of partial results

During the first four years of the project, the six senior researchers conducted extensive research in archives and manuscript archives in Hungarian (Budapest, Debrecen, Sárospatak), Slovakian (Bratislava, Késmárk/Kežmarok), Romanian (Marosvásárhely/Târgu Mureș), Austrian (Vienna) and German (Göttingen, Jena, Weimar, Freiberg, Halle) collections in which a remarkably large corpus of sources had assembled—mainly manuscripts, and, to a lesser extent, rare printed sources and other contemporary publications previously unknown in Hungarian and international scholarship. The digitized, transcribed, and thoroughly analyzed sources were the basis for the published journal articles, book chapters, and edited volumes containing workshop proceedings, as well as a digital source anthology and the manuscripts of a comprehensive volume that summarize the results of the project both in Hungarian and English.

During the course of the project, from time to time it was considered important to present our collective results at both Hungarian and international scientific forums, in addition to the individual publications and conference presentations of the researchers. We succeeded in this endeavor by publishing thematic blocks in journals and edited volumes, organizing and co-organizing workshops, holding lectures at the invitation of various professional organizations and educational institutions, and operating a continuously updated bilingual (Hungarian and English) website.⁶

As for the dissemination of the partial results on a common platform, the project team's six researchers published the first results of the project findings in a thematic block in *Századok*. The articles zoomed in on six fields of knowledge (history, statistics, anthropology, economics/agronomics, medicine, and mineralogy), displaying the respective networks and disciplinary and methodological overlaps as well as the interrelationships that exist in relation to the pedagogical concepts connected with the transfers of knowledge, the patterns of the adaptation of abstract content and scientific cognitive practices, and the use of material- and media-related tools which kept early modern Hungarian scholarship in dynamic motion in response to political, social, economic, and cultural needs dictated by Habsburg imperial interests.⁷

6 <http://tudasaramlas.btk.elte.hu/en/>, accessed: 24 October 2022.

7 Krász, "Tudásképzés és tudásközvetítés"; Balogh, "Koppi Károly"; Bodnár-Király, "Államleírás

The results of the project's second year were summarized in *Kaleidoscope Művelődés-, Tudomány- és Orvostörténeti Folyóirat* [Kaleidoscope Journal of the History of Culture, Science, and Medicine] in a thematic block entitled *The Patterns of the Circulation of Scientific Knowledge in Hungary, 1770–1830*. In this, using the praxeological approach prevalent in the international historiography of science, we focused on practices and methodological perspectives related to the production of knowledge which were decisive in the process of the development of the six fields of knowledge (aesthetics, statistics, history of philosophy, anthropology, medicine, and economics/agronomics) into independent scientific disciplines.⁸ A collection of studies edited by Dezső Gurka, a member of the research team, was published in 2019, the thematic blocks of which examine the transformation of the scientific conceptions of man, and, in this context, the fields of philosophy and anthropology during the eighteenth century. In this volume, each member of the research team published the results of their research.⁹

In 2020, György Kurucz's monograph was published based on the results of his research within the framework of the project. In the volume, he describes the technological journeys, methods of observation, and recording that served as a basis for the production of knowledge and the networks of contacts of Pál Gerics and József Lehrmann, two professors of the Georgikon, the first college of farming in Hungary, founded by Count György Festetics in 1797.¹⁰ Closely related to the monograph, a source anthology was also published in 2020, amounting to forty-two author's sheets, containing a critical edition of selected excerpts from the two travelers' diaries, reports, and letters recorded in real-time or edited and revised subsequently, as well as a selection of Count László Festetics' travel instructions.¹¹

és a » statisztika elmélete«; Sz. Kristóf, "Alexander von Humboldt"; Kurucz, "Peregrinatio oeconomica"; Krász, "Theoria medica és praxis medica"; Gurka, "A 18–19. századi magyar mineralógus peregrináció". See: https://tudasaramlas.btk.elte.hu/images/pdf/studies/szazadok_2017_05.pdf, accessed: 22 October 2022.

8 Balogh, "A magyarországi esztétikai irodalom"; Bodnár-Király, "Államleírás állam nélkül"; Gurka, "Az álom filozófiai értelmezésének"; Sz. Kristóf, "Emlékezet és kánonformálás"; Krász, "Megfigyelve leírni, leírva megfigyelni"; Kurucz, "A »technological journey«". See: <http://www.kaleidoscopehistory.hu/index.php?subpage=kotet&kotetid=56>, accessed: 22 October 2022.

9 Gurka, "The Role of Dream," 172–88; Sz. Kristóf, "The Emergence of World of Ethnography"; Balogh, "Anthropological aspects"; Bodnár-Király, "Anthropology and Human Progression"; Krász, "Casus historia and relatio morborum"; Kurucz, "Theory and Experience". See: https://tudasaramlas.btk.elte.hu/images/pdf/studies/gurka_chan.pdf, accessed: 22 October 2022.

10 Kurucz, "Kedves Hazámfiai".

11 Kurucz, *Technológiai utazás*. See: https://tudasaramlas.btk.elte.hu/images/pdf/sources/kur_tech.pdf, accessed: 22 October 2022.

On May 28–29, 2019, we organized a two-day workshop at the Faculty of Humanities of Eötvös Loránd University entitled *Sciences between Tradition and Innovation – Historical Perspectives / Wissenschaften zwischen Tradition und Innovation – historische Perspektiven*, where, besides the members of the research team, other historians of science, medicine, and literature from Hungary, Göttingen, and Vienna presented their results. Focusing on different fields of knowledge, the participants discussed the patterns of the formation of traditions in the sciences in the *Sattelzeit* (1770–1830), along with the complex processes of—from the contemporary perspective—novel methods of cognition and observation, the introduction and adaptation of new scientific content, and their socialization (*Vergesellschaftung*) through various media.¹²

During the project, two PhD dissertations were defended. The project's research fellow, Tibor Bodnár-Király, defended his thesis on the process of the disciplinarization of statistics in 2018, under the supervision of Lilla Krász. The most important contribution of the thesis to meeting the common research objectives is the elaboration of a two-component concept of statistics that is open to the specificities of East-Central European (Hungarian) processes of development. According to this, statistics during the eighteenth century did not completely break away from the tradition of early modern state descriptions (*notitia rerum publicarum*). Its development was therefore influenced as much by the disciplines of history and geography (which served as the basis of early modern state descriptions) as by the processes of modernization, state building, centralization, and bureaucratization.¹³ In 2021, Janka Kovács, who participated in the project as a PhD student, defended her dissertation, also under the supervision of Lilla Krász, on the early Hungarian discourse on psychology, the multidirectional transfers of psychological knowledge (linguistic, academic, and cultural), and the first attempts at the institutionalization and socialization of the mentally ill between 1750 and 1830, based on a wide range of sources (curricula, lecture notes, textbooks, dissertations, medical case histories, hospital regulations, patient admission books, medical topographies, city and travel descriptions, descriptions of hospitals and asylums, herbals, and medical prescriptions).¹⁴

12 See the proceedings of the conference: *Science between Tradition and Innovation – Historical Perspectives / Wissenschaften zwischen Tradition und Innovation – historische Perspektiven*, edited by Lilla Krász. Vienna: Praesens, forthcoming.

13 Bodnár-Király, “Államleírás és statisztika.”

14 Kovács, “A lélek betegségeinek reprezentációi.”

Networks of Knowledge: The Circulation of Knowledge in Europe – Hungary’s Scientific Life, 1770–1830

The results of the project will be published in the form of a synthesis volume in Hungarian and English, as well as a digital source anthology closely related to the contributions. The volume, currently in manuscript form, ready for publication,¹⁵ explores the complex process of the development of the seven fields of knowledge into scientific disciplines within a unified conceptual framework and with a common methodological approach according to a four-tier model consisting of 1) the profiles of individual scientists as actors producing and mediating knowledge; 2) epistemic arenas; 3) the practices of ‘producing knowledge’ and ‘making science’; and, 4) the media of the circulation of knowledge. This model, as the backbone of the main chapters, on the one hand, seems to be suitable for capturing the concept of science, and on the other hand, the transition between old and new forms of knowledge, as well as the individual and communal epochal constructions of theory and practice.

In the first chapter, entitled *Respublica litteraria hungarica*, the social and cultural dimensions of Hungarian scholarship which are considered typical or atypical in the context of the individual disciplines explored by the research team are highlighted from the perspective of the actors. Intellectual and scholarly profiles specific to the given field; methods of training and acquiring knowledge; traveling; correspondence-based domestic, (Habsburg) imperial, and European networks of contacts; local and regional ties to different groups and social strata; and forms of practicing the profession are considered in the contributions. In the second part, the epistemic arenas of the seven fields of knowledge such as universities, learned societies, cultural associations, various collections, and manorial centers are the focus of the analyses. In the chapter entitled *Sciences in Action*—alluding to the title of the French social anthropologist Bruno Latour’s 1987 work,¹⁶ still considered paradigmatic in the history of science—the focus is on the practices of knowledge production. The chapter on *Mediality* focuses on the epistemological, structural, and formal features of the transmission and mediation of knowledge that played a decisive role in the process of the development of the individual fields into disciplines, highlighting the genres and methods of writing characteristic of each field.

In terms of its genre, the forthcoming volume can be considered either a monograph on the history of science or a handbook comprising studies organized

15 *A tudás hálózatai. Európai tudásáramlás – magyarországi tudományosság, 1770–1830*, edited by Lilla Krász. Budapest: Corvina, forthcoming; *The Networks of Knowledge: The Circulation of Knowledge in Europe – Hungary’s Scientific Life, 1770–1830*, edited by Lilla Krász. Vienna: Praesens, forthcoming.

16 Latour, *Science in Action*.

according to a coherent and rigorously applied structure. It can therefore be read in various ways: if read chapter by chapter, the parallels between the different fields of knowledge and the uses of space, methodologies, and manners of communication may be grasped, along with the lines of division that became increasingly clear during the period under study. Reading the subsections devoted to the various scientific discourses jointly, the histories of specific disciplines unfold. In the following, reinforcing the latter approach, the most important elements of the research project are presented through a discussion of each field we explored.

While the disciplines of history, classical philology, and aesthetics are, from today's perspective, distinct regarding their coverage of different fields of culture, in Hungarian scientific and cultural life between 1770 and 1830 they were much more intertwined in terms of their subjects, experts, and institutional background. Piroska Balogh examined the profiles of four representatives of the *respublica litteraria* of the above-mentioned disciplines in terms of their sociological and educational background, the context in which they produced knowledge, and their place within the world: Károly Koppi, remembered primarily as a historian, Ézsaiás Budai, a classical philologist, Lajos János Schedius, an aesthete, and Johann Christian Engel, known chiefly as a historian. The model developed in the study shows that an important element of the training that links the three disciplines is the so-called 'philological seminar', which uses specific methods. The main way of maintaining and developing the network of knowledge was using, alongside scientific correspondence and academic membership, the medial networks of the increasingly professionalized learned organizations.

As for the arenas of the circulation of knowledge in the humanities, it became clear that the disciplines of history, aesthetics, and classical philology were isolated even in the most professionalized institutions such as universities and academies: following the model of the University of Göttingen they formed part of philological studies and were strongly connected in terms of both university education and the academic production of knowledge. This interdisciplinarity also reflects an anthropological approach that was open to the natural sciences yet incorporated practical considerations (e.g., the organization of the institutions of rural education). In less professionalized societies, and especially in associations, the popularization of these auxiliary sciences also made it possible to convey a global vision of art and culture. This specific map of knowledge will be of great help in the future for making the contemporary social impact of the humanities more systematically visible.

In examining the practices of knowledge production, new contexts emerged in which the research methodology and the cultural-anthropological approach largely associated with the philological and historical school of Göttingen brought about a decisive, paradigmatic shift in the field of historical, classical-philological, and

aesthetic research at the end of the eighteenth century. This methodology favored a new type of exploration and treatment of source material (*fons*), and its approach reinforced a universal, anthropological vision of written culture (*litterae*), as well as the simultaneous application of ethnographic and synchronic principles. With regard to the medial aspects of the circulation of knowledge, Piroska Balogh has highlighted two genres, the *commentatio* and the *recensio*, which clearly appeared in Hungarian cultural life in this period and were undoubtedly influenced by the model of Göttingen. Third, they represented and conveyed not only information but also a specific approach, and, finally, regarding their impact history (*Wirkungsgeschichte*), they proved to be successful. The above-mentioned genres played a central role in all four authors' academic oeuvres and their strategies for conveying knowledge.

Dezső Gurka explored the activities of Hungarian peregrine students involved in the mediation of post-Kantian philosophies in Göttingen and Jena, and the philosophical and disciplinary overlaps in the circulation of mineralogical knowledge. With regard to the *respublica litteraria*, he discusses the conditions that enabled the peregrine students to partially bridge the cultural divide between German academic institutions and Hungarian ones. Dezső Gurka focused on the institutional characteristics of the three German centers of knowledge, the universities of Göttingen and Jena and the Mining Academy of Freiberg, which were the most decisive in terms of the circulation of knowledge in Hungary. In the case of Jena, special attention was paid to the special constellations that explain the intensity of the reception of knowledge.

The mapping of the characteristics of the circulation of mineralogical knowledge and the specificities of the three arenas show that Abraham Gottlob Werner, the main representative of Neptunism, played a decisive role in the development of mineralogy and geology as disciplines because of the system of mineralogy he developed. Johann Georg Lenz, the director of the Mineralogical Society founded in Jena in December 1797, which had several Hungarian members, was a follower of Werner's theories and, through his network of contacts with scholars from other disciplines and cultural fields, contributed significantly to the spread of Wernerism. The influence of Wernerism, also transmitted by the Mineralogical Society of Jena, was reflected not only in literary and philosophical work but also in the geological collections of the time. The techniques of the production of mineralogical knowledge, the representations of Wernerism, and the impact of post-Kantian philosophies in Hungary are also illustrated well by the collecting and scientific activities (lectures held at the meetings of the Society, and contributions to Society year-books) of the Hungarian members (Sámuel Bodó, János Asbóth, András Gábora, and Count Sámuel Teleki). Nevertheless, the impact of post-Kantian philosophy, despite the initially intensive activity of its representatives in Jena, was far from continuous. The Hungarian followers of these philosophies became isolated upon their

return home, and, lacking an institutional framework, could not exert influence on the development of philosophy in Hungary. However, the examination of the interrelationships between mineralogy and the Schellingian philosophy of nature reveals that the Hungarian peregrines also contributed to the specific patterns of the development of scientific and cultural life in Jena in the late eighteenth and early nineteenth centuries.

Tibor Bodnár-Király's important observation about the social basis of statistics in Hungary is that the process of reception reflected pan-European and imperial tendencies, thus synchronicity rather than backwardness prevailed. As part of the pan-European tendencies of the time, the late institutionalization of statistics in Hungary created greater scope for the pluralist cultivation of state description. Consequently, Catholic historiographers and Protestant geographers were often still considered statisticians at the end of the eighteenth century, although they were in fact writing state descriptions, viewed as a rival genre. Nevertheless, statistics reflected a new form of specialization. In the university lecture notes from the period between 1790 and 1820, the slow modernization of curricula can be traced: at the level of teaching materials, the Göttingen model was followed, while at the level of the organization, and often in contradiction to curricula, the state's efforts to centralize, monopolize, and uniformize—which were the essence of the Austrian model—are visible.

In examining the methodology of statistics, its scientific practice, and media through the examples of György Pray, András Vályi, and Márton Schwartzner, and focusing on the difficulty of gathering information, Bodnár-Király points out that the general lack of information and the valorization of methodologies can be interpreted as mutually reinforcing processes. Methodological awareness and the technique of compilation alone were insufficient to make published texts authentic and reliable. For this reason, depending on the chosen methodological approach, the authors of this period used a variety of complementary techniques (questionnaires, personal surveys, etc.) to generate more authentic and up-to-date data for their state descriptions. By studying the complex structure of the media of statistics (prints, textbooks, manuscripts), Bodnár-Király establishes a general model that is a guide to interpreting the interrelationships among university textbooks, manuscript learning materials, and the Enlightenment.

Ildikó Sz. Kristóf discusses in detail the slow process of change between the late scholastic and stadial representations of cultural otherness in the field of ethnology/anthropology. During this process, the emphasis shifted from an essentially *Wunderkammer*-like mode of description and representation to the model of 'savagery–barbarism–civilization' on which German, English, and French (Parisian) approaches, especially those of Georg Christian Raff, David Cranz, James Cook,

and Alexander von Humboldt, exerted significant influence. In this shift, the role of the Göttingen model conveyed by Hungarian peregrine translators such as Mihály Dobosy is particularly decisive. The adaptation of the view of global/universal history promoted by the school of Göttingen and the new discipline encountered there, the so-called *Allgemeine Völkerkunde* (universal ethnology), which combined geography and ethnography, formed a new type of academic discourse and canon. This discourse was comprised not only of texts and images, but also of the knowledge of the cabinet of the University of Göttingen and the memory of the objects seen there as a specific *lieu de mémoire*. It is important to note that the Protestant German models of science provided non-Austrian/non-Habsburg and non-Catholic alternatives for reformist scholars seeking to innovate in Hungary. But there were also other ways of doing science at the time, including ethnology/anthropology, not only according to the Göttingen model. Within the Protestant denomination, for example, there existed the Humboldtian way (influenced by Paris and then Berlin), while within Catholicism there was the Jesuit model. The Catholic/Jesuit model centered on Nagyszombat (Trnava, today located in Slovakia) also involved several foreign links (France, Peru, Ecuador, Bolivia, etc.). The four chapters, in addition to tracing the changes within the discourse, focus on seemingly constant structural elements (i.e., European vs. non-European, Christian vs. pagan, complex vs. simple).

The starting point of Lilla Krász's research in the field of medicine is that the Kingdom of Hungary in the eighteenth century occupied a special place on the European map of knowledge in terms of the acquisition of medical knowledge. As there was no medical faculty at which it would have been possible to receive the highest level of medical training until 1770, all medical doctors working in Hungary obtained their degrees from foreign educational centers. This situation resulted in significant disadvantages for the organization of knowledge in Hungary and the development of the organizational and medial background of the circulation of knowledge (for example, scholarly associations and journals were lacking). On the other hand, through the multi-directional *peregrinatio medica hungarica* doctors who had studied at foreign universities brought to Hungary from the most modern educational centers of contemporary Europe the most diverse theoretical and methodological concepts, practical medical knowledge, and literature, thereby promoting the simultaneous accumulation and adaptation of heterogenous forms of knowledge and experiences, in this way facilitating the development of a medical tradition characteristic of the region.

The example of medical education at the medical faculty of the University of Nagyszombat (which later moved to Buda, and then to Pest), which followed the model of the University of Vienna (influenced by the University of Göttingen in its curriculum and textbooks) after the reforms of van Swieten, illustrates well how and

by what means medicine interpreted as the theory of practice was transformed into medicine defined as the practice of theory, which was also linked to the requirements of scientific research. Similarly, it is possible to trace the route which, starting from a model of medicine that focused on the individual within the framework of medical semiotics, led to the emergence of organized public health that increasingly built on the tools of diagnostic medicine. Throughout this process, the most significant shift was the introduction of wards in hospitals, viewed even by contemporary standards as proto-clinics, which were perceived as spaces of learning and where techniques of registration for recording the course and outcome of diseases according to uniform categories developed, along with the consistent use of collections of instruments and anatomical-pathological collections of specimens established for the purpose of demonstration, along with institutional (university) and private libraries at which scholarly literature could be consulted and excerpted in the spirit of the working methods of the humanists.

In the second half of the eighteenth century, in the context of the bureaucratic organization of the modern state, the medical reports compiled by municipal physicians (*physicus/Physiker*) as part of the (public) health administration of the Kingdom of Hungary emerged as a new epistemic genre that can be interpreted as part of an 'institution' for quality assurance, an empirical technique of cognition, and as a networking tool. With regard to the system of reporting, the intrinsic relationship between the practice of medical report writing, the use of the data and information in the reports, and the new media associated with the transmission of knowledge (scientific treatises written either in Latin or German, journal articles, popular medical literature written in Hungarian) that emerged during the period under study are discussed.

György Kurucz illustrates by presenting several examples the decisive role the Hungarian Protestant agricultural writers, part of the *respublica litteraria*, played in elevating the recognition of the agrarian sciences within the emerging system of disciplines. Examining the activities of Protestant (both Calvinist and Lutheran) students at the Protestant universities of the model countries (England, the Netherlands, and the German principalities), he shows that translations were primarily made by former students who had studied at Western European universities. The publication of the first comprehensive agricultural textbook and the first agricultural journal in Hungarian, and the publication of works such as Humphry Davy's (1778–1829) textbook on agrochemistry, revolutionary by the standards of the age, represented a higher level of transfer of knowledge. The research also shows that, from among the fields of the circulation of agricultural knowledge in Hungary, the Georgikon, the first college of farming in Hungary, founded by Count György Festetics in 1797, was of outstanding importance. The founder consciously developed a specialized library

that enabled the professors at the college to draw on work by the renowned Western European authors of the period. The Georgikon was also an important arena for the acquisition of specialized knowledge, but research has shown that Festetics also utilized the teachers' networks of contacts in Western Europe. What is more, students' and professors' study tours also served as a means of acquiring and transferring practical knowledge, and Festetics published detailed reports on the Georgikon in German journals and newspapers.

In terms of the practices of the production of knowledge, Kurucz's research clearly points out that the founder's son, Count László Festetics, was a worthy heir of his father's intellectual legacy and mode of pursuit of modern knowledge. After the Napoleonic Wars, he helped Pál Gerics, a physician and veterinarian, and József Lehrmann, a gardener and viticulturist, to obtain broader practical experience with agricultural technology by sending them on a five-year study tour around Western Europe in 1820. The German-language instructions, reports, and travel journals with regular entries, prove how the role of science in improving technological practice and quality of life was recognized. As for the medial specificities associated with the circulation of agricultural knowledge, Kurucz explored and analyzed the activities of Pál Gerics and József Lehrmann, who left behind an outstanding corpus of sources documenting their journey, among them partial reports, comprehensive accounts, and the revised travel journals of the two professors of the Georgikon. The practice of revision is noteworthy because it shows how the experiences of the two professors were interpreted later when moving away from the actual field of experience to incorporate newer technological procedures and knowledge. Also, the revised journals provide additional, exceptionally important socio-culturally relevant data about the places that were visited and people the professors became acquainted with.

DigiCirculation of knowledge: A digital anthology of sources

The four-tier model applied in the synthesis volume (actors–spaces–practices–media) was also used to compile a digital anthology of sources¹⁷ of nearly forty-five author's sheets, comprising a significant amount of hitherto unknown mainly manuscript sources, and to a lesser extent printed sources in Hungarian, Latin, and German from the period under study. The annotated critical edition of sources of various genres targeted different audiences, while the academic commentaries,

17 The English and the Hungarian versions of the digital anthology can be accessed through the following links: <https://eltdedata.elte-dh.hu/wiki/DigiTud%C3%A1s%C3%A1raml%C3%A1s>; https://eltdedata.elte-dh.hu/wiki/The_Circulation_of_Scientific_Knowledge, accessed: 24 October 2022.

university lecture notes, travel instructions, travel diaries, reports, and ego-documents (funeral orations and wills) reveal contemporary modes of speech and writing and specific language and concepts, but also capture the progress of the thought style (*Denkstil*) of the period, as well as the development of the practices of ‘making knowledge’ and ‘doing science’ and the changes in the focal points that determined the perception and observation of things and interactions.

The publication of the sources in digital format makes it easy to search for and read about—in addition to the personal and spatial networks that are customarily illustrated in similar projects—patterns, internal events, and interrelationships associated with the process of disciplinarization due to the identification of plausible conceptual networks, and, at a later stage, to display them in the form of data visualizations. The categories that make up the conceptual networks were developed by assigning subcategories to a total of nineteen period- and subject-specific main concepts mapped according to content and the use of language and concepts in the published excerpts.

Table 1 Main concepts and sub-concepts (in alphabetical order)

	Main concept	Sub-concept
1	body concept	disease explanations, disease symptoms, external traits and physical appearance, forms of therapy, general course of disease, healing, ingrained bad habits of self-healing, turning points of disease, variations of the same disease
2	cultural landscape	building with gardens, buildings, differences between the savages and the civilized, garden, habitat, harbor, hut, urbanization, urbanity
3	experiences of otherness	acceptance, assimilation, comparison, demonizing, images of the enemy, rejection, relationship with neighboring peoples
4	gender	external traits, female religiosity, gendered actions and prohibitions, ideas about gender, mutilation of male and female bodies, use of instruments, women’s rights
5	government and administration	assessorial council, authorities, authorities of the popular assembly, division of the New World, dysfunctions, economic and knowledge distribution system, establishment of administrative units, financial matters, general assembly, government officials, governorship, gubernatorial authorities, gubernatorial revenues, hereditary governor, limitation of power, magistrates, medical writing, military command, operation of administrative units, royal privileges, succession, state council
6	historicity	age specificities, auxiliary sciences, basic concepts of historicity, church history, formation of mankind, geographical discoveries, historical literature, historical monuments, historical periods, historical sources, history of Europe, methodology of historical research, methodology of historiography, role of the state, stadial view of society, uses of studying history

7	human resources	criteria of humanity, culture, demographic conditions, development of liberty, education, endemic diseases, epidemics, freedom of thought, healing with electricity, individual diseases, instincts, lifestyle, moral, moral perfection, mother tongue, population density, population movements, problem of the freedom of will, prominent legislators, religion, the purpose of man, trade, upbringing
8	instruments	capacitor, clothing, electric experimental device, electric pistol, electrophorus, electrostatic experimental device, experimental device for producing Lichtenberg figures, experimental device for producing oxyhydrogen, means of transport, measuring device, mill, threshing machine, triboelectric experimental device, utility instrument, weapons
9	natural resources	animal husbandry and crop farming, animals, arable land, climate theory, climatic conditions, commercial commodities, meadow and field, minerals, plants, resource management, rinderpest
10	perception of nature	cultural climate theory, cultural geography, nature and history
11	power	distribution of lands, division of power, forms of state, laws, leading elite, military state, persecution of Christians, politics, sovereign, state officials, state organization
12	public policy	medical statistics, use of health services
13	respublica litteraria	actors, anatomical theatre, botanical garden, clinical practice, collection of instruments, collection of specimens, economic collection, founding hospital, hospitals, institutions of social care, laboratory, library, medical habitus, mental asylum, museum, <i>Naturalienkabinet</i> , orphanage, peregrination, public museum, scholarly journals, schools, scientific patronage, scientific society, scientific travel, textbook, translation and adaptation, university collections, workhouse
14	rites	cannibalism, discipline of the secrecy of sacraments, exclusion, experience of emotions, mysteries, rituals, sacraments
15	scholarship	concept of statistics, curricula of political science, establishment of a department, ethnographic profile, integration of politics and statistics, overlap between law and politics, separation of politics and statistics, statistics and history, statistics and law, teaching of statistics, travel
16	society	affections, crime and punishment, education, endemic diseases, factors determining society, fundamental concepts describing society, historic changes, industry, morals, national character, national language, natural law, non-European peoples, organization of society, physiology, population, promotion of the common good, religion, serving the community, sociability, social layers, social orders, social relations, social stratification, types of community
17	state	forms of government, forms of state, geographical boundaries, industry, national coat of arms, political boundary, rivers and waters, sovereign, state description, taxation, title, trading colonies, types of estates

18	technology	animal husbandry, cattle farming, crop farming, food preparation, food processing, grazing, horse breeding, livestock farming, manufacturing, meadow cultivation, mineral processing, pasture farming, sheep farming, soil cultivation, toolmaking, viticulture, waste processing, wool
19	uses of the body	body decoration, grooming, head and hair styling, tattooing

The digital edition was created within the open-source Wikibase™ software, and the storage space was provided by the Digital Humanities Centre of Eötvös Loránd University.¹⁸ Sustainability was an important criterion in selecting the software: the system is operated and developed by the Wikimedia™ group and is used by international research groups for the online publication of the results of prosopographical research. The Wikibase™ software can support both text output and the background database needed for the management of data. It also has a user-friendly interface similar to that of Wikipedia™ and Wikidata™. The source publication was not produced in the markup language transcription recommended by the Text Encoding Initiative (TEI), but in Wikimedia's own format, the so-called Wikitext format. This format can be easily archived and later converted to XML format if required. The format makes it possible to display the relationships between the seven fields of knowledge and the annotations of the texts. The database contains the data that was collected during the research using the most modern technology and practices associated with the semantic web. The system makes it possible to create data visualizations that can reveal previously unknown patterns, underpin research findings, and identify new research directions.

The first phase of the preparation of the digital source publication involved the tabulation, annotation, and uniformization of the data, followed by the creation of links according to the logic of the semantic web, and finally the automatic loading of the datasets. The methodology was developed based on initial experience to make the loading of additional texts and data significantly faster and easier. While developing the data structure we accounted for the fact that the database creates a research infrastructure and a publication platform for different research projects and that some of the research data might overlap (e.g., geographical names). Each project forms a sub-collection within the database, and each entity is assigned a statement through which it is possible to display which research project may lay claim to it.

18 <http://elte-dh.hu/>, accessed: 24 October 2022. Technical specification: Zsófia Fellegi (Research Centre for the Humanities, Institute of Literary Studies), Gábor Palkó (Head of the Department of Digital Humanities, Eötvös Loránd University). Data enrichment: Janka Kovács (2019, PhD student), Ádám Sebestyén (2020–2022, PhD student), Máté Szentkereszti (2021–2022, MA student).

This method allows the user to search the entire database and each sub-collection simultaneously. In the second phase, personal and geographical names were uploaded to ELTEdata. In the source texts, these personal and geographical entities were linked to the corresponding records in the database so that the data and its textual occurrences could be searched as part of a single system. Furthermore, the map of concepts prepared by the research team was mapped and tagged in the corresponding places in the texts. The system makes it possible to expand the map of concepts and the source texts with additional data from later research projects or to add further information to pre-existing entries.

As outlined above, we have tried to create an open system that allows for the multi-level reading of the sources by genre and content, involving networks of personal, spatial, and conceptual links, which can be extended both vertically and horizontally. We aim to continue this work by adding further texts to the genres already included in the system and by broadening the scope of genres. The DigiCirculation_of_Knowledge (DICIKO) platform is also suitable for hosting and displaying information from other fields of knowledge (e.g., psychology, botany, chemistry, physics, mathematics, etc.). We intend to disseminate these results on international forums, through social media platforms and in workshops to promote and introduce the platform to the Hungarian and international scientific community in the hope of expanding the network of colleagues open to publishing sources related to the history of sciences at the turn of the eighteenth and nineteenth centuries.

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