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HISTORIOGRAPHICAL ARTICLE

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History of science in Hungary: Stewardship and audience in periods of institutional and political change

Gábor Á. Zemplén[1,2]

[1]Department of Argumentation Theory and Marketing, Faculty of Economics, ELTE Eötvös Loránd University, Budapest, Hungary

[2]Morals and Science "MTA-Lendület" Research Group, Loránd Eötvös Research Network (ELKH), Budapest, Hungary

Correspondence
Gábor Á. Zemplén, Department of Argumentation Theory and Marketing, Faculty of Economics, ELTE Eötvös Loránd University, Egyetem tér 1-3, Budapest 1053, Hungary.
Email: zemplen@gti.elte.hu

HISTORIOGRAPHICAL SECTION
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Abstract

The paper introduces the development of history of science in Hungary, focusing on the status of the field in the Hungarian Academy of Sciences, universities, and scientific societies, and the "local" output in Hungarian. The genres associated with the field became popular in the early 20th century, and the institutional framework was created in the 1970s. After 1990, constructivist methodologies for studying localizable patterns of science-related activities spread, somewhat more pronounced in histories of the human sciences. A PhD school was established, and the discipline thrived until the early 2000s. Attempts were made to develop an historically informed integrated science curriculum, and to start a Masters program in History of Science. In recent years some of the key institutions of the discipline were closed down, and the visibility and relevance of the field decreased. Although the field has a relatively stable position in the Hungarian Academy of Sciences (HAS), with dwindling institutional resources "History of science" in Hungary will most likely become—yet again—an accessory of the special sciences.

KEYWORDS
history of science, Hungary, science & technology studies, science communication, science education

1 | INTRODUCTION

A review of the discipline in Hungary can delimit the actors and topics in various ways, and issues of inclusion and exclusion are immediately apparent. A natural starting point to locate excellence and regional significance would be to investigate the scientific impact, yet many internationally visible authors are not registered in the national database for scientific publications (mtmt.hu) or have not updated their profiles for years. Should one stress the role of those Hungarian authors who maintain the existence of the field in Hungary by painstakingly updating their various data profiles, among other things? Or should the paper focus on the generations of researchers leaving Hungary, and study patterns of exile?[1]

To decrease the burden of writing disciplinary peer-history, the paper puts emphasis on institutional development and visits earlier periods in chronologically ordered sections to introduce various understandings of "history of science" in Hungary. For much of its existence, the field had unclear boundaries and disciplinary classification, although the enduring *persona* of a Hungarian historian of science was cast by the early 20th century, as were the genres associated with history of science by the audience. Section 2 introduces the early history of the field and the long-term impact of the period. For generations, interdisciplinary networks sustained the discipline in Hungary and provided a significant part of the contributions. The majority of Hungarian articles on history of science are descriptive, focusing on an individual's achievement or an institution's development, and history of science in public discourse is mostly associated with longitudinal histories or biographies of notable individuals. Even today, many retain the laudatory style expected at anniversaries of national achievements. In contrast, more delicate topics are often addressed first by historians outside Hungary, and the topic becomes "endemic" after international publications.[2]

The following two sections provide an overview of the disciplinarization of the field, with a first phase starting from the 1970s, linking history of science and technology, and a second phase starting from the 1990s, linking history of science and philosophy of science. These sections introduce some of the interdisciplinary networks that fostered that development, and help understand why the label is used for numerous styles of scholarship in the histories of the special sciences.[3] The late and partial institutionalization of the discipline from the 1970s (Section 3) and the rapid growth from the 1990s in spite of the financial difficulties of the new democracy (Section 4) strengthened the status of the field.

When the core ideas of this paper were presented at a conference organized by the Ignaz Lieben Gesellschaft in 2018, the relative prosperity and growing internationalization of the last 50 years already seemed jeopardized by demographic changes and trends in higher education.[4] In recent years, the closing down of a PhD school dedicated to history and philosophy of science (HPS), and the relocation of the teaching activities of the Central European University from Budapest to Vienna, decreased the number of internationally relevant knowledge-centers in Hungary. Section 5 describes some of the recent events that shook the traditional scientific establishments to the core. The paper highlights some of the informal networks and the serendipitous influence of individuals and small cohorts, and displays the fragility of Hungarian history of science, a small interdisciplinary field in a quickly changing institutional landscape, and ends with a short summary.

[1]When writing the article, I checked some of the recent achievements; some, like László Kontler's or Tamás Demeter's work were uploaded in the database—Aspaas & Kontler (2019); Demeter (2016)—but this was not the case for Dániel Margócsy, cultural historian of early modern science, or István Rév, editor of the recent *Centaurus* Special Issue on "Technology and Information Propagation in a Propaganda War": Margócsy (2014); Rév (2019). The problem of demarcating the field exists for earlier generations, too; for example, for Stanley L. Jáki, Arthur Koestler, or Imre Lakatos.

[2]A case in point could be the work on eugenics—see Turda (2007)—and further research in history of psychology and sociology: Erős (2015). A similar pattern characterizes research on the biographical details of certain figures; for example, research on Imre Lakatos's life.

[3]Respective disciplinary networks include historical strands of research (in the hard sciences or in psychology), and various networks are maintained by research institutes (at the Rényi Institute in Mathematics, or the Institute of Philosophy).

[4]One can add the lack of adequate science policy (discussed in Zemplén 2015), and the reluctance to ensure stable career tracks within academia, as highlighted in Pléh & Zemplén (2011).

2 | THE DEVELOPMENT OF HISTORY OF SCIENCE IN HUNGARIAN

Scientific works in Hungarian became more and more common in the early 19th century, and interest in the history of national scientific achievements was soon to follow. This section's overview of the development of history of science in Hungary introduces the field and some of the enduring genres: archival research (bibliographies, histories of societies), biographies, and cultural histories of science.

The major institutional agents of change for science in general were the Hungarian Academy of Sciences (HAS), established in 1825 (the name was used from 1840), and the networks of scientists in various societies, such as the Societies for Natural Scientists and for Physicians and Naturalists, both established in 1841. The second half of the 19th century witnessed unprecedented growth in scientific output in Hungarian, and the founding of new schools, societies, and journals. Several journals, like the *Természettudományi Közlöny* (*Communications in the Natural Sciences*, established in 1869) and dozens of specialist journals established by the HAS before the early 20th century are still running.[5] These journals and societies provided the fora for increasingly in-depth historical research on the sciences in Hungarian.

In an 1891 speech, Ferenc Pulszky, former director of the National Museum, summarized the changing role of the Academy as follows. In the first phase, the focus was "on enriching our vocabulary, establishing the rules of Hungarian eloquence and the polishing of the literary language." In the second phase, "the Academy concentrated on cultivating scientific approaches, not being content with acquainting the readers with translations of foreign research, but also collecting data and furthering science in its own efforts." For Pulszky, Hungarian science had reached a third phase by the 1890s, and was "aiming at bringing the fruits of science (to which our own efforts have also contributed) to all the educated (so that science be popularized)."[6]

The study of the historical record of "our own efforts" was continuous for some fields. The history of medicine emerged from catalogues of physicians existing from the early modern period, and was linked to medical archives as well as to the medical faculty at the Jesuit University in Trnovo (Collegium Tyrnaviense: established in 1635, medical faculty from 1769, relocated to Buda in 1777). Other early fields of interest were botany, zoology, and astronomy (linked to observatories), but historical research on the exact sciences emerged with a noticeable lag.[7] The 19th-century path towards a stable scientific terminology was a rugged one, and teaching in Hungarian at the University was only authorized in 1860. What Pulszky referred to as the first phase—"enriching our vocabulary, establishing the rules of Hungarian eloquence"—was littered with alternatives abandoned by the wayside. Various proposed scientific idiolects existed, and by the end of the 19th century, understanding a 1770s physics book in Hungarian required a dictionary to map the terminology.[8] Many linguists can easily find a place in any narrative of Hungarian history of science, as the Hungarian words for science/scientist (*tudomány*/*tudós*) include the humanities, akin to the German "*Wissenschaft*/*WissenschaftlerIn*."

Following reforms in secondary education, the importance of the natural sciences increased in the curriculum, and the number of university graduates doubled in 20 years at the end of the 19th century. The new university facilities included special training colleges, which were early hubs for the discipline. Probably the most famous was the József Eötvös College (founded in Budapest, 1895), designed to train highly qualified teachers, and modeled on the *École Normale Supérieure*. Students quickly became professors, like the linguist Endre Gombocz, probably the best early historian of botany.[9]

[5]Histories of the scientific societies are rather well-researched: Forrai (2017); Gergely & Molnár (1962); Szőkefalvi-Nagy (1969). The journals' publication after 2000 was done first in partnership of Kluwer, and now Springer. Of the 88 journals listed by Akadémiai Kiadó Journals (https://akjournals.com/), many retain the name *Acta* [discipline name] *Academiae Scientiarum Hungaricae*.

[6]On the history of the HAS, see Vekerdi (1996, pp. 42, 125–126), citing the letter by Pulszky from 5 October 1891 (HAS Archives, RAL 536: 1891).

[7]On the development of early medical and anatomical research, see Gazda (1982); Dörnyei (2002); Perger (2016); on the medical society, see Kapronczay (2016). On the first four-volume biography, see Weszprémi (1774); Antall (1988).

[8]Molnár (1777); "Az első magyar fizika műszavai Molnár János 1777-es kötetében" (1897).

[9]After Gombocz, terminological, iconographic, and botanical research remained intertwined: Gombocz (1936; 1941); Kitaibel & Gombocz (1945); Csapody & Priszter (1966); Jávorka, Csapody, & Priszter (1979).

Their career-tracks usually involved some study abroad (peregrination), which aided the fast-paced transmission of German, French, and English literature. Most early contributors were generalists: not just historians, but also practicing scientists, naturalists, or linguists. Although most published in more than one language, their works in Hungarian typically fit into the larger (political) agenda, the development of the linguistic community and the nation-state. By the early 1900s, various monographs provided richly illustrated disciplinary introductions stressing scientific progress with significant historical content to satisfy the increasing demand from the growing audience.

The importance of a contributor in a narrative on "history of science" is in most cases negotiable. A single individual often contributed to various genres. For example, the physicist Ágost Heller (1843–1902), after studying with Kirchoff and Helmholtz, became a *Gymnasium* teacher, and, like many in his cohort, published bilingually in German and Hungarian. His longitudinal international history of physics with thematic sections, organized according to conceptual developments, is clearly relevant to history of science, as are some of his entries on mathematics, physics, and astronomy in the first independent *Hungarian Encyclopaedia* (*Pallas nagylexikona*, 16 + 2 volumes, 1893–1900).[10] When Heller became chief librarian at the Academy from 1894, he also looked after some of the donated collections the Academy received from patrons. In these activities, deciding what was relevant for history of science was not always clear. While working together with the Elischer family to curate their donation, Heller helped to establish a "Goethe-room" in the Academy building (1895–1896).[11] The caretaking and cataloguing of books and artifacts, including Goethe autographs on scientific topics and his collections of Karlsbad minerals, became relevant mostly in retrospect. After the destruction of World War II, the reconstruction of the collection was greatly assisted by Heller's catalogue. After decades of dormancy, the collection was again exhibited, along with a virtual museum developed in 2020, to introduce the literary and scientific achievements of Goethe and the special collection from this Hungarian-German patron.[12]

Other figures could easily be used to illustrate the typical involvement in history of science. As a result of the underdeveloped university system, teachers in academic high schools received support for research and provided a significant portion of the scientific output, and historical research on the sciences was carried out by scholars with research output in various fields. Group projects were common, but concerted efforts on specific periods or figures were rare. An early exception was connected to research on the legacy of the Bolyais, with intense attention from various mathematicians and historians, leading to the publication of both primary works (*Tentamen* and *Appendix*) and the Gauss–Bolyai correspondence between 1897 and 1904.[13]

The emergence of the discipline was linked to disciplinary networks, but—unlike in Vienna, Cracow, or Prague—the field was not institutionalized early. This period left lasting marks on the history of science in Hungary, both with respect to the type of disciplinary networks that maintained the field and to the content and labels used. As early medical histories were commonly connected to research on great physicians, literal translations of several organizations' names even today retain the label "history of doctors/medics." The constancy in genre, style, and occasion is also noteworthy. As societies paid increasing attention to earlier generations of scientists, much of the work related to history of science came in the form of eulogies, encomia, and commemorations in the journals and annals of scientific societies. Bibliographies form a significant part of the output in any period. Soon after the establishment of history of science as a genre of writing, biographies of internationally recognized authors, like Johannes Segner, or famed Hungarian figures, like Stephanus Hatvani, became popular.[14] A detailed work on chemists and alchemists

[10]Examples from his German-Hungarian oeuvre include Heller (1882; 1888; 1896).

[11]The room was well known and received many illustrious visitors, so that its history became a topic of research and the guest-book was partially reprinted. On librarians of the HAS, see Fráter (1987).

[12]The exhibition is entitled "Cult and Reality" (http://elischer-goethe.mtak.hu/).

[13]The volumes were generally co-produced; for example, Bolyai, Kürschák, Réthy, & Tötössy (1902). For the Bolyai manuscript collection of the HAS, see Fráter (1968). For a critical appraisal of traditional Bolyai research, see Tanács (2008; 2009); for recent additions, Gündischné Gajzágó & Szenkovits (2013).

[14]Hatvani was considered a Faustian figure from early on: Lósy-Schmidt (1931). For more, see contemporary appraisals: Lengyel (2017); Posta (2019). On Segner, see Kovács (2018).

was written in 1928 by László Szathmáry, influencing generations to come.[15] An early proponent of the biographical structuring of historical content was József Jelitai (Woyciechowsky). Jelitai wrote on the life of the mathematician-cleric Pál Sípos (among others), and can be considered an initiator of the long-term interest in history of mathematics at Debrecen, stretching from Lajos Dávid to Barna Szénássy.[16] Biographies continued to be published even after their import decreased in mainstream history of science, in the 1980s.

For the popularization of scientific culture, domain-specific longitudinal narratives were available for each generation. The tradition of disciplinary macro-histories with periods of rise and decline stretches from the already-mentioned history of physics by Ágost Heller to Károly Simonyi's (1916–2001) *Cultural Histories of Physics*, first published in 1978.[17] Scientific research and popularization are closely connected in both, with the first showing kinship with Mach's histories, and the latter combining a universal history of a science with a humanistic account of cultural development.

History of Hungarian science co-developed with histories of education and the state from early on, in part because archives of educational or medical institutions were easy to study. For much of its history "Hungarian science was distinctively nationalistic in its style" as Gábor Palló observed, and yet an educated middle class came partly from the "rapidly assimilating German and Jewish bourgeoisie," as Tibor Frank noted.[18] Due to significant territorial losses after World War I, many important historical libraries and educational centers were decoupled from Hungary, and several institutions for applied sciences became less accessible, such as the mining "Academy" in Selmecbánya ("Bányatisztképző Főiskola" Schemnitz, Banská Štiavnica, founded in 1735; from 1763 Mining Academy "Bányászati-kohászati Akadémia").

In 1920, the signing the peace treaty at Trianon was traumatic for the Hungarian public, and in the same year the first *numerus clausus* was also passed, limiting the ratio of Jewish students at universities. The adolescent "Martians," these later-famous Hungarian scientists grew up in this rich but increasingly constrained intellectual climate: Edward Teller, John von Neumann, Eugene Wigner, Theodor von Kármán, and Leo Szilárd, who first used the term. The widespread use of the term in Hungarian historiography emerged post-1990, and several other figures were associated with the label, like the mathematicians Paul Erdős, George Pólya, the physico-chemist Michael Polanyi, the physicist Dennis Gábor, and the chemist George Hevesy.[19] With little inflow and significant outflow of researchers in all fields, peregrination to European universities was increasingly replaced by emigration and exile, and Hungarian history of science at best stagnated from the late 1930s to the early 1960s, with little institutional advancement.[20] The discipline was revived in the 1960s and 1970s, to a large extent by actors who were already active before 1945.

3 | INSTITUTIONALIZATION IN THE SOCIALIST PERIOD

The Communist takeover after World War II radically reshaped the institutional landscape. The 1949 reform of the HAS, with mass resignations and new appointments, prioritized applied (and sometimes ideological) domains while

[15]Apart from the well-known book Szathmáry (1986), he was working on a comprehensive history of chemistry, but died in 1948, leaving behind a large collection of notes on the subject. Alchemy and natural magic has since been part and parcel of Hungarian history of science, with the medieval and early modern periods often receiving regional treatment. See Bobory (2009); Láng (2010).

[16]See Jelitai (1934); Jelitai & Dunnington (1937); and the comprehensive monograph on the history of mathematics, Szénássy (1970).

[17]Various editions, with the latest 5th (posthumous) edition also online: Simonyi (2011). Simonyi was also famous as an educator and as the constructor of the first particle accelerator in Hungary (1951, exhibited at ELTE). His son Charles Simonyi, astronaut, Microsoft software architect, and patron, established among others the Simonyi Professorship of the Public Understanding of Science at Oxford University. Other popular histories of the disciplines include Sain (1986) for history of mathematics; and Szabadváry & Szőkefalvi-Nagy (1972) for chemistry.

[18]Palló (2012); Frank (2012).

[19]Marx (2000) focuses on the first five mentioned in the main text. The label is mostly used by scientists—see, for example, the chemist and historian István Hargittai (2008)—and is only occasionally analyzed in social context, as in Palló (2005). On the "double exile" pattern of Hungarians moving first to Germany and then to the USA, see Tibor Frank's (2008) monograph.

[20]For Hungarian historiography in the period, see Erős (2009), who discusses the popular approaches before World War II, such as the agricultural history initiated by Sándor Domanovszky.

culling some disciplines, such as sociology and psychology.[21] Many of the structures and most of the journals were maintained, but historical inquiry was marginalized, with a significantly smaller share of publications than in the first half of the century. Until the 1940s, honorary lectures on past members and the publication of their biographies in the HAS journals were common. During the Rákosi regime, more "practical" matters were discussed, with an occasional commemoration of living actors outside Hungary.[22] After some dormancy, history of science re-emerged in a format fit for the socialist agenda: a journal on the history of technology was launched in 1962 (*Technikatörténeti Szemle*, 1962–2005/2006), and a society for historians of medics was established in 1966.

A number of new fora enabled the re-networking of individuals with an interest in history of science.[23] A presidential committee of the Association of Technological and Scientific Unions (Műszaki és Természettudományi Egyesületek Szövetsége, MTESZ) was set up to study "history of science and technology" in 1970, which aided the popularization of the field. A research group was formed in 1972 at the Technical University in Budapest (BME) for the study of Hungarian history of science, and in 1973/1974 a Committee was established at the HAS to provide interdisciplinary representation for the field. A key player in the establishment of the discipline in the 1970s was László Mátrai (1909–1983), formerly a philosophy tutor at the Eötvös Collegium (1939–1944) and director of the University Library of the Eötvös University in Budapest from 1945 to 1980. Below, I look at these organizational achievements, beginning with the most durable one.

The longest standing institution of the discipline is the Interdepartmental Committee for the History of Science and Technology (ICHST) at the HAS. The Committee was established in December 1973 and has been affiliated with the Scientific Section II—Philosophy and Historical Sciences of the HAS since 1974. László Mátrai was the president of the Section from 1970 to 1980.[24] From the beginning, the ICHST was multidisciplinary and comprised various academic fields. Most of the Academy's other sections (Engineering, Biological and Chemical Sciences, and so on) nominate representatives to the Committee. As the Academy was reorganized at various times, the Committee's role as a "gatekeeper" also changed: in some periods, it had the right to evaluate "Academic doctorate" applications (D. Sc., usually attained 15–30 years after a PhD), while in other periods it did not (2013–2021; new evaluation criteria are currently being developed). Throughout the generations, the inflow and outflow of members has been moderate, and the ICHST has been a meeting ground for a variety of approaches, some more humanistic (historical, linguistic, philosophical, mostly focusing on periods before the 19th century) and some more science-oriented (disciplinary historians, usually focusing on 20th-century topics). Recently, the Committee has taken on foreign members (for example, Karl Hall from CEU).

Apart from the ICHST, the most significant early hub for the discipline was a presidential committee of the Association of Technological and Scientific Unions (MTESZ) set up in 1970 to study "history of science and technology." The alliance of organizations grew to a significant size in the socialist period, with over 70,000 members, and created a network between industrial domains (textile, biochemistry, and so on) and disciplines in natural sciences. The MTESZ presidential committee organized regular meetings for decades, which functioned as an assembly place with lectures and discussions, and from 1984 these included the largest annual conference for history of science. The suggestion to host conferences was first raised at an ICHST meeting by József Antall, the first Prime Minister chosen after the first free elections of the post-socialist era in 1990.[25] The annual conferences were supported by various organizations, including the National Patent Office, the previously mentioned ICHST, the National Museum of Technology (a collection of artifacts without exhibition rooms), the Semmelweis Library and Archives, and the Society for

[21]For a detailed head count, see Pótó (2018), who also describes the refashioning of the HAS, with 69 new institutes established within an 8-month period.
[22]An early laudation is to Zdenek Nejedly and the establishment of the Czechoslovakian Academy in 1952–1953: Gergely & Molnár (1962. p. 26.) A good introduction to the scientific climate through the example of Michurinist biology is provided by Gábor Palló and Miklós Müller (2017). For the development of post-war psychology, see in Pléh (2008, Chs. 15–16).
[23]For an overview of the period, see J. Zemplén (1968).
[24]Committees of this type usually represent emerging disciplines or multidisciplinary fields. For the early history of the HAS Committees from 1854 to 1949, see Fráter (1974).
[25]From 1985, József Antall became the general director of the library of history of medicine. The library shared the building with an ageing prima donna, who first offered her palace to the Red Cross in 1945, and the palace hosted the collection from 1956. See Kapronczay (1994).

the History of Medicine (Orvostörténeti Társaság). The conferences included 30 to 60 talks on average and were the major gatherings of professional and lay historians of science, often inviting renowned scientific figures (presidents of the Academy, established scientists) to speak.[26]

From 1972, an Academy-funded research group operated at the BME (currently Budapest University of Technology and Economics), in the Department of Experimental Physics with the leadership of Jolán Zemplén, the first female professor of physics in Hungary (earlier wed to László Mátrai).[27] Her books on the history of physics in Hungary gave a detailed analysis of the different trajectories of development of Cartesian, Newtonian, and Boscovich-influenced approaches in 18th-century Catholic and Protestant schools (including Slovakian and Transylvanian areas). The primary focus of the affiliated researchers was on writing histories of the sciences in Hungary. The efforts linked archival research with popularization of science, and have resulted in several catalogues, bibliographies, and periodic disciplinary overviews. The research group was dissolved after the 1995 financial reform (a crisis-response to salvage the liquidity of Hungary after years of economic recession), but the participants remained active, carrying out similar work. Some (such as historian of chemistry Gábor Palló) continued to work under the auspices of the Academy, and to this day the Institute of Philosophy has an HPS-oriented research group (and has also hosted the Lukács Archives). Some members established a firm (István Gazda, Hungarian Institute of History of Science Ltd.), while others (Gábor Bíró) continued academic teaching.

The late socialist period can be considered a period of stable development for history of science. The above-mentioned venues provided an early meeting point for mostly autodidactically trained experts coming predominantly from the natural sciences, as well as many with humanistic backgrounds (Greek-Latin studies) before World War II. This informal group of scholars included the well-known disciplinary historian Árpád Szabó (classics, mathematics), who influenced the views of László Kalmár and Imre Lakatos on mathematics.[28] Before this period, little systematic work had been carried out on the development of science in its Hungarian context during the 18th and 19th centuries, and the task was addressed by Barna Szénássy (mathematics), Ferenc Szabadváry and Zoltán Szőkefalvi-Nagy (chemistry), as well as László Vekerdi, László Makkai (institutional history), and Valter Endrei (history of technology). In journals, peer history became—once again—common, and biographies became popular. The librarian László Móra was probably the most prolific biographer, especially in history of chemistry. A number of book series were launched, publishing (translations of) selected writings of famous scientists. The multi-volume biography on Hungarian luminaries in science and technology (*Műszaki Nagyjaink*, 6 volumes) played a significant role in the canonization of focal figures.[29] For all publication formats, the comparatively large print runs meant that dissemination activities reached wide audiences (even for publishing houses like Kriterion, located in Romania, with significant Hungarian output).

As the contemporary international literature was acquisitioned by central libraries, the influx of ideas was relatively easy during this period. The library of the HAS, located next to the historic main building of the Academy, had a special focus on general history of science, and had close contact with scholars. Librarian László Vekerdi was an expert on many international topics, directing researchers to new books and journals. He refused to complete a doctorate and wrote accessible and well-informed papers and books for lay readers.[30] Because reputation was less bound to written output in the socialist period, an analysis of citations would not disclose significant parts of this intellectual network. As various players preferred not to publish ideological writings, many high-quality translations and biographies were produced in this period, and historical topics attracted significant attention.

[26]At the first conference, historian of chemistry Ferenc Szabadváry stressed that the discipline was not acknowledged to the extent that it should have its own society, but the conference series was one step towards disciplinarization; see Vámos (2009). MTESZ also published yearly collections of "anniversaries in technological and scientific disciplines" from the early 1980s to 2000s.

[27]See J. Zemplén (1964, 1998). On her work, see Gazda (2009). When asked to write a contribution to a collection of biographies on female scientists, I conducted a number of oral interviews that inform the summary of this section; see Balogh (2000).

[28]Árpád Szabó (1960; 1978; 1969).

[29]For a lexicon of bibliographies, see Abonyi, Ádám, Csiky, & Alpár (1986). For physics, *Válogatott tanulmányok*, a series of mostly 20th-century scientists' writings, was the most significant.

[30]His excellent Newton biography is Vekerdi (1977); for an appraisal of the oeuvre, see Szállási (2010).

In the 1970s and 1980s, control mechanisms were actively slowing down or channeling uptake processes. In 1973, for example, a number of publications were suppressed, and some members of the Lukács school were prohibited from lecturing. The ban was not only due to their criticism of Marx's economic theory, but also to their dealing with themes such as the pluralistic sense of truth. By this time, new historiographic trends entering mostly via the Anglo-Saxon philosophical tradition were already widely circulating. György Bence's dissertation on a "Marxist philosophy of science" in 1972, for example, already showed the influence of post-Kuhnian history, but the thesis was only defended in 1989 and published in 1990.[31] Links to the recent exiles from the 1970s, like George Márkus or Ferenc Altrichter, who focused on hermeneutics of science and analytical philosophy, respectively, were still obscured at times, for example by publishing a text under a colleague's "borrowed" name.

These developments took place in an intellectual environment where cross-disciplinary links were common: Kuhn's views were discussed together with ideas from Wittgenstein, the Frankfurt School, or Noam Chomsky. Yet again, a receptive and eclectic interdisciplinary culture emerged, although a number of earlier trends (such as the Catholic tradition in psychology) played reduced roles. Representatives of the local philosophical traditions (such as Karl Mannheim, Menyhért Palágyi) were acutely aware of sociological issues, and the enduring sociological tradition in philosophy was recently highlighted by Tamás Demeter.[32]

Analytic approaches were on the rise, and within the sciences strong traditions of methodological reflexivity existed before 1990, as exemplified by historically well-informed professors, who often also contributed to history of science. The historical approach was seen as a "productive stance" leading to innovative research contributions (for example, Pál Juhász-Nagy in ecology and biomathematics, linking Tibor Gánti and Eörs Szathmáry) and helping disciplinarization (for example, Tibor Vámos in cybernetics and information theory). Early scientometric analysis was part and parcel of overviewing the recent history of fields, and some of the most highly cited Hungarian scientists today (such as Tibor Braun, A. Schubert) played a role in the birth of scientometrics.[33] Rich informal networks were formed in the 1960s and 1970s that flourished into the 1980s, by which time the official platforms and venues were interlinked with the less and less hidden "*samizdat*" cultures. Expatriate scientists (especially Nobel laureates) were more and more welcome in the 1980s, and the late socialist regime held science in high regard. Science education curricula yielded internationally acknowledged results, and were developed with the help of prominent scientists, many of whom had an interest in historical topics, like György Marx.[34] It was in this context that the second wave of institutionalization took place in the 1990s.

4 | THE RISE OF HPS AND SSK IN A MULTIPARTY DEMOCRACY

The Hungarian institutions stemming from the 1970s and described in the previous section aimed to unearth scientific cultural heritage and foster science education and the scientific worldview, and were unaffected by the Kuhnian revolution. This was not so for the departments that shifted their focus to HPS shortly after the changes of 1989–1990 in Budapest, where there was a strong emphasis on philosophy and methodology of science. Researchers at the HPS department of Eötvös Loránd University (ELTE) pursued contemporary research topics in logic, systems theory, philosophy of physics (George Kampis, Miklós Rédei), or history, philosophy, and hermeneutics of science (Péter Szegedi, László Ropolyi). The Philosophy and History of Science department at BME was influenced by Hacking, Kuhn, and Cambridge-style HPS, and offered elective courses on history and philosophy of science and technology.

[31]See Bence (1990). An informative overview in English on the emergence of Hungarian philosophy of science is provided by Ujlaki (1994).

[32]See Demeter (2008).

[33]Scientometric data play an important role in evaluating performance in the hard sciences; in disciplinary histories these are most consistently used for psychology: Pléh (1979; 2011).

[34]For a comparison of French and Hungarian mathematics education in the 1960s, see Gosztonyi (2015). Pólya's heuristic method played an important role in mathematics education, and in chemistry a systematic approach was developed, starting with nuclear physical foundations.

A further department at the BME existed for some years for History of Technology and Innovation Management, with an STS (science–technology–society) profile.

A PhD School was established at the BME in 1997–1998, under the leadership of Márta Fehér (1942–2020), whose research interlinked history and philosophy of science. Her early historical work was on variational principles in physics after Maupertuis, and she co-authored a book on inductive philosophy of science with a Popperian, László Hársing. In the 1970s, she was also "silenced" for years (banned from giving lectures), but in 1980 was able to write a book on the incommensurability of scientific theories (a C.Sc. "Candidate of Science" thesis). Her more historical work included several case studies, from alternative mathematizations of nature in the 17th century to Algarotti's methods of popularization. For her role as protagonist of "sociology of science," the Kuhn- and Bloor-inspired SSK in Hungary was paramount, and she also played a key role in the Michael Polanyi Liberal Philosophical Association. She was the founding editor of the journal *Polanyiana*, publishing articles on the scientific and philosophical ideas of Michael Polányi.[35] She also developed novel courses from the 1980s, including on history of methodology, informal logic, and argumentation.

The PhD program at BME integrated various approaches as it was launched by Márta Fehér together with philosopher of technology Imre Hronszky and József Németh (1938–2019), a biographer and institutional historian.[36] For some years it was accredited as a multidisciplinary engineering program offering a degree in history of engineers, technology, and science, but after 2002 it was reclassified as a doctoral program in humanities. For some years, it retained its multidisciplinary nature as a program in both history and philosophy. Symbolic of the unstable anchoring of the discipline is that the School received a "center of excellence in History" award from the Hungarian Accreditation Council for 3 years (2007–2009), but before the review was due it was reaccredited as belonging to philosophy only (2008). The PhDs ranged broadly from history of Hungarian industrial companies to conceptual analyses of mathematics, and the School graduated dozens of historians of technology, historians and philosophers of science, analytical philosophers, and communications experts. In 2017, most senior faculty left as a response to autocratic moves by the rector and chancellor, and the school ceased to operate. Most of the students are currently applying for degrees at the ELTE Philosophy PhD program.

By 2000, one could speak of the emergence of science and technology studies (STS) in Hungary. STS perspectives were increasingly informing scientific policy-making, as in the creation of a registry and roadmap of National Research Infrastructure (2008–2010). Theoretical strands of "sociology of (scientific) knowledge" (SSK) surfaced in sociology curricula, and some PhDs were experimenting with anthropological methods of observation.[37] Much of the innovative work in the field from the 1980s to the early 2000s adopted the case-study format, and some of the Hungarian case studies were explicitly "constructivist," that is, they regarded scientific knowledge as primarily the product of human activities and interactions. However, laboratory ethnographies and other fieldwork were never fully integrated. While history of science was seen as one of the dynamically developing research fields open to multidisciplinarity in Hungary, after a promising start the field had not become a standalone *discipline*.

Historical research in some disciplines (stretching from psychology to the exact sciences) is rather well organized and productive, but the intra-disciplinary networks interact only moderately with one another. There has never been a centralized mailing list for history of science; most news is circulated via a philosophers' list, some via cultural history or disciplinary networks. The examples could be continued. Attempts were made by the BME and ELTE departments to accredit a "history of science" Masters program, but without success. At the Central European University

[35]The early integrated pre-Kuhnian work is Fehér & Hársing (1977); for a selection of her English essays and articles, see Fehér (1996). The journal *Polanyiana* had relevance in networking (for example, chemists interested in Polanyi's early research) as well as publishing essays. The Polányi papers were studied by various members of PhD school, including Margitay (2010). The last thesis defended on Polányi was by Gábor I. Bíró; see his monograph Biró (2019).

[36]Fehér and Hronszky were the co-organizers of The IUHPS (International Union of History and Philosophy of Science) congress in Veszprém, Hungary in 1984: see Hronszky, Fehér, & Dajka (1988).

[37]Many PhDs were obtained abroad, like Emese Lafferton's work on Hungarian psychiatry: Lafferton (2007). For "constructivist" examples, see Júlia Gyimesi's (2011; 2012) work, or the laboratory ethnography of canine ethologists was written by Katalin Mund. The most significant STS conference was organized in 2014: https://stsmuhely.wordpress.com/program/. The strand of constructivist laboratory anthropology co-existed with a methodologically reflexive "oral history" tradition, as part of peer- or disciplinary history: Bodor, Pléh, & Lányi (1998); Lányi (2007); Palló (1998); Pléh (2014).

(founded in 1991), the launching of a science studies department and program was considered during the rectorship of Yehuda Elkana (1999–2009), but the department was not established. Nevertheless, the facilities and programs (such as summer schools) of CEU were important fora for historians of science and science studies scholars, and various programs of the institution (history, medieval studies, philosophy) trained historians of science.

A major international conference of the field (IUHPST/DHST) was held in Budapest in 2009; organization began in 2005 and was led by Éva Vámos (1950–2015), director of the Hungarian Museum for Science and Technology. Plans were made to assemble a booklet on the Hungarian field in connection with the event, but the effort was never realized, partly because of a lack of clarity about what the discipline should include. No such plans were made for the HOPOS conference (History of the Philosophy of Science), which was held in Budapest in 2010 with few Hungarian participants.

Demographic changes had a significant impact on the careers of younger scholars in history of science. The first decade of the new millennium saw strengthening ties with regional centers like Vienna (also linked to work on the historiography of Viennese Circle by Kristóf Nyíri, following Rudolf Haller), as well as new co-tutelle schemes with France. Peregrination yet again became typical, and the outflow of researchers grew significantly, with an influx coming mostly from Slovakia, Rumania, or other areas with significant Hungarian minorities. But changes in state-funded education resulted in a decline of the number of dual humanities and science/engineering postgraduates, a characteristic of the practitioners dedicated to history of science in the previous generations.[38] With the move to mass education—as opposed to the earlier, more elitist training structure—the student–teacher ratio at universities quickly grew from about 8:1 in 1995 to above 15:1 in 2004, reaching the OECD average.[39] The number of university students increased from 100 000 in the early 1990s to over 400 000 from 2003 to 2006. Following this peak yearly applicant numbers dropped from over 167,000 in 2004 to below 100,000 in 2008.[40]

Just at the time that the integration of more history of science in high school science curricula received support, and attempts were made to develop an historically informed integrated science curriculum, the relevance of history of science in higher education decreased.[41] With the Bologna process, a new "3 + 2" training system was adopted for most university programs. In the humanities, the number of students dwindled in the Master's programs from which many of the previous generation's HPS scholars had come. Bachelor's degrees in liberal arts gained prominence, with significantly fewer philosophy-oriented graduates: in earlier years, five universities had been running MAs in philosophy with well over 100 graduates *in toto*; this figure dropped to less than five students on average after 2014. As for the dedicated departments, at ELTE the new science curricula contained less history of science, so student numbers gradually decreased, and the department was dissolved. At BME, other, practically oriented areas became dominant.[42]

One could point to several unfavorable trends, as the development of the expert culture took place in a society where experts were heard increasingly less. By 2000, a boom in high-level specialized journals was around its peak: several publications were linked to universities, institutes of the Academy, or scientific societies, and many were supported by local councils, or NGOs such as the Soros Foundation. By 2010 funding decreased, and much of the specialized-journal market collapsed. In the case of books, the numbers increased from about 9,000 titles per year to well over 12,000 titles per year in the decade up to 2010, but the number of copies sold overall dropped significantly from over 45 million per year to about 30 million per year, alongisde a decrease in the share of academic books from

[38]Beginning with an early boom after the fall of Communism (15 new institutions were established in 1992/1993), the number of universities and colleges increased from around 70 to 90 from the 1990s to 2000. After a reorganization of the fragmented higher educational landscape in 2000, their number dropped to 60, followed by a decade of slow but steady growth due to new private institutions. See Kocsis (2011).

[39]See Polónyi (2007a).

[40]For analysis see Polónyi (2007b), and the yearly statistics published on www.felvi.hu.

[41]Some of the early high-school textbooks for science subjects were historically well-informed. For a holistic approach to biology, see Czakó (1991). Integrated historical approaches for science subjects were developed from the 1990s by Both & Csorba (1993), and for some years were in use in academic high schools; see Radnóti (1995). Some high-school modules were developed or translated linked to the EU-funded seventh-framework History and Philosophy in Science Teaching (HIPST) project, introduced in G. A. Zemplén (2011).

[42]History of Science as an elective has long been established at BME, but from the early 2000s student numbers dwindled, and the students applying were less frequently high achievers (lower average by approximately one grade on a scale of five).

above 15% to below 10%. The visibility of academia decreased with the gradual spread of "books on demand" printing.[43]

The historically informed approach of many university textbooks, which grew out of research in the departmental libraries (with *rara* books commonly on some of the locked upper shelves), was gradually replaced by didactically streamlined and more pragmatic (usually American) standard textbooks, occluding local traditions with multi-lingual sensitivities and interest in methodological change and the local environment. A major resource for early training, the secondary-school textbook market also changed significantly, and debates in didactics moved from such nuances as how to incorporate more historical content into science curricula to debates on the workload of teachers, decreasing science content, and other existential issues.[44]

History of science has always played an important role in maintaining national pride, but is not necessarily the ideal vehicle for transmitting the image of a fast-paced, cutting-edge scientific culture. When popularization of science received additional funding, the media visibility of science was boosted by the yearly "World Science Forum". A major televised series was launched adopting the French program *L'Université de tous les savoirs*, with famous scientists giving popular talks on prime-time television (*Mindentudás Egyeteme*). While the series contributed to the popularization of science in general, it put little stress on the historical development of science. As a result, while the visibility of science grew, the relative visibility of historical works did not.[45] For some years, it seemed that an emerging field can take over many of the accustomed functions of history of science for the broader public, and at ELTE a Masters program in Science Communication was launched, but was only available for a few years (2011–2015).

In the new millennium, increasing stress on techno-scientific pragmatism and a decrease in the prestige of research with no direct benefit became more and more evident. A major public debate in 2005–2006 foreshadowed the capture of scientific institutions by the government, portraying basic research as a luxury that the state cannot afford.[46] The last few years have witnessed a major re-engineering of the institutional landscape, and the next section reviews recent challenges to the field.

5 | RECENT TRENDS & CHALLENGES

In the most recent past, Hungary has been significantly reshaped as a democratic culture, and this section reflects on the situation of the discipline in that context.[47] The booming periods of the discipline around the turns of the last two centuries can be correlated with the existence of special colleges—breeding networks of scientists open to interdisciplinarity. An early hub was the already mentioned Eötvös Collegium, and for the second period of flourishing special training colleges founded after 1990 were important, like the "Invisible College."[48] The rich intellectual environments of both phases were abruptly terminated. Imre Lakatos played an important role in the refashioning of the Eötvös Collegium in the 1940s, and a similar destabilization of the delicate niches took place after 2011, when over 50 higher educational foundations were closed, with activities in special colleges either terminated or centralized.

In the last period, "history of science" as a label for research has not become more popular. OTKA (Országos Tudományos Kutatási Alapprogramok), the autonomous "foundational" research support institution, has distributed

[43]The last multi-volume book-project with significant print run was the series *Reception and Creativity: Open Hungarian Culture*, conforming to a center–periphery master-narrative (*Recepció és kreativitás: nyitott Magyar kultúra*, 7 volumes, Enciklopédia Humana, 2004–). The series on History and Philosophy of Science (*Tudománytörténet és Tudományfilozófia*, L'Harmattan 2004–) had volumes on "boundary work," "emergence," and "Kuhn and relativism," but had small print runs, like most other volumes or series since. A broadsheet devoting significant resources to science communication, including history, was *Népszabadság*, terminated in 2016. On book publishing see: https://www.ksh.hu/docs/hun/xftp/idoszaki/kkiadas/kkiadas14.pdf.

[44]Hungary has relatively few adult learners, around a quarter or third of the OECD and EU average for various groups; see Kocsis (2011).

[45]The series ran for 10 semesters (2002–2007) with some "master courses," and a somewhat downscaled 2.0 version was launched in 2011 (with more digital content and more discussions).

[46]For the analysis, see Sallay (2010).

[47]As Freedom House's (2020) "Nations in Transit" report stated: "Hungary's decline has been the most precipitous ever tracked in Nations in Transit; it was one of the three democratic frontrunners as of 2005, but in 2020 it became the first country to descend by two regime categories and leave the group of democracies entirely." For an introduction to changes up to 2016, see Pap (2017).

[48]The College was a Hungarian initiative and was later used as a template to establish Invisible Colleges in various developing countries.

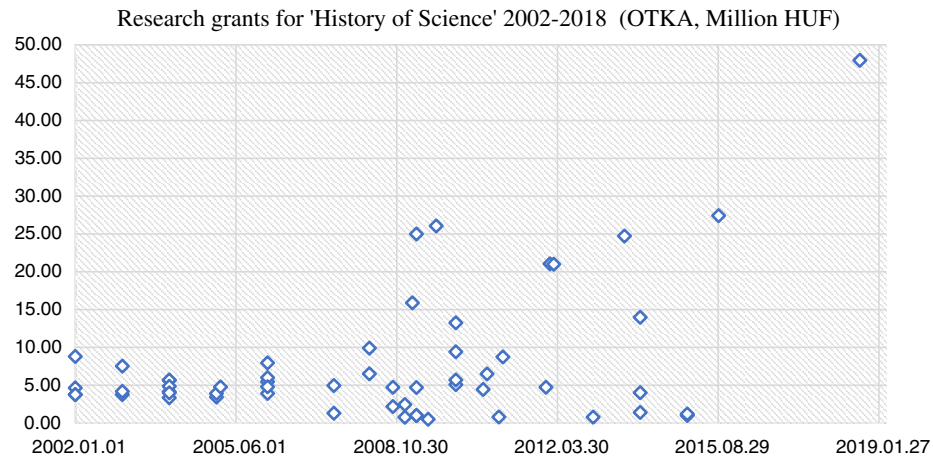

FIGURE 1 OTKA grant support (2002–2018) for projects classified as "history of science." 1 EUR was approximately 240 HUF at the beginning of the period and 320 HUF at the end; the current rate is around 360 HUF. x-axis: time of grant start; y-axis: funding in million HUF (often distributed over 3–4 years) [Color figure can be viewed at wileyonlinelibrary.com]

about 1 million EUR for research in the period 2002–2018, less than 1% of the annual budget. Figure 1 shows the distribution of funding for projects classified as "history of science" by the principal investigator in the OTKA National Basic Scientific Program grant scheme. After the move from many small grants towards fewer and larger projects in 2008, funding become more erratic for the small and fragmented field.

The funded projects are mostly linked with the flagship entities introduced in the earlier sections, the institutes of the HAS (nine projects from the Humanities Research Institute, four from Psychology-Cognitive Science), the mentioned universities (ELTE 10, BME 4), and the Hungarian Institute for History of Science Ltd (10 grants, mostly for publishing). Various other universities and some museums, NGOs, or publishing houses were also supported, usually with a single grant in the investigated period. The last two grants in Figure 1 supported Hungarian dance history (27 million HUF), and the Antal Reguly Museum's collection (48 million HUF), outside the previously described networks.

With the emergence of an "illiberal" regime, institutional stability is passé, and stakeholders are rarely consulted before major changes. In 2020, some of the basic research-funding decisions by OTKA were overruled by the Ministry of Technology and Innovation, referring to scientometric evaluation. The decision was reversed after various actors expressed their reservations and some resigned from their positions. Recently, several universities, starting with Corvinus University of Budapest (2018–2019), were decoupled from the state and converted into "foundations," and a much-criticized model of privatization with little accountability has been established. Several changes were carried out during the Covid-19 pandemic: the privatization of over a dozen state universities, although some institutions actively resisted the process, like SZFE, a university for performing arts (2019–2021). From September 2021, about 70% of university students will study in these privatized institutions of higher education.

The dozens of institutes in the Research Institute Network of the Hungarian Academy of Sciences have been decoupled from the HAS in 2019/2020, and for researchers of the research institute network (now Eötvös Loránd Research Network) employment status granting "tenured" positions ceased as of January 2021. Given conditions in the labor market, few of those employed refused to sign the new contract.

For the past 50 years, the outflow of researchers from Hungary has surpassed the numbers incoming, and this has been accelerated further by the relocation of CEU to Vienna. Grants for repatriation provide some years of comfort, but for decades the schemes have only been moderately successful. This is not surprising when one looks at the

level of funding. Per capita, R&D expenditure in Hungary is about one seventh of the Swedish value, and Hungarian salaries are not attractive (even for the region); a mid-career associate professor can earn below the German minimum wage.

The academic presence of the field is also impacted by the lack of a significant role in education. In university history programs, history of science has had little place for generations. High-school history curricula address the development of science only in passing. Textbooks discuss history of science (and technology) marginally—for instance, inadequate space is allotted to portraying the emergence of scientific institutions.[49] As for science curricula and textbooks, while alternatives were developed only a few years ago, when history of science played an important, often organizing role, this historical perspective in science education has been mostly eradicated due to decreasing freedom in the choice of textbooks. The new curricular reforms (NAT2018-20) have been described by the Academy as lacking an integrating view of the individual and of society and treating students as subjects to normative regulations, and in history for having an overemphasis on political history.[50] Increasing centralization of the high-school system comes with minimal "nature of science" (NOS) content.

The recent reshaping of Hungarian history, with the help of think-tanks and institutes (like the Magyarságkutató Intézet) promoting upbeat historical narratives, is part of the "culture wars," and is increasing the conflict with traditional scholarly communities (archaeologists, historians, linguists). Debates on history curricula highlighted the intrusion of fringe views, most pronounced in early national history. Links to Attila the Hun and the origins of the Hungarian language are some of the domains that conform easily to existing preconceptions and (therefore?) government ideology, and where the funding of partisan views that confuse linguistic and ethnic relationships is worrying. History of science is by and large uncontested territory, as it is less and less present in contemporary culture. With the termination of the PhD program at BME in 2017/2018, and with the changes in higher education discussed earlier, the field has limited resources to recruit new generations of researchers.

On the bright side, the discipline continues to have stable footing at the Hungarian Academy of Sciences. Currently, in addition to the previously mentioned Committee of Section II of the HAS, the role and activity of medical history has also increased. Under the auspices of Section I of Linguistics and Literary Scholarship, and within the Committee on Cultural History, the Work Committee on medical history (Élettudomány-történeti Munkabizottság) has also organized a number of conferences, and supports the journal *Kaleidoscope*, now running for 10 years.[51] The most substantial OTKA research grant in history funds a group reconstructing the patterns of the circulation of knowledge in Hungary (PI Lilla Krász), focusing on the human sciences from 1770 to 1830, and links to various European centers, most specifically to Göttingen.[52] Among the Hungarian flagship "Lendület" research groups, the Institute of Philosophy (earlier HAS, now Eötvös Loránd Research Network (ELKH)) hosts a group on "Morals and Science" (PI Tamás Demeter), and will host a group on "Value Polarizations in Science" (PI Ádám Tamás Tuboly) focusing on HOPOS-related themes and historical epistemology.[53]

The current trend to measure scientific output and the increased focus on scientometric evaluation makes any discipline unattractive where the cited half-life in major journals is over 10 years. As career-tracks in research linked to the Academy are currently neither lucrative nor appear very stable, few of the best students would focus on academic research in a "slow" discipline like history of science. With this in mind, the field has the potential to thrive where support is most likely to be found: in disciplinary communities, as "histories of special sciences."[54]

[49]This conclusion was based on an overview of currently approved "History" content by the Educational Authority (Oktatási Hivatal), analysis of textbooks for 9th and 10th grades (OH-TOR09TB and FI-504011001/1), as well as the new official curricula (NAT 2020: 5/2020. I. 31.), and the related course-specifications. The relevant documentation in Hungarian can be accessed at: https://www.oktatas.hu/kozneveles/kerettantervek/2020_nat.

[50]MTA KEB (2018).

[51]http://www.kaleidoscopehistory.hu/

[52]One of the significant Kuhnian monographs, by Vera Békés (1997), developed the theme of the "missing paradigm," studying the convoluted history of historical linguistics and other social sciences. The period has been explored in several yearly conferences organized by Dezső Gurka.

[53]See Demeter, Murphy, & Zittel (2014); Tuboly (2021); G. A. Zemplén & Demeter (2010) for some of the topics.

[54]Usually combining "internal" theoretical development and a focus on individual achievements: Inzelt (2015); Rédei (2020); Vargha, Balázs, & Zsoldos (2011).

6 | SUMMARY

This paper has provided an outline of history of science in Hungary, with a focus on institutional development. The chronologically ordered sections overviewed the ebbs and flows of the discipline since the emergence of the field in the 19th century, thriving in periods when interdisciplinary networks and training facilities were well supported, during or after booms in education. The popular genres, objects of study, and approaches before World War I had a lasting impact on how the field is portrayed for the wider audience, as both scientistic and nationalistic.

In the socialist period, some of the resilient informal networks helped revive the interdisciplinary field. A significant wave of institutionalization started in the 1970s, and "History of Science and Technology" became a research area. In the 1990s, a demographic boom, changes in the educational system, as well as strengthening ties with international research centers contributed to an upsurge in researchers, and departments dedicated to "History and Philosophy of Science" were established. By the end of the decade, a doctoral school of the field was accredited.

The second wave of institutionalization refashioned history of science in Hungary, increasing the importance of mainstream history as well as sociological and philosophical perspectives, and decreasing the focus on select individuals—a significant departure from the tradition of histories of engineers and medics. Some constructivist, critical traditions decoupled history of science from scientistic and nationalistic agendas.

Although recognized in the Academy, during the last decade history of science has lost some of its main outposts in higher education in Hungary and has been mostly erased from secondary education. The changes currently taking place are highly significant for the future research environment, but their import is unclear. As no studies are available on how the radical changes would impact the Hungarian research ecosystem, and as legislation is developed "on the go," it is exceedingly hard to predict the future of the fragmented field.

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ORCID

Gábor Á. Zemplén https://orcid.org/0000-0001-7017-4661

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