

Mathematics and International Relationships in Print (Journals, Books) and Correspondence **Matematica e internazionalità nella stampa (riviste, testi) e nelle corrispondenze**

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A complex transition: German general and review journals to specialized journals in the early 19th century

The general and review journals, very numerous in the later years of the 19th century, give evidence of much general interest in mathematics. The passage to research journals, notably that of Crelle, attempted to retain the audience by a variety of strategies. In this paper we examine the characteristics of mathematics in the general journals, the volumes that are reviewed, and the strategies of Crelle and others to interest broader publics in more advanced and difficult subjects.

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Matematica e internazionalità nel carteggio fra Guccia e Cremona e nei Rendiconti del Circolo Matematico

Il carteggio fra Giovan Battista Guccia (1855-1914) e Luigi Cremona (1830-1903) è costituito da 59 lettere, che coprono un arco cronologico che va dal 1878 al 1900. In particolare le lettere di Guccia a Cremona sono 45, di cui 44 sono conservate presso l'Istituto Mazziniano di Genova, mentre le lettere di Cremona a Guccia sono 14 e sono conservate presso l'archivio del Circolo Matematico di Palermo, insieme alla lettera di Guccia a Cremona del 28 luglio 1881. Giovan Battista Guccia si laureò a Roma nel 1880, sotto la guida di Luigi Cremona. Nel 1889, in seguito a concorso, fu nominato professore straordinario di Geometria superiore all'Università di Palermo e nel 1894 fu nominato ordinario. Nel 1884, fondò, con personale contributo di mezzi e di lavoro, il Circolo Matematico di Palermo, i cui Rendiconti divennero, qualche decennio dopo, una delle più importanti riviste matematiche internazionali. Egli ne fu, fino alla morte, il direttore e l'animatore. Alla prematura morte lasciò una cinquantina di lavori geometrici, nell'indirizzo strettamente cremoniano. Dall'esame del carteggio si evince la presenza di alcuni temi sopra gli altri: la descrizione della carriera scientifica e dei collegamenti internazionali di Guccia con relazioni dettagliate sui viaggi all'estero; i riferimenti al Circolo Matematico di Palermo, sin dalla prima fase della sua costituzione, e le acute valutazioni dell'ambito matematico europeo compiute da Guccia per garantire lo sviluppo internazionale del Circolo e dei Rendiconti.

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Des corps d'ingénieurs nationaux pris dans la circulation internationale des savoirs : l'exemple des ponts et chaussées français au XIXe siècle

Alimenté, après 1794, par d'anciens polytechniciens rompus aux sciences et aux mathématiques, le corps des ponts et chaussées, à l'instar des différents corps d'ingénieurs en France qui recrutent à la sortie de l'Ecole polytechnique, a su progressivement mettre en place une série de mécanismes de production, de stockage et d'analyse, de dissémination et d'utilisation des connaissances et des savoir faire nécessaires pour réaliser ses missions au XIXe siècle. Une bonne partie de ces connaissances et savoir faire sont d'origine étrangère, captés d'abord avant d'être appropriés par les membres du corps grâce à une série de moyens de « management de la connaissance et de l'information », pour parler comme l'historien P. Burke. Cette communication présentera et discutera certain de ces moyens développés par le corps des ponts à partir du début du XIXe siècle :

cours de langues étrangères, l'italien à partir de 1806, auquel s'ajoutent l'anglais et l'allemand quelques années plus tard ; constitution d'une bibliothèque dont une partie significative est composée d'ouvrages et de revues étrangers; organisation de missions scientifiques à l'étranger sur une base systématique (ainsi les meilleurs élèves de chaque promotion gagnaient-ils un voyage d'études à l'étranger) ; création d'une revue de corps, les *Annales des ponts et chaussées*, fondée en 1831, qui contient plusieurs publications faisant état de ce qui se passe et se fait à l'étranger dans des domaines qui intéressent le corps.

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The Theory of Continuous Groups in Elie Cartan's correspondence

In recent times, new documentary sources concerning Elie Cartan's scientific production, namely letters and private notebooks, have been rendered available to historians, thus awakening the interest in research on such a prominent mathematical personality. In particular, the study of Cartan's correspondence with a multitude of mathematicians throughout the world offers the chance to gain a better comprehension of his works as well as of its influence in shaping the development of mathematics in the last century.

In this talk, I will concentrate upon Cartan's correspondence with two eminent mathematicians on the subject of Lie group theory: Jan Arnoldus Schouten and Ugo Amaldi. The hope is that of providing a better comprehension of Cartan's work on Lie groups (both finite and infinite) as well as of its difficult reception within the European mathematical community.

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Giornale di Matematiche (1863-1893): A bridge to the European research

Giornale di Matematiche was the first mathematics' journal founded in an Italian university after the Unification in 1860.

It was born on the initiative of a professors' group from the University of Naples, to provide Italian universities with a journal that could make the developments of European mathematics known, especially to young people.

According to the promoters of the initiative, this scientific journal had to lead young scholars to the difficult path of mathematical research.

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Les journaux pour enseignants et étudiants : usages locaux et circulation internationale des mathématiques (1870-1914)

Après 1870, les journaux de mathématiques destinés à un public étudiant et enseignants se multiplient : en France, plusieurs d'entre eux sont créés, qui reprennent la ligne éditoriale initiale des *Nouvelles Annales de mathématiques* (qui existent quant à elles depuis 1842) ; en Belgique, la revue *Mathesis* voit le jour ; en Grande Bretagne, ce sont les *Mathematical questions from the Educational Times*, le *Messenger of Mathematics* et la *Mathematical Gazette* qui occupent cette fonction ; en Italie, on trouve le *Giornale di matematiche*, ou encore le *Periodico di Matematica per l'insegnamento secondario*. Ces revues étant liées à l'enseignement, elles sont façonnées par le contexte éducatif de leur pays de publication. On peut ainsi y lire des corrections de concours de dimension nationale (Polytechnique, Cambridge, professorat), ou encore des annonces de manuels destinés à des enseignements particuliers, voire de cours spécifiques. Les contributeurs et les rédacteurs appartiennent, le plus souvent, au monde de l'enseignement du pays dans lequel ces revues sont publiées. De ce point de vue, ces journaux apparaissent comme conçus à une échelle locale, et destinés à un usage tout aussi local.

Pourtant, on trouve aussi au fil des pages des manifestations d'une circulation internationale des mathématiques publiées dans ces journaux. Cette circulation est présente à l'intérieur du groupe que forment ces revues, par les références à des articles publiés à l'étranger par une autre revue pour étudiants et enseignants, par la publications des mêmes questions, voire la réédition de réponses parues ailleurs. Elle est également présente au travers de la volonté des rédacteurs de faire connaître à leurs lecteurs certaines avancées de la recherche internationale.

Cette communication sera consacrée à l'articulation de ces deux échelles, locale et internationale, dans les revues destinées aux étudiants et aux enseignants : comment dialoguent-elles au travers des frontières ? Quels sont les objets mathématiques qui circulent, et quels sont les effets de cette circulation ? Peut-on parler d'une communauté internationale autour de ces revues ?

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Cardano's "Opus perfectum": an encyclopedia to extend algebra beyond abacus environments towards a transnational dimension

Even though Leonardo Pisano's *Liber Abaci* was written in Latin, the Italian tradition of practical mathematics and algebra – started from the beginning of 13th century and developed till the 16th century – has been mostly a vernacular and local tradition.

The invention of the movable type printing technology did not change this aspect: the best appreciated and spread abacus treatises, that is Pacioli's *Summa*, Borghi's *Libro de abacho* – to mention only the most famous – were still in vernacular and mirrored an everyday life geographically limited. Girolamo Cardano's *Practica arithmetice* (1539) represented a breakpoint in this trend. Cardano decided to write in Latin his first mathematical work, a kind of abacus treatise, to enlarge his public to the intellectual environments and to make his *Practica* one of the main means for spreading the practical mathematics throughout Europe. It was not an easy operation, as it presented – just to take an example – the difficulty of translating some particular expression of the abacus vulgar lexicon in latin terms. Nevertheless it was a successful operation: Viète, Stifel, Nunez and others often mentioned Cardano's *Practica*.

But Cardano's project was much more ambitious. His following goal was to publish an encyclopedia of practical arithmetic in fifteen volumes, called *Opus arithmetice perfectum*. He was not able to complete his project, but we have some volumes (*Ars magna*, *Opus novum de proportionibus*) and fragments still extant that shed a light on this work, aimed to go beyond the abacus environments so to give a transnational dimension to the practical arithmetic. This encyclopedia, inspired to the architecture of Euclid's *Elements*, was to be a reference point in the whole mathematical community. This was the reason why, for example, Cardano adopted a completely different approach in respect with the *Practica*, abandoning the terminology of the abacus for a lexis more representative of the purity of Latin. My talk is focused in describing the features and the fortune of Cardano's editorial project, interpreted as an attempt to transform a mainly local phenomenon into a tool shared by a wider community to stimulate the development of mathematics.

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The Italian Commission for Mathematics Teaching and ICMI: Interwoven Histories (1908-1955)

The origins of the Italian Commission for Mathematics Teaching are linked to the founding of the International Commission on Mathematical Instruction (ICMI) which was constituted in Rome during the fourth International Congress of Mathematicians (ICM IV, 6-11 April 1908). ICMI's first president was Felix Klein, well-known for his important reforms in the teaching of mathematics in Germany.

In my talk I will illustrate – also referring to unpublished documents – the Italian contribution to the activities of ICMI from 1908 to the 1955, when the Italian Commission for Mathematics Teaching was created. I will focus on: the role of Guido Castelnuovo in the earliest period and Klein's influence; the echoes of ICMI's activities in journals, academic policies and school reforms in Italy; the dissolution of ICMI following World War I and the Italian side of the story; the political role of Salvatore Pincherle and Castelnuovo in re-establishing international collaboration in 1928; the birth of the Italian Commission for Mathematics Teaching and the role of Guido Ascoli.

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Offres éditoriales en mathématique au 19e siècle et cadres nationaux: France, Italie, Grande Bretagne. Premières approches

Nous voudrions discuter ici l'opérationnalité et la pertinence de la prise en compte du cadre national dans l'étude des journaux de mathématiques au 19e siècle. Après un premier travail réalisé sur les journaux français, c'est à dire les journaux mathématiques créés et édités en France au cours du XIXe siècle, cherchant à préciser les dynamiques de création des journaux et de segmentation des publics et leurs liens au cadre national français, c'est à dire l'histoire institutionnelle, politique, culturelle du pays, nous voudrions tenter une mise en perspective avec les cadres italiens et britanniques.

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The international partnerships on mathematics at the age of Totalitarianisms

As is well known, an articulated process of ideological indoctrination, known as the *fascistization of school and research*, was put into place in Italy during the dictatorship (1922-1945). This process went hand in hand with a focused strategy of closure and boycotting of international scientific trends and experiences, known as the *policy of cultural autarchy*. In particular, after 1936 scientific exchanges of teachers and students were systematically discouraged; famous scholars such as G. Fubini and G. Colonnetti, were refused passports to attend international congresses or to teach abroad as visiting professors, and even foreign books, journals and teaching materials were subjected to severe controls. On the contrary, favoured intellectuals of the regime, such as F. Severi,

E. Bompiani, L. Fantappiè, were often invited as lecturers in France, German, Japan, Brazil, Scandinavia, and took the opportunity to celebrate the superiority of Latin genius and the success of the cultural lines promoted by the fascist dictatorship.

Analysing the correspondences and the publications of this period, and thanks to sources preserved in some Italian archives (the Historical Archives of the Turin University and Polytechnic, the archive of FESE [Fond Européen de Secours aux Etudiants], the archive of Del.As.Em, [Delegazione per l'assistenza agli emigranti ebrei], the network of correspondences among V. Volterra, G. Castelnuovo and F. Enriques, ...), in this talk we will illustrate:

- the repercussions of cultural autarchy on the evolution of Italian mathematics;
- the strategies adopted by some scholars (G. Castelnuovo, F. Enriques, V. Volterra, A. Terracini, F.G. Tricomi, E. Persico, F. Severi, E. Bompiani, L. Fantappiè, ...), in order to mitigate the effects of this forced scientific isolation and
- the tension – under a totalitarian regime – between the physical control over individuals and objects, and the free supranational circulation of scientific knowledge and ideas.

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The mathematical journals at the University of Pisa and European influences

The University of Pisa has a long tradition in the field of scientific journals, starting from the last decades in XVII century, that set it in a peculiar position between the academic institutions of the time.

The first period is under the name of *Giornale dei letterati*, published from 1771 to 1839, with some changes in the title and long interruptions, followed by some series of the *Giornale toscano* and collected papers concerning scientific topics, then from 1846 by the *Annali delle università toscane*, until 1925, and finally from 1871 by the *Annali della Scuola Normale*.

The *Giornale* took place as the expression of the board of professors, directed by the superintendent Angelo Fabroni. This close relationship with the university was an advantage for the magazine, kept out from the control of religious authorities, but at the same time a limit, with regard to the level of non-uniform scientific contributions of teachers.

Fabroni had a large network of relationship with both individuals (d'Alembert, Condorcet, J.D. Cassini, Lalande, Waring, Priestley) and institutions in Europe (Royal Society, Académie des Sciences). The journal become one of the most influential literary review of the time, and also from the mathematical point of view it has interesting elements, most of all for the presence of excerpts from the main foreign journals and reviews of works recently published.

The attention paid to the developments of sciences in the European framework was a constant of the *Giornale dei letterati*, that ended its life after the first Congress of Italian scientists, held in Pisa in 1839.

A different purpose inspired the *Annali delle università toscane*, whose aim was to give to the professors a place to publish not only research articles, but also lessons, critical editions, treatises, etc., without external contributions.

Finally in 1871 the most famous mathematician working in Pisa, Enrico Betti, edited the *Annali della Scuola Normale*, containing the best thesis of the students; this journal played a significant role in the development of the international dimension of the Italian research, due to the large reached number of interchanges between universities.

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Poincaré avait-il une stratégie éditoriale internationale?

Henri Poincaré a publié dans de nombreuses revues internationales (*Acta mathematica*, *Rendiconti del Circolo Matematico di Palermo*, *American Journal of mathematics*...) et a entretenu une correspondance plus ou moins nourrie avec plusieurs mathématiciens éditeur de journaux (G. Mittag-Leffler, G. Guccia, F. Klein, Thomas Craig, ...). Nous essayerons à partir de ces éléments de discuter si Poincaré avait une stratégie éditoriale bien définie et le cas échéant de la reconstruire.

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Rôle de la traduction dans les circulations internationales qu'établissent les journaux savants du 18e siècle

En concevant le projet de traduction française des *Philosophical Transactions*, François de Brémond a commencé par compiler des tables – rangées par ordre chronologique, par ordre des matières et par noms d'auteurs - pour les mémoires imprimés dans les *Transactions philosophiques* de la Société royale de Londres depuis 1665 jusqu'en 1735. Ces tables, parues à Paris en 1739, ont la particularité de faire apparaître en marge les reprises des mémoires par d'autres journaux. Ces *marginalia* permettent d'étudier (partiellement du moins) les circulations internationales des articles publiés originalement par les *Transactions*. A Trento, je me concentrerai sur les articles de mathématiques et leurs reprises, notamment par les *Acta eruditorum*, mais aussi par d'autres journaux. Je m'intéresserai à la forme de ces reprises : traductions, extraits, citations, etc., aux délais entre la publication originale et la reprise, aux modifications intervenues et à la présence de commentaires ou autres interventions des rédacteurs. Cette étude devrait permettre d'établir une circulation mathématique relativement spécialisée entre divers journaux du XVIII^e siècle.

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The international stays of studies of graduates in mathematics at the Turin University (19th century)

Starting in the '30s and '40s of the 19th century Sardinia Kingdom focused on the study and the imitation of more advanced European countries in order to update and modernize Science, economy and industry. Generations of students of the Turin's Faculty of Mathematical and Physical Sciences and of the *Scuola di Applicazione per gli ingegneri* were spent by their professors – first of all by the foreseeing mathematicians C.I. Giulio and Q. Sella – and sponsored by the government to attend prestigious European schools in France, Belgium, England, Germany, Saxony, Prussia, etc. Moreover they scouted factories, and scientific and educational establishments to educate themselves professionally and to gather information to be used to improve the Italian system.

Among them we mention the Giulio's students, S. Grandis, G. Sommeiller and S. Grattoni who went in Belgium (1846-47) for a railway specialization, becoming then fundamental for the Frejus tunneling; G.D. Fenolio attended the Forest Academy in Neustadt Eberswalde in Prussia (1846-47), Q. Sella and F. Giordano (1847-51) the *Ecole des Mines* in Paris and G.V. Schiaparelli studied at the Berlin University (1857-58) and then spent a year at the Pulkova observatory near St. Petersburg (1859-60). The finding of Sella's scientific diary, written during his studies in Paris (1849-50), sheds some light on how his interest for mathematical crystallography was born. Furthermore thanks to him, another generation of graduates in mathematics started to study abroad: C. Perazzi (1854-55), G. Axerio (1856-58), N. Pellati (1859-60) and G. Berruti (1860-62). Through the correspondence preserved in Quintino Sella's archives – largely still unexplored – in my talk I try to see if and how it is possible to create a map of the locations where the Turin university graduates in mathematics went and establish when the Italian Ministry of Public Instruction started the scholarship to abroad improvement of the best national students.

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The diffusion in Italy of S. Lie's theory on continuous transformation groups. The role of C. Segre and his followers

The aim of my research is to analyze the influence of the diffusion of Sophus Lie's (1842-1899) theory of continuous transformation groups on the development of Italian mathematics, in particular in the field of algebraic geometry, thanks to Corrado Segre's (1863-1924) scientific, didactic and promoting activity. Segre's interest in Lie's groups theory and in its applications (especially to geometry as a consequence of Felix Klein's Erlangen Program) comes out from some of his writings (stored in the mathematics library, entitled to Giuseppe Peano, of the University of Turin),

among which one can find the *Quaderno 11*, relating to his Superior Geometry course held in academic year 1897-98, entitled *Lezioni sui gruppi continui di trasformazioni*. Among the students who attended the course there were Mr. and Mrs. William and Grace Young, whose notes have been used for a comparison of the contents (Archives – University of Liverpool).

Italian geometers (in particular, those close to Corrado Segre's school), played an important role in the connection between Lie's groups theory and geometry; a proof of this can be found in some of such geometers' – among which Federico Enriques (1871-1946) and Gino Fano (1871-1952) – writings.

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International relationships among mathematicians and editorial strategies in some Italian journals of 18th, 19th and 20th centuries

I intend to analyze and compare the international relationships established by mathematicians in Italian periodicals, particularly on the *Giornale de' letterati d'Italia*, the *Raccolta di opuscoli scientifici e filologici*, the *Nuova Raccolta* (ed. A. Calogerà) and the *Annali di Matematica pura e applicata* from 1858 to 1924.

My aim is to find elements useful to trace the editorial strategies by journalists, directors and editors, mathematicians, university professors and members of scientific societies or academies and those by some authors in the second half of 19th century and the first twenty years of 20th, choosing journals for their publications.

I'll try to discuss, through the correspondence and the printed articles and reviews, which audience or readership the editors addressed in prevalence (students, researchers, teachers of schools, university professors, members of academies, ...) and which kind of relationships the compilers of these mathematical journals did establish with the mathematicians and the directors of other mathematical periodicals in Italy and Europe. Particular attention will be paid to Italian translations of essays and articles of foreign mathematicians, and to the relationships between translators and authors.

Archives

Calogerà archives in S. Petersburg and Venice; Fagnani's archive in Pesaro; Riccati's archives in Padua, Udine and Castelfranco Veneto; Betti's archive in SNS Pise; Brioschi's archive in Milan Polytechnic; L. Cremona's archives in Genoa Mazziniano and Univ. Library; Giulio's archives in Turin Museo del Risorgimento and Bibl. Storia Cultura del Piemonte; C. Segre's archive in Turin Dept. of Math. Univ.; Sella's archives in Fondazione Sella Biella.

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Dalla tradizione francese all'editoria locale: i trattati di geometria descrittiva in Italia nell'Ottocento

Il processo di diffusione della geometria descrittiva prese avvio in Italia negli anni dell'occupazione francese (1796-1813). La creazione degli stati satellite italiani e l'applicazione in essi di modelli scolastici e amministrativi ispirati a quelli realizzati in Francia furono determinanti per l'avvio di questo processo. La geometria descrittiva venne fin da subito inserita nei programmi d'insegnamento delle scuole militari (Modena, 1798; Napoli, 1799) - probabilmente anche in virtù della grande influenza esercitata da Gaspard Monge che soggiornò in Italia negli anni 1796-1798 per espletare i suoi compiti di commissario repubblicano - e si diffuse ulteriormente negli anni successivi (Napoli, Università, 1806) e a restaurazione avvenuta (Torino, Accademia Militare, 1815; Roma e Ferrara, Scuole degli ingegneri pontifici, 1817).

I testi di geometria descrittiva e di applicazioni pubblicati in Italia all'inizio dell'Ottocento da autori come Antonio Bordoni, Vincenzo Flauti, Carlo Sereni e Giuseppe Tramontini costituivano all'epoca l'unica produzione editoriale dopo quella francese. In alcuni dei paesi scientificamente più evoluti, come la Germania o l'Austria, ma anche in Olanda e in Inghilterra, la pubblicazione di trattati analoghi ebbe infatti inizio solo a metà degli anni venti o nei decenni successivi. I primi testi italiani e le traduzioni in lingua italiana dei trattati francesi ebbero una longevità tale da costituire ancora agli inizi del Novecento una preziosa bibliografia di riferimento, sia per l'insegnamento universitario sia per quello secondario. A questa prima trattatistica fece seguito nella seconda metà dell'Ottocento una seconda generazione di manuali di geometria descrittiva, alcuni dei quali specificatamente destinati all'insegnamento pre-universitario dopo che a partire dal 1860 la disciplina entrò a far parte delle materie di studio delle scuole secondarie a indirizzo tecnico.

Nell'intervento mi soffermerò sui caratteri più rilevanti di questa produzione editoriale, descrivendone le varie fortune ed evidenziando gli elementi di continuità e di discontinuità con la tradizione francese.

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Editer des mathématiques en France et ailleurs: Libraires-Imprimeurs, graveurs et Bibliothécaires, 1750-1850

L'acte d'édition et de diffusion d'un ouvrage de mathématiques requiert l'intervention de différents acteurs du monde des livres : des libraires-imprimeurs, des graveurs et des bibliothécaires. Nous commencerons par situer notre étude dans un cadre historiographique et méthodologique avant de nous focaliser longuement sur la situation française.

Ainsi, nous étudierons les parcours et les contributions de certains de ces acteurs invisibles comme ceux du libraire malouin Henri-Louis Hovius (1756-1822) éditeur en 1815 d'un *Traité d'arithmétique*, offert comme un préservatif contre les routines aux personnes qui sont privées des leçons lumineuses que des professeurs donnent dans les écoles spéciales, dans les lycées, dans les collèges, etc. rédigé par un certain Bonnefin « ex-trésorier des Invalides de la marine à Saint-Malo»; de la graveuse de planches mathématiques Marguerite Thérèse de Maugein (1736-1787?) ou encore du bibliothécaire clermontois Charles Gonod (1792-1849), intermédiaire indispensable dans une partie de la production éditoriale d'André-Marie Ampère (1775-1836).

Nous terminerons cet exposé en nous interrogeant sur des éléments comparatifs avec d'autres situations éditoriales en Allemagne, en Amérique, en Égypte, au Maroc et en Italie.