

The *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche* (1868-1887) an example of the internationalisation of research

Abstract

Around the beginning of the year 1868, the first issue of the *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, edited by Prince Baldassarre Boncompagni, was published. The *Bullettino*, which was the first European journal exclusively dedicated to the history of mathematics and physics, continued to be published for a total of twenty years in monthly issues. Officially only one-fourth of the two hundred copies of the journal were distributed in Italy, whilst the remaining copies reached the other main European countries. The *Bullettino* – which was in two parts, one for original papers, reviews and translations of memoirs published abroad, and one for bibliographical notices– had a range of aims: to establish links between historians of science all over Europe, to quickly spread Italian research in the field, and to provide the means to keep Italian scholars up to date with the latest developments abroad.

The *Bullettino* was not just an academic journal to which researchers submitted their works for publication, but also the result of information, relationships, partnerships and debates, with Boncompagni as its chief editor at the center. This paper has two aims: to describe some of the dynamics that led to the articles included in the *Bullettino*, and to provide an overview of the *Bullettino*'s content, focusing on historical contributions on Galileo, Copernicus, Domenico Maria Novara, on Lagrange's correspondence, on the correspondence between Sophie Germain and Gauss, and on contributions on astronomy and optics in Arab and Hebrew cultures by authors such Antonio Favaro, Gilberto Govi, Angelo Genocchi, Maximilian Curtze, Moritz Steinschneider and Enrico Narducci.

Sommario

All'inizio del 1868 uscì alle stampe il primo fascicolo del *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, edito dal Prince Baldassarre Boncompagni. Si tratta della prima rivista in Europa esclusivamente dedicata alla storia della matematica e della fisica. Il *Bullettino* continuò a uscire in fascicoli mensili per complessive venti annate. Ufficialmente solo un quarto dei duecento esemplari stampati erano distribuiti in Italia, mentre i restanti erano destinati alle altre nazioni europee. Il *Bullettino* era diviso in due parti, una comprendente articoli originali, recensioni e traduzioni di memorie pubblicate all'estero, e una contenente notizie bibliografiche. Gli obiettivi della rivista erano molteplici: stabilire rapporti tra gli storici delle scienze matematiche e fisiche in Europa, fornire uno strumento di divulgazione delle ricerche italiane nel settore all'estero, e contemporaneamente di aggiornamento per quanto riguarda le ricerche sviluppate all'estero. Il *Bullettino* non è una rivista come oggi si potrebbe intendere, a cui i ricercatori autonomamente sottopongono le proprie ricerche, ma piuttosto va riguardato come il risultato di relazioni, informazioni, collaborazioni, e dibattiti con al centro la figura di Boncompagni come principale regista.

Il presente articolo si pone due obiettivi principali: da una parte fornire alcuni esempi delle dinamiche che hanno prodotto saggi e articoli inclusi nel *Bullettino*, dall'altra fornire una panoramica dei contenuti della rivista, con particolare attenzione ai contributi su Galileo, Copernico, Domenico Maria Novara, sulla corrispondenza di Lagrange e su quella tra Sophie Germain e Gauss, su astronomia e ottica nelle culture Araba ed Ebraica, da parte di Antonio Favaro, Gilberto Govi, Angelo Genocchi, Maximilian Curtze, Moritz Steinschneider, Enrico Narducci.

Keywords: Journals and history of science; *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, Baldassarre Boncompagni.

Mathematics Subject Classification (MSC 2000) code numbers: 01 History and biography

1. Introduction

On 17th February 1868, during a meeting of the *Académie des Sciences* in Paris, Michel Chasles presented the first copy “of a *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, published in Rome” on behalf of Prince Boncompagni. Chasles explained that this was a monthly bulletin in which Baldassarre Boncompagni “will collect bibliographic information and articles on the history of mathematical and physical sciences that experts will be kind enough to send him”.¹ It continued to be published fairly regularly in the following months and later years, with twenty volumes for each of its twenty years of publication. It had a limited print edition of 200 numbered copies. Officially, the first fifty were sold in Italy, while the other one hundred and fifty were sold abroad. Chasles continued to present the copies that the *Académie* received over the years as a gift from the prince.

The *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche* (which we will refer to as the *Bullettino*) was not an academic publication as we understand it today. It was not a collection of articles submitted by authors to a scientific committee, since it had only one editor (and no peer review) to approve submissions, as the sole pre-requisite for publication. If we think of it in the way that we would think of a journal today, it loses a great deal of its physiognomy and historical relevance. We should instead think of it as it was, the result of information, relationships, partnerships and debates, with Boncompagni as its chief editor at the centre.

Baldassarre Boncompagni (1821-1894) was one of the leading figures in the history of mathematics in the second half of the 19th century. He was a member of the rich Roman patrician family to which Gregory XIII, the reformer of the calendar, also belonged. He studied under the guidance of the Abbé Barnaba Tortolini, professor of *calcolo sublime* (higher calculus) at the *Sapienza* University in Rome and under the Jesuit astronomer Ignazio Calandrelli. In 1843 Boncompagni published a study on definite integral in the *Journal für die reine und angewandte Mathematik*. He later concentrated on the history of mathematics and physics and his publications were mainly devoted to reconstructing the channels of the transmission of mathematical knowledge from the Arab world to Christian Europe and to its chronology. His works in this field include extensive studies on the thirteenth-century astronomers Guido Bonatti and Gerard of Sabbioneta, on the twelfth-century translators Gerard of Cremona and Plato of Tivoli, and on the thirteenth-century mathematician Leonardo Pisano, also known as Fibonacci, about whom little was known at that time. Boncompagni not only reconstructed Fibonacci’s biography, but he also highlighted his scientific importance in the history of mathematics and edited all Fibonacci’s writings. Moreover, he edited and published the arithmetic of John of Spain and a Latin version of the arithmetic of Al-Khwarizmi.²

Boncompagni assembled a remarkable library of around twenty thousand printed volumes and six hundred manuscripts, focussed on the history of science. The heart of the collection included the

¹ “accueillera les communications de bibliographie et d’histoire des sciences mathématiques et physiques que les savants voudront bien lui adresser”, *Comptes rendus hebdomadaires des séances de l’Académie des Sciences*, vol. 66, 1868, p. 307.

² Boncompagni’s life and work have been described in eloquent articles by his contemporaries [Codazza, 1864]; [Galli 1893-94]; [Favaro, 1894-95] and more recently [Cappelletti, 1969].

first works on arithmetic and medieval abaci. Informed by a network of collaborators, Boncompagni purchased books and manuscripts all over the world and when it was impossible to purchase an item, he commissioned scholars to produce a facsimile. Most of them were word-for-word copies, but many were also almost exact reproduction of the originals.

Boncompagni's heirs sold his library in Rome in 1898. Since then, Boncompagni's collections have been scattered throughout the world. The Stockholm Universitetsbibliotek, Trinity College Library (Dublin), the Cornell University Library (Ithaca, N.Y.), the Vatican Library, Columbia University Library (New York City) and the Biblioteca Comunale in Treviso own a large part of the manuscript collection.³ The letters that Boncompagni received from his correspondents have also been dispersed, but many are housed in the Vatican Library.⁴ Boncompagni's letters to other scholars are now preserved in several locations, for example, letters to Angelo Genocchi can be found in the *Biblioteca Passerini-Landi* in Piacenza, while his letters to Gustaf Eneström are housed in the Swedish Royal Academy of Sciences in Stockholm.

Each volume of the *Bullettino* was accompanied by a general index of articles and a global index of names, which were certainly important for focussed research, but not enough to capture the significance of Boncompagni's cultural undertaking. In Favaro's words:

It should be worthwhile undertaking to collect and reunite all the information contained in the twenty volumes in one work. Otherwise, despite the copious registers in each volume, one could barely get a proper perspective.⁵

Although there are plenty of works that illustrate the contents of the *Bullettino*,⁶ ours has a different aim: to investigate and describe the dynamics, the interlinked research and partnerships that produced the twenty volumes of the journal, in the characteristic manner or style that makes them still useful to consult today.

The *Bullettino* was the first specialist, independent periodical on the history of mathematical disciplines in Europe. Previously, there were only occasional articles dedicated to the historical aspects of mathematical disciplines as part of mainstream periodicals or as a supplement in some mathematics journals.⁷

However, until the first decade of the 19th century, mathematical research was published through the Proceedings and Memoirs of Scientific Academies and Societies, or broad spectrum journals, like, for example the *Giornale Arcadico di Scienze, Lettere ed Arti* in Italy, which included articles dedicated to a range of sciences, as well as to literature, art and poetry, etc.⁸

France and Germany were the first countries to publish specialist mathematical journals. The first French publication, the *Annales de mathématiques pures et appliquées* was founded by Joseph

³ See [Folkerts, 2012].

⁴ *Biblioteca Apostolica Vaticana, Carteggi di B. Boncompagni* in Boncompagni's collection.

⁵ "farebbe opera egregia chi dai venti volumi estraesse e pogresse insieme riuniti tutti i dati di fatto i quali vi si trovano disseminati e che riuscirebbe troppo malagevole il cercare senza alcuna guida, non ostante i copiosi indici aggiunti alla fine di ogni volume" [Favaro, 1889, 112].

⁶ [Fiocca, 2015], [Jayawardene, 1988], [Lefons, 1984].

⁷ In 1855 the *Nouvelles Annales de Mathématiques* launched the *Bulletin de Bibliographie, d'Histoire et de Biographie Mathématiques* as a supplement. This is the earliest journal devoted to history of mathematics. See [Dauben, 1998, p. 2]. In Italy, the *Giornale Arcadico di Scienze, Lettere ed Arti*, a journal of broad spectrum, published also articles devoted to the history of the mathematical and physical sciences. See for example [Boncompagni, 1853].

⁸ The journal was founded by Salvatore Betti (1792-1882), Luigi Biondi (1776-1839) and Pietro Odescalchi (1789-1856) from a noble Roman family, who was the main director for thirty-seven years and covered the costs.

Diez Gergonne in 1810, followed in 1836 by Joseph Liouville's famous *Journal de mathématiques pures et appliquées*. In 1842 Olry Terquem founded the *Nouvelles Annales de Mathématiques* which from 1855 to 1862 had a supplement with its own numbering, dedicated to the history of mathematics, entitled *Bulletin de Bibliographie, d'Histoire et de Biographie Mathématique*. The *Bulletin*, also edited by Terquem, was divided into three sections: *Biographie*, *Bibliographie* and *Historique*.⁹

1826 saw the publication in Germany of the *Journal für die reine und angewandte Mathematik*, known as Crelle's Journal, after its founder August Leopold Crelle. Later, in 1856, Oskar Schlömilch and Benjamin Witzschel founded the journal *Zeitschrift für Mathematik und Physik*. When Moritz Cantor joined the editorial board, the journal also began to publish articles on the history of mathematics. However, it was only from 1875 that the section entitled *Historisch-literarische Abteilungen der Zeitschrift für Mathematik und Physik*, appeared as a supplement to volume 20, with its own numbering system. This continued until volume 45 in 1900. In the meantime, M. Cantor had begun to publish a separate series, *Abhandlungen zur Geschichte der Mathematik*, whose first volume came out in 1877.¹⁰

In Italy, Barnaba Tortolini decided to found a journal dedicated to mathematical, physical and natural sciences in 1850, the *Annali di scienze matematiche e fisiche*, which soon became a reference point for Italian mathematics.¹¹ The leading mathematicians of the time were published in the journal, including Francesco Brioschi, Enrico Betti, Angelo Genocchi, Felice Casorati and Luigi Cremona.

Before founding his own journal, Tortolini published fairly regularly in the *Giornale Arcadico di Scienze Lettere ed Arti*, which was printed in Rome from 1819 by Prince Pietro Odescalchi and also provided an opportunity for other mathematicians, including Domenico Chelini. Steiner and Jacobi also published occasionally in the journal, when from October 1843 to April 1844, in the company of Dirichlet, they stayed in Rome and formed friendships with their Roman colleagues.¹²

As early as 1849, Tortolini began an editorial project, together with Clemente Palomba and Ignazio Cugnoni, on the board of the fifth and last volume of the *Raccolta di Lettere ed altri Scritti intorno alla Fisica ed alla Matematica*, founded by Palomba in 1845.¹³ However the experience ended within a year, as Tortolini wrote to Placido Tardy on 13th February 1850, informing him that he had abandoned the journal and his two partners Palomba and Cugnoni, and had begun to publish a new journal independently, the *Annali di Scienze Matematiche e Fisiche*.¹⁴

The first eight volumes of the *Annali di Scienze Matematiche e Fisiche* (1850-1857) were printed in Rome at the *Tipografia delle Belle Arti*. Eight years later, it was felt that there was a need to change the direction of the journal and make it more specialist. The new publication was entitled the *Annali di Matematica pura ed applicata* and continued to be published in Rome by Tortolini

⁹ [Dauben, 1998, 2].

¹⁰ [Dauben, 1998, 8-10].

¹¹ [Martini, 2003].

¹² [Chelini, 1851].

¹³ Clemente Palomba (1819-1891) was an assistant at the *Osservatorio del Collegio Romano* from 1839 until 1845. He is well known for his study about the spots of Venus which were used by the priest Francesco De Vico to deduce the period of rotation of the planet. Ignazio Cugnoni (1822-1903) worked at the same astronomical observatory directed by De Vico. They were both members of the *Pontificia Accademia dei Nuovi Lincei*. See [Emanuelli, 1937, 83-84].

¹⁴ The correspondence of the mathematician Placido Tardy was given to the University Library of Genoa in 1925 by professor Gino Loria. It includes sixty-one letters of Tortolini and twenty-five of Boncompagni (*Biblioteca Universitaria di Genova, Cassetta Loria*, No.14 and No.10).

until 1866, under the direction of Betti, Brioschi, Genocchi and Tortolini himself, at the Francesco Bleggi booksellers.

From 1867 the *Annali di Matematica* were printed in Milan by Brioschi and 26 volumes were published in total between 1867 and 1897 (Brioschi's is known as the second series of the journal, with the first one being that printed in Rome with Tortolini as editor).¹⁵

2. The Birth of the *Bullettino*

In both the *Annali di Scienze Matematiche e Fisiche*, and the *Annali di Matematica pura ed applicata* published in Rome (i.e. the first series) there were articles on the history of mathematics, while this was no longer the case with the second series.

The dates – the transfer of the *Annali di Matematica* from Rome to Milan in 1867 and the start of publication the following year of Boncompagni's *Bullettino* - are no coincidence. In fact, from the sixth volume Boncompagni worked in partnership with Tortolini and his *Annali* and this partnership continued while the journal's editorial board remained in Rome. Around half of the sixth volume of 1855 is made up of articles on the history of mathematics. This can be explained when we consider that in 1854 Boncompagni had published three previously unpublished pamphlets by Leonardo Pisano, including *Liber Quadratorum*, which was thought to be lost.¹⁶ This was a notable contribution to information about Fibonacci and his work, which created immediate interest among leading scholars of the discipline in Italy and abroad, including Angelo Genocchi, Victor Amédée Lebesgue and Olry Terquem.

In the sixth volume of the *Annali di Scienze Matematiche e Fisiche* there were extracts from letters to Boncompagni regarding the edition of Pisano's writings,¹⁷ one by V.A. Lebesgue (*Sur un problème traité par Léonard de Pisa dans son Flos relatif à une équation de troisième degré*) and six by Genocchi (*Intorno ad alcuni problemi trattati nel Liber Quadratorum*). There were another two contributions by Genocchi, *Note analitiche sopra i tre scritti inediti di Leonardo Pisano* and *Intorno a Leonardo Pisano matematico del secolo XIII*.¹⁸ There were also two works by Boncompagni on some problems of number theory (including the problem of the “*congruo-congruenti*” numbers, studied by Leonardo Pisano, Pacioli and Cossali).¹⁹ Finally, Franz Woepcke, published an article on the use of Indian numerals by Arabs.

Articles on the history of mathematics continued to be published in the *Annali di Scienze Matematiche e Fisiche* in the following years: in the seventh volume Olry Terquem dedicated a contribution to Boncompagni's edition of the three pamphlets by Leonardo Pisano mentioned

¹⁵ [Bottazzini, Nastasi, 2013] describes this transition in some details.

¹⁶ [Boncompagni, 1854].

¹⁷ Boncompagni asked Placido Tardy to contribute to the *Annali*. On May 21st 1855 Boncompagni sent to Tardy the volume *Tre scritti inediti di Leonardo Pisano* [Boncompagni, 1854] asking him to make a study on it, in particular regarding the relations with the theories of modern geometers and mathematicians (“specialmente intorno alle relazioni che in tali scritti si legge colle dottrine dei moderni analisti e geometri”). The result, reported in a letter or in a paper, would have been published into the *Annali* (*Biblioteca Universitaria di Genova, Cassetta Loria*, No.10). Tardy did not accept this kind suggestion, instead he would accept, as we will see, the next suggestion to give a contribution to the *Bullettino*.

¹⁸ [Picutti, 1991]. It is well known that Genocchi indicated a series of errors in the edition of Pisano's work, therefore Boncompagni made a new edition [Boncompagni, 1856].

¹⁹ [Picutti, 1981].

above, in the eighth volume an extract of a letter by Thomas-Henri Martin to Boncompagni was published, as well as an article on Nicomachus of Gerasa's arithmetic.

Letters or extracts from letters to Boncompagni on subjects relating to the history of mathematics continued to appear, even when the journal took the name of *Annali di Matematica pura e applicata*. These were sent by Genocchi, Angelo Secchi, Moritz Steinschneider, Woepcke, M. Cantor, V.A. Lebesgue and Aristide Marre, who would be future contributors to the *Bullettino*. A translation from Dutch into French of Wenckebach's memoir on Petrus Adsigerius and the oldest observations on magnetic declination,²⁰ which was part of the seventh and last volume of the first series of the *Annali di Matematica*, is naturally linked to the *Bullettino*, whose first volume opened with a long article by Timoteo Bertelli on Petrus Peregrinus de Maricourt and his *Epistola de Magnete*.²¹ Also in the first volume of the *Bullettino*, Maximilian Curtze inserted a short note as a contribution to the question raised by Cantor in a letter to Boncompagni, published in the *Annali di Matematica* (vol. IV, 1861), drawing attention, in particular, to a work in which Boethius' treatise of astronomy was cited as still existent at the time. Once again this shows the continuity between the two journals.

We already know that Francesco Brioschi, with the help of Luigi Cremona, re-launched the *Annali di Matematica*, transferring the publication to Milan and beginning the second series in 1867. It is easy to imagine that this transfer was the reason for Boncompagni's decision to undertake this new editorial initiative – the *Bullettino* – himself, as the first volume came out the following year.

Favaro wrote on the subject:

He (Boncompagni) was now in direct correspondence with the most important Italian and foreign experts in the field of scientific history, and because the reputation of his enlightened generosity brought works from everywhere into his own private press, and the history of science researches multiplied as a result of his example, he decided to create a special journal for his favourite studies, whose publication began in 1868 with the extremely modest title of "*Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*".²²

Moreover, vexed by the editorial difficulties of publishing his early works, Boncompagni had created his own private press several years before, entitled "*Tipografia delle Scienze Matematiche e Fisiche*" with typographical characters that could be used to write mathematical formulae and special characters for abbreviations and symbols that were found in ancient manuscripts in Hebrew and Arabic. It was initially located on the ground floor of Palazzo Boncompagni-Simonetti in via del Corso in Rome (the address '*via Lata n. 3*' which can be seen on the frontispiece of the volumes of the *Bullettino* only indicates that the entrance was on the side of the building overlooking that

²⁰ The translator was the Dutchman Timen Hooiberg (1809-1897), head of the lithographic printing department of the National Museum of Antiquities (*Rijksmuseum van Oudheden*) in Leiden.

²¹ For Petrus Peregrinus de Maricourt, alias Petrus Adsigerius, see [Del Centina, Fiocca, 2010, 286-287].

²² "Egli (Boncompagni) era ormai entrato in corrispondenza diretta con tutti i più valenti cultori di storia scientifica così italiani come stranieri, e poiché la fama della sua illuminata generosità faceva affluire da ogni parte lavori alla tipografia da lui istituita, e le ricerche di storia scientifica si andavano, dietro il suo esempio moltiplicando, egli pensò di dare agli studi da lui prediletti un organo speciale del quale intraprese la pubblicazione nel 1868 col titolo modestissimo di "*Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*", [Favaro, 1894-95, 513].

street), then in the Casino Aurora in the Ludovisi quarter, where Boncompagni also moved his library and his home and where he remained until his death.²³

3. Structure and Content

The structure of the *Bullettino* was the same as *Annali di Matematica*, as outlined by Brioschi in 1857,²⁴ with two parts, one for original memoirs and another for bibliographical articles, reviews, extracts and translations of memoirs published elsewhere. It had a range of aims: to create a link between experts in the subject, to spread Italian research quickly and to give Italian scholars the means to keep up to date with progress in the discipline abroad. The *Bullettino* had monthly issues, each one with 4 or more 4° pages. The official languages were Italian, French and Latin and it cost 35 cents a sheet in France.²⁵ In reality the subscription price was “only for show”, because the journal was sent free to leading academies and libraries and to scholars who requested it, as Favaro states.²⁶

The *Bullettino* helped spread the Italian language amongst German historians of mathematics, many of whom received the journal. As stated above, the publisher’s intention was to keep hundred and fifty copies for other countries, and many German-speaking authors published in the *Bullettino*, where their articles were translated into one of the official languages. In this respect it is meaningful that in the *Bibliotheca Mathematica* edited by Gustaf Eneström, which can be considered one of the heirs of the *Bullettino*, articles by Italian authors were included in their original language.

Favaro speaks of Boncompagni’s profound commitment to his *Bullettino*:

Only those who had the honour of seeing their works included in this publication and, we must admit, to had been tormented by letters and telegrams from its illustrious Patron daily during the type-setting, can have a real idea of the amount of work that the ephemeris he founded must have cost him.... ; so that there was nothing written for the journal that he edited to which he was not an extremely efficient contributor, both by providing copious amounts of material and by adding valuable notes, each one of which contained either a previously unknown biographical fact or news of an unknown manuscript, or a rare work, all characterised by that scrupulous precision which, one can say without the slightest exaggeration, had never been employed by anyone before him.²⁷

The *Bullettino* contained articles of varying lengths. Some were very long, while others were just a few pages. They were mainly related to themes linked to the history of mathematics, but there were also reviews of scientific works, mostly mathematics, and also physics, physical geography

²³ [Cappelletti, 1969].

²⁴ See the letter from Brioschi to Betti dated April 28th 1857, partially published in [Bottazzini, 2000, 73-74].

²⁵ See *Bulletin des sciences mathématiques et astronomiques*, vol. 1, 1870, p. 98.

²⁶ [Favaro, 1894-95, p. 515]

²⁷ “Soltanto chi ebbe l’onore di vedere i proprii lavori inseriti in questa pubblicazione, e di essere anche, diciamolo pure, tormentato dalla corrispondenza postale e telegrafica dell’illustre Mecenate, la quale durante la composizione tipografica era quotidiana, può formarsi un’idea esatta della somma di lavoro che gli costava l’effemeride da lui fondata.... ; imperocché possa dirsi non esservi scritto della raccolta da lui edita, del quale egli non sia stato collaboratore efficacissimo, sia somministrando copiosi materiali, sia aggiungendo note preziose, ognuna delle quali porta o un dato biografico fino allora ignorato, o notizia di un manoscritto sconosciuto, o di un’opera rara, il tutto improntato di quella scrupolosa esattezza che, prima di lui, può dirsi senza ombra di esagerazione, nessuno aveva mai pensato ad adoperare”. [Favaro, 1894-95, 514].

and meteorology, etc., published both in Italy and abroad, translated in a language that was more accessible to an Italian reader (in Italian or French instead of German, Danish or Russian).²⁸ There were important articles already published elsewhere, editions of unpublished manuscripts, scientific correspondence, biographical documents, catalogues of published or unpublished works completed by an author's biographical note, and bibliographical works. The section *Annunzi di recenti pubblicazioni*, published bimonthly, was, according to Favaro, "the exclusive and particular work of the illustrious editor".²⁹ It listed scientific works hot off the press on the history of mathematical sciences, but also on mathematics, physics, chemistry, astronomy and electro-magnetism, etc. and contained indexes of recent issues of leading scientific journals of the time.³⁰

Among the merits of the *Bullettino* are its many biographies and bibliographies of mathematicians of the past, some of which are very thorough, with catalogues of works, sometimes including those that were unpublished. L.C. Béziat contributed a one hundred and forty page work on Johannes Hevelius (VIII 497-558, 589-669),³¹ Giambattista Biadego contributed a work on Gianfrancesco Malfatti with a catalogue of his works and of works related to Malfatti's problem (IX 361-392), Baldassarre Boncompagni wrote about Francesco Barozzi (XVII 795-848), Cornelio de Simoni wrote about Andalò di Negro (VII 313-336), Antonio Favaro wrote about Bartolomeo Sovero a 17th century Swiss mathematician (XV 1-48; XIX 99-114) and about Prosdocimus de Beldemandis, a 15th century mathematician from Padua (XII 1-74, 115-251; XVIII 405-423) in a work of over two hundred pages. Charles Henry contributed a work on Jean-Antoine Nicolas Caritat Marquis de Condorcet (XVI 271-291), Ferdinando Jacoli on Anton Maria Lorgna (X 1-74), Aristide Marre on Nicolas Chuquet (XIII 555-592; XIV 413-460), Pietro Riccardi on Jean François du Soleil (X 407-427), Moritz Steinschneider on Arzachel, an 11th century Arabian astronomer (XIV 171- 182, XVI 493-504, XVII 765-794, XVIII 343-360, XX 1-36; 575-604) and on Johannes de Liniis (de Liveris) and Johannes Siculus (XII 345-351), while Gustavo Uzielli wrote about Paolo dal Pozzo Toscanelli (XVI 611-618) and Federico Napoli about Francesco Maurolico (IX 1-22).

There are also biographies and bibliographies of recently deceased mathematicians, some of whom had contributed to the journal. We therefore have historical information about the life and

²⁸ The translators from German into Italian are: Alfonso Sparagna (1849-?) who was employed at the Ministry of Public Education in Rome, the geophysicist Filippo Keller (1830-1903), the engineer Giovanni Battista Biadego (1850-1923), the mathematicians Giovanni Garbieri (1849-1931) and Antonio Favaro (1847-1922), who also translated an article from English to Italian. The translators from German into French are: the mathematician Paul Mansion (1844-1919) and the astronomer Ernest Pasquier (1849-1926). The translators from Danish into French are: the journalist and historian Louis-Antoine Léouzon Le Duc (1815-1889), the linguist Aristide Marre (1823-1918) and the mathematician Hieronymus Georg Zeuthen (1939-1920). The translators from Russian into French are: the mathematician Jule Hoüel (1823-1886) and his collaborator A. Potocki.

²⁹ "esclusiva fatica particolare dell'illustre editore", [Favaro, 1889, 111].

³⁰ The following journals are analyzed: *Annalen der Physik und Chemie*, *Annales de Mathématiques*, *Annali di Matematica pura e applicata*, *Archiv der Mathematik und Physik*, *Atti dell'Accademia Pontificia dei Nuovi Lincei*, *Atti dell'Istituto Veneto*, *Bulletin de la Société Philomatique*, *Bulletins de l'Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique*, *Il Nuovo Cimento*, *Giornale di Matematiche*, *Journal de Mathématiques pures et appliquées*, *Journal für die reine und angewandte Mathematik*, *Mémoires de la Société des Sciences Physiques et Naturelles*, *Quarterly Journal of pure and applied Mathematics*, *Rendiconti del Reale Istituto Lombardo*, *Rivista urbinata di scienze, lettere e arti*, *Società Reale di Napoli*, *Giornale Arcadico di scienze, lettere e arti*.

³¹ From here on, in brackets, the volume number of the *Bullettino* in Latin numerals, and the pages number in Arabic numerals.

works of mathematicians, engineers and scientists, some already published elsewhere and included in the *Bullettino*, translated into Italian or French.³²

Other gems include editions of unpublished works, documents and scientific correspondence. For further information, see the third index, ‘*Indice di documenti inediti*’, which occupies twenty heavily written quarto pages of the last volume of the collection.

Boncompagni worked together with the authors of the *Bullettino* in various ways, offering the valuable manuscripts in his library, providing facsimiles of rare books and manuscripts and often adding scholarly notes, which were always initialled B.B., containing either a biographical fact that had been ignored, or mention of an unknown manuscript or a rare work.³³

The editorial line of the *Bullettino* was innovative and controversial. It is well known that the journal paid a great deal of attention to bibliographical references and scholarly notes, in the tradition of philologists and humanists. Boncompagni’s methodological approach to history was a positivist one, according to which only the gradual accumulation of data and direct knowledge of documentary sources can produce historical understanding. Consequently, in the *Bullettino* priority was given to publishing documents that had to be cited with absolute precision and reproduced in the most scrupulous way. Furthermore, the difficulty of introducing any lines of interpretation or judgment in the articles is pointed out by one of Boncompagni’s most prolific collaborators, Antonio Favaro. In replying to Gilberto Govi, who had praised his work on Beldomandis published in the *Bullettino*, Favaro wrote:

“Thank you for the extremely kind words you have written about my little work on Prosdocimus de Beldemandis. I would be well-pleased by your praises if I did not know that they are entirely due to your benevolence. This work was published in a form that was very different to the one I had imagined: a bibliographic index was produced, a pretext for an excessive number of notes and God only knows how much I suffered to have them accept that little bit of criticism and analysis that were tolerated. Perhaps a complete study of Prosdocimus and other teachers and authors of mathematics of his age will follow, but first I have to forget all the troubles and arguments that this poor progeny of mine has cost me.”³⁴

³² Here the list of the biographies: Giuseppe Zecchini Lionelli (1776-1847) (XVIII 652-660), Farkas (Wolfgang) Bolyai (1775-1856) (I, 277-299), Nikolaj Ivanovič Lobačevskij (1792-1856) (II 223-262), Geminiano Riccardi (1794-1857) (VIII 1-35), János Bolyai (1802-1860) (I 277-299), Giovanni Battista Amici (1786-1863) (III, 187-248), Franz Woepcke (1826-1864) (II 119-152), Giovanni Plana (1781-1864) (XIX 121-128), Bernhard Riemann (1826-1866) (III 409-428), Jean Baptiste Brasseur (1802-1868) (II 263-272), Jules Plücker (1801-1868) (V 183-212), Nazareno Mancini (1822-1870) (III 429-438), Felice Chiò (1813-1871) (IV 363-400), Alfred Clebsch (1833-1872) (VIII 121-184), William John Macquorn Rankine (1820-1872) (VII 1-61), Giovanni Antonelli delle Scuole Pie (1818-1872) (V 253-277), Hermann Hankel (1839-1873) (IX 290-308), Paolo Rosa (1825-1874) (VIII 305-320), Louis-Othon Hesse (1811-1875) (IX 309-314), Gottfried Friedlein (1828-1875) (IX, 531-553), Victor-Amédée Lebesgue (1791-1875) (IX 554-573), Louis Amelie Sédillot (1808-1875) (IX 649-700), Joseph-Ivanovitch Somoff (1815-1876) (XI 453-481), Hermann Günther Grassmann (1809-1877) (XI 699-756), Giovanni Santini (1787-1877) (XI, 1-110), Sebastiano Purgotti (1799-1879) (XVI 619-672), Michel Chasles (1793-1880) (XIII 815-827), Carlo Alberto Castigliano (1847-1884) (XVIII 293-313), François Joseph Lionnet (1805-1884) (XVIII 429-440), Théodore D’Oppolzer (1841- 1886) (XX 439-480) and Savino Realis (1818-1886) (XIX 55-58).

³³ For some examples of the interlinked research see the subsequent paragraph on the closest partnerships.

³⁴ “La ringrazio delle gentilissime cose ch’Ella ha voluto scrivermi a proposito di quel mio lavoruccio intorno Prosdocimo de Beldomandi: i di Lei elogi mi farebbero inorgogliare se non sapessi di doverli interamente alla di Lei benevolenza. Quel lavoro è stato pubblicato in una forma ben diversa da quella nella quale io l’avevo concepito: è riuscito un indice bibliografico, un pretesto per un numero sovrabondevole di note e Dio solo sa quanto ho penato per farvi accettare quel po’ di critica e di analisi che vi furono tollerate. Forse uno studio completo su Prosdocimo e sopra altri insegnanti e autori di matematica del suo tempo verrà in seguito, ma prima bisognerà che io dimentichi affatto tutte le noie e i dibattimenti che mi costò questo povero figliuolo”, see the letter from Favaro to Govi, on December 1st 1879, in [Schettino, Borrelli, 2014, 61-62].

Moritz Steinschneider, another distinguished collaborator of the journal, recognised Boncompagni's generosity but also pointed out the lack of a thoughtful dimension in his work: "There is no reasoning, only bibliographical notices with accuracy less pedantic than ridiculous".³⁵ In the face of this harsh judgment, Steinschneider acknowledged that some very important information on Jewish and Arab literature in the Middle Ages was to be found in Boncompagni's work, and also praised his work on Leonardo Pisano.³⁶

The meticulousness with which the works were cited was regarded as exaggerated and even damaging, because together with the excess of quotations, it made it difficult to follow the line of the argument.³⁷ However, as Favaro states,

...it achieved, amongst others, two particular advantages. The first was to ensure that the erudition scattered liberally throughout was truly of good quality and first hand, because whoever wrote in the *Bullettino* and cited a manuscript or a printed work, could say that they had either seen the original, or had taken advantage of one of the wonderful facsimiles that Prince Boncompagni gave so generously to those who contributed to his publication. The second, which was no less remarkable, was to assume an approach of the utmost rigour in research, so it is no exaggeration to say that writing for the *Bullettino* was extremely useful, even for the most experienced authors.....³⁸

Certain anomalies that can be seen in different examples of the same volume are explained by Antonio Favaro, who worked in close partnership with Boncompagni. Near the deadline given to the authors, mainly for fear of being too late to publish the bimonthly *Annunzi di recenti pubblicazioni*, the prince grew more impatient and sometimes an article was printed without the author having released the print samples.³⁹ The editor also occasionally introduced variations or his own additions, obviously with the best intentions but without the author's knowledge.⁴⁰ This meant that, after protest by the authors, pages had to be reprinted to restore the original text, leading to long delays and difficulties in substituting them, especially if the volume was already bound.

The *Bullettino* was moreover reviewed in the *Revue des publications périodiques* section by the *Bulletin des sciences mathématiques et astronomiques*, the journal edited by Jules Hoüel and

³⁵ "Non c'è nessun ragionamento, niente che notizie bibliografiche con esattezza meno pedantesca che ridicola!". See [Salah 2012, 436].

³⁶ On this subject see the subsequent paragraph on Moritz Steinschneider and Enrico Narducci.

³⁷ With regard to the comments on Boncompagni's erudition and his overlong notes by some collaborators such as Moritz Cantor and Paul Mansion, see [Mazzotti, 2000]. Mazzotti analyses the style and the contents of the *Bullettino* by considering the cultural conditions in which the journal was conceived and realized. According to him, the eccentric personality of Boncompagni and his maniacal precision, are not satisfactory to explain the general methodology of the studies published in the journal. However, according to him, the style of the journal reflects in many ways, at the level of historiography of science, the struggle of the official Roman Catholic culture against the growing secularization of knowledge and society. This thesis seems to us rather forced, and not supported by a sufficient evidence.

³⁸ "...raggiunse, tra gli altri, due singolari vantaggi. Il primo, cioè quello di assicurare che la erudizione sparsa a piene mani dovunque, era veramente di buona lega e di prima mano, poiché chiunque, scrivendo nel *Bullettino*, citava un manoscritto od uno stampato, poteva dire o di averlo avuto realmente sott'occhio nell'originale, o di aver potuto approfittare di uno di quei stupendi fac-simili dei quali il Principe Boncompagni era tanto generoso coi cooperatori della sua pubblicazione. Il secondo, e non meno pregevole, di far assumere l'abito del massimo rigore nelle indagini, cosicché non apparisca soverchio il dire che lo scrivere per il *Bullettino* non rimase senza utilità grandissima anche per i più provetti....", [Favaro, 1889, 110-111].

³⁹ [Favaro, 1902, 384].

⁴⁰ See for example Steinschneider's edition of the lives of fourteen Arabic mathematicians by Berardino Baldi in volume V of the *Bullettino*. In a note to the article, Boncompagni announced a new edition of Steinschneider's notes, in which additions and changes would have been omitted with the aim to go back to the original text.

Gaston Darboux from 1870, which in 1885 became the *Bulletin des sciences mathématiques*. The last issue was also described among recent publications in the *Nouvelles Annales de Mathématiques* journal.

4. Relationships with Authors and Editors of Journals

The *Bullettino* authors' network covered all the main countries in continental Europe; not only Italy, but also France, Germany, Holland, Sweden, Belgium, Switzerland, the Poland of today, Russia and Spain. The number of foreign authors was around double that of Italian authors.

An example of Boncompagni's role in promoting the history of mathematics, of his partnership with the authors of the *Bullettino*, and of the network of international relations through which Italian research was spread abroad, is the article entitled *Intorno ad una formula del Leibniz* by Placido Tardy (I 177-186),⁴¹ the only work by this mathematician to be published in the *Bullettino*. Boncompagni asked him to contribute a piece for the journal.⁴² Using Tardy's article, *Sui differenziali a indice qualunque*, published in the *Annali di Matematica pura e applicata* (1858), as a starting point, Boncompagni asked him to "expound and develop in full" his demonstration of the product rule for derivatives of arbitrary index, whole or fractional, positive or negative.⁴³ Tardy sent it to Boncompagni who answered by asking him to add some historical information on the theory of fractional derivatives, as "This collection is not a journal of pure mathematics, like those of Messers Brioschi and Liouville."⁴⁴ For this reason he sent him copies of important extracts (taken from *Commercium Philosophicum et Mathematicum* between Leibniz and Johann Bernoulli, from *Leibnizens Mathematische Schriften* by C.I. Gerhardt, from the *Journal de l'Ecole Polytechnique* of 1832 containing Liouville's memoir, *Sur le Calcul des différentielles à indices quelconques*) with the request to indicate in an addition to the work, "one or each of these extracts". The title also had to reflect the fact that there was something historical in the writing "in order to be faithful to the title of the collection".⁴⁵

Boncompagni sent Tardy's note to the German mathematician Carl Wilhelm Borchardt (1817-1880), wrongly assumed to be president of the Academy of Sciences in Berlin by Boncompagni. Borchardt presented it to the Academy on 3rd December 1868, adding his personal observations. Tardy's article was later translated into French and included in the *Nouvelles Annales de Mathématiques* (vol. VIII 1869) and prompted an article by Angelo Genocchi, *Di una formola del Leibniz e di una lettera di Lagrange al conte Fagnano* (*Atti della Reale Accademia delle Scienze di Torino*, vol. IV 1868-69). The contents of Tardy's and Genocchi's notes were described in a work by Hoüel presented to the *Société des Sciences Physiques et Naturelles of Bordeaux*, in a note by Moritz Cantor in the journal *Zeitschrift für Mathematik und Physik* (1869), and in a note published in *Archiv der Mathematik und Physik* (vol. XV 1869). The second volume of the *Bullettino* (II 273-278) contains the communication of Tardy's note to the Berlin Academy, with Borchardt's above

⁴¹ On Tardy's mathematical work see [Loria, 1915].

⁴² See the letter from Boncompagni to Tardy, on March 13th 1868 (*Biblioteca Universitaria di Genova, Cassetta Loria*, binder 10).

⁴³ See the letter from Boncompagni to Tardy, on May 9th 1868 (*Ibidem*).

⁴⁴ "Questa raccolta non essendo un giornale di matematiche pure, come quello dei Sigg. Brioschi e Liouville", letter from Boncompagni to Tardy, on May 29th 1868 (*Ibidem*).

⁴⁵ "al fine di essere fedele al titolo della detta raccolta", letter from Boncompagni to Tardy, on May 29th 1868 (*Ibidem*).

mentioned observations, translated into French, and a bibliographical note by Boncompagni that summarised the whole affair.

As we have already noted, the first issue of the *Bullettino* contained the memoir of the Barnabite Father, Timoteo Bertelli (1826-1905), *Sopra Pietro Peregrino di Maricourt e la sua Epistola "De Magnete"*. This was followed by *Sulla epistola di Pietro Peregrino di Maricourt e sopra alcuni trovati e teorie magnetiche del secolo XIII*, in three parts in the March, April, October, November and December issues of the same year. The two memoirs, comprising around two hundred pages in total, are a complete study of the life and work of Petrus de Maricourt. The codices were listed and a new edition of the work was compiled that was an improvement on the previous one by Guglielmo Libri (I 1-32; 65-89; 101-139; 319-420). Bertelli returned to the *Epistola* by Petrus Peregrinus de Maricourt a few years later, presenting two Vatican codices that contain the work (IV 303-331) to which Boncompagni added a note on the editions printed (IV 332-339).

Bertelli, who taught mathematics, physics and natural history in the college of his order, "alla Querce" in Florence, since 1868, became director of the Vatican Observatory (*de facto* but not by name) and later on president of the *Accademia Pontificia dei Nuovi Lincei*. He is particularly remembered for his contributions to seismology.⁴⁶ He also contributed other articles to the *Bullettino*: *Di un supposto sistema telegrafico magnetico indicato da alcuni autori dei secoli XVI e XVII* (I 187-196), suggested to him by reading the brief note *La première idée du télégraphe magnétique* by the Dutchman George Auguste Vorstermann von Oyen (I 100), which attributed the first idea of a magnetic telegraph to the Dutch mathematician Wynant van Westen; *Appunti storici intorno alle ricerche sui piccoli e spontanei moti dei pendoli fatte dal secolo XVII in poi* (VI 1-44); and an extensive note in the last volume, *Di alcune teorie e ricerche elettro-sismiche antiche e moderne* (XX 481-542).

In the historical notes on research related to the motion of pendulums, Bertelli had mentioned a work by Jean-Baptiste Morin, a professor of mathematics in Paris in the 17th century, refuting the idea of the earth's motion. Galileo, who was the recipient, commented on it in a famous manuscript that was published in the *Bullettino* under the title *Note per il Morino* with an introduction in which Boncompagni discussed its authenticity (VI 45-60). Angelo Genocchi returned to the subject a few years later and contributed the *Rassegna di scritti intorno alle deviazioni dei pendoli e alla esperienza del Foucault* (XV 631-636).

Two of the *Bullettino* authors were Belgian, Paul Mansion (1844-1919) and Constantin Marie Le Paige (1852-1929), to which we could add Eugène Catalan (1814-1894), born in Bruges in 1814, then part of the French Empire, professor of analysis from 1865 at the University of Liège and Le Paige's teacher.⁴⁷

Mansion and Catalan, together with Joseph Neuberg, worked on the publication of two scientific journals: *Nouvelle correspondance mathématique* (1874-1880) – a name chosen to underline the continuity with the previous journal published in Belgium by Adolphe Quetelet and Jean-Guillaume Garnier, *Correspondance mathématique et physique* (1825-1839) – and, from 1881, the journal *Mathesis*.

⁴⁶ [Pozzato, 1967].

⁴⁷ On Paul Mansion and Constantin Marie Le Paige see [Dauben, Scriba 2002, 476 and 463-464, respectively]. On Eugène Catalan see [Jongmans, 1996].

Mansion, a lecturer of mathematics at the University of Ghent and a member of various academies, including the *Accademia Pontificia dei Nuovi Lincei*, worked in various areas of mathematics (probability, non-Euclidean geometry and calculus) and was interested in the history of mathematics. He began to contribute to the *Bullettino* in 1870, compiling the *Catalogue des travaux de Bernhard Riemann* (III 418-428) and translating, from German, an article by Ernst Schering, published in 1867, including it in the *Bullettino* under the title *Notice biographique sur Bernhard Riemann* (III 409-417). He carried out a faithful analysis of the volume that came out the same year, *Reproduction du cours d'analyse de première année à l'École polytechnique*, by Charles Hermite (VI 387-434) and of a posthumous work by Hermann Hankel, Riemann's pupil, on the history of mathematics in antiquity and in the Middle Ages (VIII 185-220). He described the life and works of the recently deceased Alfred Clebsch, (VIII 121-184) and, finally, the state of mathematical disciplines in Belgium from 1871 to 1875 (VI 277-312; X 471-542) to readers of the *Bullettino*.

Constantin Marie Le Paige, who was a professor of mathematics and astronomy from 1882 at the University of Liège, published the previously unseen correspondence of René-François de Sluse (XVII 427-554; 603-726). This discovery of the correspondence, in various places and institutions, was the result of an international partnership with David Bierens de Haan in Leiden and, mainly, Aristide Marre in Paris: “Without Mr. Aristide Marre's extensive knowledge of the riches amassed by the National Library, the letters of our scholar would probably have been consigned to oblivion”, but also with Boncompagni, who ordered copies to be made of letters and passages from rare works in London and Rome.

Eugène Catalan contributed three notes to the *Bullettino*. The first was a response to the summary of the first three years of the journal by the mathematician Joseph Bertrand (1822-1900).⁴⁸ According to Catalan, Bernard had gone beyond the bounds of criticism because “his so-called report is nothing but a long diatribe”.⁴⁹ Anyway, the main aim of Catalan's note was to defend the work of his colleague Jean-Baptiste Brasseur (1802-1868). After having criticized the meticulous accuracy in the citations of the bibliographical voices, which were repeated, according to Bertrand, *in extenso* up to eleven times in a single article, and up to twice in a page, the mathematician goes into the merits of some of the articles, adding his own comments, sometimes ironically, and declaring what he wanted to find in them. One of Bertrand's criticism was directed toward Alphonse Leroy who, in his article on the work and the life of Brasseur (II, 263-272) had exaggerated, according to Bertrand, the importance of this mathematician by placing him at the same level of Steiner and Charles.

After the publication of an article by Vorstermann von Oyen on mathematician Ludolph Van Ceulen (I, 141-156), Catalan wrote a letter to Boncompagni containing information about the inscription on the mathematician's tomb in Leiden, which contained the first 36 decimal numbers of pi. An extract from Catalan's letter, dated Liège, 1st September 1868, was published by Boncompagni six years later together with *Notice sur quelques quadrateurs du cercle dans les Pays-Bas* by Bierens de Haan (VII 99-140).

Catalan's brief note *Une polemique entre Goldbach et Daniel Bernoulli* (XVIII 464-467) was also published, containing, amongst other things, an extract from two letters to Boncompagni dated 29th November and 10th December 1884 and a P.S. from 17th March 1885. Boncompagni had

⁴⁸ *Journal des Savants*, October 1870, pp. 593-607.

⁴⁹ “son soi-disant *Compte-rendu* n'est qu'une longue diatribe”, see [Catalan, 1871, 127].

contacted Catalan, the author of a conjecture that bears his name (two whole positive consecutive numbers, other than 8 or 9, cannot be consecutive powers, i.e. the equation $x^m - y^n = 1$ with x, y as whole positives, has only one solution) with a request for a “precise” statement of Goldbach’s conjecture of the decomposition of each even number other than two in the sum of two prime numbers. Catalan could not find Goldbach’s conjecture in *Correspondance Mathématique et Physique de quelques célèbres géomètres du XVIII. éme siècle*, published by Fuss, but “by way of compensation” found an interesting discussion there between Bernoulli and Goldbach, which inspired the aforementioned note published in the *Bullettino*. As for the question posed by Boncompagni, wrote Catalan, having consulted Adolphe Desboves and the vice-president of the St. Petersburg Academy, Viktor Jakovlevič Bunjakovskij, not only was the problem unsolved, but other historiographical issues had arisen. The Swedish mathematician Gustaf Eneström (1852-1923) was also consulted about the conjecture.⁵⁰ He was visiting Rome on 29th April 1885 and wrote to Boncompagni to point out Goldbach’s letter to Euler in *Correspondance Mathématique et Physique* of 30th June 1742, containing the formulation of the conjecture, but also a work in which Euler “seems to mention a special case of Goldbach’s conjecture” (XVIII 468).⁵¹

Two authors of the *Bullettino* were Dutch: Vorstermann von Oyen (1836-1915) and David Bierens de Haan (1822-1895). The former taught mathematics and physics at the *Gymnasium* in Winschoten, and from 1860 was director of the Aardenburg public school. Bierens de Haan taught mathematics at the *Gymnasium* in Deventer and, from 1863, at the University of Leiden.⁵² As well as a study on Ludolf van Ceulen, Vorstermann von Oyen contributed a large-scale review of the Dutch land surveyors of the 16th and 17th centuries and their tools to the *Bullettino* (III 323-376). Bierens de Haan began to contribute to the *Bullettino* in 1872 with a short note on the controversy linked to Meindert Semeijns’s magnetic system (V 213-220), to which Boncompagni added a bio-bibliographical work on the author, based on research commissioned in Leiden. Bierens de Haan continued the partnership with two articles, one on Dutch logarithmic tables (VI 203-238) and another on a Dutch mathematical pamphlet from 1663 (XI 383-452). The greatest contribution, however, was a bibliography of Dutch works in the mathematical and physical sciences with their applications in the 16th, 17th and 18th centuries, of around 500 pages (XIV 461-630, 677- 717; XV, 225-312, 355- 440; XVI 393-444; 687-718).

5. The Closest Partnerships

The most assiduous collaborators of the *Bullettino* worked mostly on medieval mathematical and physical sciences and on Galileo’s work. These two central themes were clearly related to Boncompagni’s interests and to those of his closest partner, Antonio Favaro, a professor of

⁵⁰ Gustaf Eneström (1852-1923), who was librarian at the Library of the Astronomical Observatory of the Uppsala University, and from 1879 at the Stockholm Royal Library, had a mathematical education (a theorem in the theory of distribution of zeros of polynomials is known as the Eneström-Kakeya theorem). He made research in statistics, actuarial mathematics and history of mathematics. He studied in particular Euler’s work and the science in the medieval Islamic world. The correspondence of Eneström is preserved in Stockholm at the Swedish Royal Academy of Sciences (*Kungliga Vetenskapsakademien*) and includes 44 letters of Boncompagni of the years 1878-1886, written in Italian and French. The first letter, dated December 4th 1878, is the answer to Eneström’s letter dated November 24th. Jules Jochens, secretary at the Berlin Royal Library, was sometimes intermediary between the two.

⁵¹ In addition to this, a bibliographical article by Eneström about Euclid’s *Elements* translations in Swedish was published in the same volume (XVIII 332-342).

⁵² On Vorstermann von Oyen and Bierens de Haan see [Dauben, Scriba 2002, 558 and 362-363, respectively].

mathematics at the University of Padua, who in 1878 offered the first course in history of mathematics in Italy.⁵³ Few contributions regarded historical topics of modern mathematical sciences and very little was the space devoted to Greek mathematics. Let us begin with an overview of the contributions by some authors who can be regarded as having the closest partnerships with the *Bullettino*: Gilberto Govi, Maximilian Curtze, Angelo Genocchi, Antonio Favaro, Moritz Steinschneider and Enrico Narducci.

5.1. *Gilberto Govi: the Galilean Studies and the Search for Italian Forerunners*

In 1870, when the first two articles by Gilberto Govi (1826-1889)⁵⁴ were published in the *Bullettino*, Rome was taken by Italian troops. Govi, at that time professor of Experimental Physics at the University of Turin, personally took part in this historic event. He rushed to the city walls and entered with the *Bersaglieri* corps through Porta Pia, on 20th September. Italy's capital was transferred from Florence to Rome. This event, which was the dream of the Italian patriots, was the fulfilment of the national unity after the political unification of Italy in 1861. Many Italian mathematicians participated in the wars against the Austro-Hungarian Empire in the 1840s and 1850s – the Italian *Risorgimento* – and after the unification, a number of them were involved in the political life of the new State, as the case of Francesco Brioschi and Luigi Cremona. They also made endeavour to create an Italian school of mathematics and to rediscovery the Italian tradition in this discipline, in the belief that the history of mathematics could play a role in creating a national consciousness.⁵⁵

The political upheavals of these years had no influence on Boncompagni's editorial policy and his cordial relationship with Govi is confirmed by Favaro, according to whom, although Boncompagni did not endorse the new order in Rome and remained faithful to the *Accademia Pontificia dei Nuovi Lincei*, this “did not implicate in any way that he wished for a return to the old ways”.⁵⁶

Govi and Boncompagni probably met in person during one of Govi's frequent stays in the capital.⁵⁷ They were certainly in contact by letter. On 26th February 1887, Govi wrote to Boncompagni from Naples, thanking him for the offer to present his work to the *Accademia [Pontifica] dei Nuovi Lincei*, of which Govi wrote, “You are a singular ornament”, when Govi was himself a member of the *Reale Accademia dei Lincei*, and observing that no rivalry could exist between them in the name of science, which was truly universal:

By sending you these works, I intended to leave you complete liberty to use them and I would be extremely honoured if, as you so kindly offered, you presented them to the scientific fellowship of which you are the singular ornament. Science does not belong to one country, or to one faith ..., it, and it alone, is truly universal, because all scientific truths contain the spirits of every place and every belief. If only men had always thought this way, they would not now deplore the tragic errors and persecutions of science, so much more tragic for those who defended them or caused them! ... Now Favaro will begin the new,

⁵³ [Favaro 1887]. See also [Pepe 2013].

⁵⁴ [Ferraresi, 2002]. On Govi's approach to the history of science see [Favaro 1923] and [Schettino, Borrelli 2014].

⁵⁵ For accounts of the Italian research in history of mathematics during the *Risorgimento*, see [Bottazzini, 2002, 77-79]. On the involvement of Italian mathematicians in the political life of the new state see [Bottazzini, Nastasi, 2013].

⁵⁶ “non implicava menomamente ch'egli facesse voti per un ritorno all'antico”, see [Favaro 1894-95, 520].

⁵⁷ [Fiocca 2012].

complete edition of Galileo and I, with Prof. Genocchi and Schiaparelli will have the honour and satisfaction of scrutinising its execution. So finally with Leonardo and with Galileo we will also start to gradually abandon the old and unproductive habit of only republishing novellas, poems, plays, histories and academic discourses here in Italy and will start to honour science with national monuments. Let us hope that after Leonardo and Galileo there will be the other greats to whom human progress is indebted for so many advances and Italy for so much splendour.⁵⁸

Govi, who taught Experimental Physics (including at the University of Naples), was also interested in the history of science. The crucial themes of his research in this field were Galileo's work and scientific and technical inventions throughout history. Govi's first two articles in the *Bullettino* concern these themes: *Intorno a tre lettere di Galileo Galilei tratte dall'archivio dei Gonzaga*, with an edition of the letters (III 267-281) and *Recherches historiques sur l'invention du niveau a bulle d'air* (III 282-296).

Govi had been led to explore historic research on the invention of the *niveau a bulle d'air* (spirit level) after reading the article by the Swiss astronomer Rudolf Wolf (1816-1893)⁵⁹ *Matériaux divers pour l'histoire des mathématiques* published in Zurich in 1857 and included in the *Bullettino* (II 313-342), with copious notes by Boncompagni. From Govi's article, we learn that also Boncompagni was involved in this research. One of his agents in Paris, presumably Aristide Marre, track down a pamphlet in which the spirit level was described (probably for the first time), while Govi had carried out research on this topic in Florence amongst the manuscripts of the *Accademia del Cimento*.

Govi did not work with the *Bullettino* again until ten years after his first contributions. His numerous appointments, including the organisation of Rome's libraries, the transformation of the *Accademia Pontificia dei Nuovi Lincei*, which was re-named the *Reale Accademia dei Lincei*,⁶⁰ his plan to edit Leonardo's writings, but also his prolonged absences and many journeys on scientific missions were certainly among the reasons. In 1880 and 1881 he contributed *Nuovo documento relativo alla invenzione dei cannocchiali binocoli* (XIII 471-480) and *Alcune lettere inedite di Galileo Galilei pubblicate e illustrate* (XIV 351-378). Favaro also published a work entitled *Sulla invenzione dei canocchiali binoculari* at almost the same time (*Atti della Reale Accademia delle Scienze di Torino* vol. XVI of 1881), while Galileo's letters (five letters to Cardinal Federico Borromeo), transcribed by Govi from 1871, were published extremely rapidly, when he discovered

⁵⁸ "Mandando a lei quegli scritti ho inteso di lasciarle piena libertà di disporne e mi terrò molto onorato se Ella, come gentilmente mi offrì, vorrà presentarli al sodalizio scientifico di cui Ella è singolare ornamento. La scienza non è di nessun Paese, né di una fede, ..., essa, anzi essa sola, è veramente universale poiché nelle verità scientifiche tutti convengono gli spiriti d'ogni luogo e di ogni credenza. Così avesser sempre pensato gli uomini, che ora non si avrebbero a deplorare errori e persecuzioni funesti alla scienza, ma più funesti per chi li difese o li provocò! ... Ora il Favaro incomincerà la nuova e compiuta edizione di Galileo ed io col prof. Genocchi e collo Schiaparelli avrò l'onore e la soddisfazione di investigarne la esecuzione. Così finalmente con Lionardo e col Galileo si comincerà anche in Italia ad abbandonare un po' la vecchia e infeconda abitudine di non ripubblicare se non Novelle, Poemi, Commedie, Storie e discorsi accademici e s'incomincerà a onorare con monumenti Nazionali la Scienza. Speriamo che dietro a Lionardo e a Galileo possano venire gli altri sommi ai quali il progresso umano è debitore di tanti avanzamenti e l'Italia di tanto splendore.", *Biblioteca Apostolica Vaticana, Carteggi di B. Boncompagni*, P. 391 ff. 84-85.

⁵⁹ Rudolf Wolf worked at the Polytechnic School (*Eidgenössisches Polytechnikum*) and at the University of Zurich.

⁶⁰ The changeover of the Academy from Pontifical to Royal, was not easy. In the session of December 4th 1870 some members did not recognize the legitimacy of the new government. The physician Benedetto Viale-Prelà gave up the office of President and left the meeting with ten of the members out of a total of twenty-five. Then they decided to continue the *Pontificia Accademia* and transfer the headquarters inside the Vatican, in the so called *Casina of Pio IV*. See [Paoloni, Simili 2004].

that others (in reality Favaro) were about to publish them.⁶¹ Govi's last contribution, *Della invenzione del Micrometro per gli strumenti astronomici*, was published in the last volume of the *Bullettino* (XX 607-622). This article includes, amongst others, an image of the moon taken from a copperplate engraving of 1649 by Eustachio Divini, a manufacturer and experimenter of optical instruments, which was rediscovered as a result of the combined research of Govi and Boncompagni, amongst his heirs in Osimo in the Marche region of Italy.

5.2. Maximilian Curtze: Copernicus and Domenico Maria Novara in the *Bullettino*

One of the most valuable contributors to the *Bullettino* was the Medieval expert Maximilian Curtze (1837-1903), a nineteenth century German historian of science and mathematics.⁶² Curtze taught for thirty years at the Thorn *Gymnasium* in Western Prussia and was one of the founders of the Copernican Society of Science and Art (*Copernicus-Verein für Wissenschaft und Kunst*), of which Boncompagni was an honorary member. Favaro remembered him as “one amongst the most valuable contributors to the unforgettable *Bullettino*”⁶³ and recognised his tireless commitment to spreading the works of some of Italy's leading mathematicians (Battaglini, Brioschi, Cremona, Schiaparelli, Sella and others), thanks to his thorough knowledge of Italian. His reputation as the most important researcher of his age in the field of Western mathematics in the Middle Ages, derived from his ceaseless activity as an editor of Medieval mathematical texts, which were mostly previously unpublished, of manuscripts that were previously unknown, including works by Nicole Oresme, the Banū Mūsā, Jordanus Nemorarius, Johannes de Sacrobosco, Petrus de Dacia, Al-Nayrīzī, Savasorda, Leonardo Mainardi and the correspondence of Regiomontanus. His fame also derived from his re-evaluation or rediscovery of authors including Johannes de Muris, Dominicus de Clavasio, Robertus Anglicus and Johannes de Lineriis.⁶⁴

Curtze was the main editor of the new edition of *De revolutionibus*, based on Copernicus' autographs, published in Thorn in 1873, to celebrate the four-hundredth anniversary of Copernicus' birth.⁶⁵ Between 1874-75 he published three articles under the title *Reliquiae Copernicanae*.⁶⁶ In 1877, he discovered an unpublished manuscript by Copernicus in the Imperial Library of Vienna, which was a review of the Copernican system, *Nicolai Copernici de hypothesibus motuum coelestium a se constitutis commentariolus*.⁶⁷

The volumes that belonged to Copernicus, inherited from the chapter of Frauenburg Cathedral, were taken by the King of Sweden, Gustavus Adolphus, as spoils of war and removed to Sweden, where they can still be found in Uppsala. Boncompagni instructed Curtze to travel to Uppsala. The story of this journey, told to the Copernican Society of Science and Arts in Thorn, was published in the *Bullettino*, translated into Italian (XI 167-171; 172-176). An account of the journey is also found in the work *Inedita Copernicana*, based on manuscripts discovered in Berlin, Frauenburg, Uppsala and Vienna, which Curtze dedicated to Boncompagni.⁶⁸

⁶¹ See the letter from Favaro to Govi, on June 3rd 1882 published in [Schettino, Borrelli 2014, 67-68].

⁶² [Günther, 1903-04].

⁶³ “fra i più preziosi collaboratori dell'indimenticabile *Bullettino*”, see [Favaro 1903-04, 378].

⁶⁴ [Dauben, Scriba 2002, 402-403].

⁶⁵ *Ibidem*, p. 402.

⁶⁶ [Curtze 1874] and [Curtze 1875].

⁶⁷ A few years later, one copy more was found in Stockholm and was published [Copernicus 1881].

⁶⁸ [Curtze, 1878]. See also [Curtze 1882].

In the same years, important information about Copernicus was obtained from research by historian Carlo Malagola in the archive of Senator Malvezzi de' Medici in Bologna.⁶⁹ The discovery of Copernicus' name in the acts of the German nation in the University of Bologna, as a student of law, from 1496 to 1500, caused serious doubts about the veracity of claims by Niccolò Commeno Papadopoli,⁷⁰ generally accepted by biographers, according to which: 1. Copernicus studied philosophy and medicine for four years in Padua, as listed in records of Poles at the University of Padua; and 2. Copernicus graduated in philosophy and medicine, as shown in the acts of the college of physicians at the University of Padua in 1499.

Malagola described the results of his research on Copernicus during several sessions of the *Reale Deputazione di Storia Patria per le Provincie di Romagna*,⁷¹ and also appointed Curtze to communicate information regarding Copernicus' stay in Bologna to the Copernican Society of Science and Art in Thorn on 8th May 1876.⁷²

The results of Malagola's research produced a series of articles in German journals. Two of these were translated into Italian and included in the *Bullettino: Copernico in Italia* (IX 315-319) and *Copernico a Bologna* by Franz Hipler (1836-1898), dated Braunsberg, 2nd May 1876 (IX 320-325).

Moritz Cantor also commented on Copernicus' nationality in the daily *Beilage zur Allgemeinen Zeitung* (1st August 1876). The article was included in the *Bullettino*, translated into Italian, with copious notes by Boncompagni, under the title *Sulla nazionalità del Copernico* (IX 701-716). While, according to Hipler, Copernicus' registration in the German students' body at the University of Bologna did not allow any conclusion to be made about his nationality, Cantor, also on the basis of recent research by Malagola, affirmed that Copernicus was, without a shadow of a doubt, German. To help resolve the issue, Boncompagni employed Favaro to carry out "thorough investigations" in the University of Padua Archive, to search for traces of Copernicus' presence. A summary of the research was included in a letter to Boncompagni dated 15th April 1877, published in the *Bullettino* (X 303-312).⁷³ It was Favaro once again who informed readers of the *Bullettino* of the Copernican documents published by Carlo Malagola, *Intorno alla pubblicazione fatta dal Dr. Carlo Malagola di alcuni documenti relativi a Niccolò Copernico* (XI 319-334) and of the publication of *Reliquiae Copernicanae* and *Inedita Copernicana* by Curtze (XII 775-807).⁷⁴

Copernican studies gained new lease on life in Italy too, with the four-hundredth anniversary of the birth of Nicolaus Copernicus, and a series of initiatives including ones in Rome promoted by Domenico Berti (1820-1897) aimed at founding a museum in honour of Copernicus at "La

⁶⁹ [Malagola 1878]. See in particular chapter VIII: *Della dimora di Nicolò Copernico in Bologna*, pp. 306-366. Malagola's work also contains documents regarding Domenico Maria Novara and Scipione dal Ferro.

⁷⁰ [Papadopoli, 1726,195].

⁷¹ On 13th and 26th June 1875, 9th and 23rd April and 24th December 1876, 14th and 28th January and 23rd December 1877.

⁷² [Malagola 1880]. A letter from C. Malagola to M. Curtze dated April 12th 1876 can be found in the daily *Thorner Ostdeutsche Zeitung*, No. 92 of April 20th 1876.

⁷³ The research led Favaro to the following conclusions: 1. In the Archive of the University of Padua there was no evidence of Copernicus as a student; 2. Even if Copernicus was a student at the University of Padua around 1500, the condition of the University Archive would have not allowed to confirm that; 3. Most likely, the statement that Copernicus obtained the degree in Medicine and Philosophy at the University of Padua was wrong.

⁷⁴ Curtze, in turn, offered a translation into German of [Favaro, 1880], see [Favaro 1881].

Sapienza” University and other initiatives in Padua.⁷⁵ In particular, searches were made for Copernicus’ Italian degree both in Bologna and in Padua. It was, however, found in Ferrara by Luigi Napoleone Cittadella, director of the City Library. In 1876, Cittadella discovered Copernicus’ degree in canon law in the city’s ancient notarial archive, amongst the acts of notary Tommaso Meleghini. On 11th November of the same year, Cittadella wrote to Boncompagni sending him “a literal copy of two short but extremely interesting documents, which you can publish with your wise observations. I found them a few days ago”.⁷⁶ This was Copernicus’ degree certificate and the degree in Medicine and Liberal Arts, dated Ferrara University, 28th 1484 awarded to Domenico Maria Novara.⁷⁷ Boncompagni announced this discovery in a volume which was a tribute to Pope Pius IX for his episcopal jubilee,⁷⁸ and it was the object of an expert study in the Proceedings of the *Accademia Pontifica dei Nuovi Lincei*.⁷⁹

Thanks to his perfect knowledge of Italian, Curtze translated Silvestro Gherardi’s work, *Di alcuni materiali per la storia della Facoltà Matematica nell’antica Università di Bologna* into German (Sassi nelle Spaderie press, 1846) and published the translation in German with the title *Einige Materialien zur Geschichte der mathematischen Facultät der alten Universität Bologna* (Berlin, S. Calvary & Comp., 1871). Gherardi searched for old sources that cited the most important predictions of Domenico Maria Novara, Copernicus’ teacher in Bologna, in which the maximum declination of the sun, i.e. the obliquity of the ecliptic, equal to 23 degrees and 29 minutes, was determined. This measurement, lower than previous measurements by Aratus and Ptolemy, was a vital contribution to the discovery of the progressive decrease of the obliquity of the ecliptic. The interest Gherardi’s material aroused can be seen in Curtze’s report to the Copernican Society on 18th October 1869, which fully recognised Novara’s importance in Copernicus’ education.⁸⁰

Following this report, Boncompagni instructed Curtze to inform the Copernican Society of news about various writings printed by Novara in his possession,⁸¹ which were unknown to all the bibliographers. Curtze’s communication, translated into Italian, was included in the *Bullettino* (IV 140-149) with a short addition by Boncompagni (IV, 340-341). The same volume contained a second work by Curtze on the spelling of the name and country of origin of Witelo (Vitellio) (IV 49-76). Boncompagni added Baldi’s *Vita di Vitellio* and also his own article concerning Witelo’s manuscript on Optics cited by Luca Pacioli (IV 78-81). In regard to Witelo’s family name and home country, the Polish historian Teofil Zebrowski (1800-1887) gave a contribution few years later (XII 315- 317).

Another article dedicated to Novara by the *Bullettino* was written by Ferdinando Jacoli and entitled, *Intorno alla determinazione di Domenico Maria Novara dell’obliquità dell’eclittica* (X 75-

⁷⁵ Artur Wolynski, who was a political refugee in Italy, cooperated on the project and became the first director of the *Museo Copernicano e Astronomico* in Rome. Wolynski also participated in Favaro’s research in the Archives of the University of Padua to search for traces of Copernicus’ presence.

⁷⁶ “copia litterale di due *brevi*, ma *interessantissimi* documenti, ch’Ella potrà in qualche modo pubblicare con le sue savie osservazioni: li ho trovati or son pochi giorni”, [Boncompagni 1877, 341].

⁷⁷ *Archivio di Stato di Ferrara, Archivio Notarile antico, notaio Tommaso Meleghini*, 237, binder 5, 1465-1489 (for Novara); binder 6, 1490-1506 (for Copernicus). The two documents are published also in [Pepe 2003, 38, 55].

⁷⁸ [Boncompagni 1877a].

⁷⁹ [Boncompagni, 1877].

⁸⁰ [Curtze 1869].

⁸¹ [Curtze 1870] and [Curtze 1870a]. Curtze’s articles, published in the journal *Altpreussischen Monatsschrift*, were announced in the *Rivista Europea*, Anno I, vol. 2 (3), May 1st 1870, pp. 536-53, and Anno II, vol. 1 (3), February 1st 1871, pp. 560-561 and also in the *Gazzetta Ferrarese* No. 90 and No. 91 for the year 1871.

88). This was aimed at documenting the oldest source attesting to Novara's main astronomical discovery.

5.3. Angelo Genocchi: Lagrange's Correspondence and the Correspondence between Sophie Germain and Gauss

Angelo Genocchi (1817-1889), who taught for more than thirty years at the University of Turin, was an important figure in the Italian scientific environment in the second half of the eighteenth century. His interest in the history of mathematics was closely linked to the themes of his mathematical research. He was Boncompagni's close friend and the two had an intense correspondence over the years.⁸²

Genocchi's first work in the *Bullettino* is full of mathematical content and was entitled *Rassegna d'alcuni scritti relativi all'addizione degli integrali ellittici ed abeliani* (III 47-66). This article provides a valuable review of writings concerning the addition formulas for elliptic and abelian integrals which extends until the contemporary authors: Laguerre, Jacobi, Liouville, Hermite and Cremona.

After the death of his colleague from Turin, Felice Chiò, Genocchi published *Notizie intorno alla vita ed agli scritti di Felice Chiò* (IV 363-380), which created a controversy with Luigi Federico Menabrea in the pages of the *Bullettino*, centred on two articles by the latter (V 301-305; VI 435-457) and Genocchi's replies (V 535-542; VI 530-532). According to Genocchi, Boncompagni tried to promote the printing of the unpublished works and contributed to a bust of Chiò in his honour at the University of Turin, as well as publishing a catalogue of Chiò's published and unpublished works (IV 381-400).

The edition of *Oeuvres de Lagrange*, which began in 1867 and was edited by J.A. Serret and G. Darboux, aroused an interest in tracing the mathematician's unpublished correspondence of most of the Italian leading historians of mathematics of the age, including Favaro, Boncompagni and Pietro Riccardi. Also, a few years before, Euler's letters to Lagrange, which were kept in the library of the *Institut de France*, had been published.⁸³

In August 1869 Boncompagni wrote to the Russian mathematician Joseph-Ivanovitch Somoff, for information on Johann Bernoulli's letters and on the correspondence between Euler and Lagrange in the Library of the Academy of Sciences in St. Petersburg or in other libraries in the city.⁸⁴ In 1877, as a result of information from Somoff, Boncompagni published a lithograph made in St. Petersburg of eleven signed and unpublished letters from Lagrange to Euler found in the Archives "*de la salle des Conférences*" (of the Hall of Conferences) of the St. Petersburg Academy of Sciences, *Lettres inédites de Joseph Louis Lagrange à Léonard Euler*.⁸⁵

The publication was presented to various academies, not only in Italy. Angelo Genocchi described the contents of the letters in detail to the Academy of Sciences in Turin, and the

⁸² [Conte, Giacardi, 1991].

⁸³ [Euler, 1862].

⁸⁴ Somoff died in 1876 and a necrology written in French appeared in the *Bullettino* (XI 453-486). The original necrology was written in Russian by Andrej Somoff and translated into French by J. Hoüel. Boncompagni added a list of J.-I. Somoff works and a note concerning the letter that Prof. J.-I. Somoff addressed to him on May 28th 1871.

⁸⁵ The correspondence between Euler and Lagrange was published again in [Lagrange, 1892]. Several letters of Lagrange's correspondence were published elsewhere later. For Lagrange's family correspondence see [Borgato, Pepe, 1989].

presentation was also included in the *Bullettino* (X 657-667), as well as in the Proceedings of the Academy. This contribution of Genocchi is notable as it features the first analysis of this very important part of Lagrange's correspondence.⁸⁶ In Germany Moritz Cantor published a work based on the entire correspondence between Lagrange and Euler, which was also included in the *Bullettino*, translated into Italian by Antonio Favaro (XI 197-216). Boncompagni contacted the librarian at the library of the University of Uppsala Observatory, Gustaf Eneström, who wrote a review in the journal *Tidsskrift for Matematik*, which was also included in the *Bullettino*, translated into French (XII 828-838).⁸⁷ In the same volume of the *Bullettino*, Eneström also gave information about the correspondence of Johann Bernoulli, purchased in 1798 from the Stockholm Academy of Sciences, and only recently rediscovered "in a cache of the Stockholm observatory, where the mathematical part of his library is currently kept" (XII 313-314).⁸⁸

The *Bullettino* had already focussed on Lagrange's letters, with the publication of ten of them written to Antonio Maria Lorgna, belonging to the collection of Lorgna's manuscripts at the Verona City Library, in which their mathematical content was described by Giambattista Biadego (1850-1925), an engineer from Verona (VI 101-141).⁸⁹

Angelo Genocchi continued to be an important reference point for Boncompagni. Their relationship, which had begun as far back as the early 1850s, with the publication of pamphlets by Leonardo Pisano,⁹⁰ became closer once again at the end of the 1870s, when both were involved in research into the letters of Sophie Germain to Gauss. In 1880 Boncompagni published a lithograph, made in Göttingen, of five out of ten letters from Germain to Gauss which he had discovered at the university library in Göttingen. Genocchi presented the publication to the Turin Academy of Sciences, raised awareness that this important correspondence was much larger. He commented on its mathematical contents in an article that was included in the Proceedings of the Academy (vol. 15, 1879-80). The *Bullettino* published six articles by Genocchi dedicated to the Germain-Gauss correspondence, but also to some problems of number theory linked to it: *Alcune asserzioni di C.F. Gauss circa le forme quadratiche $YY \pm nZZ$* ; *Teoremi di Sofia Germain intorno ai residui biquadratici* (XVII 245-247; 248-251); *Ancora un cenno dei residui cubici e biquadratici*; *Sur la loi de réciprocité de Legendre étendue aux nombres non premiers*; *Sur quelques théorèmes qui peuvent conduire à la loi de réciprocité de Legendre*; and *Intorno all'ampliamento di un lemma di Gauss* (XVIII, 231-234; 235-237; 238-243; 650-651). Boncompagni's editorial project to publish the whole of the correspondence, with the aid of Genocchi as an expert in number theory, was never completed.⁹¹

⁸⁶ For details concerning Genocchi and the edition of Lagrange's correspondence see [Pepe, 1991].

⁸⁷ For the translation Boncompagni entrusted the author and also Aristide Marre, who (with Léouzon Le Duc) completed the translation before Eneström. Boncompagni apologized to the author saying that he wanted to meet the deadline of the publication of the volume.

⁸⁸ "dans une cache de l'observatoire de Stockholm, où est gardée à présent la partie mathématique de sa bibliothèque".

⁸⁹ Boncompagni added a note with the bibliographical references of Lagrange's ten letters in Italian (VI 142-152; 539-543).

⁹⁰ See [Genocchi, 1855] and [Genocchi, 1855a]. Most of the correspondence between Genocchi and Boncompagni can be found at the Library of the Mathematical Department of the University *La Sapienza* of Roma, see [Israel, 1990]. Letters from Boncompagni to Genocchi can be also found in the Library *Passerini Landi* of Piacenza.

⁹¹ The whole correspondence between Sophie Germain and Gauss of the years 1804-1829 (ten letters from Germain, the mathematical notes enclosed in her first five letters, and four letters from Gauss) is published, with a full historical introduction which presents Boncompagni's editorial project which remained incomplete at his death, and the mathematical content of the letters, in [Del Centina, Fiocca, 2012].

To complete Genocchi's work on the law of quadratic reciprocity, the *Bullettino* published the Italian translation of Leopold Kronecker's observations concerning the history of the reciprocity law, with the title *Intorno alla storia della legge di reciprocità* (XVIII, 244-249).⁹²

5.4. Antonio Favaro: the History of Continued Fractions and the Galilean Studies

One of the most active contributors to the *Bullettino* was Antonio Favaro, who produced thirty-five works, including articles and reviews, from the seventh volume onwards.⁹³ He was born in Padua in 1847 and, after studying at the University of Padua, at the School of Application for Engineers in Turin and at the Polytechnic School in Zurich, he became a professor of graphic statics at the University of Padua. In 1878 he also began to teach a course on the history of mathematics. His early work was on engineering themes, but from 1874 onwards he dedicated himself almost exclusively to the history of mathematics and, from 1879, to Galileo. Although, as we have already noted,⁹⁴ Favaro did not fully agree with the methodological approach of the *Bullettino* taken by Boncompagni, relations between the two were always ones of mutual esteem and cooperation. When, having reached the twentieth volume, Boncompagni decided to abandon the direction of the *Bullettino* for health reasons but wanted the journal to continue, he offered the role to Favaro. Favaro regretfully declined the Prince's "most generous offer" and later declared that this refusal "was certainly not the least of the sacrifices that my studies of Galileo cost me".⁹⁵ For his part, Favaro showed sentiments of deference and gratitude towards Boncompagni "for the benevolence that he has continually shown me over the long course of almost five *lustra* (25 years), both for the instruction that I have received and finally for his generous help with those studies, which I can proudly say that he initiated and encouraged".⁹⁶

Favaro's first article published in the *Bullettino* is a long essay, of around one hundred pages, on the development of continued fractions, from the thirteenth to the seventeenth century, in the issues of September and November 1874 (VII 451-502; 533-589). The work was sent to Boncompagni before the May issue was published,⁹⁷ so Favaro did not yet know about Siegmund Günther's work, *Storia dello sviluppo della teoria delle frazioni continue fino all'Euler*, which was part of this issue (VII 213-254).

The theme was, in any case, a current one. Guglielmo Libri had dealt with it in volume IV of his *Histoire des Sciences Mathématiques en Italie*,⁹⁸ highlighting Pietro Antonio Cataldi's merits in the invention of continued fractions. Moritz Cantor underlined the presence of ascending continued fractions in the work of Leonardo Pisano,⁹⁹ as did Günther himself in 1872 in one of the "Programm der Lateinschule" in Weissenberg (*Beiträge zur Erfindungsgeschichte der*

⁹² The text in German was published in a monthly summary (*Monatsberichte*) in the year 1875 by the Berlin Royal Academy of Sciences.

⁹³ [Bucciantini, 1995].

⁹⁴ See the letter from Favaro to Govi, on December 1st 1879, cited in the note 34.

⁹⁵ "non fu certamente il minore dei sacrificii che gli studi galileiani mi sono costati", see [Favaro, 1894-95, 516-517].

⁹⁶ "per la benevolenza costantemente accordatami per il lungo corso di quasi cinque lustri, sia per gli insegnamenti che ne ho ricevuti, sia infine per gli aiuti dei quali mi fu largo in quegli studi nei quali posso con orgoglio riconoscente affermare di essere stato da lui iniziato e confortato", *Ibidem*, p. 509.

⁹⁷ This information is given in a note signed by Boncompagni.

⁹⁸ [Libri, 1841, 87-97].

⁹⁹ [Cantor, 1863, 354, 432].

Kettenbrüche). Following this first work, Günther decided to return to the discovery and development of the theory of continued fractions, after receiving information about new documents from Boncompagni and Moritz Cantor, and published the aforementioned article in the *Bullettino*.

Favaro was aware only of Günther's first contribution, as he declared that he had partially used it, to "illustrate a period of the history of continued fractions, demonstrated in documents of incontestable authority, up to the point in which the giant steps made by this theory in the work of Euler and Lagrange achieved all the importance in which mathematicians hold it today".¹⁰⁰

The same volume of the *Bullettino* (VII 590-596) also included an Italian translation of a second work by Günther on approximating irrational quantities and a comparison of different methods (*Paragone di due metodi per la determinazione approssimativa di quantità irrazionali*), published in German in the Proceedings of the Society of Physics and Medicine in Erlangen in the same year. This was a response to a query by Boncompagni in the *Nouvelles Annales de Mathématiques* (vol. 12, 1873, p. 191-192) to establish whether a certain result of Franz Woepcke's regarding the approximation of the root of 2 using the incomplete quotient of a continued fraction could also be extended to successive incomplete quotients.

In the past, the theme of continued fractions had occasioned an exchange of letters between Boncompagni and Franz Woepcke (on 23rd November and 5th December 1861), which Boncompagni wanted to recall in the same volume of the *Bullettino* by publishing some extracts (VII 255-262). Boncompagni's interest arose from the discovery of an unpublished treatise on arithmetic and algebra by Luca Pacioli, (Ms. Vatican Library, Lat. 3129), about which Boncompagni had made a series of queries to Woepcke.¹⁰¹

As well as the works already cited on Copernicus, Favaro wrote *Notizie sulla vita e le opere di Hermann Grassmann*, who had recently died, for the *Bullettino*, (XI 699-756) and on his own course in the history of mathematics at the University of Padua (XI 799-801).

Two important contributions were dedicated to Prosdocimus de Beldemandis, a teacher of mathematics at the University of Padua in the 15th century (XII 1-74, 115-251; XVIII 405-423) and to Barthélemy Souvey, a 17th century Swiss mathematician (XV 1-48; XIX 99-114).

From 1882 Favaro began to contribute a number of studies on Galileo to the *Bullettino*, which were part of a programme that was to end with a summary work on Galileo and a complete history of the University of Padua. The previous year, he had presented a project for a new edition of Galileo's works to the Regio Istituto Veneto, which was approved by Minister Coppino in a royal decree dated 20th February 1887, and the first volume came out in 1890. The contributions published in the *Bullettino* are largely the result of research carried out on collections of manuscripts.¹⁰²

¹⁰⁰ "illustrare un periodo della storia delle frazioni continue, quale risulta da documenti di incontestabile autorità, conducendola fino al punto in cui i passi giganteschi fatti da questa teoria ad opera di Eulero e di Lagrange portarono ad attribuirle tutta quella importanza in che è tenuta oggidi dai matematici", [Favaro, 1874, 456].

¹⁰¹ The first description of this work of Pacioli was given by Boncompagni who published a facsimile and the introduction (VII 258- 259; XII 381-383, 428-430). Pacioli's work is now published: [Pacioli, 1996].

¹⁰² Favaro's contributions on Galileo in the *Bullettino* include: 1. The catalogue of Galilean autograph manuscripts in the Marsili Archive in Bologna (XV 581-592). 2. The edition of unpublished works by Galileo, including the Galilean work de motu, discovered amongst the manuscripts of the National Library in Florence "thanks to the intelligent and generous support of Prince Boncompagni", which drew his attention to some of the codices in the collection (XVI 1-97, 135-210). 3. An edition of the unpublished discourse on the magnet by Benedetto Castelli (XVI 545-564). 4. The catalogue of manuscripts in the Libri-Ashburnham collection of the Laurentian Library in Florence, quickly compiled by Favaro after the arrival of the manuscripts in the library on 4th December 1884 (XVII 849-878). 5. An article on Galileo's relations with Federico Cesi, based on unpublished documents that threw light on the publication of Galileo's

Favaro put Raffaello Caverni (1837-1900) in contact with Boncompagni for the publication in the *Bullettino of Notizie storiche intorno all'invenzione del termometro*, which was printed in volume XI and was Caverni's only contribution to the journal.¹⁰³ The cooperation and friendship between Favaro and Caverni, which lasted for over a decade, before its end in the late 1880s, helped Caverni break out of his isolation from the scientific environment of the time. On 2nd January 1879 Favaro informed him of Boncompagni's intention to stop publishing the *Bullettino* at the end of the year. Favaro stated that he aimed to continue publishing the journal if this were to happen, and counted on Caverni's cooperation.¹⁰⁴ As we know when, a few years after, Boncompagni decided to abandon the publication of the *Bullettino*, Favaro was busy with other studies that prevented him from taking on this prestigious, but onerous role.

5.5. Moritz Steinschneider and Enrico Narducci: Astronomy and Optics in the Arab and Hebrew Cultures

An Italian Jew, Samuel David Luzzatto, whom Boncompagni consulted at the end of 1856 for the translation of some difficult passages in a text by mathematician Abraham ben Meir Ibn Ezra, put him in contact with the German orientalist Moritz Steinschneider (1816-1907).¹⁰⁵ Steinschneider was a pioneer in the study of the history of mathematics and astronomy in Arabic and Hebrew.¹⁰⁶ He was the head of the Jewish female high school (Töchterschule) in Berlin and worked at the Königliche Bibliothek, giving him access to the most important collections of Arabic and Hebrew manuscripts in Europe. Many articles and letters by Steinschneider clearly show his perfect command of Italian, which allowed him to establish long-lasting contacts with Italian scholars and spread scientific results in both directions.

Despite their differences in religion, politics and interpretation of the research in history of science,¹⁰⁷ Steinschneider established a friendship and a close partnership with Boncompagni that lasted almost forty years. Steinschneider helped spread Boncompagni's work in Germany, with

letters on sunspots (XVII 219-229). 6. An article on the death of Marco Velsero and on some details of Galileo's life (XVII 252-270). 7. The publication of previously unprinted documents on the history of Galileo's manuscripts in the National Library in Florence (XVIII 1-112, 151-230). 8. Conclusions about the unknown academic who opposed Galileo's Discourse on Floating Bodies (XVIII 321-326); 9. A catalogue of Galilean documents in the National Library of Florence that had recently been discovered, with a catalogue of manuscripts belonging to G.B. Nelli (XIX 1-54). 10. The publication of an inventory of Galileo's library (XIX 219-293; XX 372-376). 11. The publication of documents on the history of the Accademia dei Lincei in Galileo's manuscripts in the National Library of Florence (XX 95-102; 123-134), and 12. An article on Giovanni Tarde's visit to Galileo on 12th -15th November 1614 (XX 345-371).

¹⁰³ See the letter from Favaro to Caverni on April 20th 1878, in [Maffioli, 1985, 56].

¹⁰⁴ [Maffioli, 1985, 57].

¹⁰⁵ [Salah, 2012, 436]. Steinschneider published two articles on Abraham ben Meir Ibn Ezra: [Steinschneider, 1867]; [Steinschneider, 1880].

¹⁰⁶ Recently, Steinschneider's work had a new edition [Steinschneider, 2014] and a volume of essays about him has been published [Leicht, Freudenthal, 2012].

¹⁰⁷ Steinschneider wrote to Luzzatto on July 13rd 1863 the following judgment on Boncompagni: "In my opinion he is more erudite than ingenious ... In *Serapeum* I had recognized his liberality, even if I am afraid that he spends his money not rarely without gain ... I think that other men of the same social class spend their money on obsessions that are far less laudable." ("Mi pare ch'è più erudito che ingegnoso ... nel *Serapeum* ho fatto giustizia della sua liberalità, benché io tema ch'egli spenda il suo danaro non di rado senza profitto ... mi dico però che altri uomini del suo rango spendono il loro danaro in manie molto meno lodabili"). Later on, on December 16th of the same year, Steinschneider criticized Boncompagni's work: "There is no reasoning, only bibliographical notices with an accuracy less pedantic than ridiculous" ("non c'è nessun ragionamento, niente che notizie bibliografiche con esattezza meno pedantesca che ridicola"). See [Salah, 2012, 436].

articles in the bibliographic journal, *Serapeum*, printed in Leipzig.¹⁰⁸ In turn Boncompagni gave him copies of manuscripts from the libraries of Rome, Paris and Oxford and published several of his works at his *Tipografia delle Scienze Matematiche e Fisiche*.

On several occasions Steinschneider proposed using Boncompagni's research to show that the comparative study of different literatures could be useful to both of them. In Boncompagni's works, Steinschneider found "some very important information on the Jewish and Arabic literature of the Middle Ages":

It is true that the centre of the studies of this scholar is Leonardo Pisano (Fibonacci) : but, as we will see, Mr. Boncompagni is not content with merely publishing the works of this interesting author, accompanying them with critical notes, and collecting everything that can help shed light on the life and works of his ancient co-patriot; but he scours all the mathematical literature of the Middle Ages, to search for problems discussed by Fibonacci, so that we can almost say that Mr. B. carries out his vast research in the circle of history of European mathematicians in the Middle Ages, starting from a central point, and taking his viewpoint from the works of Fibonacci.¹⁰⁹

Many letters to Boncompagni or articles by Steinschneider were published in Italy, all written in Italian, a language "that I loved greatly amongst modern languages from my boyhood".¹¹⁰ *Annali di Matematica Pura e Applicata* (vol. V, 1864) contained a letter dated Berlin, 15th December 1862, *Intorno al Liber Karastonis*, which Steinschneider addressed to Boncompagni asking him to publish it. The letter's purpose was to show, amongst other things, that studying Latin manuscripts could not only benefit Arabic bibliography but also lexicography. Other works were published by the *Tipografia delle Scienze Matematiche e Fisiche*: in 1863 *Intorno ad alcuni matematici del medio evo ed alle opere da essi composti*, in 1866 *Brani dell'aritmetica d'Elia Misrachi; tradotti dall'ebraico con alcune note*, and in 1867 *Intorno ad otto manoscritti arabi di matematica posseduti dal ch. sig. Guglielmo Libri : con una nota intorno al Calcolo del vincitore e del vinto*.

Steinschneider's contributions to the *Bullettino* covered the journal's whole twenty-year lifespan. The first volume contained the article *Aven Natan e le teorie sulla origine della luce lunare e delle stelle presso gli autori ebrei del medio evo* (I 33-40) and the fourth contained six letters to Boncompagni from 1867-1871, *Intorno ad alcuni passi d'opere del medio evo relativi alla calamita* (IV 257-302). They demonstrate, amongst other things, Steinschneider's relationship with Timoteo Bertelli, who was at the time involved in collecting material on *Epistola De Magnete* by Petrus Peregrinus de Maricourt and on the historical interpretation of the introduction of the magnet to Europe in the Middle Ages. In 1867 Steinschneider also corresponded with Bertelli,¹¹¹ who encouraged him to pursue his studies on the subject.

¹⁰⁸ [Steinschneider, 1858]. This article, in French translation, was published again in Rome with many additions, [Steinschneider, 1859]. See also [Steinschneider, 1858a]; [Steinschneider, 1863].

¹⁰⁹ "Il est vrai que le centre des études de ce savant est Léonard de Pisa (Fibonacci) : mais, comme on verra, Mr. Boncompagni ne se contente pas de publier les ouvrages de cet auteur intéressant, de les accompagner de notes critiques, et de ramasser tout ce qui peut servir à l'éclaircissement de la vie et des ouvrages de son compatriote ancien ; mais il parcourt toutes les parties de la littérature mathématique du moyen âge, pour chercher les problèmes traités par Fibonacci, de manière qu'on pourrait presque dire que Mr. B. fait ses vastes recherches dans le cercle de l'histoire des mathématiques européennes du moyen âge, sortant d'un centre, et prenant pour point de vue, les ouvrages de Léonard.", [Steinschneider, 1859, 4].

¹¹⁰ "già a me diletissima fra le lingue moderne fino dalla mia fanciullezza", [Salah, 2012, 414].

¹¹¹ Three letters from Bertelli to Steinschneider of 1867 can be found in New York by the *Jewish Theological Seminary*, see [Salah, 2012, 447].

In his study of medieval works on the magnet, Steinschneider had cited a passage taken from *Proemio all'Almanac* by Jacob ben Machir, also known as Profatius Judaeus. A search for codices that contained the work were carried out in partnership with Boncompagni and led to the publication of *Proemio* on the basis of two ancient texts, one of which was in Hebrew, with a Latin translation (IX 595-614).

Boncompagni had three manuscripts, which had belonged to the Albani Library in Rome, of the then unpublished work, *De le vite de' matematici* by Bernardino Baldi, described by Enrico Narducci in the *Catalogo dei manoscritti ora posseduti da D. Baldassarre Boncompagni* (1862). Steinschneider was interested in the lives of fourteen Arabic mathematicians and Boncompagni sent him a copy, inviting him to annotate it in order to publish the lives and notes in the *Bullettino* (V 427-534). Narducci was responsible for editing the lives of the Italian mathematicians in Baldi's work (XIX 335-354).

Steinschneider's article *Intorno a Johannes de Lineriis e Johannes Siculos* (XII 345-351) was inspired by reading Favaro's work on Prosdocius de Beldemandis, published in the January and February issues of the same volume of the *Bullettino*. In particular, the distinction between the two authors, and the works that Favaro attributed to one or the other, were not established beyond doubt, according to Steinschneider. Steinschneider therefore offered to make a personal contribution to these questions, which, he observed involved the thirty years of research that he was carrying out on the 11th century Arab astronomer in Spain, Abu Ishaq Ibrahim Ibn Yahya Al-Zarkali, known in the West as Arzachel, whose astronomical observations in Toledo led to the compilation of the so-called Tables of Toledo. Steinschneider's study of Arzachel numbered over a hundred pages and was published in the *Bullettino* in successive issues (XIV 171- 182, XVI 493-504, XVII 765-794, XVIII 343-360; XX 1-36, 575-604). Steinschneider observed that the works of Arab authors from Spain or North Africa were often spread amongst Jews and Christians thanks to their translations in Hebrew, Latin and Spanish. This, he continued, involved complex research in which, as well as a knowledge of eastern languages and the discipline, a critical sense was needed to resolve the confusion that reigned between the sources, solve many doubts and fill in a great deal of gaps. His work on Arzachel reflects over thirty years of research into his name and the country and the age in which Arzachel lived, with a list of works in the original Arabic or in translation, works modelled on those of Arzachel and quotes from his works by other authors. Once again Boncompagni assisted Steinschneider in his research by providing information on source manuscripts.

The study of the astronomical tables attributed to Peter III of Aragon (XIII, 413-436), again shows Steinschneider's fruitful relationship with Boncompagni, whose agents he used when needed. Aristide Marre in Paris found a copy of the manuscript, *Canones super tabulis Petri tertij* in the Bibliothèque Nationale. The *Canones* were published by Steinschneider in the article, together with the *Prologue hébreu* taken from a Vatican codex, a transparent paper facsimile of which was obtained by the Prince. Steinschneider's theory that King Peter, named in the preface to the tables, was Peter IV and that Jacob Carsi was Jacob Carsono, was confirmed by Andreu Balaguer y Merino, a member of the Academy of Barcelona, in a work published in a Barcelona journal, which was republished in the *Bullettino* at Steinschneider's request (XV 170-174).

Steinschneider also published in *Il Buonarroti*, the journal edited by Enrico Narducci (1832-1893) and printed in Rome at Boncompagni's printing press.¹¹² Narducci, who had been the

¹¹² Steinschneider also published in *Il Vessillo Israelitico*, Piedmontese Journal for Jewish studies. Among his articles there are *Letteratura Italiana dei Guidei*, *Letteratura Anti-giudaica in Lingua Italiana*.

Prince's librarian since 1854, wrote several articles together with Steinschneider published in the volume *Letteratura delle donne* (Rome, *Tipografia delle Scienze Matematiche e Fisiche* 1880). Steinschneider and Narducci had probably been in contact since 1864 and kept up a correspondence for over a quarter of a century, as surviving letters show.¹¹³ In the fourth volume of the *Bullettino* Narducci was responsible for an Italian translation of a treatise on Optics by Alhazen (IV 1-48, 137-139), citing, amongst others, a work on astronomy by this author. A letter that Steinschneider wrote to Narducci at the time contained information on this unpublished work of astronomy by Ibn Haitam (Abu Ali al-Hasan ibn al-Haytham – latinised as Alhazen), on which Steinschneider published in the *Bullettino* ten years later a *Notice* and later a *Supplement* (XIV 721-740, XVI 505-513).¹¹⁴

Narducci's most important contribution to the *Bullettino* was undoubtedly the one dedicated to the 13th century astronomer, Bartolomeo of Parma, also including the edition of his *Tractatus Sphaerae* (XVII 1-120; 165-218). Even on this occasion Boncompagni's contribution was relevant, as Narducci testified: "So Affò like Pezzana, did't know another relevant passage about which I'm going to write below, and which I got through the courtesy of the prince D. Baldassarre Boncompagni, to whom I am appreciative for the majority of the manuscript sources utilized in the present article".¹¹⁵

6. Eneström's *Bibliotheca Mathematica*: Heir of the *Bullettino*

As we have already mentioned, in early 1879 Boncompagni told Favaro of his intention to stop publishing the *Bullettino* at the end of the year. During the year the news of the end of the *Bullettino*, perhaps due to Boncompagni's state of health (he was suffering from Bright's disease), spread further.¹¹⁶ Only at the end of 1880 was it discovered that the *Bullettino* would continue¹¹⁷ and that the January and February issue of 1880 would be published in mid-December.¹¹⁸

In 1882 renewed fears that the *Bullettino* would cease led Gustaf Eneström to promote his *Bibliotheca Mathematica*. But by the time Boncompagni had finally made up his mind to terminate his journal, Eneström had already published three mainly bibliographical volumes (I series 1884-1886) as an appendix to Mittag-Leffler's international journal, *Acta Mathematica*.¹¹⁹ The third

¹¹³ Sixty-two letters of Narducci from 1864 until 1889 can be found in New York by the *Jewish Theological Seminary*. See [Salah, 2012, 449].

¹¹⁴ In the article there are excerpts from two manuscripts, one kept at Oxford (provided by Boncompagni through the courtesy of "Mr Allnut"), the other stored at the Vatican Library (provided by Boncompagni and Narducci, at different times).

¹¹⁵ "Tanto all'Affò quanto al Pezzana per altro sfuggì un altro importante passo che qui appresso riporto, la cui comunicazione debbo alla generosa cortesia del ch. Signor principe D. Baldassarre Boncompagni, cui pure, minima parte di tanti altri lavori, debbo la maggior parte dei materiali manoscritti, dei quali mi sono giovato per istendere la presente memoria." See [Narducci, 1884, 6]. Ireneo Affò wrote *Memorie degli scrittori e letterati parmigiani* (5 vols., 1789-1797) and *Storia della città di Parma* (4 vols., 1792-1795), which was kept on by Angelo Pezzana (5 vols., 1837-1859).

¹¹⁶ [Favaro, 1894-95, 516]. Favaro did not tell us when Boncompagni became ill.

¹¹⁷ "The news you told me, that the *Bullettino* will continue, is really a good news for the friends of the history of the mathematical sciences" ("La nouvelle que vous rapportez que le *Bullettino* va être continué, est vraiment une bonne nouvelle pour les amis de l'histoire des sciences mathématiques..."). This excerpt from Eneström's letter to Marre has been transcribed by Boncompagni in his letter to Eneström dated December 2nd 1880. See Eneström's correspondence in the Swedish Royal Academy of Sciences in Stockholm.

¹¹⁸ Letter from Boncompagni to Eneström, on December 2nd 1880, *Ibidem*.

¹¹⁹ [Dauben, 1998, 11].

volume was published only thanks to Boncompagni's financial help. In fact, at the end of 1885 when Eneström told him that his journal would probably close due to lack of funds, Boncompagni offered to contribute six hundred and sixty francs, which he sent to Mittag-Leffler "as a contribution to the expenses of printing your *Bibliotheca Mathematica* for 1886".¹²⁰ The journal was later published independently, with thirteen volumes in the second series (1887-1899), and another fourteen volumes in the third (1900-1914).¹²¹

Boncompagni worked to present the new journal *Bibliotheca Mathematica* to leading academies in Italy.¹²² He personally presented the first four issues that made up the first volume to the *Accademia Pontificia dei Nuovi Lincei*.¹²³ After describing the various sections of the journal and the notes published there, he added a statistical note on the four issues that "contained an indication of 918 works in 12 languages: 325 in French, 315 in German, 104 in English, 79 in Italian, 36 in Scandinavian languages, 27 in Russian, 16 in Dutch, 6 in Spanish, 4 in Latin and Greek, 4 in Portuguese, 1 in Polish and 1 in Bohemian."¹²⁴ He ended with the hope that the journal would continue, as it could be of great benefit to the spread of knowledge of works on mathematical and physical sciences.

Boncompagni personally met Eneström in Rome in April 1885. They shared a passion for books. Like Boncompagni, Eneström also had a well-stocked library of books on mathematics, the size of which has been compared to that of Michel Chasles.¹²⁵ On his death, the contents were donated to the *Stockholm Högskola*, later the University of Stockholm. On Boncompagni's death, however, his library, as we know, was dispersed on the antiques market and the entire collection of facsimiles that Boncompagni commissioned worldwide, was purchased by Mittag-Leffler. In 1964 they were moved to the Archives of the Royal Swedish Academy of Sciences in Stockholm. Now they are to be found in the stacks of the Stockholms Universitetsbibliotek (University Library).¹²⁶

Conclusion

In this study, we have shown how the *Bullettino*, the first journal entirely dedicated to the history of mathematical and physical sciences, was issued concurrently with another publication, the *Annali di Scienze Matematiche e Fisiche*, edited in Rome by Tortolini. The *Bullettino* was unique in its field, showing the outcomes of the intense activity that resulted from its philanthropic editor's relationships and collaborations.

Despite the copious index added at the end of each volume, retracing the complex features of the *Bullettino*, as well as understanding the origin of its 20 volumes and bringing to light the

¹²⁰ See the letters from Boncompagni to Eneström, on November 11th 1885 and on January 12th gennaio 1886, in Eneström's correspondence, Stockholm, Swedish Royal Academy of Sciences.

¹²¹ [Eneström, 1900].

¹²² See the letters from Boncompagni to Eneström, on January 6th and on 23rd 1885, in Eneström's correspondence, Stockholm, Swedish Royal Academy of Sciences.

¹²³ [Boncompagni, 1884-85].

¹²⁴ "contengono una indicazione di 918 scritti pubblicati in 12 lingue, cioè 325 in francese, 315 in tedesco, 104 in inglese, 79 in italiano, 36 in lingue scandinave, 27 in russo, 16 in neerlandese, 6 in spagnuolo, 4 in latino ed in greco, 4 in portoghese, 1 in polacco ed 1 in boemo.", [Boncompagni, 1884-85, p. 77].

¹²⁵ [Lorey, 1926]; [Cajori, 1924].

¹²⁶ [Grattan-Guinness, 1971]. As regards the manuscripts which belonged to Boncompagni, see [Folkerts, 2012].

valuable information and news it contained, was rather challenging. Indeed, the *Bullettino* initially appears to be a random set of articles, some of which are very long while others are much shorter (including contributions of a single page). These do not necessarily have a structured order, which makes the journal's relevance hard to grasp.

In this work we have highlighted through some examples the underlying dynamics and the related research and collaborations set up by Boncompagni, which produced the twenty volumes of this journal in its seemingly confused form. Furthermore, we have provided an overview of the *Bullettino's* content, focusing on the contributions on Galileo, Copernicus, Domenico Maria Novara, on Lagrange's correspondence, on the correspondence between Sophie Germain and Gauss, and on contributions on astronomy and optics in Arab and Hebrew cultures by authors such Antonio Favaro, Gilberto Govi, Angelo Genocchi, Maximilian Curtze, Moritz Steinschneider and Enrico Narducci.

Our findings underline how Boncompagni's journal fully achieved its aims, which were to create a network among Italian and foreign experts in the field, to disseminate Italian research abroad rapidly, and to keep Italian scholars up to date with foreign scientific historiography.

We have also stressed that the last year of the publication of the *Bullettino* coincided with the first release of Eneström's *Bibliotheca Mathematica*, which aimed to continue *Bullettino's* activity so showing, once again, the major international impact of Boncompagni's journal.

Bibliography

Boncompagni, B., 1853. Intorno ad alcune opere di Leonardo Pisano matematico del secolo decimoterzo. *Giornale Arcadico di Scienze, Lettere ed Arti*, 131, 3-129; 132, 3-176; 133, 3-11.

Boncompagni, B., 1854. Tre scritti inediti di Leonardo Pisano pubblicati da Baldassarre Boncompagni, secondo la lezione di un codice della Biblioteca Ambrosiana di Milano. *Galileiana*, Firenze.

Boncompagni, B., 1856. Opuscoli di Leonardo Pisano secondo la lezione di un codice della Biblioteca Ambrosiana di Milano, *Galileiana*, Firenze.

Boncompagni, B., 1877. Intorno ad un documento inedito relativo a Niccolò Copernico. *Atti dell'Accademia Pontificia de' Nuovi Lincei*, 30, 341-397.

Boncompagni, B., 1877a. Nota intorno ad un documento inedito relativo a Niccolò Copernico. In: *Triplice omaggio alla Santità di Papa Pio IX nel suo Giubileo Episcopale*, Tipografia della Pace, Roma, p. 291.

Boncompagni, B., 1884-85. Intorno alla «*Bibliotheca Mathematica*» del D.^f Gustavo Eneström rapporto di B. Boncompagni. *Atti dell'Accademia Pontificia dei Nuovi Lincei*, 38, 75-77.

Borgato, M.T., Pepe, L., 1989. Sulle lettere familiari di G.L. Lagrange. *Bollettino di Storia delle Scienze Matematiche*, 9, 193-318.

Bottazzini U., Nastasi, P., 2013. *La patria ci vuole eroi. Matematici e vita politica nell'Italia del Risorgimento*. Zanichelli. Bologna.

Bottazzini, U., 2000. Brioschi e gli «*Annali di Matematica*». In: Lacaíta, C. G., Silvestri, A., (Eds.), *Francesco Brioschi e il suo tempo (1824-1897)*. I Saggi. Franco Angeli, Milano, 71-84.

Bottazzini, U., 2002. Italy. In: Dauben, J. W., Scriba, C. J., (Eds.), *Writing the History of Mathematics: its Historical Development*. Birkhäuser, Basel, pp. 62-95.

Bucciantini, M., 1995. Favaro, Antonio. *Dizionario Biografico degli Italiani*, 45, ad vocem.

- Cajori, F., 1924. Gustaf Eneström. *Science*, 59 No. 1514, 10.
- Cantor, M., 1863. *Mathematische Beiträge zum Kulturleben der Völker*. Druck und Verlag von H.W. Schmidt, Halle.
- Cappelletti, V., 1969. Boncompagni Ludovisi, Baldassarre. *Dizionario Biografico degli Italiani*, 11, ad vocem.
- Catalan, E., 1871. Sur un article du *Journal des Savants*. *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, 4, 127.
- Chelini, D., 1851. Jacobi in Roma. *Annali di Scienze Matematiche e Fisiche*, 2, 142-143.
- Codazza, G., 1864. Il principe Boncompagni e la storia delle scienze matematiche in Italia. *Il Politecnico*, 91, 5-27.
- Conte, A., Giacardi, L., (Eds.), 1991. Angelo Genocchi e i suoi interlocutori scientifici. Contributi dall'epistolario. Deputazione Subalpina di Storia Patria, Torino.
- Copernicus, N., 1881. Nicolai Coppernici de hypothesibus motuum coelestium a se constitutis commentariolus: manuscriptum stockholmiense, Lindhagen, A. (Ed.). Kongl. Boktryckeriet, Stockholm.
- Curtze, M., 1869. Über Domenico Maria Novara da Ferrara, den Lehrer des Copernicus in Bologna. *Altpreussische Monatsschrift*, 6, 735-743.
- Curtze, M., 1870. Über einige bis jetzt unbekannt gedruckte Schriften des Domenico Maria Novara da Ferrara. *Altpreussische Monatsschrift*, 7, 515-521.
- Curtze, M., 1870a. Weitere Notizen über bis jetzt unbekannt gedruckte Schriften des Domenico Maria Novara da Ferrara. *Altpreussische Monatsschrift*, 7, 726-727.
- Curtze, M., 1874. Reliquae Copernicanae. *Zeitschrift für Mathematik und Physik*, 19, 76-82; 432-458.
- Curtze, M., 1875. Reliquae Copernicanae. *Zeitschrift für Mathematik und Physik*, 20, 221-248.
- Curtze, M., 1878. *Inedita Coppernicana*, aus den Handschriften zu Berlin, Frauenburg, Upsala und Wien herausgegeben. *Mitteilungen des Coppernicus-Vereins für Wissenschaft und Kunst zu Thorn*, 1, 73 pp. Also published in *Archiv für Mathematik und Physik*, 62, 1878, 113-148; 337-374.
- Curtze, M., 1882. *Ergänzungen zu den "Inedita Coppernicana"* im ersten Hefte dieser *Mitteilungen*, *Mitteilungen des Coppernicus-Vereins für Wissenschaft und Kunst zu Thorn*, 4, 9 pp.
- Dauben, J. W., 1998. *Historia Mathematicae: Journal of the History of Mathematics*. In: Beretta, M., Pogliano, C., Redondi, P. (Eds.), *Journal and History of Science*. Olschki, Firenze, 1-30.
- Dauben, J. W., Scriba, C. J., (Eds.), 2002. *Writing the History of Mathematics: its Historical Development*. Birkhäuser, Basel.
- Del Centina, A., Fiocca, A., 2010. *Guglielmo Libri matematico e storico della matematica*. Olschki, Firenze.
- Del Centina, A., Fiocca, A., 2012. The Correspondence between Sophie Germain and Carl Friedrich Gauss. *Archive for History of Exact Sciences*, 66, 585-700.
- Emanuelli, P., 1937. Bio-bibliografie di astronomi dimenticati. *Memorie della Società Astronomica Italiana*, 10, 81-103.
- Eneström, G., 1900. Ziele und Aufgaben eines Organs für mathematisch-historische Forschung und für aktuelle Fragen auf dem Gebiete der mathematischen Wissenschaften. *Bibliotheca Mathematica*, 1, 1-7.
- Euler, L., 1862. *Opera postuma mathematica et physica*, vol. I, Fuss, P.-H., Fuss, N. (Eds.). Eggers et Socios, Petropoli.
- Favaro, A., 1874. Notizie storiche sulle frazioni continue dal secolo decimoterzo al secolo decimosettimo. *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, 7, 451-502; 533-589.

- Favaro, A., 1880. Lo studio di Padova al tempo di Niccolò Copernico. *Atti del R. Istituto Veneto di Scienze, Lettere ed Arti*, 6, 285-356.
- Favaro, A., 1881. Die Hochschule Padua zur Zeit des Copernicus. *Mitteilungen des Copernicus-Vereins für Wissenschaft und Kunst zu Thorn*, 3, 3-60.
- Favaro, A., 1887. Otto anni d'insegnamento di Storia delle Matematiche nella R. Università di Padova. *Bibliotheca Mathematica*, 1, 49-54.
- Favaro, A., 1889. Il *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche* pubblicato da D. B. Boncompagni (1868-1887). *Bibliotheca Mathematica*, 3, 109-115.
- Favaro, A., 1894-95. Don Baldassarre Boncompagni e la storia delle scienze matematiche e fisiche. *Atti del R. Istituto Veneto di Scienze, Lettere ed Arti*, 53, 509-521.
- Favaro, A., 1902. Intorno ad alcune anomalie presentate dal "Bullettino" del Principe Boncompagni. *Bibliotheca Mathematica*, 3, 383-385.
- Favaro, A., 1903-04. Intorno al presunto autore della *Artis Metricæ Practicæ Compilatio* edita da Massimiliano Curtze. *Atti del Reale Istituto Veneto di scienze, lettere ed arti. Parte seconda*, 63 (4), 377-395.
- Favaro, A., 1923. *Gilberto Govi ed i suoi scritti intorno a Leonardo da Vinci*. P. Maglione e C. Strini, Roma, 1-55.
- Ferraresi, A., 2002. Govi, Gilberto. In: *Dizionario Biografico degli Italiani*, 58, ad vocem.
- Fiocca, A., 2012. La storia della matematica nel Risorgimento Italiano. In: Pepe, L., (Ed.), *Europa matematica e Risorgimento Italiano*. Clueb, Bologna, 99-123.
- Fiocca, A., 2015. Il 'Bullettino Boncompagni' e la riscoperta della matematica medievale. In: Caye P., Nanni R., Napolitani P.D. (Eds.), *Scienze e rappresentazioni. Saggi in onore di Pierre Souffrin*. Olschki, Firenze, 495-509.
- Folkerts, M., 2012. The Fate of the Manuscripts in the Boncompagni Collection, Introduction. In: Folkerts, M., Thomson, R. B., *Boncompagni Manuscripts: Present Shelfmarks, Beta Version 1.6 (May 2012)*. <http://warburg.sas.ac.uk/fileadmin/images/library/3orientation/Boncompagni.pdf>.
- Galli, I., 1893-94. Elogio del Principe Don Baldassarre Boncompagni. *Atti dell'Accademia Pontificia de' Nuovi Lincei*, 47, 161-186.
- Genocchi, A., 1855. Sopra tre scritti inediti di Leonardo Pisano. *Note Analitiche. Annali di Scienze Matematiche e Fisiche*, 6, passim.
- Genocchi, A., 1855a. Brani di lettere di Angelo Genocchi a Baldassarre Boncompagni. *Annali di Scienze Matematiche e Fisiche*, 6, passim.
- Grattan-Guinness, I., 1971. Materials for the History of Mathematics in the Institut Mittag-Leffler. *Isis*, 62 (3), 363-374.
- Günther, S., 1903-04. Maximilian Curtze. *Bibliotheca Mathematica*, 4, 65-81 (with the list of the works and the portrait).
- Israel, G., 1990. On Correspondence between B. Boncompagni and A. Genocchi. *Historia Mathematica*, 17, (1), 48-54.
- Jayawardene, S.A., 1988. Renaissance Mathematics (and Astronomy). Baldassarre Boncompagni's *Bullettino di Bibliografia e di Storia delle Scienze Matematiche e Fisiche* (1868-87). In: Hay C. (Ed.), *Mathematics from Manuscripts to Print 1300-1800*. Oxford University Press, New York, 190-194.
- Jongmans, F., 1996. Eugène Catalan: Géomètre sans patrie, républicain sans république. *Société Belge des Professeurs de Mathématiques d'Expression Française, Mons* (reviewed by Gispert, H., 1999, *Historia Mathematica*, 26, 77-79).
- Lagrange, G.L., 1892. *Œuvres publiées par les soins de Joseph-Alfred Serret et Gaston Darboux sous les auspices de M. le Ministre de l'Instruction Publique*, 14, Gauthier-Villars, Paris.

- Lefons, C., 1984. Un capitolo dimenticato della storia delle scienze in Italia: il «Bulettno di Bibliografia e di Storia delle Scienze Matematiche e Fisiche» di Baldassarre Boncompagni. *Giornale critico della filosofia italiana*, 4, 65-90.
- Leicht, R., Freudenthal, G., (Eds.), 2012. *Studies on Steinschneider: Moritz Steinschneider and the Emergence of the Science of Judaism in Nineteenth-Century Germany*. Brill, Leiden-Boston.
- Libri, G., 1841. *Histoire des Sciences Mathématiques en Italie*, vol. IV. Renouard, Paris.
- Lorey, W., 1926. Gustav Eneström. *Isis*, 8, 313-320.
- Loria, G., 1915. Commemorazione del socio nazionale Prof. Placido Tardy. *Rendiconti della R. Accademia dei Lincei, classe di scienze fisiche, matematiche, naturali*, 24, 505-531.
- Maffioli, C., 1985. Sulla genesi e sugli inediti della storia del metodo sperimentale in Italia di Raffaello Caverni. *Annali dell'Istituto e Museo di Storia della Scienza di Firenze*, 10, 23-85.
- Malagola, C., 1878. *Della vita e delle opere di Antonio Urceo detto Codro*. Fava e Garagnani, Bologna.
- Malagola, C., 1880. *Der Aufenthalt des Copernicus in Bologna*, translation by Maximilian Curtze. *Mitteilungen des Copernicus-Vereins für Wissenschaft und Kunst zu Thorn*, 2, 17-119.
- Martini, L., 2003. The Politics of Unification: Barnaba Tortolini and the Publications of Research Mathematics in Italy, 1850-1865. In: *Il Sogno di Galois scritti di storia della matematica dedicati a Laura Toti Rigatelli per il suo 60° compleanno*. Centro Studi della Matematica Medioevale, Università di Siena, 171-198.
- Mazzotti, M., 2000. For science and for the Pope-king: writing the history of the exact sciences in nineteenth-century Rome. *The British Journal for the History of Science*, 33, 257-282.
- Narducci, E., 1884. Intorno al «Tractatus Sphærae» di Bartolomeo da Parma astronomo del secolo XIII ed altri scritti del medesimo autore. *Bulettno di Bibliografia e di Storia delle Scienze Matematiche e Fisiche*, 17, 1-42.
- Pacioli, L., 1996. *Tractatus Mathematicus ad Discipulos Perusinos*, Calzoni, G., Cavazzoni, G., (Eds.). Delta Grafica, Città di Castello.
- Paoloni, G., Simili, R., (Eds.), 2004. *I Lincei nell'Italia Unita. Mostra storico-documentaria (Roma 22 novembre 2003-10 gennaio 2004)*. Giorgio Bretschneider Editore, Roma.
- Papadopoli, N.C., 1726. *Historia Gymnasii Patavini*, vol. II apud Sebastianum Coleti, Venezia.
- Pepe, L., 1991. Angelo Genocchi e l'edizione della corrispondenza di Lagrange. In: Conte, A., Giacardi, L., (Eds.), *Angelo Genocchi e i suoi interlocutori scientifici. Contributi dall'epistolario*. Deputazione Subalpina di Storia Patria, Torino, 221-240.
- Pepe, L., (Ed.), 2003. *Copernico e lo Studio di Ferrara. Università, dottori e studenti*. Clueb, Bologna.
- Pepe, L., 2013. Antonio Favaro come professore. In: Baldini, U., Brizzi, G.P., (Eds.), *Amicitiae pignus. Studi storici per Piero Del Negro*. Unicopli, Milano, pp. 243-264.
- Picutti, E., 1981. Sui numeri congruo-congruenti di Leonardo Pisano. *Rivista Internazionale di Storia della Scienza*, 23 (2), 141-170.
- Picutti, E., 1991. I contributi di Angelo Genocchi alla storia della matematica medioevale. In: Conte, A., Giacardi, L., (Eds.), *Angelo Genocchi e i suoi interlocutori scientifici*. Deputazione Subalpina di Storia Patria, Torino, 241-280.
- Pozzato, E., 1967. Bertelli, Timoteo, *Dizionario Biografico degli Italiani*, 9, ad vocem.
- Salah, A., 2012. Steinschneider and Italy. In: Leicht, R., Freudenthal, G., (Eds.), *Studies on Steinschneider: Moritz Steinschneider and the Emergence of the Science of Judaism in Nineteenth-Century Germany*. Brill, Leiden-Boston, 411-446.

Schettino, E., Borrelli, A., 2014. Il carteggio fra Gilberto Govi, Antonio Favaro e Giovanni Virginio Schiaparelli per l'Edizione Nazionale delle Opere di Galileo Galilei. *Rivista di Storia dell'Università di Torino*, 3 (2), 43-126.

Steinschneider, M., 1858. Die Schriften des Fürsten Boncompagni (in Rom) zur Geschichte der Mathematik. Eine bibliographische Mitteilung. *Serapeum. Zeitschrift für Bibliothekwissenschaft, Handschriftenkunde und ältere Litteratur*, 3, 33-41; 6, 96.

Steinschneider, M., 1858a. Die « Tipografia delle Scienze Matematiche e Fisiche » in Rom und die Schriften des Fürsten Boncompagni. *Serapeum, Zeitschrift für Bibliothekwissenschaft, Handschriftenkunde und ältere Litteratur*, 16, 278-281.

Steinschneider, M., 1859. Les ouvrages du Prince Boncompagni concernant l'histoire des sciences mathématiques. Notice bibliographique extraite et traduite du Journal Allemand « Serapeum » 1858 (No. 3 et 6) enrichie de quelques additions nouvelles et accompagnée de quelques extraits de manuscrits. *Imprimerie des Sciences Mathématiques et Physiques, Rome*.

Steinschneider, M., 1863. Fürst Boncompagni und die « Tipografia delle Scienze Matematiche e Fisiche ». *Serapeum, Zeitschrift für Bibliothekwissenschaft, Handschriftenkunde und ältere Litteratur*, 7, 97-108.

Steinschneider, M., 1867. Abraham Judaeus-Savasorda und Ibn Esra. Zur Geschichte der Mathematischen Wissenschaften im 12. Jahrhundert. *Zeitschrift für Mathematik und Physik*, 12, 1-44.

Steinschneider, M., 1880. Abraham ibn Esra. *Zeitschrift für Mathematik und Physik*, 25/suppl., 59-128.

Steinschneider, M., 2014. *Mathematik bei den Juden. Band II: 1551-1840*, Freudenthal, G. (Ed.). Georg Olms, Hildesheim, Zürich, New York.