Massimo Tinazzi[1]

THE LIFE AND THE WORK OF GIUSEPPE ZAMBONI AT THE LIGHT OF HIS UNPUBLISHED LETTERS

Abbot Giuseppe Zamboni remained in Physics annals for the construction and the improvement of the so-called “dry piles” that were a good alternative at “humid” piles of Volta, and for the realization of different models of electrostatic watches. From his long job and notable production only few manuscripts were saved from the destruction, and today they are all kept in the Civic library in Verona, and they were finally catalogued for this occasion. The Zamboni’s papers are composed of 21 files containing the preliminary texts of school lessons that the physicist expounded at the “Regio Liceo Convitto” in Verona. This one is the main corpus of personal documents to which we have to add a few loose sheets on which he wrote some reflections about electric problems, and eleven academic diplomas coming from the main Italian academies of the 19th century. In addition to this material there are 49 letters received essentially from other Italian and foreign physics, or from colleagues that were teachers too. Others eight letters written by Giuseppe Zamboni and sent to different correspondents, on the contrary, are kept in other collections, as the one of Giuliari, in the autographs of Scolari, a pair in the collection of the mathematician Pietro Cossali, and others located in different correspondence.

Some books in several volumes handwritten complete this picture, containing the development of the lessons, explained in different years, of courses of experimental physics that Zamboni held at the Royal College, he had written and bind by Carlo Bitriglini and Alessandro Zoppi.

Among the letters received by Zamboni we can read someone that permit to do some reflections about this character and about his physics work. A very important indication regards the dates of the letters, that can indicate the steps of the development of his piles and clocks. For example, from a request of Sebastiano Alloy we have the certainty that already in 1800 Zamboni had obtained good results in the construction of “dry piles” [Letter of Luigi Sebastiano Alloy to GZ, Milan, 4 July 1800], because he had the request of some advice to realize the piles of Zamboni, a period that is previous at the correspondence with Alessandro Volta in 1812 (Tinazzi, 1997; Volta, 1967).

He received the news of his election at the teaching post of experimental physics at the Royal College at the beginning of 1804, and this fact was a fundamental event for his future. His satisfaction appeared from the letter written to Pietro Cossali[1] in February of that year, well known fellow citizen teacher of Astronomy, Meteorology and Hydraulics at the university of the kingdom of Parma, Piacenza and Guastalla (Tinazzi, 1994), and who was at the top of his career of mathematician. On that occasion Zamboni informed Cossali about his election at the Royal College and the important legacy of the machines of the count Giovan Battista Gazzola[2] given to the school [collection Pietro Cossali, MSS 1512^{30} paper 166]. Today we have few traces of this correspondence, but we know that Zamboni regularly received the astronomical works of Cossali from Parma with intermediary Benedetto del Bene[3] [Cossali P., 28 letters (S. Cristina Parma, 10 December 1782, 6 may 1804) to Benedetto del Bene (B 276 collection of letters B. Del Bene), letter of 4/3/1804] and Alessandro Carli[4] [Cossali P., 50 letters to Alessandro Carli (w. l., Parma 9 April 1801, 14 September 1804 and 23 December 1804; collection Pietro Cossali MS 1512^{35} papers 303-310]. These characters had held public offices during the government in Verona and they had occupied also of the Veronese schools. They had contributed to the development of the Royal College entrusting the teaching post of different subjects to the important cultural personalities, as Fortis[5]. The relations went on also after Cossali's removal to the Padua university, in fact with his great interests he had followed the debate about electrical phenomena and he had written an article on Journal of Literary Italy to exalt the Zamboni's inventions [Letter of GZ to Pietro Cossali, Verona, 1 April 1813, MS 1512^{30} paper 165].

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Of course the physics results were obtained by Zamboni with perseverance and obstinacy, above all asking the financial helps, always interesting, for his laboratory: in fact with prof. Gaetano Pinali, chemical teacher in the same college, during 1808 he asked the school administration to have new and more suitable rooms where to realize the chemical and physics experimental laboratories [letter of 14 April 1808, b. 76].

The year 1831 was particularly very rich of realizations: in fact many of his instruments are dated 1830-31, and they were apparatus by now well adjusted, and those ones saved by missing or destruction have demonstrated a good efficiency. It was also the moment of the greatest notoriety and the magazines and journals directors contacted him to insert his articles in their publications, as for a note about his electromotive to be published on Revue Enciclopédique [Letter of Jean Faïloni to GZ, Paris, 23 june 1831], while, another request of collaboration come to him from the "Nuovi Annali Italiani" [Letter of Vincenzo Antinori to GZ, Florence, 26 July 1832]. A further offer of collaboration came also for a chapter about electricity from editor Tasso for the "Enciclopedia Italiana" [Letter of Antonio Francesco Falconetti to GZ, Venice, 24 june 1837].

There were other contacts with the physician Gianpietro Maiocchi[6] [Letter of Gianpietro Maiocchi to GZ, Milan, 23 august 1831] and with the Swiss August De la Rive[7], another author that was interested in the realization of the "dry piles" [Letter of August De La Rive to GZ, Geneva, 24 September 1831; 25 December 1831]. Among his estimators in Italy we can count also Luigi Pacinotti, as a colleague of the Pisa university wrote to Zamboni to ask him to send to Pacinotti, at that time director of physics laboratory of Pisa, the universal dynamical electroscope set by that time [Letter of Zanini Garbi to GZ, Pisa, 18 December 1834].

An occasion to develop the debate about the concepts linked to the operation of piles and the causes producing electricity, besides the movement of pendulums, was the exchange of opinions with the famous Ambrogio Fusinieri[8] too, who remarked some Zamboni's works that were ready to be published [Letter of Ambrogio Fusinieri to GZ, Padua, 23 august 1832]. Some letters, also published on newspapers and on Annals of different academies, testify the recurrent direct and indirect epistolary exchange between the two physicians [Letter of Ambrogio Fusinieri to GZ, Vicenza, 12 june 1834; 12 September 1834].

Also with very well-known Salvatore Dal Negro[9] there was a collaboration, to point out that the near Padua university was occasion of very productive exchanges. And Dal Negro sent him the notes of works published by other colleagues, the results of his experiments about electromotives and about the theory of contact, that is one of the work hypotheses about the functioning of piles [Letter of Salvatore Dal Negro to GZ, Padua, 11 November 1833; 1 April 1833].

With Stefano Marianini[10] he dwelt upon the theory of contact among metals that constituted the pile, about the chemical action of liquid in contact with metal and about the theory directed at the interpretation of the phenomena that produced the electricity, as the theory of De Luc[11]. It followed in part the not electrochemical theory of Peclet[12], that implicitly admired the Zamboni's electromotives indirectly testifing its longevity in his correspondence, and of Faraday. They didn't admit that the liquids could alter the electromotive power of metals with chemical action [Letter of Stefano Marianini to GZ, Modena, 22 April 1837; 15 April 1842].

The cultural vivacity of which Giuseppe Zamboni was spectator, protagonist and mentor was testified also by his sharing at the foundation of the Literary Society in Verona, promoted in 1808 by a group of citizens. The idea born far back in the past when some Veroneses had begun to meet since 1801 in the house of the count Giovan Battista Gazzola, to read dissertations and to debate articles about science matter. In fact Gazzola was a cultivated mathematics, physics, chemistry and he was greatly passionated of Paleontology, so much that in his house he had prepared a real museum of ichtyolithes and other fossils, then requisitioned by French.

Besides Gazzola, among the promoters of the Literary Society we remember Ciro Pollini[13], well-known author of the classic "Flora Veronensis" (1822-24) and Alessandro Torri[14] who was restive at the Austrian government

and he emigrated to Pisa in 1822 [Letter of GZ to Alessandro Torri, Verona, 16 November 1809, (b. 49)]. Besides Torri, who was entrusted by the commission to choose the best magazines and newspapers for the Literary Society, in History, Geography, voyages, fine arts, literature, we cannot forget Giuseppe Torelli[15] and Giovanni Bottagisio[16], student of Dantean studies. The Literary Society intended "to acquire the best scientific and literary journal from different regions, and to obtain a comfortable and suitable room, where all the members, when they would like, could go to read cited works".

Some years after the death of Zamboni during a meeting of the Agriculture Commerce and Arts Academy of Verona in 1851 the count Luigi Morando de Rizzoni remembered the teaching and of divulger ability with the following words: "He wrote in a masterly manner the Perpetual Electromotor, in a so tidy, clear and suitable way that initiated the non-expert to Science; with this book he exhibited in which manner his lessons where learned by his pupils, also the slower ones. (Scrisse in dettato scelto l'Elettromotore Perpetuo, in modo così ordinato, appropriato, ed esplicativo da iniziare alla scienza i non esercitati e schivi; mostrò con questo scritto il perché nei suoi discepoli, anche i più tardi, le sue lezioni si stampavano in mente)". His devotion was so much that the time devoted to his pupils didn't exhaust only in the period of lessons, but it prolonged also during holidays, when he devoted one days during the week to meet his students, even in his house of Arbizzano (in the country near Verona) where he used to rest [Letter of GZ to Virginia de Rosmini of Rovereto, Arbizzano 18 October 1839), Autogr. Giuliari].

Besides this fact today other documents provide us the proofs of his great care in teaching, as his manuscripts. In fact Giuseppe Zamboni prepared himself the texts on which he would expose the lessons, as he had to develop a whole course of Physics that started from basic concepts, as mechanics, across the dynamics, the optics, thermodynamics (which in that time it didn't have that name and it concerned the "caloric"), to arrive at electromagnetism, with many subjects that today we could define of university level.

Among the manuscripts remained we find essentially these texts for lessons, collected in 21 files of notes. These proofs took shape in some final books, however manuscript, probably by some of his students or by copyists. In 1827 he prepared two volumes for the "Corso di fisica sperimentale nell'I.R. Liceo Convitto di Verona", then followed the "Lezioni di fisica raccolte a cura di Carlo Bitriglini" in two volumes, and the ones titled "Fisica sperimentale compilate in diverse lezioni da Alessandro Zoppi", in 4 volumes. A handwritten textbook, for scholastic use, remains today very well preserved in the library of the Stimate Institute in Verona, while another he had in publication as we can see from the compliments given him by Barlocci that previewed the preliminary texts [Letter of Saverio Barlocci to GZ, Rome, 10 June 1837].

When his fame spread in Europe, some of his colleagues coming from other cities went sometimes to attend his lectures and to visit his much loved and rich physics laboratory, even comparable with that one of the Pavia university [Letter of Alessandro Perez to GZ, Pavia, 16 November 1841]. His relations with foreigner colleagues thickened and besides the compliments he received their visits, as that one of professor of history Goefihen and of the professor of philology Beoker of Berlin university [Letter of Rudolphi to GZ, Aniona, 15 May 1827].

Therefore the notoriety of his work expanded to Italy and crossed the frontiers, so many researchers addressed him for suggestions, publications, calls for electric materials. These relations were finalized at the develop of instruments in evolution: for example, from Perugia, Luigi Canali[17] wrote to Zamboni to propose a report that he had prepared about the electromotive [Letter of Luigi Canali to GZ, Perugia, 30 January 1821; 17 January 1822]. And Canali was not a secondary personality or a simple passionate: in fact he had the teaching post of physics and chemistry at Perugia university.

Another notable personage that we find in the correspondence is Pietro Configliachi[18], who wrote from Pavia to Zamboni to discuss about electromotive [Letter of Pietro Configliachi to GZ, Pavia, 10 February 1816]. Later, in 1818-19 Zamboni begun a correspondence with count Grimaldi of Lucca that sent him the compliments after receiving the dry pile and whose structural details he asked. Moreover he showed to have appreciated very much the technique of "vanes"

(electrodes with particular form) used to improve the sensibility at electric action [Letter of Count Grimaldi to GZ, Lucca, 30 December, 1818; 22 march, 1819].

In the construction of the piles Zamboni didn't confine himself to find the best combination of elements, but he managed to realize also the instruments to build his piles in the best way and to perfect pendulums and clocks, arriving at a production that today we could label "a little series". In fact he was be able to sell his piles to different colleagues for their physics laboratories, for schools, to private citizens that put them at home also as a simple object of curiosity, realizing also simple toys of equilibrium (pastime) moved with the same electrostatic principle. Indeed during his voyage to Milan Zamboni met mister Mellesio with whom debated his calculus and to whom he had sold one of his clocks [Letter of G. Mellesio to GZ, Milan, 23 march 1833; 24 April 1833]. From some letters received from Antonio Sebastianutti and from count Giovanni Battista Giuliari[19] during the years 1830 and 1831 we have confirmation that Zamboni had began a little business of his piles and "perpetual" pendulums, acquired by friends and by far correspondents. It is interesting the chance of the diffusion of a scientific product, that during the 19th century aroused much curiosity, although technically advanced objects, specially as the Bohnemberger electroscope [Letter of Antonio Sebastianutti to GZ, Trieste, 30 October 1830; Zamboni G., 1 letter, Verona, 20 January 1831, to count Giovan Battista Giuliari, Carteggio G.B.C. Giuliari B. 587; Letter of Augusto Perego to GZ, Brescia, 27 August 1840; Letter of Luigi Lechi to GZ, Brescia, 24 December 1840]. In the field of teaching it is particularly interesting a letter of Giuliano Giordano belonging to the Society of Jesus, who asked to Zamboni, in 1841, some notes and some models of piles to use for experiments for physics teaching in a school of Naples. "I shall be in Naples in a few days to continue, with the help of Lord, my Physics lessons in our public college of S. Sebastiano during next November, where I taught four years ago. For this reason I absolutely need his electromotive and all his very valuable publications included in different magazines, if it is possible to have them separately: besides this one I should appreciate two pairs of his piles, one to move a very light little pendulum, the other the smaller I could use for the electroscope. (Io sarò tra pochi giorni in Napoli per riprendervi con l'aiuto del Signore al prossimo Novembre le mie lezioni di Fisica nel pubblico nostro Collegio di S. Sebastiano che io vi faceva quattro anni indietro. A tal uopo io ho bisogno assoluto del suo elettromotore e di tutte le sue pregevolissime memorie inserite ne' vari giornali, se è possibile averle separatamente: oltre questo bramerei due coppie della sua pila, l'una valevole a mettere in moto un leggerissimo pendolino, l'altra più piccola la potrei adoperare per elettroscopio)" [Letter of Giuliano Giordano to GZ, Rome, 10 October 1841].

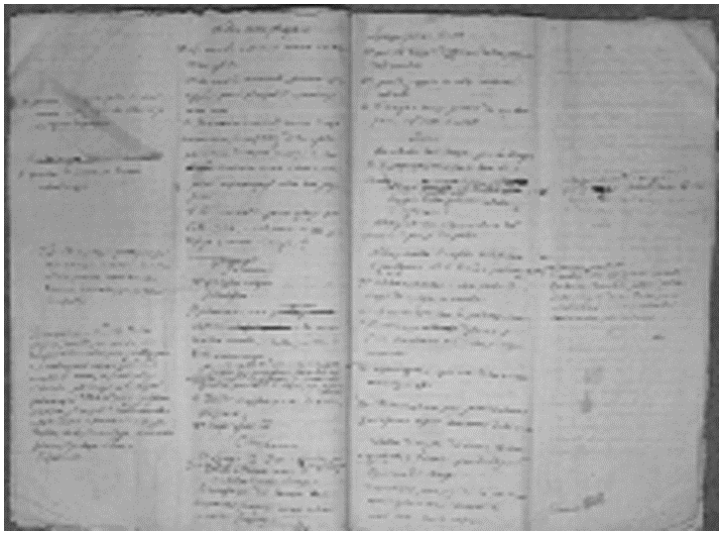


Fig. 1 Autograph text of Zamboni written to prepare the physics lessons.

In 1841 Zamboni was convoked also by the Royal Institute of Science Letters and Arts of Venice: in consequence of some deceases that had left free some posts among members of the Institute he was get involved to participate at

the commission that had to decide the admission of some new members, that had to compound the about forty constituting the heart of the institute, and the maximum number that was possible to add [Letter of Leonardo Marin to GZ, Venezia, 20 February 1841; letter of G. Pasini to GZ, Venezia, 20 February 1841].

A last note from his abundant memorandum for the lessons: in the related booklets the chapter dedicated to the electricity is dated 1845-46 (year of his death), and this fact clearly shows that he had began again to work with renewed enthusiasm also at the and of his years, a so continuous engagement that perhaps was one of the causes that contributed to his end, with a probable and definitive heart attack.

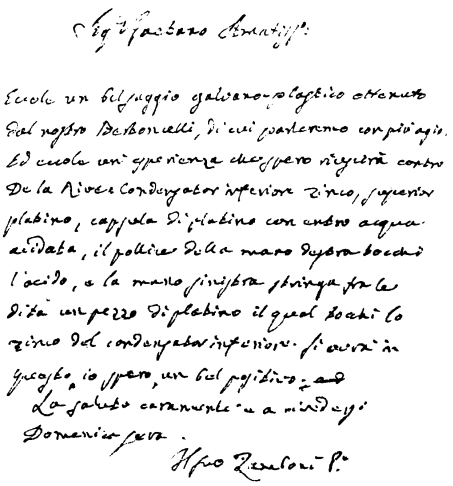


Fig. 2 Letter of Giuseppe Zamboni to Gaetano Spandri, with which he sent to Spandri an essay about galvanic phenomena that he had received from Bertoncelli, and he gave the instructions to build a galvanometer.

MANUSCRIPTS OF THE COLLECTION ZAMBONI: STANDARDS OF CATALOGUING

The manuscripts and the correspondence of Giuseppe Zamboni are now in the Civic Library in Verona, kept in two boxes, with number 182 and 183, one of them contains also materials of other authors. Awaiting to reorder these paper definitely with the standards to agree with the heads of Civic Library of Verona, the signs of cataloguing are related to the actual arrangement. Only some letters are archived in two other collections, while the four handwritten physics books are catalogued in the book heritage of the Library. The reference of every group of papers was left with the order with which Zamboni had ordered them, while some loose sheets were catalogued separately, and both have the reference of related box. The letters, organized with the alphabetical order of the correspondents, are furnished with the indication of sender or of addressee, of the expedition date and locality. About every letter it is added a synthetic account of content, and also a list of cited personages in them (inside round brackets). The abbreviations are: GZ for Giuseppe Zamboni, B for box. The abbreviations “w.d.a.l.” are referred at the lack of date and locality of provenance, “w.d.” at the lack of date, “w.l.” at the lack of indication of locality of provenance. The indications inside square brackets have as reference the place of the document in the cataloguing of Civic Library in Verona if it is located in a collection different from that one of Zamboni. Dates and localities inside round brackets have been obtained from indirect elements present in the same letter or from other external clues enough reliable, when they are not present inside the same document.

The cited letters which are not gathered in Zamboni's collection are addressed to count Bartolomeo Giuliari and to Pietro Cossali, and located in related collections.

Issue 185 (5) various papers (Zamboni B 182):
- New analysis of solar light of Brewster (Bibl. Univ., June 1832, p. 147)
- 1 sheet with spectra of solar light

- 1 sheet with arguments of hygrometry
- 1 sheet with references to physics lessons number 4 and 5
- 4 sheets about caloric
- 1 sheet about circular currents

Collection of 21 issues of notes of physics lessons (Zamboni B 182):
1) 3 optic lessons and 5 catoptrics lessons
2) 5 lessons of dioptrics
3) One lesson about colours
4) One lesson of optic
5) One lesson about diffraction and polarization of light
6) One lesson about caloric I, one lesson about vapour and hygrometry (28 April 1837)
7) One lesson caloric II (temperature)
8-9) One lesson about caloric III
10) One lesson about winds and acoustic
11) One lesson about acoustic
12) One lesson about caloric I
13-14) One lesson about caloric II
15) One lesson about electricity I
16) One lesson about electricity II
17) One lesson about electricity III (Magnetism, electromagnetism, 1841)
18) One lesson about electromagnetism IV
19) One lesson about electricity I 1845-46
20) One lesson about electricity II
21) Lesson 7 about magnetism

Original manuscript of Zamboni G., Esame della memoria del Sig. I. Buff intitolata: Addition a la theorie de l'Electrophore (Annales de Physique et Chimie, Septemb 1842, p. 107) e nella miglior costruzione di questa macchina, Verona (published in the Memorie dell'I.R. Istituto Veneto di Scienze, Lettere ed Arti, vol 2°, Venezia, tip. Antonelli, 1845, p. 251)
[MS 313 Poligr. 168.7. B. XVIII. 15]

Zamboni G., Corso di fisica sperimentale nell'I.R. Liceo Convitto di Verona, Verona, 1827
[MS 3153 I-II Fisica 91.2]
Lezioni di fisica del prof. ab. Giuseppe Zamboni Raccolte a cura di Carlo Bitriglini, Vol 1° e 2°, w.d.
[MS 3152 Fisica 90.4]
Zamboni G., Fisica sperimentale del prof. Giuseppe Zamboni compilata in diverse lezioni da Alessandro Zoppi, w.d.
[MS 2586 mat. fis. 84.2]
Zamboni G., Lezioni di fisica, w.d.
[Library of Stimate Institute]

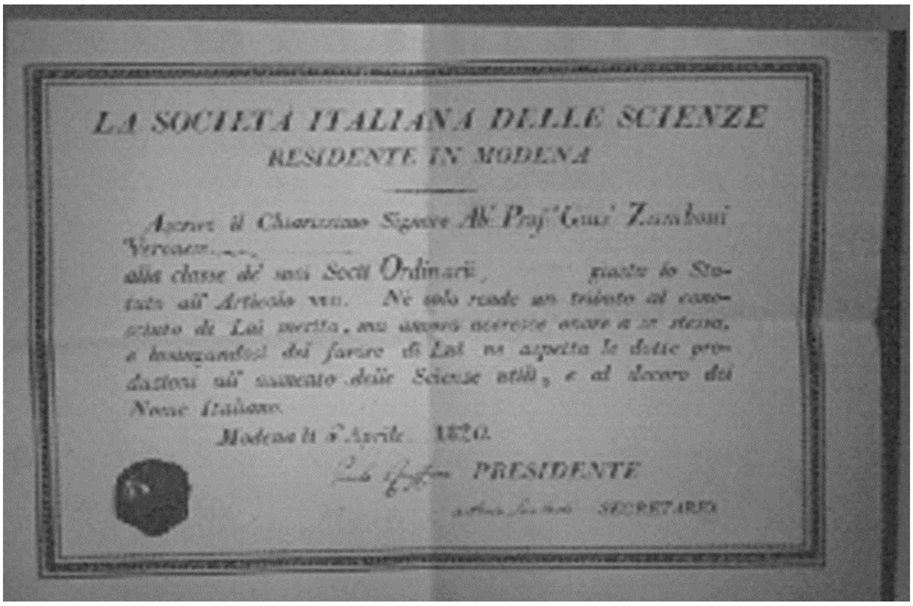
Academic certificates
[Zamboni B 183]
1) La Imperiale e Reale Società Aretina di Scienze Lettere ed Arti, Arezzo, 29 July 1821, mailing member
(Cav Angelo Zoranzo dei Giudici president, Anastasio Angelucci secretary)
2) Società Italiana delle Scienze residente in Modena, Modena, 6 April 1820, ordinary member
(Paolo Ruffini president, Antonio Lombardi secretary)
3) Accademia degli Agiati di Rovereto, Rovereto, 23 April 1813, received 24 May 1813
(Giacopo Iabarelli president, Father Giuseppe Pederzani, Father Carlo Tranquillini revisors, Father Giovanpietro Beltrami secretary)
4) Ateneo di Venezia, Venezia, 6 March 1839, mailing member
(Leonardo Marin president, Luigi Casarini vicepresident, Giacinto Mamia secretary for the sciences)
5) Ateneo di Brescia, Brescia, 3 June 1819, honorary member
(Counte Ugoni president, abbot Antonio Bianchi secretary)

6) Società Economico-Agraria di Perugia, Perugia 3 April 1840, honorary member

(Francesco Connestabile della Staffa president, professor Nazareno Calderini secretary of Acts, Ugo Calindi secretary of Correspondences)

7) Accademia Scientiarum Instituti Bononiensis, Bologna, 3 October 1837

(Antonio Alessandrini president, B. Magistrini)


LA SOCIETÀ ITALIANA DELLE SCIENZE
RESIDENTE IN MODENA

Modena li 8 Aprile 1820.

PRESIDENTE

SEGRETARIO

Fig. 3 Certificate of Italian Society of Sciences assigned Zamboni in 1820.

8) Ateneo di Scienze Lettere ed Arti di Bergamo, Bergamo, 11 January 1844

(Pietro count Moroni president, Agostino Salirono secretary)

9) Accademia Scientifico-letteraria dei Concordi in Rovigo, Rovigo 27 April 1840, mailing member

(L. Campanella president, Flessa secretary)

10) I. R. Accademia di Scienze Lettere ed Arti di Padova, Padova, 15 May 1843, mailing member

(Agostini president, L. Menin secretary for sciences, Antonio Cittadella Vigodarzere secretary for Arts)

11) Reale Istituto d'incoraggiamento alle Scienze naturali, Napoli, 9 March 1820

(Vincenzo Stellati secretary, cavalier Sementini proposing Zamboni to the academy)

LETTERS

Letter of Luigi Sebastiano Alloy to GZ, Milan, 4 July 1800 (Zamboni B 183)

Request of suggestions to build the piles of Zamboni

Letter of Ippolito Anselmi to GZ, Padua, 12 February 1846, with added a communication of abbot Pavoila (Zamboni B 183)

Remembrance of a visit in Padua, about a competition for a position in the law-court

(Abbot Pertile, doctor Franceschi, lawyer Orio, dr. Antonelli, Anselmi, abbot Furlanetto, Torcellini)

Letter of Vincenzo Antinori[20] to GZ, Florence, 26 July 1832 (Zamboni B 183)

Reply to a previous letter about electromotive, about a possible publication on Nuovi Annali Italiani

(Cavalier Nobili, Viesseux)

Letter of Saverio Barlocci to GZ, Rome, 10 June 1837 (Zamboni B 183)

Thanks for the booklet of replay to Fusinieri against the chemical action, about book that is in press for the physical course at the university

Letter of Giuseppe Belli to GZ, Padua, 6 May 1842 (Zamboni B 183)

About theory of pile operation, about chemical theory of metals contact

(August De La Rive, Alessandro Volta)

Letter of Giuseppe Belli to GZ, Padua, 11 October 1843 (Zamboni B 183)

thanks for the received publication

(Abbot Pertile, Sgardi)

Letter of Giuseppe Belli to GZ, Padua, w.d. (Zamboni B 183)

about humidity and the stop of his clock, suggestion to put a little of calcium chloride under glass bell to absorb humidity, about an article on Journal of Padua about a letter of Volta and the theory of contact

(Count Mallerio, Luigi Polidori, Gidal?, De La Rive, Marianini)

Letter of Giovanpietro Beltrami to GZ, Rovereto, 6 April 1832 (Zamboni B 183)

Announcement of the death of Father Felice Antonio Balista

Letter of Pietro Bonamini to GZ, Verona, 9 November 1833 (Zamboni B 183)

Communication about the payment of a bill as requested by Zamboni

Letter of Luigi Canali to GZ, Perugia, 30 January 1821 (Zamboni B 183)

About a work about electromotive that he wants to send to Zamboni

(Guglielmo Piatti printer)

Letter of Luigi Canali to GZ, Perugia, 17 January 1822 (Zamboni B 183)

Communication about some problems with typographer Piatti

(Padre Castori Benedectine, Federigo Chiaromonti)

Letter of Gabrio Casati[21] to GZ, Milan, 19 June 1839 (Zamboni B 183)

Recommendations to Zamboni for professor Brambilla's widow

(Zuliani)

Letter of Gabrio Casati to GZ, Milan, 22 June 1839 (Zamboni B 183)

About the death of professor Brambilla

(Zuliani)

Letter of Antonio Cesari to GZ, Verona, 26 September 1822 (Zamboni B 182)

Letter of Pietro Configliachi to GZ, Pavia, 10 February 1816 (Zamboni B 183)

About electromotive

(Giuseppe Bondoni)

Letter of Flavio Casarotti to GZ, w.d.a.l. (Zamboni B 183)

Letter of Salvatore Dal Negro to GZ, Padua, 1 April 1833 (Zamboni B 183)

Delivery of the result of some experiments about electromotives

(Volta)

Letter of Salvatore Dal Negro to GZ, Padua, 11 November 1833 (Zamboni B 183)

Comments about the experiments published by Magini, about metals contact

(Fusinieri, Laplace)

Letter of August De La Rive to GZ, Geneva, 25 December 1831 (Zamboni B 183)

About theory of perpetual electromotive

Letter of August De La Rive to GZ, Geneva, 24 September 1831 (Zamboni B 183)

About piles

Letter of GZ to lady Virginia de Rosmini of Rovereto, Verona, 15 September 1808 (Autogr. Giuliari b. 226)

Thanks and comments about the sentence of Orlandi, about the diatribe in prefecture with Pinali and Cristani

Letter of GZ to lady Virginia de Rosmini of Rovereto, Arbizzano, 18 October 1839 (Autogr. Giuliari B 226)

From his holidays he communicates that one day during the week he dedicates to his pupils of college, greetings to Fedrigotti e Cripperi families

(Angelica de Rosmini daughter of Virginia)

Letter of Jean Faïloni a GZ, Paris, 23 June 1831 (Zamboni B 183)

Request for the publication of a Zamboni's memory "Sull'Applicazione dell'orologio all'Elettromotore" on Revue Enciclopédique, sent at Bureau Central de actions pour tout a qui regarde les sciences ... Bureau du Bulletin Universel

Letter of Antonio Francesco Falconetti to GZ, Venice, 24 June 1837 (Zamboni B 183)

Request of a collaboration for the Italian Encyclopedia

(Tasso editor)

Letter of Ambrogio Fusinieri to GZ, Padua, 23 august 1832 (Zamboni B 183)

Comments about the work about pendulum in publication on a journal

(Billori)

Letter of Ambrogio Fusinieri to GZ, Vicenza, 16 January 1836 (Zamboni B 183)

Sent the issues of the journal, reassurance that the letter II about electrochemical theory will be printed rapidly

Letter of Ambrogio Fusinieri to GZ, Vicenza, 12 September 1834 (Zamboni B 183)

Assurance that his reply about electrochemical theory will be printed in the Annals of journal

Letter of Ambrogio Fusinieri to GZ, Vicenza, 12 June 1834 (Zamboni B 183)

Announcement of a replay on journal and one of this sent by letter

Letter of Ambrogio Fusinieri to GZ, Vicenza, 19 September 1835 (Zamboni B 183)

Announcement about the change of the printing on the next number of journal of the article about electrochemistry

Letter of Giuseppe Maria Gilardoni to GZ, S. Martin Buon Albergo, 22 April 1841 (Zamboni B 183)

Request of a replay about a liturgical question written by Pojana

(monsignor Marchi)

Letter of Giuseppe Maria Gilardoni to GZ, S. Martino Buon Albergo, 6 May 1845 (Zamboni B 182)

Criticism of two reasoning about soul written by uncle of bishop Father Antonio

Letter of Giuliano Giordano to GZ, Rome, 10 October 1841 (Zamboni B 183) (On the sheets there are some notes of Zamboni about contact theory)

Request of notes and piles of Zamboni for teaching in a school of Naples

Letter of Giuliano Giordano to GZ, Naples, 6 May 1842 (Zamboni B 183)

Announcement that piles and notes were received

(Rector Ferrari)

Letter of GZ to count Gio Batta Giuliari, Verona, 20 January 1831 (Carteggio G.B.C. Giuliari b 587) About the price of clock and piles

(Francesco Miniscalchi)

Letter of Count Grimaldi to GZ, Lucca, 30 December 1818 (Zamboni B 183)

Appreciation of the technique of vanes to better the sensibility of electrical effect, request of technical clear up of piles

Letter of Count Grimaldi to GZ, Lucca, 22 march 1819 (Zamboni B 183)

About a bill of 10 louis for the suppliers Carli, about other payments

(Pasquale de Carli, Leoni, Torri)

Letter of Luigi Guelfi to GZ, Montechiari, 20 march 1813 (Zamboni B 183)

Request of explanations about a lunar phenomenon

Letter of Luigi Lechi to GZ, Brescia, 24 December 1840 (Zamboni B 183)

About the electromotive received from Perego and Candella

Letter of Giampietro Maiocchi to GZ, Milan, 23 august 1831 (Zamboni B 183)

Communication of the price of the piles that weren't paid to Pollani, forwarding of three copies of a Zamboni's work for professor Santoni of Padua and for Agriculture Academy, comments about treatise of electromotive

(Professor Tidini?)

Letter of Stefano Marianini to GZ, Modena, 15 April 1842 (Zamboni B 183)

The friends of professor Giovanni Bianchi admired the electromotives, forwarding his memory about electrology and a memory about magnetization obtained by electrical currents and about insulators, the chemical Martens of Bruxelles contesting Faraday

(Andrea Bugna)

Letter of Stefano Marianini to GZ, Modena, 22 April 1837 (Zamboni B 183)

About theory of contact, memory with chemical action of liquid on metal, about replay of Zamboni to Fusinieri

(Faraday, Archimede, Nobili, Becquerel)

Letter of Leonardo Marin to GZ, Venice, 20 February 1841 (Zamboni B 183)

Convocation for the admission of new members among the forty ones of the Institute

(Count Scopoli, Sandri,, Volta, professor Naniaj)

Letter of G. Mellesio (o Mellonio?) to GZ, Milan, 23 march 1833 (Zamboni B 183)

About an appointment in Melesio's house to discuss the calculuses and to arrange the clock

(Polidori)

Letter of G. Mellesio to GZ, Milan, 24 April 1833 (Zamboni B 183)

Communication of the good operation of a Zamboni pendulum, about a visit of abbot Rosmini

(Castelbarco, Somaglia, Padulli?, Polidori)

Letter of (Metternich), Vienna, 8 February 1817 (Zamboni B 183)

Thanks for the received publication and forwarding of a present

Letter of Pope Pio VII to GZ, Rome, w. d. (Zamboni B 183)

The Pope allows to celebrate the Mass for a feast in the private oratory of brothers Nicolini

Letter of G. Pasini to GZ, Venice, 20 February 1841 (Zamboni B 183)

Communication of the death of Giovanni Maria Zecchinelli, request of names for new ten members of the Institute now available, official presentation of prince viceroy

(Count Scopoli, Bizio, Venanzio, Santini, Rosmini, Viviani)

Letter of G. Pasini to GZ, Venice, 18 February 1846 (Zamboni B 183)

Invitation at the regular meeting

(Scopoli, Letronne, Fapanni, Iappelli, Renier)

Letter of Penzoldi to GZ, w. l., 27 October 1841 (Zamboni B 183)

Recommendation for the care of the study of Alberto de Gasteiger, son of a friend

Letter of Luigi Perego to GZ, Brescia, 27 august 1840 (Zamboni B 183)

Thanks for the electroscopy sent from Zamboni

(Lechi, Galli, Rivato)

Letter of Luigi Perego to GZ, Brescia, 7 May 1843 (Zamboni B 183)

Forwarding of a memory and thanks for the received memory about electromotive, request of two new piles for the Bohnemberger electroscopy

Letter of Alessandro Perez to GZ, Pavia, 16 November 1841 (Zamboni B 183)

Thanks for the lessons of Zamboni that he could attend in Verona, praises of the Zamboni's physics laboratory that is similar to that one in Pavia, praises of the electromotive functioning in Pavia and request of two piles for Bohnemberger electroscopy

(Dr. Zambra, Ampere, Volta, Eustachio Orlandi)

Letter of Rudolphi to GZ, Aniona (e)?, 15 May 1827 (Zamboni B 183)

Recommendation for two friends, professor of history Goefihen and professor of phylology Beoker at the Berlin university, setting out on a journey in Italy

Letter of Antonio Sebastianutti to GZ, Trieste, 30 October 1830 (Zamboni B 183)

Received letter from count Lodovico Fedrigotti that announces the sending of pendulum and piles, paid the platinum wire to friend Olivieri, payment of the piles from Edoardo d'Angeli that will be his student, request of information about the last clock realized

Letter of Zanini (o Ranini?) Garbi to GZ, Pisa, 18 December 1834 (Zamboni B 183)

Request to send to professor Luigi Pacinotti, director of physics laboratory of Pisa, his universal dynamic electroscopy, forwarding of the Science Annals of Regno Lombardo Veneto

Letter of GZ to Gaetano Spandri, w. d. and l. + 1 sheet and portrait [Autografoteca Scolari, B 273]

Forwarding to Spandri an assay about galvanic phenomena received from Bertoncelli, instructions to build a galvanometer

(De la Rive, Nobili, Arago, Dujardin)

Letter of GZ to Jacopo Antonio Pinali to the Administration office of the Regio Liceo convitto of Verona, Verona, 14 April 1808 [B 76]

Request to have suitable rooms to realize the chemical and physical experimental laboratory

Letter of GZ to Alessandro Torri, Verona, 16 November 1809 [B 49]

Torri receives the commission to choose the best newspapers for the Literary Society

(Antonio Zamboni, Bottagisio)

Letter of GZ to Pietro Cossali, Verona, 15 February 1804 [Collection Pietro Cossali MS 1512^{30} c. 166]

About the received mathematical work about the equation of d'Alembert and the ephemerides, about the assignment of teaching post of experimental physics in Parma university and about the instruments given by count Giovan Battista Gazzola to the school

Letter of GZ to Pietro Cossali, Verona, 1 April 1813 [Collection Pietro Cossali MS 1512[30] c. 165]

Thanks for the article about his pile published in Giornale dell'Italia Letteraria

Acknowledgements

I wish to thank Mr. Agostino Contò to have placed kindly many halps to consult the manuscripts of Giuseppe Zamboni and I am grateful to Giovanna Cavalleri for her help given in the translation.

NOTES

1) Pietro Cossali (Verona, 1748-1815) was a Theatine abbot and he showed a precocious genius for mathematical research. In 1786 Ferdinando of Borbone gave him a teaching post for experimental Physics at Parma university, then transformed in to Astronomy, Meteorology and Hydraulic. He was very known for the fundamental book about Italian history of mathematics. Since 1806 he moved to Padua university were he taught "sublime calculus" and was consultant for the control of rivers (Baldini 1984; Gamba, 1824; Morando di Custoza, 1980; Tinazzi, 1994).

2) The count Giovan Battista Gazzola (Verona 1757-1834) was president of Agriculture Commerce and Arts Academy of Verona. During 1784 begun to realize a collection of fossil fishes coming from Bolca quarries that he had acquired in 1787. He organized a sort of private museum with more than 1200 exemplaries of fossils that were requisitioned by the French military but he made another collection acquiring other collections (Spreti V., 1931, vol. III, p. 385; **Sorbini;** Di Crollanza G.B., 1886, vol I, p. 463).

3) Benedetto Del Bene (Verona 1749-1825) was perpetual secretary of Agriculture Commerce and Arts Academy of Verona, and secretary of Italian Society, secretary of Painting and Sculpture Academy, registrar of health office, principal of Public Schools (Adorno, 1988; Cimmino, 1968, p. 562).

4) Count Alessandro Carli (Verona 1740-1814) was passionately fond of theatre, historic, director of education in Verona, author of theatrical tragedies (Preto, 1977; Murari Bra, 1807; Cimmino, 1968, p. 558).

5) Giovanni Battista Alberto Fortis (Padua 1741-Bologna 1803) was Augustinian abbot, one of the most important Italian naturalists. After some years of religious life he left the monastery and worked at the compilation of the Encyclopedic Journal. He was associated to many academies and he taught in Padua university (Gamba, 1824; Vedova, 1835; Poggendorff, 1863; Nappo T., Noto P., 1993, p. 633)

6) Gianpietro Giovanni Alessandro Majocchi (Cremona ?-Torino 1854) was physics and mechanics professor at college S. Alessandro of Milan (Poggendorff, 1863, p. 20)

7) August De La Rive (Geneva 1801-1873) was a physicist, rector of Geneva Academy and he was active in political engagement (Nappo T., Noto P., 1993 p. 520)

8) Ambrogio Fusinieri (Vicenza 1773-1853) was a doctor and physicist, author of many works about electricity supply (Poggendorff, 1863; Nappo T., Noto P., 1993 p. 654)

9) Salvatore Dal Negro (Venice 1768-Padova 1839) abbot, physics and mechanics professor in Padua university, he was interested of electrical and electromagnetic phenomena, he took care of the instruments of physics laboratories of the university (Colombini G., 1994; Colombini G., 1986; Poggendorff, 1863)

10) Stefano Marianini (?-1844) was physics professor (Nappo T., Noto P., 1993, p. 891)

11) Guillaume Antoine De Luc (Genf 1729-1812) was a chemist and geologist particularly active in the studies about the electricity supply (Poggendorff, 1863, p. 546; AA.VV., 1958, p. 419)

12) Jean Claude Eugène Peclet (Besançon 1793-Paris 1857) physics professor in the college of Marsiglia and Industrial Physics professor in the Arts and Manufactures school of Paris (Poggendorff, 1863)

13) Ciro Pollini (Verona 1782-1833) was teacher and botanist, passionate agronomist and wrote his main work about olive-growing. He discovered a new species of cochineal on olives of the Garda lake (AA.VV., 1990).

14) Alessandro Torri (Verona 1780-1844) noble, fond of literature, editor of Pindemonte's books (Cimmino N.F., 1968, p. 581; Nappo T., Noto P., 1993 p. 1349)

15) Giuseppe Torelli (Verona 1721-1781) doctor in law, poet, teacher of Pindemonte (Cimmino, 1968, p. 581; Pindemonte I., 1840; Nappo T., Noto P., 1993 p. 1345; Gamba 1824)

16) Giovanni Bottagisio (19° sec) was a landholder that participated to the projects to recover the Veronese country in the years 1860-1880: he was called to participate to the executive commission that supervised the dossiers near Chamber of Commerce, then he became one of the thirty delegates of the society for the agrarian land and the building of irrigation canal.

era un proprietario terriero che partecipò ai progetti di recupero della campagna veronese negli anni 1860-1880: fu chiamato a far parte di una commissione esecutiva che seguiva le pratiche presso la camera di commerio, poi divenne uno dei trenta delegati del consorzio per i fondi agricoli e la costruzione di un canale di irrigazione. (Zalin, 1986; Zenetti; Zumiani, 1987-88)

17) Luigi Canali (Perugia 1759-1841) after the studies in geometry and mathematics had the philosophy degree and was associated to the College of philosopher, doctors and artists of Perugia. At first he was assigned lecturer of philosophy, but in 1799 he had the chair of physics and chemistry, reviving the interest for the sciences in Perugia, being interested also in astronomy. In 1803 was assigned director of municipal library in Perugia. He constituted also the core of collection of Natural History Museum, then in 1824 he was constituted rector of Perugia university (Lippi Boncambi, 1974).

18) Pietro Configliachi (Milan 1777-Cernobbio 1844), was trained to theological and philosophical studies, and became Barnabite. He was supplant professor of letters and philosophy in the main colleges in Milan. After the age of 22 he taught physics and natural sciences in Cremona. He was a skilled researcher and he was assigned to a teaching post for physics at Pavia university to substitute Alessandro Volta. Then he became director of physics laboratory and of observatory, then in 1811 rector of the university until 1814. In 1816, after he had the philosophical degree, he was assigned deputy manager of mathematic faculty. At the Pavia university he had the physics teaching post since 1817 to 1841 and was an important reorganizer of this institution (Ramazzotti, 1982).

19) Giovan Battista Giuliari (Verona 1810-1892) canonical, paleographer, director of Capitulary Library in Verona, author of books about Veronese language and culture (AA.VV., 1994; Marchi, 1993)

20) Vincenzo Antinori (Florence 1792-1865) was conspicuous as one of most enthusiastic researcher of Italian scientific traditions of which he traced a history from 17th to 19th century, he collaborated with Leopoldo Nobili at the experiments about electromagnetism, in 1831 he became director of the Museum of Florentine Observatory (De Caro, 1961; Nappo T., Noto P., 1993, p. 76)

21) Gabrio Casati (Milan 1798-1893) was assistant manager of Milanese college of S. Alessandro, in 1834 was established podestà of Milan, president of temporary government, since 1853 was assigned senator (Ambrosoli, 1978, p. 244; Nappo T., Noto P., 1993, p. 383)

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