

CHEMISTRY IN FLORENCE
FROM THE LAST MEMBER OF “MEDICI FAMILY” TO THE PRESENT DAYS

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1 – Historical Background

In 1321, the year of the death of Dante Alighieri, the so-called *Studium Generale*, the first nucleus of the University of Florence, was founded following a deliberation of the Florentine Republic. Among teaching courses there were Civil and Canonical Law, Literature and Medicine. Since the beginning, however, the life of the *Studium Generale* was difficult being the *Studium* opposed by Popes, Emperors and local Authorities. The *Studium Generale* was then suppressed and refounded several times. Later, during the Medicean rule, the Grand-Dukes owned a collection of Natural History, in addition to a large amount of paintings, statues and archaeological relics. The collection of Natural History, not ordered according to scientific criteria, was considered only as a curiosity to show to renowned guests and princes rather than an ensemble of natural samples collected for people advantage. This situation did not change until the last Medicean Grand-Duke, Gian Gastone (1671-1737), sat on his throne.

In 1763 the new Grand-Duke, Francis II of Lorraine (1708-1763) ordered Giovanni Targioni Tozzetti (1712-1783) to classify “the natural things of the Florence Gallery”. After finishing the job Targioni Tozzetti recommended, without success, to use the Medicean collection for public teaching. Only in 1775 the next Grand-Duke, Peter Leopold of Lorraine (1747-1792), inaugurated the Museum of Physics and Natural History and called Felice Fontana (1730-1805) as Director. However, the Museum was never opened to public teaching. In 1807 Charles Ludwig of Bourbon (1799-1883), king of Etruria under the mother supervision, established the Lyceum of Physical and Natural Studies.

The University, as it is known today, was organized in 1859, a couple of years before the Italian unification, when the Faculty of Physical and Natural Sciences of the Institute for Specialization and Applied Higher Studies was founded. The Institute was sponsored by public and private organizations. After the First World War, due to economic difficulties related to monetary devaluation it was decided by the fascist administration to stop the Institute in spite of the protests from the last Superintendent, Marquis Filippo Torregiani (1851-1924). As a result, the Institute ended September 30th, 1924 and the next day, October 1st, 1924, was the starting day for the University of Florence.

2 Scientists and Naturalists in the period of the Museum of Physics and Natural History (1775-1807)

2.1 Giovanni Targioni Tozzetti was born in Florence in 1712 and there he died in 1783. Doctor and naturalist, he was the forefather of a family of scientists whose works contributed to the scientific and economic progress of Tuscany. After graduation in Medicine he preferred to study Botany owing to the fascination for this discipline inherited from the father. Later, as a consequence of his deep interests in Botany, he became Director of the Florentine Botanical Garden. During his life he was interested in several other disciplines, from Vegetal Pathology to Medicine, from Zoology to Mineralogy, Architecture and Cartography. He drafted a corographic, topographic, and physical map of Tuscany.

In 1763 Giovanni Targioni Tozzetti published the Catalogue of the Natural Products conserved in the Royal Gallery. He proposed to dedicate a scientific Museum to this collection. Indeed, the Grand-Duke accepted the proposal, and in 1775, it was created the Museum of Physics and Natural History. He was also the founder of the lito-mineralogical Collection that includes nearly 9000 rocks and mineral samples. This collection is still open to public, due to the collaboration between the Museum of Natural History (University of Florence, Mineralogical Section) and the Museum of the History of Science.

2.2 Felice Fontana was born in the small town of Pomarolo (Trento, Italy) in 1730. Anatomist, physiologist, chemist and naturalist, he was one of the most famous Italian scientists of the eighteenth century. He firstly studied Histology and Physiology at the Universities of Padua and Bologna where he moved in 1755 as an assistant to physiologist Caldani (1725-1813). He understood basic properties of the nervous fibers and muscles, such as the electrical nature of the nervous stimulus. After being nominated Professor of Logic at the University of Pisa in 1765, he was called in Florence by the Grand-Duke Peter Leopold as court physicist. Then, he took the Direction of the Royal Museum of Physics and Natural History until 1805. During this period he collaborated with Susini (1754-1814), a famous wax modeler, and prepared anatomical waxes still conserved in the Museo della Specola (University of Florence). He was also interested in several natural phenomena such as the iris motions, the viper poison effects on humans and the macroscopic observations of the red globules.

Ten years after his nomination, he undertook a five years voyage to France and England to establish scientific relationships with the most important chemists, such as A. Lavoisier and J. Priestley. In these years he published chemical studies on gaseous fluids in the field of the so-called pneumatic

chemistry, the most advanced field of research in Europe at that time. In 1775 he wrote “Physical Researches on the fixed air”, a treaty on carbon dioxide. Four years later he wrote two other treaties, published by the London Royal Society: “Experiments and observations on the inflammable air breathed by various animals” and “Account of the airs extracted from different kinds of water”. In 1783 he proposed in the “General Principles of the Solid and Fluid Bodies” that matter should be subjected to two Newtonian forces, attraction and expansion. Felice Fontana died in Florence in 1805.

2.3 Giovanni Fabbroni was born in Florence in 1752 and there he died in 1822; he was a polyhedral man, i.e., naturalist, economist, agronomist, chemist and politician. He first collaborated with Fontana in the formation of the Museum of Physics and Natural History. In the years 1777-



Giovanni
Fabbroni

1778 he wrote the essay “Considerations on the actual conditions of Agriculture”. He was then involved in different problems relative to wine making and fertilizers; moreover he favored the diffusion of new plants and arboreal cultivations. He published an essay of mineralogical character,

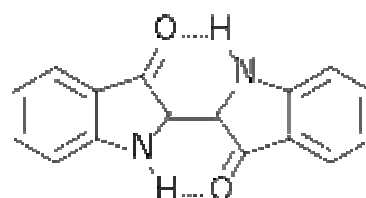
“About charcoal or mine carbon commonly known as fossil fuel”. He made also electrochemical studies by means of the Volta electrochemical cell.

During the kingdom of Ferdinand III of Tuscany (1769-1824) he became member of the International Committee of Weights and Measures and in 1800 was nominated Director of the Florence Mint. He entered also the Committee for the introduction of the metric system in Tuscany and during the Restoration he was responsible of the Tuscan mines. Following the death of Fontana, he was nominated Director of the Museum. A dark-side moon crater bears his name.

3 Chemists in the period of the Lyceum of Physical and Natural Studies (1807 - 1859)



3.1 Giuseppe Gazzera was born in Florence in 1771. Although he graduated in law in 1795, he was particularly attracted by the researches of French chemists. He obtained the professorship in Chemistry at the



Indigo dye is an organic compound with a distinctive blue color. Historically, indigo was a natural dye extracted from plants, and this process was important

Lyceum and was member of the Accademia dei Georgofili and of the Accademia della Crusca. He studied indigo and boric acid (H_3BO_3) found in minerals nearby Larderello and was also active in the field of Agricultural Chemistry. After Restoration and the suppression of the Florentine Lyceum, Gazzeri moved, as Superintendent of the Pharmacy School, to Santa Maria Nova Hospital where he taught for longtime Pharmaceutical Chemistry. Giuseppe Gazzeri died in Florence in 1847. In appreciation to his efforts invested in chemistry, which have shown exceptional commitment, professionalism and openmindedness, a commemorative marble plaque was set in Carmine square (Florence).

3.2 Gioacchino Taddei (1792-1860) was the successor of Gazzeri as Superintendent and teacher of Pharmaceutical Chemistry. He was involved in several researches: corn gluten, quality of the city water in Florence, and mercury poisoning. He also published a notable book entitled “General Pharmacopoeia”. In late 1848 he was suspended from teaching due to the role of head of the Tuscan Parliament following the 1848 revolution. He was reintegrated in his teaching duties only in 1859, following the collapse of the Grand-Duchy of Tuscany and after the Italian unification was nominated senator of the Italian Kingdom.



Commemorative plaque of Giacchino Taddei attached to his home-wall in San Miniato, Pisa.

3.3 Luigi Guerri (1823-1892) was a pioneer in the researches on disinfectant substances. He made studies on water quality of the city of Florence, such as Gazzeri did. Other important researches were focused on the synthesis and characterization of several compounds of phosphorus and iodine. He synthesized piro- and metaphosphoric acids and an allotropic form of phosphorus; he also studied the properties of red phosphorus. He discovered synthetic methods for the production of potassium and sodium iodides. As full professor of Pharmaceutical Chemistry, he was one of the most renown chemists and teachers in the nineteenth century. He was also an active patriot and soldier, and took part in the battles of Curtatone and Montanara.

4 Chemists in the period of the Institute of High Specialization and Applied Studies (1859 - 1924)

In 1859 the provisional government of Tuscany, led by the “Iron Baron”, Bettino Ricasoli (1809-1880), allowed the formation of the Institute of High Specialization and Applied Studies (later, University of Florence) and nominated as Superintendent Marquis Gino Capponi (1792-1876). The Institute duties were: (a) the professional training and (b) the specialization. Accordingly, the Institute was intended to supply teaching posts for important disciplines so that Florence could become the capital of the Italian culture before the National independence. Four “Schools” were instituted: Philology and Philosophy, Legal Sciences, Natural Sciences, Medicine and Surgery, aimed at instructing young students beyond the college studies and at encouraging them to the “true creativity”. The project, somehow utopian and too ambitious, was never achieved because of lack of enough financial support.

4.1 The first Chemistry chair in Florence was instituted in the nineteenth century and the choice for this high teaching post was a German chemist, Hugo Joseph Schiff. He was born in 1834 in Frankfurt on Main from a Jewish family of Spanish origin. He was nominated full professor at the “Institute of High Specialization and Applied Studies” following the invitation of Matteucci, minister of Education and famous physicist. Two years later he discovered the so-called “Schiff bases” which are immines synthesized by condensation of amines with aldehydes. The Schiff bases form a family of compounds largely used not only as reaction intermediates but also in the coordination chemistry. They are widely applied and constitute an essential part of every textbook of Organic Chemistry. In the same period he developed a method for the aldehyde detection by means of the “Schiff reactive” which today is used for the determination of fragments along the DNA sequence.

The first Schiff laboratory was in the Museo della Specola. In the laboratory annex Schiff and other famous Italian chemists, among which S. Cannizzaro (1826-1910) and F. Selmi (1817-1881), founded *Gazzetta Chimica Italiana*, the first Italian journal devoted to chemical research. Later in 1877, he won the Chemistry chair in the University of Turin. However, he unwillingly moved to Turin and in 1879 he finally reentered in Florence thanks to the recommendation of the mayor U. Peruzzi (1822-1891). Back in Florence he requested a larger room for his activity and was satisfied when the chemical laboratories were transferred in the former stables of the Grand-Duke, where the physical laboratories were already set. The cohabitation between chemists and physicists was difficult, due to the harsh temper of Schiff.

Since young student, Schiff developed strong liberal ideals. He met Marx in the occasion of the First International Workingmen's Association and brought to Italy his revolutionary ideas. In 1894 he was one of the founders of the socialist newspaper *Avanti!*. Due to its character, he was not loved neither by his contemporaries nor students, but in occasion of his 70th birthday the most renowned European chemists met in Florence to honor the old scientist. Ugo Schiff died in Florence in 1915.

4.2 Augusto Piccini was born in 1854. He was a precocious student, particularly gifted in chemistry. In 1878 he graduated in Chemistry in the University of Padua and later moved to the University of Rome as assistant of S. Cannizzaro (1826-1910). During these years he knew G. Ciamician (1857-1922) and R. Nasini (1854-1931) with whom he developed a deep friendship lasting until his premature death. In 1885 he became professor of General Chemistry at the University of Catania and two years later he obtained the professorship in Rome. Eventually, he moved to Florence, as professor of Pharmacy, teaching also Organic Chemistry.

Piccini was a talented experimental chemist which contributed to revitalize the chemical research in Italy. He studied in particular the relationship between periodicity and atomic weight of the elements. The contribution of his work to Chemistry was acknowledged by D. Mendeleev (1834-1907) and B. Branauer (1855-1935). Indeed, most part of Piccini studies, performed by means of the traditional “wet chemistry”, has been confirmed only in recent time by X-ray diffraction studies. When in 1905 Piccini died, due to septicemia following an ordinary tooth extraction, he was not yet 51 years old.

4.3 Guido Pellizzari was born in Florence in 1858 and died there shortly before turning his 80th birthday. He graduated in Chemistry under Schiff guidance and remained, as assistant, in his laboratory where he synthesized the derivatives of sebacic, succinic and ftalic acids. At the age of 31 he became full professor of Chemistry in the University of Catania and two years later moved to Genova as Professor of General Chemistry. During the following twenty years he devoted himself on organic synthesis and resolution of chemical problems related to the processing of photographic plates. He studied bisulfites salts of organic bases and favored the use of these compounds for this process.

In 1916 he came back to Florence as professor of Pharmaceutical Chemistry and held this position until his retirement in 1933. In 1919 he was elected corresponding member of the Accademia dei Lincei and six years later he received the prize from the Accademia for his studies on guanidine.

4.4 In the occasion of the X National Congress of the Italian Chemical Society a plaque was placed on the native house of Angelo Angeli in Tarcento (Udine, Italy). It is written:

*“To Angelo Angeli, son of the strong people of Friuli
brilliant developer of ideas which were forerunners of modern chemistry
Italian scientists and technicians attending the X National Congress of Chemistry
gathered in his homeland
mindful of the imperishable work
with devotion on his native house this plaque placed
June 22nd, 1968”.*

Angeli was born in Tarcento in 1864. Since its youth he was interested in Chemistry and during the military service he was enrolled in the University of Padua where he knew the famous chemist Giacomo Ciamician (1857-1922). This latter acknowledged the uncommon cleverness of Angeli and when he moved to Bologna in 1889 he asked Angeli to follow him, though Angeli was not yet graduated. After graduation he applied for the chair of Teaching Chemistry and won. However, he did not become professor since he missed specific qualifications for the subject! Few years later he accepted the chair of Pharmaceutical Chemistry in Palermo, under lobbying and recommendation of Adolf von Baeyer (1835-1917); eventually in 1905 he moved to Florence as professor of the same discipline. He succeeded Schiff in 1915 and later became professor of Organic Chemistry, a chair purposely set for him.

| NOMINATION YEAR | ANGELI INDICATION FROM | WINNER |
|-----------------|--|------------------------|
| 1911 | <i>A. von Baeyer</i> | M. Curie |
| 1913 | <i>A. von Baeyer</i> | A. Werner |
| 1917 | <i>N. Parravano G. Pellizzari</i> | Premio non assegnato |
| 1918 | <i>H. J. Baker</i> | F. Haber |
| 1922 | <i>N. Parravano</i> | F. W. Aston |
| 1924 | <i>G. Pellizzari L. Rolla</i> | Premio non assegnato |
| 1926 | <i>L. Cambi</i> | T. Svedberg |
| 1928 | <i>G. Bruni L. Cambi G. R. Levi A. Menozzi</i> | A. Windaus |
| 1931 | <i>G. Pellizzari</i> | C. Bosch F. Bergius |

The scientific production of Angeli consists of 220 papers among which five are the most remarkable:

1906 - On some oxygenated compounds of nitrogen;

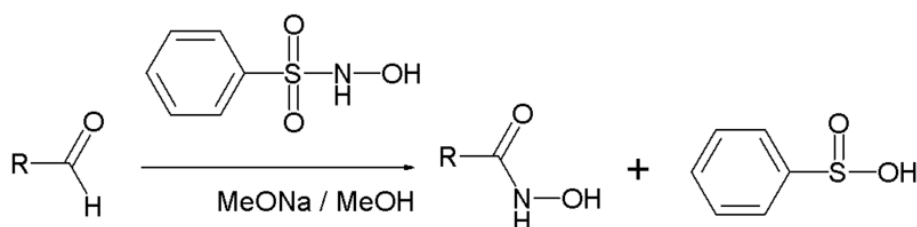
1911 - The action of nitrous and nitric acids on indole and on pyrrole;

1916 - On the formation of azocompounds;

1924 - On the analogy of behaviour between some benzene derivatives and the corresponding derivatives of the aliphatic series;

1930 – Studies and considerations on the structure of diazocompounds.

He was also interested in natural substances for whom he related the olfactory activity to the molecular structure. The name of Angeli is also associated to the so-called “reaction of Angeli and Rimini” (see below) according to which aldehydes react with sulfonamide in alkali solution giving hydroxammic and sulfonic acids



In addition to Baeyer his work was appreciated by a number of other chemists among which Richard Willstätter, 1915 Nobel prize winner. It is also noteworthy to remind that Angeli was repeatedly nominated for the Nobel prize, from 1910s up to his death. Angeli died in Florence in 1931.

4.5 Nicola Parravano was born in Fontana di Liri (Rome, Italy) in 1883. He graduated in Chemistry at 21 and quickly obtained a grant to perform his studies in Berlin in the field of the steel industry, concrete and explosives. As metallurgic chemist and favourite pupil of Emanuele Paternò (1847-1935), his influence over the chemical community was steadily increasing until Parravano became in the late 1920s and 1930s the leading personality among chemists. Not yet thirty years old, he was professor of Chemistry and Technology in the University of Padua and then, in 1915, he was appointed full professor of Physical Chemistry (the first in Italy) in Florence. During the war he had important assignments as expert of explosives and entered the Military Commission for their testing. In any case the Florentine period was quite short, from 1915 to 1919. He considered Florence a peripheral university and managed successfully to come back to Rome; he strongly supported fascism, and from it, he received large financial support, credit and power. During the fascist dictatorship Parravano was regarded as the foretype of the “fascist scientist” caring more about applied than fundamental science. In this period he was among the organizers of the National Institute of Chemistry and then, with Guglielmo Marconi (1874-1937), of the National Research

Council. Among the scientific community he was considered, more politician than chemist. At the utmost of his scientific and political career, suddenly, he died of an heart attack at the age of 55 in summer 1938.

4.6 Luigi Rolla, was born in Genova in 1882; in 1902 he graduated in Chemistry and in 1908 obtained a six months grant to study in Berlin under Walter Nernst (1864-1941). There he performed research on surface tension at very low temperature, verifying the third principle of thermodynamics. In 1921 he was nominated professor, subjected to confirmation, of Inorganic and Organic Chemistry in the University of Sassari but in the same year he moved to Florence as full professor. Three years later he sent a sealed envelope to the Accademia dei Lincei as safeguard of results obtained with the young graduated Lorenzo Fernandes (1902-1977) describing the isolation of a new element of atomic number 61 under fractioning of rare earth minerals. The element was named *florentium* after the city and the university of Florence. In the same year a team of American chemists from the University of Illinois, led by J.B. Hopkins (1873-1952), with his coworkers L. Yntema (1892-1976) and J.B. Harris (1901-1972), claimed the same discovery and called the element illinium. A long controversy followed to establish which team had the priority of the discovery. It is worth telling that neither team isolated element 61. In 1942 Rolla, G. Piccardi (1895-1972), J. Junkes (1900-1984) and A. Gatterer (1886-1953) – two ecclesiastic members – of the Papal Academy - published a note withdrawing the discovery of *florentium*. It was only in 1945 that the occurrence of element 61 was experimentally obtained by J.A. Marinsky (1918-2005), L.E. Glendenin (1918-2008) and C.D. Coryell (1912-1971) analyzing the by-products of the uranium fission. The name of promethium for this “rare earth” was given only two years later. Among other scientific results, Rolla developed a method for the determination of the ionization potentials of the elements. In 1931 he received the Cannizzaro prize for the detection of the natural radioactivity of Samarium. In 1935, Rolla came back to the University of Genova. He retired in 1952 and died eight years later, at the age of 78.

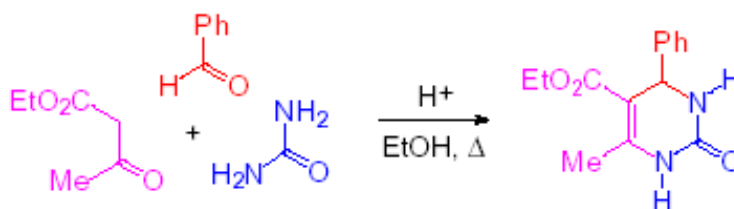
5 Chemists in the period of the Royal University of Florence (1924 - 1946)

5.1 Sergio Berlingozzi was born in Montevarchi (Arezzo, Italy) in 1890. In 1913 he graduated in Chemistry and in 1922 moved to Naples as university assistant of Pharmaceutical Chemistry. In this period he characterized the composition of *squalus acanthias* liver oil (shark liver-oil) and published “Practical Guide to Qualitative Analysis”. The years 1928-1933 were hugely fruitful and rich of results: firstly, he worked on the relationship between physiological

properties of drugs and molecular structure, secondly he refined chemical methods for drug analysis and studied the pharmacological effects of nitroarsenic derivatives.

After a short period spent in Rome he went back to Naples as professor in charge of the Organic Chemistry and in 1933 he won the professorship of Pharmaceutical Chemistry at Siena University. In 1946 he was called to Florence, by unanimous vote of the Faculty of Sciences of the University, as professor of Organic Chemistry. In Florence he worked on the systematic purification of aminoacids by paper chromatography and electrophoresis and studied the antiepileptic properties of phenylacetate. There, on late 1957, he died.

5.2 Mario Torquato Passerini was born in 1891 in the small town of Casellina/Torri (now part of the city of Scandicci, Florence, Italy). He took part in the First World War and graduated in Chemistry and Pharmacy in 1916 on leave. In 1921 he published the first paper reporting on the reaction later known as “Passerini reaction” (on the right). This three-component reaction among a carboxylic acid, a double C=O bond from an aldehyde or a ketone and an isocyanide paved the way to the direct synthesis of hydroxilates of carbosamides. The Passerini reaction is fast in aprotic solvents at room temperature. On this basis it is believed that the reaction does not follow an ionic mechanism. The hydrogen bond plays a fundamental role in the formation of the cyclic transition product.



In 1930 he became professor in charge of the Pharmaceutical Chemistry course in Siena and then in 1936 full professor of the same discipline at the University of Florence. In the years following World War II he characterized the natural substances in *olea europea* and *lygustrum japonicum* leaves and in *helichrysum italicum* flowers of. He retired in 1961 and died the following year in his home of Florence.

5.3 Giovanni Canneri was born in Montelupo Fiorentino (Firenze, Italy) in 1897. After graduation in Inorganic Chemistry he reported on the synthesis of several compounds of thallium: nitrates, ferricyanides, iposulfites, chromates, sulfites and sulfates. In 1922 he discovered double sulfate salts, largely used by Rolla in the search of element 61 by means of mineral fractioning. In 1932 he isolated the element praseodymium (Pr) in the metallic state and synthesized Pr alloys with Al, Mg, Cu and Ag. In 1934 he took the professorship of Analytical Chemistry in the University of Florence. Subsequent studies were on the catalyst role of V₂O₅ in the conversion of methanol to

formaldehyde and on the polarographic method for the quantitative determination of cerium, in collaboration with Danilo Cozzi (1916-2004). After the war he proposed with Cozzi the identification method of fluorides by means of the alteration of glassy surfaces and with Maria Marconi (1900-1985) the identification method of esterified oils. Curiously, he was also involved in a odd event related to the belief of UFO. The mysterious whitish glassy objects swayed in the skies of Florence, 27 October 1954, were analyzed by Canneri which refuted the idea of an extraterrestrial origin. Canneri died in Florence in 1964.

5.4 Giorgio Piccardi, born in Florence in 1895, was an eclectic chemist for his wide interest



Oil on canvas self-portrait by Giorgio Piccardi

in many fields of research. After graduation in 1921 he elucidated the correlation between ionization energies and periodic properties of the elements. He was then committed to the fractioning of rare earth minerals in searching for element 61, tentatively called *florentium*, but the attempts to confirm its presence failed. He took care personally of more than 50000 samples in the fractioned crystallizations and the spectroscopic analysis to estimate the purity grade. After taking the professorship in Genova he came back to Florence in 1945 and starting from this year he addressed his attention to the dynamics of natural processes. He studied the so-called “fenomeni fluttuanti” (floating phenomena), i.e., evolutionary processes in open systems depending on external forces. He observed the precipitation of BiOCl in water solution and

related the process to the influence of sunspots on chemical reactions. Piccardi was also interested in the study of interphase and surface phenomena and assembled the instrumentation, the “tensiometro bifilare”, now visible in the Museum of Science n Milano. He died in Florence in 1972.

5.5 Vincenzo Caglioti, born in Calabria in 1902, graduated in Chemistry in the University of Naples and became professor in the University of Florence in 1936. After only two years he moved to Rome where he taught for almost 40 years. Well-known and famous person, he was president of the Italian Research Council (CNR) and obtained the National Prize for Chemistry in 1957. While in Rome, on December 1998, he passed away at the very grand-age of 96.

5.6 Adolfo Quilico was born in Milano in 1902 and soon after graduation he refuted the postulated occurrence of silver suboxide (Ag_4O) by means of X-ray spectroscopy. In 1930, following the studies of Angeli he discovered a new method for the synthesis of “pirrole blacks” and determined their structure. In 1936 he took the professorship in the University of Cagliari and then was called to Florence. In 1943 he went back to Milano following the retirement of his mentor, Giuseppe Bruni (1873-1946). He studied the reaction between benzonitriloxide and ethylene derivatives to give isoxazolines. In so doing, he clarified the reactivity of double C=C bonds. In 1970 he received the prize Karrer from the University of Zurich and died in Milano on December 1982, the day before his 80th birthday.

5.7 Enzo Ferroni died in a Florentine hospital on the April 9th, 2007 at the age of eighty-six. He was born in Florence in 1921 and was educated at the University of Florence where he took his degree in Chemistry “Magna cum Laude”, (full marks and honors). Here, too, he met professor Giorgio Piccardi (1895-1972) and their friendship kindled the deep and warm interest in Florence and its artistic treasures. Soon after World War II he visited Belgium and thereafter returned for a long stay. In Brussels he met Ilya Prigogine (1917-2003) with whom he began to share a deep interest in the study of the thermodynamics of surface phenomena.

For a great part of his professional life, Ferroni was physical-chemistry master firstly at the University of Cagliari (1961-1965) and latterly in Florence (1965-1991). In 1967 he was elected “Preside” (Head) of the Faculty of Science and in 1976 “Magnifico Rettore” (Rector) of the University of Florence. Five years after his retirement he was created Emeritus professor.

On Friday November 4th, 1966, Ferroni’s scientific interests would drastically change; after a month of heavy rain, the Arno River overflowed its banks, flooding the city of Florence and causing incalculable damage to life, property, and cultural patrimony. Now known as “l’Alluvione,” the Florence Flood revolutionized the field of art restoration as no other single event: a great part of this “revolution” was carried on by Ferroni, who devoted his genius and strength to the paintings restoration. Ferroni set up and tested innovative technologies in the field of cultural heritage conservation.