Brioschi, Francesco | Encyclopedia.com

(*b*. Milan, Italy, 22 December 1824; *d*. Milan, 14 December 1897)

mathematics, hydraulics.

Brioschi graduated in 1845 from the University of Pavia, where he was a student of Antonio Bordoni. From 1852 to 1861 he was a professor of applied mathematics there, teaching theoretical mechanics, civil architecture, and hydraulics. He was the general secretary of the Ministry of Education in 1861–1862, a senator from 1865, and, from 1870 until 1882, a member of the Executive Council of the Ministry of Education. In 1863 Brioschi organized the Istituto Tecnico Superiore in Milan, serving as director and professor of mathematics and hydraulics until his death. From 1884 he was president of the Accademia Nazionale dei Lincei.

From the beginning of his career, Brioschi strove to overcome the backwardness of Italian mathematics, to popularize new scientific trends, and to raise the quality of the teaching of mathematics in secondary schools and universities. He published many essays and reviews, and participated in the organization of the journal *Annali di matematica pura ed applicata*, heading its editorial staff from 1867 until his death (until 1877 in conjunction with Cremona). He also helped to organize the journal *Politecnico*.

In his original papers Brioschi appears as a virtuoso in computation, as an analyst, and as an algebraist. In the works of his most fruitful decade (1851–1860) he widely applied and developed the still new theory of determinants. His *Teoria dei determinanti* (1854) was the first nonelementary statement of the theory and its basic applications. Brioschi devoted several important papers, following Caley, Sylvester, and Hermite, to the then developing theory of forms of two or more variables, which Hermite termed "… one of the major mathematical achievements of our time." He applied exclusively algebraic means of solution to such questions as the deduction of equations in partial derivatives for the discriminant of a binary form and for the resultant of two such forms. A significant part of his results in this area was included in a monograph published in the first four volumes of *Annali di matematica*.

In these same years Brioschi added new results to the theory of the transformation of elliptic and Abelian functions. In his greatest achievement, following Hermite and simultaneously with Kronecker, he applied elliptical modular functions to the solution of fifth-degree equations. At the same time, Brioschi popularized Gauss's theory of surfaces in Italy and brought forth, in connection with this, geometric papers.

During the 1860's and 1870's Brioschi continued his work in algebra and analysis in traditional directions, using the Weierstrass theory of elliptic functions. From these viewpoints, he addressed himself to the theory of differential equations and, in the 1880's, to the theory of hyperelliptic functions. His second great achievement relates to this latter period: the solution of sixth-degree equations with the aid of hyperelliptic functions.

Brioschi did not propound any strikingly new ideas in mathematics, nor did he discover any new fields. "I am only a calculator," he humbly characterized himself. However, he was a brilliant analyst with algebraic propensities and possessed a rare mobility of thought that responded to new ideas from their very inception. This enabled him to enrich science with new results for half a century.

Along with Betti, Brioschi began a new epoch in the history of Italian mathematics, leading it out of its provincial backwardness. He was the teacher of its most outstanding representatives in the next generation, among them Casorati, Cremona, and Beltrami.

In mechanics Brioschi dealt with problems of statics, proving Moebius' results by analytic means; with the integration of equations in dynamics, according to Jacobi's method; with hydrostatics; and with hydrodynamics. His work as a hydraulic engineer was significant, although it is reflected comparatively little in his publications. Brioschi used the findings of a series of major projects or participated in the projects' development—for example, in the regulation of the Po and Tiber (which goals remained unaccomplished). Two more of Brioschi's works should be mentioned: with Betti he brought out a treatment of the first six books of Euclid's *Elements* for secondary schools, and he edited Leonardo da Vinci's *Codice Atlantico*, an important source for the history of science and technology.

An adherent of pure mathematics, Brioschi highly valued its significance in application and allotted to it a significant place in technical education, emphasizing the great role of the latter in the development of national industry. At the same time he insisted on the value of the humanities and, simultaneously with his founding of the Politechnicum, he organized the Accademia Scientifica-Litteraria in Milan.

In addition to the publication of the *Codice Atlantico*, Brioschi produced several important articles on contemporary mathematicians.

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