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(b. Paris, France, 24 July 1856; d. Paris, 11 December 1941)

mathematics

Picard's father, the director of a silk factory, was of Burgundian origin; his mother was the daughter of a doctor from northern France. At the death of her husband, during the siege of Paris in 1870, she was obliged to seek employment in order to care for her two sons. Picard was a brilliant student at the Lycée Henri IV and was especially interested in literature, Greek, Latin, and history. An avid reader with a remarkable memory, he acquired a rare erudition. For many years he retained a liking for physical exercise—gymnastics and mountain climbing—and an interest in carefully planned travel. He chose his vocation after reading a book on algebra at the end of his secondary studies. In 1874, after only one year of preparation, he was accepted as first candidate by the École Normale Supérieure and as second candidate by the école Polytechnique. After a famous interview with Pasteur, he chose the former, where he would be permitted to devote himself entirely to research. He placed first in the competition for the *agrégation* in 1877 but had already made several important discoveries and had received the degree of *docteur ès sciences*.

From 1877 to 1878 Picard was retained as an assistant at the école Normale Supérieure. Appointed professor at the University of Toulouse in 1879, he returned to Paris in 1881 as lecturer in physical and experimental mechanics at the Sorbonne and as lecturer in mechanics and astronomy at the École Normale Superieure. Although he accepted these teaching posts outside his preferred field, Picard continued his work in analysis, and the first of the two famous theorems that bear his name dates from 1879, when he was twenty-three. In 1885 he was unanimously elected to the chair of differential and integral calculus at the Sorbonne, where he served as his own *suppléant* before reaching the prescribed age of thirty for the post. In 1897, at his own request, he exchanged this chair for that of analysis and higher algebra, where he was able to train students for research.

Nominated in 1881 by the section of geometry for election to the Academie des Sciences, he was elected in 1889. In 1886 he received the Prix Poncelet and in 1888 the Grand Prix des Sciences Mathematiques for a memoir that was greatly admired by Poincare. Picard's mathematical activity during the period 1878–1888 resulted in more than 100 articles and notes. A member of the Academie Francaise (1924), he received the Grande Croix de la Legion d'Honneur in 1932 and the Mittag-Leffler Gold Medal from the Swedish Academy of Sciences in 1937. He received an honorary doctorate from five foreign universities and was a member of thirty-seven academies and learned societies.

Picard was chairman of numerous commissions, including the Bureau des Longitudes; and his administrative abilities and his sincere and resolute character earned him great prestige. As permanent secretary of the Académie des Sciences from 1917 to his death in 1941, he wrote an annual notice on either a scientist or a subject of current interest. He also wrote many prefaces to mathematical books and participated in the publication of works of C. Hermite and G.-H. Halphen.

An outstanding teacher, Picard was devoted to the young, and from 1894 to 1937 he trained more than 10,000 engineers at the École Centrale des Arts et Manufactures. He was responsible, with extraordinary sucess, for choosing pupil-teachers at the École Normale Supérieure de Jeunes Filles dem Sèvres (1900–1927)He was director of the Société des Amis des Sciences founded by Pasteur to look after needy scholars and their families.

In 1881 Picard married the daughter of his mentor and friends Charles Hermite. His life of uninterrupted professional success was clouded by the the death of his daughter and two sons in World War I. His gransons were wounded and capture in World War II, and the invasion and occupation of France darknened the last two years of his life. He died in the Palais de l'Institut, where he lived as *secrétaire prepétuel* of the Academy.

Picard's works were mostly in mathematical analysis and algebraic geometry. As early as 1878 he had studied the integrals of differential equations by making successive substitutions with equations having suitable partial derivatives. The following year he discovered the first of the two well-known theorems that bear his name. The first states: Let $f(z)$ be an entire function. If there exsit two values of A for whcih the equation $f(z) = A$ does not have a finite root, then $f(z)$ is a constant. From this theorem it follows that if $f(z)$ is an entire function that is not a constant, there cannot be more than one value fo A for whcih $f(z) = A$ has no solution.

Picard's second theorem, which extended a result stated by Weierstrass, states: Let $f(z)$ be a function, analytic everywhere except at a, where it has an essential isolated singularity; the equation $f(z) = A$ has in general an infinity of roots in any neighborhood of a. Although the equation can fail for certain exceptional valuse of the constant A, there cannot be more than two such valuse (1880). This results led to a classification of regular analytic functions; and it was the origin of important work

carried out especially by Emile Borel and Otto von Blumenthal. The latter established generalizations that he called Picard's little theorem and Picard's big theorems Picard's theorems revealed the fruithfulness of the idea of introducing, in the terms of a problem, a restriction bearing on the case of an exception that can be shown to be unique.

From 1883 to 1888 Picard extends Poincaré's invesigations on automorphic functions of functions of two complex variables, which he called hypergeometric and hyperfuchsian (1883, 1885). These functions led Picard to the study of algebraic surfaces (1901). Setting himself the task of differential equations and the theory of alegbraic equations, Picard took up Galois's theory and obtained for a linear differential equation a group of transformations now called the Picard group.

Picard's method for demonstrating the existence of the integrals of differential equations by successive approximations at first appears very simple. The introduction of n functions $u_1, u_2,...,u_n$ reestablishes the system.

with the inital conditions $x = x_0$ gives $u_i = a_i$. There is then resolved by n quadratures the syatem.

the v_i satisfying the initial conditions and the same being true of

and so forth. It remains to prove—and this is the essential point—that under certain conditions (idenitfied by Cauchy) the functions that are sucessively introduced tend toward limits that are precisely the desired integrals in the neighbourhood of x_0 Picard himself extended his method to numerous cases, particularly to the equations of complex variables and also to intergal equations became of considerable importance in mathematical physcics, with much of the genuine progress due to Fredholm. By Completing the ealier works Picard made more precise the necessary conditions for the existence of the various types equations

These works, as well as many dispersed results found in notes, were assembled in Picard's three-volume Traite' d'analyse, which immediately became a classic and was accessible to many students through its range of subjects, clear exposition, and lucid style. Picard examined several specific case before discussing his general theory.

In theoretical physics Picard applied analysis to theories of elasticity, heat, and electricity. He was particularly sucessful in achieving an elegant solution to the problem of the propagation of electrical impulses along cables (équation des télégraphiques). This research was to have been collected in a fourth volume of his treatise on anaysis; but it appeared instead in four fascicles of *Cahiers scientifiques*.

After 1900 Picard published several historical and philosophical reflections, in particular *La science moderne et état actuel* (1905), and speeches and reports. When he was more than eighty years old he presented considerations on the questions of homogeneity and similarity encountered by physicists and engineers.

Throughout his life Picard supported the inno-vations of other mathematicians, including the early work of Lebesgue. With Poincare he was the most distinguished French mathematician of his generation.

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