788.

GALOIS.

[From the *Encyclopædia Britannica, Ninth Edition*, vol. X. (1879), p. 48.]

GALOIS, EVARISTE (1811—1832), an eminently original and profound French mathematician, born 26th October 1811, killed in a duel May 1832. A necrological notice by his friend M. Auguste Chevalier appeared in the *Revue Encyclopédique*, September 1832, p. 744; and his collected works are published, *Liouville*, t. XI. (1846), pp. 381—444, about fifty of these pages being occupied by researches on the resolubility of algebraic equations by radicals. But these researches, crowning as it were the previous labours of Lagrange, Gauss, and Abel, have in a signal manner advanced the theory, and it is not too much to say that they are the foundation of all that has since been done, or is doing, in the subject. The fundamental notion consists in the establishment of a group of permutations of the roots of an equation, such that every function of the roots invariable by the substitutions of the group is rationally known, and reciprocally that every rationally determinable function of the roots is invariable by the substitutions of the group; some further explanation of the theorem, and in connexion with it an explanation of the notion of an adjoint radical, is given under Equation, No. 32, [786]. As part of the theory (but the investigation has a very high independent value as regards the Theory of Numbers, to which it properly belongs), Galois introduces the notion of the imaginary roots of an irreducible congruence of a degree superior to unity; i.e., such a congruence, $F(x) \equiv 0$ (mod. a prime number p), has no integer root; but what is done is to introduce a quantity i subjected to the condition of verifying the congruence in question, $F(i) \equiv 1$ (mod. p), which quantity i is an imaginary of an entirely new kind, occupying in the theory of numbers a position analogous to that of $\sqrt{-1}$ in algebra.