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(*b*. Claveyson, Drôme, France, 13 August 1704; *d*. Cuiseaux, Saône-et-Loire, France, 21 August 1771)

mathematics.

The son of Jacques, a royal notary, and of Madeleine Seytres, Fontaine studied at the Collège de Tournon before his introduction to mathematics at Paris under the guidance of Père Castel. About 1732 he acquired property in the vicinity of Paris and, having formed friendships with Clairaut and Maupertuis, presented several memoirs to the Académie des Sciences, which admitted him as *adjoint mécanicien* on 11 June 1733. Although he was promoted to geometer in 1739 and to pensionary geometer in 1742, Fontaine rarely participated in the work of the Academy and led a rather solitary existence. A difficult personality, he showed almost no interest in the work of others and incurred considerable enmity by claiming priority in certain discoveries. In 1765 he retired permanently to an estate in Burgundy, the purchase of which had almost ruined him. He broke his silence only in order to engage in an imprudent polemic with Lagrange, whom he had initially encouraged. He died before he was able to read Lagrange's reply, however.

Fontaine's work is of limited scope, often obscure, and willfully ignorant of the contributions of other mathematicians. Nevertheless, its inspiration is often original and it presents, amid confused developments, a number of ideas that proved fertile, especially in the fields of the calculus of variations, of differential equations, and of the theory of equations.

One of the first memoirs that Fontaine presented to the Academy in 1734 solved the problem of tautochrones in the case where the resistance of the medium is a second-degree function of the speed of the moving body; the method employed, more general than that of his predecessors (Huygens, Newton, Euler, Johann I Bernoulli, and others), heralds the procedures of the calculus of variations. It won deserved esteem for its author, but Fontaine erred in reconsidering the subject in 1767 and 1768 in order to criticize—unjustly—the method of variations presented by Lagrange in 1762.

On the subject of integral calculus, Fontaine was interested in the conditions of integrability of differential forms with several variables and in homogeneous functions; independently of Euler and Clairaut, he discovered the relation termed homogeneity. He gave particular attention to the problem of notation, utilizing both the Newtonian symbols of fluxions and fluents and the differential notation of Leibniz, which he usefully completed by introducing a coherent symbolism for partial differentials that was successful for a long time before being replaced by δ. One of the first to tackle the study of differential equations of the *n*th order, he failed in his ambitious plan to regroup all the types of equations that can be solved. He did, however, introduce several interesting ideas that foreshadowed in particular the theory of singular integrals.

In the theory of equations, Fontaine attempted to extend to higher degrees a method of studying equations based on their decomposition into linear factors that had shown its usefulness in the case of equations of the third and fourth degree. His memoir, complex and often unclear, was rapidly outclassed by the works of Lagrange and Vandermonde.

In his work of 1764 Fontaine included a study of dynamics dated 1739 and based on a principle closely analogous to the one that d'Alembert had made the foundation of his treatise of 1743. Although Fontaine did not raise any claim of priority, he attracted the hostility of a powerful rival who subsequently took pains to destroy the reputation of his work, which—without being of the first rank—still merits mention for its original inspiration and for certain fecund ideas that it contains.

BIBLIOGRAPHY

I. Original Works. Fontaine's works are limited to several memoirs published in the *Histoire de l'Académie royale des sciences* for 1734, 1747, 1767, and 1768 and to a volume published as M. Fontaine, *Mémoires donnés à l'Académie royale des sciences non imprimés dans leur temps* (Paris, 1764), repr., without change, as *Traité de calcul différentiel et intégral* (Paris, 1770). Actually, the two successive titles are inexact, because this collection joins to the memoirs already published in 1734 and 1747 ten others, dealing essentially with infinitesimal geometry, integral calculus, mechanics, and astronomy. Only the three memoirs inserted in the volumes of the *Histoire de l'Académie royale des sciences* for 1767 and 1768 are not included in this work.

II. Secondary Literature. On Fontaine and his work, see J. L. Boucharlat, in Michaud, ed., *Biographie universelle*, XV (Paris, 1816), 179–183, and new ed., XIV (Paris, 1856), 323–326; F. Cajori, *A History of Mathematical Notations*, II (Chicago, 1929), esp. 198–199, 206–207, 223–224; J. M. Caritat de Condorcet, "Éloge de M. Fontaine, prononcé le 13 novembre 1773," in *Histoire de l'Académie royale des sciences, 1771* (Paris, 1774), pp. 105–116; J. de Lalande, in Bibliographie astronomique (Paris, 1803), pp. 481, 486; M. Marie, *Histoire des sciences mathématiques et physiques*, VIII (Paris, 1886), 39–42; J. F. Montucla, in *Histoire des mathématiques*, new ed., III (Paris, 1802), 44, 177, 343, 627, 657; N. Nielsen, *Géomètres français du* XVIII[e] *siècle* (Copenhagen–Paris, 1935), pp. 174–182; and *Poggendorff, Biographisch-literarisches Handwörterbuch*, I (Leipzig, 1863), col. 766.

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