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(*b.* Saverne, Bas-Rhin, France, 7 April 1768; *d.* Mainz, Germany, 30 October 1810)

FRANÇAIS, JACQUES FRÉDÉRIC

(*b.* Saverne, Bas-Rhin, France, 20 June 1775; *d.* Metz, France, 9 March 1833)

mathematics.

The mathematical works of the Français, brothers, Francois and Jacques Frédéric, are so poorly distinguished by most authors and their biographies so imprecise that it is necessary to devote a common article to the two of them. Sons of Jacques Frédéric Français., a grocer, and of Maria Barbara Steib, they were both born at Saverne, seven years apart. In 1789, François, the elder, became a seminarist. Named professor at the *college* in Colmar in June 1791, he assumed the chair of mathematics at the *collège* in Strasbourg in September 1792. He participated actively in political life and was a secretary of the *société populaire* of Strasbourg. He took part in the Vendee campaign from May to October 1793 and, after a brief return to civilian life, went back to the army as an officer until October 1797, when he was named professor of mathematics at the *École Centrale du Haut-Rhin* in Colmar. He left this position in September 1803 to teach mathematics, first at the lycee in Mainz, then at the *École d'Artillerie* at La Fere (1804), and, finally, at the *École, d'Artillerie* in Mainz. At his death he left four small children, whom his younger brother adopted soon afterward.

Jacques Frédéric Français., after having been an outstanding student at the *collège* of Strasbourg, enrolled as a volunteer in 1793 and was named assistant in the corps of engineers in September 1794. He was admitted to the *École Polytechnique* on 30 December 1797, and from there he went, in March 1800, to the *École du Genie*. A first lieutenant in January 1801, he participated in the expedition sent by Napoleon to attempt to save the French army in Egypt. On his return he was quartered at Toulon and was named captain of the sappers in December 1801; in November 1802, he became second in command of the staff headquarters of the corps of engineers. In this capacity he participated, with Admiral Villeneuve's squadron, in the expedition to the Antilles and in the naval battles of [Cape Finisterre](#) and Trafalgar (1805). Beginning at the end of that year, he was successively assigned to garrisons at Condé-sur-Escaut; then Kehl (1806); Strasbourg (1807), under the command of Malus; and Metz (from 1808), to the staff headquarters of the *École d'Application*. Promoted to first in command in July 1810, he was named, at the beginning of 1811, professor of military art at the *École d'Application du Génie et de l'Artillerie* in Metz. He held this last position until his death.

In July 1795 François Français, presented a memoir on the integration of partial differential equations; a new version of this paper, addressed to the Académie des Sciences in 1797, is mentioned by S. F. Lacroix (*Traité du calcul différentiel et du calcul intégral*, III, 598) as an important contribution to the theory of these equations. According to the testimony of Biot (*Procès-verbaux de l'Académie des sciences*, III, 204–205), Français, then assisted “his uncle” Louis-Francois Arbogast in the elaboration of the “calculus of derivations” and in the preparation of a treatise that he devoted to this subject (1800). Having inherited Arbogast's papers in April 1803, he continued to work on the development of the calculus of derivations and its applications; thus, in a memoir presented to the Academy in November 1804, he applied this calculus to the movement of projectiles in a resistant medium. Highly esteemed by the mathematicians of the Paris Academy—Lagrange, Legendre, Lacroix, and Biot—Francois Français, pursued original mathematical investigations, but without publishing anything. Following his death his brother Jacques Frédéric included several brief extracts in the *Annales de mathématiques* from his unpublished papers (the application of the calculus of derivations; formulas concerning polygons and polyhedra; and a study of a special curve, the tractrix); these papers were, moreover, a precious source of inspiration to him.

After having presented a memoir, now lost, on the complete integral of first-order partial differential equations in 1800, Jacques Frédéric Français, did not return to mathematics until 1807–1808. He then published, on the urging of Malus, two memoirs on [analytic geometry](#); they treated the equation of the straight line and of the plane in oblique coordinates and the transformation of the systems of oblique coordinates. Applying his method to the famous problem of finding a sphere tangent to four given spheres, he gave a solution to it in 1808, which he corrected immediately before completing it in 1812.

The study of his brother's papers attracted him once more to infinitesimal calculus and especially to the development of the calculus of derivations, to which he in turn devoted two important memoirs: one in 1811 (published in 1813) on the separation of the scales of differentiation and the integration of those functions which they determine; and the other in 1815, on the principles of this calculus. In April 1811 he presented a memoir to the Academy, published in 1812 and 1813 in the *Annales de mathématiques*, in which he put forth an unusual example in the theory of the extrema of functions of several variables. In

1813 he published a rather fully developed study on the rotation of solid bodies, in which, in the words of Cauchy (*Procès-verbaux de l'Académie des sciences*, VIII, 523–525), “interesting research is mixed with several errors.”

In September 1813 Français, published in the *Annales de mathématiques* a resounding article in which he presents the principles of the geometric representation of complex numbers and draws from them several applications. However, in the final paragraph, he acknowledges having taken a portion of his ideas from a letter of 1806 in which Legendre gave his brother François information about a manuscript study on this same subject that had been entrusted to him by an anonymous young author, and he requested that this author reveal himself. In fact, in the following issue of the *Annales de mathématiques*, this author, Jean-Robert Argand, whose study, although printed, had remained practically unknown, replied with a summary of the main conceptions of his work (*Essai sur une manière de représenter les quantités imaginaires dans les constructions géométriques* [Paris, 1806]). A polemic then arose in the *Annales*, in 1813 and 1814, between Argand himself, Français, and Français.-Joseph Servois: the first two attempted to justify the principle itself of this geometric representation, while Servois was concerned above all else to preserve the rigor and purity of algebra. These publications had the great merit of widely diffusing an innovation whose essence, although presented by Caspar Wessel in Copenhagen in 1797 (and published in 1799), by the Abbé Adrien-Quentin Buée in London in 1805, and by Argand in Paris in 1806, had remained unnoticed by the leading mathematicians.

Although Jacques Frédéric Français,'s mathematical publications were interrupted rather suddenly at the end of 1815, it does not seem that his curiosity was extinguished, and Poncelet's long stay in Metz certainly contributed to maintaining it. While not of the first rank, the mathematical activity of the Français, brothers merits mention for its originality and diversity.

J. F. Soleirol, in his *Éloge de Monsieur Français, . . . prononcé sur sa tombe le 11 mars 1833 . . .* (Metz, 1833), points out that Français, also composed a course on military art, a course on geodesy, and two memoirs, one on permanent fortifications and the other on the thrust of the earth.

A final point remains to be made. Upon the death of Arbogast in April 1803, his writings, his important mathematical library, and the rich collection of scientific manuscripts that he had gathered passed to his “nephew,” François Français,. When François died, he bequeathed this collection of manuscripts and books, augmented by his own writings, to his brother Jacques Frédéric, who announced in December 1823 that they were being placed on sale (see *Bulletin general et universel des annonces . . .* I, fasc. 3 [1823], 493–495). Upon the latter's death the essential portion of the collection, not yet sold, passed into the hands of a bookseller in Metz, at whose shop Count Libri was still able to find various valuable manuscripts in 1839. With the sale of Libri's library, these items were dispersed; some are now in the Biblioteca Medicea Laurenziana in Florence (in particular, certain papers of Francois Français,) and in the Bibliothèque Nationale de Paris, while others, which are very precious, have not yet been found. It is hoped that a thorough investigation will be undertaken in order to locate them.

BIBLIOGRAPHY

I. Original Works.

(1) Francois Français,. His work amounts to four posthumous memoirs published by his brother in the *Annales de mathématiques pures et appliquées*. They deal with an aspect of the “Calcul des dérivations” (“Méthode de différentiation indépendante du développement des fonctions en series,” in *Annales*, **2** [May 1812], 325–331); with theorems concerning polyhedra and polygons (*ibid.*, **3** [Dec. 1812], 189–191, and **5** [May 1815], 341–350); and with the tractrix (**4** [Apr. 1814], 305–319). Two important memoirs presented to the Académie des Sciences remain unpublished but were known and utilized by different authors—the memoir on the integration of partial differential equations, presented in 1797 (see S.F. Lacroix, *Traité du calcul différentiel et du calcul intégral*, 2nd, ed., III [Paris, 1819], 598); and the memoir on the movement of projectiles in resisting media, presented on 26 Nov. 1804, which, moreover, was the object of a flattering report by Biot on 22 April 1805 (*Procès-verbaux de l'Académie des sciences . . .*, III [Hendaye, 1913], 159, 204–205).

(2) Jacques Frédéric Français,. His work includes an individual publication, *Memoire sur le mouvement de rotation d'un corps solide libre autour de son centre de masse* (Paris, 1813); and a series of memoirs published in the *Correspondance sur l'École polytechnique (C.E.P.)*, the *Journal de l'École polytechnique (J.E.P.)*, and the *Annales de mathématiques pures et appliquées* of Gergonne (*Annales*). They are listed below by subject and in chronological order.

Analytic Geometry: letter to Hachette, in *C.E.P.*, **1** no. 8 (May 1807), 320–321; on the straight line and the plane in oblique coordinates, in *C.E.P.*, **1**, no. 9 (Jan. 1808), 337–346; on a sphere tangent to four spheres in the following issues of *C.E.P.*: **1**, no. 9 (Jan. 1808), 346–349; **1**, no. 10 (Apr. 1808), 418–421; **2**, no. 2 (Jan. 1810), 63–66; **2**, no. 5 (Jan. 1813), 409–410; and in *Annales*, **3** (Nov. 1812), 158–161; on the transformation of oblique coordinates, in *J.E.P.*, **7**, *Cahier* 14 (Apr. 1808), 182–190; and on various Problems, in *C.E.P.*, **2**, no. 2 (Jan. 1810), 60–70.

Infinitesimal Calculus: on a singular case of the theory of the extrema of functions of several variables, in *Annales*, **3** (Oct. 1812), 132–137; and *ibid.*, **3** (June 1813), 197–206; on scales of differentiation and integration, *ibid.*, **3** (Feb. 1813), 244–272; on the calculus of derivations derived from its true principles, *ibid.*, **6** (Sept. 1815), 61–111.

Solid Mechanics: on rotation of solid bodies, in *Annales*, **3** (Jan. 1813), 197–206.

Geometric Representation of Imaginary Numbers: articles in *Annales*, **4** (Sept. 1813), 61–71; **4** (Jan. 1814), 222–227; **4** (June 1814), 364–366; and articles repr. in J. Houel, ed. (see below), pp. 63–74, 96–101, 109–110.

Other Topics: problems concerning the calendar, in *Annales*, **4** (Mar. 1814), 273–276, and *ibid.*, **4** (May 1814), 337–338; remarks on the tractrix, *ibid.*, 332–336; and a problem involving the pendulum and the flying bridge, *ibid.*, **6** (Oct. 1815), 126–129.

II. Secondary Literature. On the brothers Français, see M. Chasles, *Rapport sur les progrès de la géométrie* (Paris, 1870), p. 57 (on François), pp. 35, 61 (on Jacques Frédéric); S.F. Lacroix, *Traité du calcul différentiel et du calcul intégral* (Paris, 1819), II, pp. 656–658, 789, III, p. 598, 726, 752 (on François), pp. 631–632, 752 (on Jacques Frédéric); N. Nielsen, *Géomètres français, sous la Révolution* (Copenhagen, 1929), pp. 96–97 (on François), pp. 97–103 (on Jacques Frédéric); and the [Royal Society Catalogue of Scientific Papers](#), II (London, 1868), 694–695: nos. 4, 7, 14, and 16 are on François, the others on Jacques Frédéric. Baptism records may be found in the municipal archives of Saverne.

On François Français, see (in chronological order), *Almanach national* (later *Almanach impérial*) for an VII (1798–1799) to 1810; *Procès-verbaux du Comité d'instruction publique de la convention nationale*, VI (Paris, 1907), 452; *Procès-verbaux de l'Académie des sciences*, III (Hendaye, 1913), 59, 159, 204–205, 262, 504; and J. Joachim, *L'école centrale du Haut-Rhin* (Colmar, 1934), esp. pp. 151–155, where there is partial confusion with Louis François Français, war commissioner. See also the archives of the Département du Haut-Rhin.

On Jacques Frédéric Français, see R. Argand, *Essai sur une nouvelle manière de représenter les quantités imaginaires dans les constructions géométriques*, 2nd ed. (Paris, 1874), pp. v–xvi, 63–74, 96–101, 109–110; S. Bachelard, *La représentation géométrique des quantités imaginaires au début du XIX^e siècle* (Paris, 1966), pp. 11–13, 30; C.B. Boyer, *History of Analytic Geometry* ([New York](#), 1956), pp. 222–223; A. Fourcy, *Histoire de l'École polytechnique* (Paris, 1828), p. 403; G. Libri, in *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, **9** (1839), 357–358, and “Fermat,” in *Revue des deux mondes* (15 May 1845), pp. 679–707; G. Loria, “Origines, perfectionnement et développement de la notion de coordonnées,” in *Osiris*, **8** (1948), esp. 220–223, where there is confusion with Frédéric Louis Français; and J.V. Poncelet, *Applications d'analyse et de géométrie*, II (Paris, 1864), 592–595; and J. F. Soleirol, *Eloge de Monsieur Français, . . . prononcé sur sa tombe le 11 mars 1833 . . .* (Metz, 1833). Further material may be found in *Almanach national* (later *Almanach impérial*, then *Almanach royal*) for an VII (1798–1799) to 1833; Ferussac, ed., *Bulletin général et universel des annonces et des nouvelles scientifiques*, **1**, fasc. 3 (1823), 493–495; and *Procès-verbaux de l'Académie des sciences*, III–V (Hendaye, 1913–1914), III, 265; IV, 475, 554; V, 152, 168, 524.

Part of the original documentation of this article comes from the archives of the École Polytechnique, the Service Historique de l'Armée, and the archives of the Legion of Honor.

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