Kramp, Chrétien Or Christian | Encyclopedia.com

(*b*. Strasbourg, France, 8 July 1760, *d*. Strasbourg, 13 May 1826)

physics, astronomy, mathematics.

Kramp's father, Jean-Michel, was a teacher (*professeur régent*) at the Gymnasium in Strasbourg. Brought up speaking French and German, Kramp studied medicine and practiced in several Rhineland cities that were contained in the region annexed to France in 1795. Turning to education, Kramp taught mathematics, chemistry, and experimental physics at the École Centrale of the department of the Ruhr in Cologne. Following Napoleon's reorganization of the educational system, whereby the Écolcs Centrales were replaced by lycées and faculties of law, letters, medicine, and science were created, Kramp, around 1809, became professor of mathematics and dean of the Faculty of Science of Strasbourg. A corresponding member of the Berlin Academy since 1812, he was elected a corresponding member of the geometry section of the Academy of Sciences of Paris at the end of 1817.

In 1783, the year the Montgolfier brothers made the first balloon ascension, Kramp published in Strasbourg an account of aerostatics in which he treated the subject historically, physically, and mathematically. He wrote a supplement to this work in 1786. In 1793 he published a study on crystallo. graphy (in collaboration with Bekkerhin) and, in Strasbourg, a memoir on double refraction.

Kramp published a medical work in Latin in 1786 and another, a treatise on fevers, in German in 1794.His critique of practical medicine appeared in Leipzig in 1795. Moreover, in 1812 he published a rather mediocre study on the application of algebraic analysis to the phenomenon of the circulation of the blood. He corresponded with Bessel on astronomy and made several calculations of eclipses and occultations in the years before 1820; his most important astronomical work, however, is the *Analyse des réfractions astrono. miques et terrestres* (1798), which was very favorably received by the Institut de France. He wrote several elementary treatises in pure mathematics, as well as numerous memoirs, and the *Éléments d'arithmétique universelle* (1808). A disciple of the German philos. opher and mathematician K. F. Hindenburg, Kramp also contributed to the various journals that Hinden. burg edited. He may thus be considered to be one of the representatives of the combinatorial school, which played an important role in German mathematics.

In the *Analyse des réfractions astronomiques* Kramp attempted to solve the problem of refraction by the simplifying assumption that the elasticity of air is proportional to its density. He also presented a rather extensive numerical table of the transcendental function

which is so important in the calculus of probabilities, and which sometimes is called Kramp's transcendental. In this same work he considered products of which the factors are in arithmetic progression. He indicated the products by $a^{n|d}$; hence

$$a(a + d)(a + 2d)...[a + (n-1)d] = a^{n|d}.$$

He called these products "facultés analytiques," but he ultimately adopted the designation "factorials,". proposed by his fellow countryman Arbogast.

Although Kramp was not aware of it, his ideas were in agreement with those of Stirling (1730) and espe. cially those of Vandermond. The notation n! for the product of the first *n* numbers, however, was his own. Like Bessel, Legendre, and Gauss, Kramp extended the notion of factorial to non-whole number argu. ments, and in 1812 he published a numerical table that he sent to Bessel. In his *Arithmétique universelle* Kramp developed a method that synthesizes the fundamental principles of the calculus of variations as stated by Arbogast with the basic procedures of combinatorial analysis. He thus strove to create an intimate union of differential calculus and ordinary algebra, as had Lagrange in his last works.

BIBLIOGRAPHY

I. Original Works. Kramp's writings include *Geschich. le der Aërostatik, historisch, physisch and mathematisch ausgefuehrt*, 2 vols. (Strasbourg. 1783); *Anhang zu der Geschichte der Aërostatik* (Strasbourg, 1786); *De vi vitali Arteriarum diatribe. Addita*

nova de Febrium indole generali Conjectura (Strasbourg, 1786); *Krystallographie des Mineralreichs*(Vienna, 1794), written with Bekkerhin; *Fieber. lehre, nach mecanischen Grundsaetzen* (Heidelberg, 1794); *Kritik der praktischen Arzneykunde, mit Ruecksicht auf die Geschichte derselben und ihre neuern Lehrgebaeude* (Leip. zig, 1795); *Analyse des réfractions astronomiques et ter. restres* (Strasbourg-Leipzig, 1798); *Élements d'arithmé-tique* (Cologne-Paris, 1801); *Élements de géometrié* (Cologne, 1806); and *Élements d'arithmétique universelle* (Cologne, 1808). He also translated into German Lan. combe's *Art des Accouchements* (Mannheim, 1796) and contributed to Hindenburg's *Sammlung combinatorisch. analytischer Abhandlungen and Archiv der reinen und ange. wandte Muthematik* (1796); the *Nova Acta* of the Bayerische Akademie der Wissenschaften (1799); and Gergonne's *Annales des mathématiques pures et appliquées* (from 1810 to 1821).

II. Secondary Literature. Poggendorff, I, col. 1313 contains a partial list of Kramp's work. See also Gunther, in *Allgemeine deutsche Biographie*, XVII (Leipzig, 1883), 31-32; L. Louvet, in Hoefer, *Nouvelle Biographie générale*, XXVIII (Paris, 1861), 191-192; Niels-Nielsen, *Géomètres français sous la Révolution* (Copenhagen, 1929), pp. 128-134; and Royal Society of London, *Catalogue of Scientific Papers*, III (1869), 743-744, which lists 32 memoirs pub. lished after I799.

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