Jean-Baptiste le Rond d'Alembert (1717 – 1783)

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Jean-Baptiste le Rond d'Alembert was a French mathematician, mechanician, physicist, philosopher, and music theorist. He was also co-editor with Denis Diderot of the EncyclopÈdie. D'Alembert's formula for obtaining solutions to the wave equation is named after him.

Born in Paris, d'Alembert was the illegitimate child of the writer Claudine Guérin de Tencin and the chevalier Louis-Camus Destouches, an artillery officer. Destouches was abroad at the time of d'Alembert's birth, and a couple of days after birth his mother left him on the steps of the Saint-Jean-le-Rond de Paris church. According to custom, he was named after the patron saint of the church. D'Alembert was placed in an orphanage for found children, but was soon adopted by the wife of a glazier. Destouches secretly paid for the education of Jean le Rond, but did not want his paternity officially recognized.

D'Alembert first attended a private school. The chevalier Destouches left d'Alembert an annuity of 1200 livres on his death in 1726. Under the influence of the Destouches family, at the age of twelve d'Alembert entered the Jansenist Collège des Quatre-Nations (the institution was also known under the name "Collège Mazarin"). Here he studied philosophy, law, and the arts, graduating as bachelier in 1735. In his later life, D'Alembert scorned the Cartesian principles he had been taught by the Jansenists: "physical promotion, innate ideas and the vortices".

The Jansenists steered D'Alembert toward an ecclesiastical career, attempting to deter him from pursuits such as poetry and mathematics. Theology was, however, "rather unsubstantial fodder" for d'Alembert. He entered law school for two years, and was nominated avocat in 1738.

He was also interested in medicine and mathematics. Jean was first registered under the name Daremberg, but later changed it to d'Alembert. The name "d'Alembert" was proposed by Johann Heinrich Lambert for a suspected (but non-existent) moon of Venus.

In July 1739 he made his first contribution to the field of mathematics, pointing out the errors he had detected in L'analyse démontrée (published 1708 by Charles René Reynaud) in a communication addressed to the Académie des Sciences. At the time L'analyse démontrée was a standard work, which d'Alembert himself had used to study the foundations of mathematics. D'Alembert was also a Latin scholar of some note and worked in the latter part of his life on a superb translation of Tacitus, from which he received wide praise including that of Denis Diderot.

In 1740, he submitted his second scientific work from the field of fluid mechanics Mémoire sur la réfraction des corps solides, which was recognized by Clairaut. In this work d'Alembert theoretically explained refraction.

In 1741, after several failed attempts, d'Alembert was elected into the Académie des Sciences. He was later elected to the Berlin Academy in 1746 and a Fellow of the Royal Society in 1748

In 1743 he published his most famous work, Traité de dynamique, in which he developed his own laws of motion.

When the Encyclopédie was organized in the late 1740s, d'Alembert was engaged as co-editor (for mathematics and science) with Diderot, and served until a series of crises temporarily interrupted the publication in 1757. He authored over a thousand articles for it, including the famous Preliminary Discourse. D'Alembert "abandoned the foundation of Materialism" when he "doubted whether there exists outside us anything corresponding to what we suppose we see." In this way, D'Alembert agreed with the Idealist Berkeley and anticipated the Transcendental idealism of Kant.

In 1752, he wrote about what is now called D'Alembert's paradox: that the drag on a body immersed in an inviscid, incompressible fluid is zero.

In 1754, d'Alembert was elected a member of the Académie française, of which he became Permanent Secretary on 9 April 1772.

In 1757, an article by d'Alembert in the seventh volume of the Encyclopedia suggested that the Geneva clergymen had moved from Calvinism to pure Socinianism, basing this on information provided by Voltaire. The Pastors of Geneva were indignant, and appointed a committee to answer these charges. Under pressure from Jacob Vernes, Jean-Jacques Rousseau and others, d'Alembert eventually made the excuse that he considered anyone who did not accept the Church of Rome to be a Socinianist, and that was all he meant. He was elected a Foreign Honorary Member of the American Academy of Arts and Sciences in 1781.

D'Alembert's first exposure to music theory was in 1749 when he was called upon to review a Mémoire

submitted to the Académie by Jean-Philippe Rameau. This article, written in conjunction with Diderot, would later form the basis of Rameau's 1750 treatise Démonstration du principe de l'harmonie. D'Alembert wrote a glowing review praising the author's deductive character as an ideal scientific model. He saw in Rameau's music theories support for his own scientific ideas, a fully systematic method with a strongly deductive synthetic structure.

Two years later in 1752, d'Alembert attempted a fully comprehensive survey of Rameau's works in his Eléments de musique théorique et pratique suivant les principes de M. Rameau. Emphasizing Rameau's main claim that music was a mathematical science that had a single principle from which could be deduced all the elements and rules of musical practice as well as the explicit Cartesian methodology employed, d'Alembert helped to popularize the work of the composer and advertise his own theories. He claims to have "clarified, developed, and simplified" the principles of Rameau, arguing that the single idea of the corps sonore was not sufficient to derive the entirety of music. D'Alembert instead claimed that three principles would be necessary to generate the major musical mode, the minor mode, and the identity of octaves. Because he was not a musician, however, d'Alembert misconstrued the finer points of Rameau's thinking, changing and removing concepts that would not fit neatly into his understanding of music.

Although initially grateful, Rameau eventually turned on d'Alembert while voicing his increasing dissatisfaction with J. J. Rousseau's Encyclopédie articles on music. This led to a series of bitter exchanges between the men and contributed to the end of d'Alembert and Rousseau's friendship. A long preliminary discourse d'Alembert wrote for the 1762 edition of his Elémens attempted to summarize the dispute and act as a final rebuttal.

D'Alembert also discussed various aspects of the state of music in his celebrated Discours préliminaire of Diderot's Encyclopédie. D'Alembert claims that, compared to the other arts, music, "which speaks simultaneously to the imagination and the senses," has not been able to represent or imitate as much of reality because of the "lack of sufficient inventiveness and resourcefulness of those who cultivate it." He wanted musical expression to deal with all physical sensations rather than merely the passions alone. D'Alembert believed that modern (Baroque) music had only achieved perfection in his age, as there existed no classical Greek models to study and imitate. He claimed that "time destroyed all models which the ancients may have left us in this genre." He praises Rameau as "that manly, courageous, and fruitful genius" who picked up the slack left by Jean-Baptiste Lully in the French musical arts.

D'Alembert was a participant in several Parisian salons, particularly those of Marie Thérèse Rodet Geoffrin, of the marquise du Deffand and of Julie de Lespinasse. D'Alembert became infatuated with Mlle de Lespinasse, and eventually took up residence with her.

He suffered bad health for many years and his death was as the result of a urinary bladder illness. As a known unbeliever, D'Alembert was buried in a common unmarked grave.

In France, the fundamental theorem of algebra is known as the d'Alembert/Gauss theorem (an error in d'Alembert's proof was caught by Gauss).

He also created his ratio test, a test to see if a series converges.

The D'Alembertian operator, which first arose in D'Alembert's analysis of vibrating strings, plays an important role in modern theoretical physics.

While he made great strides in mathematics and physics, d'Alembert is also famously known for incorrectly arguing in Croix ou Pile that the probability of a coin landing heads increased for every time that it came up tails. In gambling, the strategy of decreasing one's bet the more one wins and increasing one's bet the more one loses is therefore called the D'Alembert system, a type of martingale.