Pierre Louis Moreau De Maupertuis | Encyclopedia.com

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(*b*. St.-Malo, France, 28 September 1698; *d*. Basel, Switzerland, 27 July 1759)

mathematics, biology, physics.

It was said of Maupertuis, in the official eulogy by Samuel Formed, that "Madame Moreasu idolized her son rather than loved him. She could not refuse him anything." It seems highly probable that the spoiled child inevitably developed some of those personality characteristics that later made him not only proud but intransigent and incapable of bearing criticism, traits that ultimately led to great unpleasantness in his life and, quite literally, to his undoing.

After private schooling Maupertuis went to Paris at the age of sixteen to study under Le Blond, but he found ordinary philosophical disciplines quite distasteful. In 1717 he began to study music; but he soon developed a strong interest in mathematics, which he pursued under the tutelage of Guisnée and, later, Nicole. Maupertuis was elected to the Academy of Sciences in 1723, at the age of twenty-five, and presented a dissertation, "Sur la forme des instruments de musique." This was soon followed by a mathematical memoir on maxima and minima, some biological observations on a species of salamander, and two mathematical works of much promise: "Sur la quadrature et rectification des figures formées par le roulement des polygones reguilers" and "Sur une nouvelle maniére de développer les courbes."

In 1728 Maupertuis made a trip to London that was to exert a major influence upon his subsequent career. From a conceptual world of Cartesian vortices he was transported into the scientific milieu of Newtonian mechanics, and he was quickly converted to these views. From this time on, Maupertuis was the foremost proponent of the Newtonian movement in France and a convinced defender of Newton's ideas about the shape of the earth. After returning to France he visited Basel, where he was befriended by the Bernoullis.

While pursuing, in conjunction with Clairaut, further studies in mathematics—resulting in a steady flow of notable memoirs—Maupertuis was readying his first work on Newtonian principles, "Discours sur les différentes figures des astres" (1732). It brought him the attention of the Marquise du Châtelet and of Voltaire, both of whom he instructed in the new doctrines. His position as the leading Continenta lNewtonian was confirmed the following year by his "Sur la figure de la terre et sure lese moynes que l'astronomie et la géographie fournissent pour la déterminer," which was accompanied by a complementary memoir by Clairaut.

Thus it came about that in 1735 France sent an expedition to Peru under the leadership of La Condamine and another to Lapland under the leadership of Maupertuis. Clairaut, Camus, and other scientists accompanied the latter. The mission of each expedition was to measure as accurately as possible the length of a degree along the meridian of longitude. If, indeed, the earth is flattened toward the poles, as Newton had predicted, the degree of latitude should be shorter in far northern latitudes than near the equator. The voyage began on 2 May 1736 and lasted over a year. The local base for the expedition's fieldwork was Torneå, in northern Sweden—then, according to Maupertuis, a town of fifty or sixtly houses and wooden cabins. On the return journey the ship was wrecked in the Baltic Sea, but without loss of life, instruments, or records.

Maupertuis reached Paris on 20 August 1737, only to meet with a rather chilly reception. Envy and jealousy were already at work; he had few Newtonian supporters in France except Voltaire; and La Condamine's expedition had not yet returned from Peru. At this time Maupertuis found respite at Saint-Malo and at Cirey, where Mme du Châtelet and Voltaire made him welcome. He stayed only briefly at Cirey, however, intending to revisit Basel. There he met Samuel Köning, a young student of Johann I Bernoulli. He persuaded König to accompany him back to Cirey, where Köning behaved so arrogantly that he angered Mme du Châtelet, who through this episode became temporarily estranged from Maupertuis.

The laborious analysis of the data on the length of the are of a meridional degree at various latitudes took much time and created much controversy. The measurements made in France had to be corrected. In December 1739 Maupertuis announced to the Academy the value found for the distanced along the merdian between Paris and Amiens. The expedition to Peru having returned after an arduous three years, the degree between Quito and Cuenca was added to the comparisons. Still later (1751) measurements made by Lacaille at the Cape of Good Hope permitted a fourth comparison.

In a final revision of the reports on the "Opérations pour déterminer a figure de la terre" (*Oeuvres*, IV, 335) Maupertuis summarized the corrected measurements for a degree of longitude as follows:

	Latitude	*Toises*
Peru	0°30′	56,768
Cape of Good Hope	33°18′	56,994
France	49°23′	57,199
Lapland	66°10′	57,395

In 1738 Voltaire recommended Maupertuis to Frederick the Great, who was eager to rehabilitate the academy of sciences at Berlin. Frederick commenced overtures to Mauperuis, who visited Berlin after publication of his new, anonymously printed *Éléments de géographie* and his reconciliation with Mme du Châtelet. In Berlin he met Francesco Algarotti and the family of M. de Borck, whose daughter he was later to marry. After the outbreak of the War of the Austrian Succession, Maupertuis joined Frederick in Silesia, only to be captured when his horse bolted into the enemy lines. For a time he was feared dead by his friends, but Maupertuis soon emerged safely in Vienna; ominously, he took offense at the jests of Voltaire regarding his military exploit.

Maupertuis was elected to the Académie Française in 1743. In 1744 he presented the memoir "Accord de différentes lois de la nature" and published "Dissertation sur le négre blanc." The latter was the precursor of the *Vénus physique* of 1745, which was an enlarged and more fully analyzed argument against the then dominant biological theory of the preformation of the embryo. Maupertuis argued convincingly that the embryo could not be preformed, either in the egg or in the animalcule (spermatozoon), since hereditary characteristics could be passed down equally through the male or the female parent. He rejected the vitalistic notion that some "essence" from one of the parents could affected the preformed fetus in the other parent, or that maternal impressions could mold the characteristics of the offspring. A strict mechanist, although a believer in the epigenetic view of the origin of the embryo, he looked for some corporeal contribution from each parent as a basis of heredity.

In the middle of 1745 Maupertuis finally accepted Frederick's invitation and took up residence in Berlin. In the same year he married Mlle de Borck; and on 3 March 1746 he was installed as president of the Academy. His first contribution was the brief paper "Les lois du mouvement et du repos," in which he set forth the famous principle of least action, which he regarded as his own most significant scientific contribution. It states simply that "in all the changes that take place in the universe, the sum of the products of each body multiplied by the distance it moves and by the speed with which it moves is the least possible" (*Oeuvres*, II, 328). That is, this quantity tends to a minimum, This principle was later clarified and expounded by Euler, developed by Hamilton and Lagrange, and incorporated in modern times into quantum mechanics and the biological principle of homeostasis. As Maupertuis himself said:

The laws of movement thus deduced [from this principle], being found to be precisely the same as those observed in nature, we can admire the application of it to all phenomena, in the movement of animals, in the vegetation of plants, in the revolution of the heavenly bodies: and the spectacle of the universe becomes so much the grander, so much the more beautiful, so much worthier of its Author.…

These laws, so beautiful and so simple, are perhaps the only ones which the Creator and Organizer of things has established in matter in order to effect all the phenomena of the visible world [*Oeuvres*, I, 44–45].

Maupertuis clearly was successful in attracting to Berlin scientific luminaries who greatly enhanced the luster of the new Academy. Euler, one of the greatest mathematicians of the day, was already there. La mettrie came in 1748; Mérian and Meckel in 1750; and, in the same year, after the death of Mme du Châtelet, Voltaire arrived in Berlin. With others the brusque impatience of Maupertuis rendered his efforts less successful. On the whole, however, matters were going well when the celebrated "affaire König" erupted. Samuel König, a protégé of Maupertuis, after having been elected a member of the Academy, visited Berlin, was warmly received by Maupertuis, and shortly thereafter submitted a dissertation attacking the validity of the principle of least action and then—most strangely for a devoted adherent of Leibniz—ascribed the discredited law to the latter, citing a letter from Leibniz to Hermann. Maupertuis was incensed. He demanded that the letter be produced. König produced a copy but stated that the original was in the bands of a certain Swiss named Henzi, who had been decapitated at Bern following involvement in a conspiracy. After exhaustive search no trace of the letter was found in Henzi's belongings. Maupertuis then demanded that the Academy take action against König.

At the same time Maupertuis was embroiled in a controversy between Haller and La Mettrie. The latter had dedicated to Haller, much to Haller's dismay, his *L'homme machine* (1748). La Mettrie had, in response to Haller's rejection, responded with a diatribe. Haller demanded an apology; but inasmuch as La Mettrie died at just that time, Maupertuis tried —without success—to assuage Haller with a politeletter. The episode certainly contributed to the extraordinary bitterness and tension that Maupertuis experienced in 1751.

Nevertheless, at this very time Maupertuis was able to publish one of his most significant works, later called *Système de la nature*. A sequel to the *Vénus physique*, it was a theoretical speculation on the nature of biparental heredity that included, as

evidence, an account of a study of polydactyly in the family of a Berlin barber-surgeon, Jacob Ruhe, and the first careful and explicit analysis of the transmission of a dominant hereditary trait in man. Not only did Maupertuis demonstrate that polydactyly is transmitted through either the male or the female parent, but he also made a complete record of all normal as well as abnormal members of the family. He furthermore calculated the mathematical probability that the trait would occur coincidentally in the three successive generations of the Ruhe family had it not been inherited.

On the basis of this study, Maupertuis founded a theory of the formation of the fetus and the nature of heredity that was at least a century ahead of its time. He postulated the existence of hereditary particles present in the semen of the male and female parents and corresponding to the parts of the fetus to be produced. They would come together by chemical attraction, each particle from the male parent joining a corresponding particle from the female parent. chemical affinity would also account for the property formation of adjacent parts, since particles representing adjacent parts would be more alike than those of remote parts. At certain times the maternal character would dominate; at others the paternal character. The theory was applied to explain the nature of hybrids between species and their well-known sterility; and it was extended to account for aberrations with extra structures as well as to those characterized by a missing part. The origin of new sorts of particles, as well as the presence of those representing ancestral types, was envisaged. Finally, Maupertuis thought it possible that new species might originate through the geographical isolation of such variations.

During 1752 the König affair reached a climax and a hearing was held, from which Maupertuis absented himself. The letter cited by König was held to be unauthentic and undeserving of credence, and König resigned from the Academy—only to issue a public appeal and defense. Voltaire had already run afoul of Maupertuis, and jealousy existed between them regarding their influence with the king. Maupertuis had shown scant enthusiasm for a proposed monumental dictionary of metaphysics, to be developed by the Academy as a counterpoise to the *Encyclopédie*, for Maupertuis considered the talents of the Berlin Academy insufficient to keep such a work from being superficial. In September 1752 Voltaire attacked Maupertuis, charging him not only with plagiarism and error but also with persecution of honest opponents and with tyranny over the Academy. In the *Diatribe du Cocteur Akakia*, Voltaire poured invective on the ideas that Maupertuis had expressed in his *Lettre sur le progrés des sciences* (1752) and *Lettres* (1752)—in which, among other daring speculations regarding the future course of science, Maupertuis had included his most substantial account of the investigation of polydactyly in the Ruhe family and of his own breeding experiments with Iceland dogs. In *Micromégas* Voltaire made fun of the voyage to Lapland undertaken to measure the are of the meridian and lampooned Maupertuis's amorous adventures in the North. His mockery made a great contrast with the grandiloquent words that he had once inscribed beneath a portrait of Maupertuis. In vain Frederick supported Maupertuis and tried to restore good feeling. Maupertuis was crushed, his health gave way, and he requested a leave to recuperate at Saint-Malo. Pursued by an unceasing volley of Voltaire's most savage satires, Maupertuis withdrew. He remained at Saint-Malo until the spring of 1754, when he returned to Berlin at Frederick's insistence. Here he delivered the eulogy of his friend Montesquieu, who died at Paris early in 1755. He departed again for France, a very sick man, in May 1756. Greatly distressed by the outbreak of the Seven Years' War, he decided to return home by way of Switzerland. He went to Toulouse, whence he set out again in May 1758. At Basel, too ill to proceed, he was received warmly by his old friend Johan Bernoulli. On 27 July 1759, before his wife could reach him, he died and was buried in Dornach.

Maupertuis was a man of singular aspect. He was very short. His body was always in motion; he had numerous tics. He was careless of his apparel. Perhaps he was always endeavoring to attract attention. Perhaps he shared the Napoleonic complex of little men. Certainly he was both highly original and possessed of qualities that attracted friends, especially among the ladies; the Marquise du Châctelet and many other French women corresponded regularly with him. He could be gay as well as fiery and violent. Above all he was proud, both of his intelligence and of his accomplishments, and to attack either was to wound him deeply. Above all, he could not understand the character of Köning, whom he had sponsored and who the gratuitously attacked him, or of Voltaire, whose adulation and friendship so quickly turned to malice and vituperation.

A Philosopher as well as a scientist, Maupertuis proved himself a powerful and original thinker in *Essai de cosmologie*(1750). According to A.O. Lovejoy, he anticipated Beccaria and Bentham and, along with helvétius, represents "the headwaters of the important stream of utilitarian influence which became so broad and sweeping a current through the work of the Benthamites" (*Popular Science Monthly*, **65** [1904], 340). He rejected the favorite eighteenth-century argument in favor of God— the argument from design— and instead, like Hume, he formulated a view of adaptation based on the elimination of the unfit. He recognized that Newton's kaws are ubsufficient to explain chemistry, and even more so life, and turned to Leibniz for ideas about the properties of consciousness. In the *Systèeme de la Nature* we may, with Ernst Cassirer (*Philosophy of the Enlightenment*,p. 86), see an attempt to "reconcile the two great opponents of the philosophy of nature of the seventeenth century," Newton and Leibniz. Yet in it must also be recognized a highly original work based on his own investigations of heredity. In his effort to introduce a calculus of pleasure and pain, in order to evaluate the good life and to measure happiness, Maupertuis proposed that the amount of pleasure or pain is a product of intensity ad duration. This formulation is strictly analogous to his principle of least action in the physical world and shows how he extended his philosophy of nature into a philosophy of life.

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