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# Pierre Louis Moreau de Maupertuis (1698 – 1759)

J. Van Robays

*Department of Pathology, ZOL, Campus St Jan, Schiepse Bos 6, 3600 Genk, Belgium.*

Editing: Sien Ombelet
Correspondence at: willem.ombelet@telenet.be

*Few people are aware that Maupertuis was one of the most original thinkers during the age of Enlightenment in France. He did not only excelled in all branches of common science: mathematics, physics, astronomy and biology, but also in branches that barely existed at the time, such as genetics and the theory of evolution. In many ways, he contributed to the development of these novel sciences, 100 years before Mendel and Darwin came onto the stage.*

**White Negro**

In 1744 Maupertuis saw a "white negro" at a Parisian exhibition. It intrigued him that a white negroid child could be born from two black parents. This captivation inspired him to write a treatise on 'La Dissertation Physique à l'occasion du Nègre Blanc'. No longer than a year later and in the same line he wrote an additional treatise, the 'Vénus Physique'. In the latter, he thought deeply about human reproduction and the inheritance of physical traits. Notwithstanding, in Maupertuis' time, after all, nothing was known about chromosomes, genes or inheritance patterns and certainly nothing that could scientifically explain the enigma of a "white negro". For a premise of this theory, it would take more than 100 years before Gregor Mendel proposes observations upon crossing peas in his monastery garden, thereby distilling

DISSERTATION
PHYSIQUE
A L'OCCASION
DU
NEGRE BLANC.

CHAPITRE PREMIER.

*Exposition de cet Ouvrage.*

NOus n'avons reçu que depuis très-peu de tems, une vie que nous allons perdre. Placés entre deux instans, dont l'un nous a vus naître, l'autre nous va voir mourir, nous tâchons envain d'étendre notre être au delà de ces deux termes: nous serions plus fages, si nous ne nous appliquions qu'à en bien remplir l'intervalle.

Ne pouvant rendre plus long le tems de notre vie, l'amour propre & la vi-

A

*Figure 1:* Dissertation "White Negro".

the universally applicable "Mendelian laws" of inheritance.

Indeed, Maupertuis' contemporaries had a fairly simple representation of inheritance and embryological development. In the sperm cell (discovered by Antoni Van Leeuwenhoek in 1667), or in the egg cell (not yet localized in humans at that time) a 'homunculus' was to be contained. A 'homunculus', a microscopic human, imaged a fully "preformed" being which would only have had to expand in the uterus up to reaching a baby size. Interestingly, this 'Preformation theory', however, assumed that during the last day of creation, God must have constructed an immense arsenal of such homunculi to provide all mankind with an offspring until the end of time. Whether this homunculus was present in the sperm cell (like the animalculists claimed) or in the egg cell (as the ovists claimed), was not important to Maupertuis. To him, this whole Preformation theory just didn't add up.

He listed three reasons for his misbelief. First, there was no anatomical evidence as no one had ever seen a homunculus in a sperm under a microscope. Secondly, it was obvious that a baby would show traits of both parents. For example, the father's nose and the mother's eyes. How do you explain this observation with a homunculus present in and from only one single germ cell? A third and most decisive reason was, how do the preformatists explain the many congenital abnormalities, miscarriages and the embryological monstrosities such as anencephaly, cyclopes and Siamese twins? Had God created these misfits, in his giant arsenal of homunculi? To which purpose? As a joke?

No, Maupertuis concluded, the baby receives traits from both parents.

*Figure 2:* Albino negro baby

## Maupertuis and genetics

If Mendel was called the "father of genetics", then Maupertuis certainly is its grandfather. Not only did he perform much of the mathematical logical thinking underpinning genetics, he also experimented on animals and did family tree research in humans. When Frederick II of Prussia lured him to Berlin to become head of the Royal Academy of Sciences, Maupertuis came across an interesting family with polydactyly (an individual presenting more than a normal number of fingers or toes). In the family of surgeon Jacob Ruhe, polydactyly was found to be present in successive generations. Maupertuis carefully studied their family tree and decided that a sixth finger could be passed on by both the mother and the father. Another proof that a genetic trait, or abnormality, can be passed on by both parents.

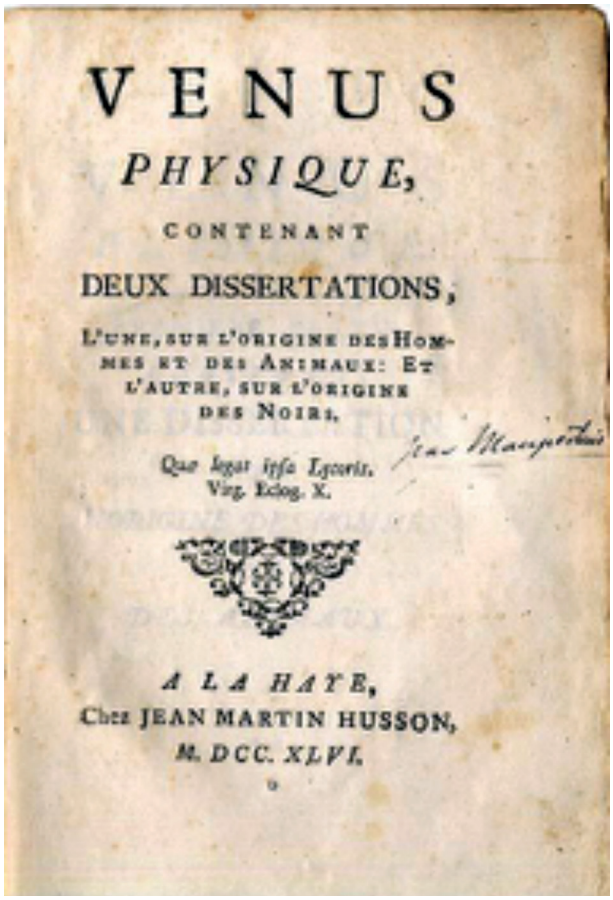
As a brilliant mathematician, then he applied the probability theory to polydactyly. How likely is it that a sixth finger occurs in a normal family and how frequent is it, compared to that, in the Ruhe family? The statistical difference was so overwhelmingly large that this physical abnormality had to be hereditary. In this way, Maupertuis introduced, a hundred years before Mendel, probability calculations into a branch that hadn't even been invented yet: genetics.

Theoretical background?

During that time, the big question arose: in which way are certain properties transferred by both parents to their children? Without knowledge of what was in the cell nucleus (J.F. Miesher would not discover the "nuclein" until 1869 and nothing was known of chromosomes and genes) Maupertuis suggested that the inheritance of characteristics was bound on "particles" in both germ cells. These particles would be responsible for the formation of different organs and structures in the baby. He believed that each particle had an affinity for a similar particle in the other sex cell and that each of the corresponding couples was passed on to the baby. By affinity he meant "attraction" because at that time, the laws of Newton, concerning gravity and attraction, had just been formulated and had enthused Maupertuis enormously.

His brilliant mind continued its reasoning: if there are too few particles, a defect may arise: a "monstre par défaut". (For example, Turner syndrome where one sex chromosome is missing). If there were too many particles present, then a malfunction would arise as well: "un monstre par exces". Here we think of all forms of trisomy (one too many of certain chromosome). It's hard to believe, but Maupertuis also postulated that either the particle of the mother or the father could dominate. As such, far ahead of his time he speculated about what we would call today "dominant traits" in the doctrine of heredity.

Finally, Maupertuis postulated (yes, the man really was a genius!) that a sudden change in a particle, (which we now call a mutation) may be responsible for the creation of a new characteristic or even a new species. Like the white negro. Here he already anticipated the mutation theory of Hugo De Vries (1901) and the theory of evolution of Darwin (1859). In 1745, he literally wrote: 'L'évolution tel qu'il l'expose se fait au hasard, 'par accident', il s'agit de 'productions fortuites'. In his Vénus Physique he quotes several times 'la formation de nouvelles races par la sélection artificielle'. So, it is not a stretch to suggest that Maupertuis was actually close to writing "natural selection by evolution" himself. A hundred years before Darwin!


VENUS

PHYSIQUE,

CONTENANT

DEUX DISSERTATIONS,

L'UNE, SUR L'ORIGINE DES HOMMES ET DES ANIMAUX: ET L'AUTRE, SUR L'ORIGINE DES NOIRS.

Quæ legat ipsa Lycoris.
Virg. Eclog. X.

A LA HAYE,
Chez JEAN MARTIN HUSSON,
M. DCC. XLVI.

*Figure :* Dissertation "Vénus Physique".

## Why forgotten?

The reasons why this brilliant predecessor of Mendel, Darwin and Hugo De Vries is today totally unknown, has to do mainly with his character. From an early age, he had been a spoiled child who was adored by his mother, resulting in a wiseacre who wouldn't tolerate any contradiction. He would, mercilessly, attack anyone who would not understand his ideas or found his theory ridiculous, sometimes in an embarrassing way. In the time when he was explaining the difficult mathematical formulas in Newton's gravity theory to Marquesa Emilie du Châtelet (mathematical prodigy and the mistress of Voltaire), as Maupertuis and Voltaire were best friends, after a disagrement, Voltaire dipped his pen in venom and wrote Maupertuis down to his destruction, disregarding the genius, yet, this was understandable. Even the most erudite mathematicians, biologists and physicists were having a hard time with a man who was, for his time, more than a century ahead in thoughts and speculations.

Maupertuis has also been largely forgotten today because he didn't focused, like Mendel, on a single



*Figure 4a and 4b:* Finnish and French Maupertuis stamps.

specific field. He had his brilliant mind scattered over hundreds of fields of study. In each domain, he quickly developed an above-average knowledge, but then abandoned the subject again in favor of something entirely new. He himself considered his greatest merit the discovery of 'Le principe de moindre action', one of the most fundamental basic principles of nature and the cosmos. In his 'Essai de Cosmologie', he even tried to use it to prove the existence of God.

### The earth: a pumpkin

Most of his portraits depict Maupertuis in a Lapland costume with a matching bear cap. On the title page of one of his works you can even see him sitting in a sled pulled by a moose. What brought Maupertuis to Lapland, had a lot to do with Newton again. If the theory of Newton was to be correct, the earth wouldn't be spherical, but flattened at both poles. In order to prove this, the degree of curvature of the meridian at the North Pole had to be measured and compared to the degree of curvature of the meridian at the equator. In 1735 Le Roi Louis XV therefore decided to finance two expeditions. One to Ecuador under the leadership of La Condamine and another to Lapland under the leadership of Maupertuis. Two years after, the data measured in both sites were compared resulting in a meridian arc at the Arctic Circle being indeed shorter than at the equator. Newton was right and Maupertuis became instantly famous. Not as the discoverer of 'Le principe the moindre action', which he was most proud of, neither as the pioneer of genetics and Darwin's evolutionary theory, but as the most brilliant French mathematician and all-round scientist from the Enlightenment era.

*Figure 5:* Maupertuis with globe and moose.