Maupertuis: the 'Old Synthesis'

FEDERICO FOCHER*

Institute of Molecular Genetics, CNR, I-27100 Pavia, Italy

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A pioneering study in 'human genetics' and the evolutionary aspects present in his revival of epigenetic theory should rank the French philosopher Pierre-Louis Moreau de Maupertuis (1698–1759) among the great forerunners of genetics and evolution.

> Could one not explain by that means [the fortuitous appearance of mutant 'particles'] how from two individuals alone the multiplication of the most dissimilar species could have followed? They could have owed their first origination only to certain fortuitous productions, in which the elementary particles failed to retain the order they possessed in the father and mother animals; each degree of error would have produced a new species; and by reason of repeated deviations would have arrived at the infinite diversity of animals that we see today; which will perhaps still increase with time, but to which perhaps the passage of centuries will bring only imperceptible increases. [Maupertuis 1751b]

These are neither Darwin's nor Wallace's words, but those of Pierre-Louis Moreau de Maupertuis, a French philosopher, who was born in Saint-Malo in 1698, and died in Basel, guest of the Bernoulli family, in 1759 (Terrall 2002).

After several years spent in Paris to introduce Newton's universal law of gravity against the old Cartesian theory of vortices, he devoted his scientific attention to living beings. In an epoch when Charles Bonnet still put minerals, plants and animals linearly on a long *Scala Naturæ*, and where every embryo was supposed to be simply the development of a preformed lilliputian *homunculus* encased either in ova or spermatozoa, he dared to propose the divergence of species ('repeated deviations') by chance ('fortuitous production') and 'time', and to reintroduce in the scientific debate the discredited epigenetic theory of development, formulated in antiquity by Aristotle and embraced, in the seventeenth century, by Descartes and William Harvey.

According to the epigenetic hypothesis, the organs of the new individual would slowly take shape only after the chance encounter, at the time of conception, of the 'elementary particles' present in the seminal fluids of *both* parents.

A keen observer, Maupertuis was induced to revive the old theory of epigenesis by a pioneering study in 'human genetics' he performed in Berlin in 1740s, when called to the court of Frederick the Great, to reorganize his Academy of Sciences. At that time, he discovered:

> Jacob Ruhe, surgeon of Berlin, born with six digits on each hand and each foot, inherited this peculiarity from his mother Elisabeth Ruhen, who inherited it from her mother Elisabeth Horstmann, of Rostock. Elisabeth Ruhen transmitted it to four children of eight she had by Jean Christian Ruhe, who had nothing extraordinary about his feet or hands. Jacob Ruhe, one of these six-digited children, espoused, at Dantzig in 1733, Sophia Louise de Tüngen, who had no extraordinary trait: he had by her six children; two boys were six-digited. One of them, Jacob Ernest, had six digits on the left foot and five on the right: he had on the right hand a sixth finger, which was amputated; on the left he had in the place of the sixth digit only a stump. One sees from this genealogy, which I have followed with exactitude, that polydactyly is transmitted equally by the father and by the mother: one sees that it is altered through the mating with five-digited persons. Through these repeated matings it must probably disappear; and must be perpetuated through mating in which it is carried in common by both sexes. [Maupertuis 1752]

How to explain the heredity of six-digitism?

> In the seminal fluid of each individual, the particles suitable for forming traits like those of that individual are the ones which are ordinarily most numerous, and which have the greatest combining power; although there are a great many others for different traits [...] The particles analogous to those of the father and the mother being the most numerous, and having the most combining power, will be those which most commonly unite; and they will ordinarily form animals like those from which they are from. [Maupertuis 1745]

*E-mail: focher@igm.cnr.it.

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Here, Maupertuis clearly asserts that among different elementary particles, flowed from every district of the body in genital organs and then present in seminal fluids, only few appear in the progeny, while others remain concealed. Could this be a naive intuition of the concepts of dominance and segregation? We are tempted to say yes, especially since we are aware of his further observations that some parental characters, concealed in children (first generation), can reappear in grandchildren (second generation) (Maupertuis 1745).

And what about natural selection?

> May we not say that, in the fortuitous combination of the productions of Nature, since only those creatures *could* survive in whose organization a certain degree of adaptation was present, there is nothing extraordinary in the fact that such adaptation is actually found in all those species which now exist? Chance, one may say, turned out a vast number of individuals; a small proportion of these were organized in such a manner that the animals' organs could satisfy their needs. A much greater number showed neither adaptation nor order; these last have all perished [...] Thus the species which we see today are but a small part of all those that a blind destiny has produced. [Maupertuis 1751a]

In his works, Maupertuis always rejected a miraculous view of life, broke with all forms of creationism; refusing preformation and reintroducing the materialistic theory of epigenesis and biparental heredity. He also contributed to introducing *time* in natural history, but above all, by observing a family genealogy and the works of the breeders, he assigned to *chance* a key role in the generation of individuals and in the evolution of species, sensing a changing world which would be the basis of the evolutionary ideas of Lamarck, Darwin and Wallace.

Chance, time, dominance, divergence, selection: although vague and naive, they are certainly smart intuitions of a brillant mind far ahead of his times. Readers, browse Maupertuis' works and you will wonder why his name is almost forgotten and hardly ranked among the great thinkers of genetics and evolution (Glass 1955).

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