Pluralistic models of inheritance: toward the reform of a central concept in biology

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Abstract

Session: New Directions in the Study of Inheritance (Eugene Earnshaw-Whyte, Olivier Morin, Gaëlle Pontarotti) Inheritance refers both to the permanence of forms throughout generations (Jacob, 1970) and to the processes involved in the reliable recurrence of features within lineages (Mameli, 2005; Helantera & Uller, 2010). Although the science of heredity has been dominated by the genetic paradigm for decades, several critics recently asserted the replication and transmission of DNA, which appeared to be the support of heritable characters, are not the sole responsible for intergenerational resemblances, and claim for the integration of pluralistic or inclusive inheritance models in biology (Griffiths & Gray, 2004; Jablonka & Lamb, 2005; Danchin et al., 2011). I will argue the multiplication of resemblance channels may bring about a drastic conceptual reform regarding inheritance and its associated notions. After a brief presentation of non-genetic inheritance (ecological, epigenetic, cultural, etc.), I will show that pluralistic models betray the obsolescence of the *replication* of traits rhetoric and urge scientists to adopt that of *maintenance*. Given the mosaic nature of evolving entities, made up of elements not necessarily able to beget offspring and following unsynchronized recurrence cycles, I will then suggest an inclusive concept of inheritance should be coupled to the notion of *persistence* of entities and conceived, consequently, without reproduction or generations. The multidirectional transmission of many variants and the subsequent upheaval of genealogies may furthermore persuade scientists to consider *lineages* in terms of continuity of functional structures instead of genetic ones. Finally, the fickleness of non-genetic variants may sign the return, after the stable Mendelian inheritance, of a highly dynamic phenomenon.

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