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August Weismann: From the cell to the rejection of Lamarckian inheritance

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August Weismann (1834-1914) one of the greatest evolutionists of the 19th century, drew the boundaries of the discourse about heredity and evolution and influenced their terminology. He was aware that a clear picture of the process of evolution must be based on the evidence from different biological fields and he addressed the practitioners of diverse biological disciplines. With his synthetic theory, The Germ Plasm, Weismann forged the first evolutionary synthesis between Darwinism and the biology of his age. By synthesizing heredity, development, embryology, ecology, paleontology systematic and cytology he provided a rich, innovative and challenging account of evolution.

However Weismann believed that the clue to the understanding of macro phenomena had to come from understanding the lowest level and most basic unit: the cell. In my talk I shall argue that Weismann reached the conclusion that the inheritance of acquired characters, one of the most revolutionizing tenets of the evolutionary discourse does not occur as a consequence of the factors leading to evolutionary change but following his investigation of inheritance. I will show how Weismann used the principle of developmental segregation of cell lineages, discovered during his first embryologic investigations of dipterans, integrated it with the most recent discoveries in cytology, and synthesized the two with natural selection, thus providing a foundation for the idea of the continuity of the germ-plasm, the material of heredity. Weismann's belief that the hereditary substance passed unchanged from the parents' germ cells to the offspring was contrary to Darwin's pangenesis theory, and excluded the possibility of an interaction between the heredity units and the cells of the body. The synthesis of such a theory of heredity led Weismann to the rejection of inheritance of acquired characters, the mechanism of Lamarckian inheritance.

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