

<Further Development 2_1>

The Germ Plasm Theory

In one of the ironies of research, conditional specification was demonstrated by attempts to disprove it. In 1888, August Weismann proposed the first testable model of cell specification, the germ plasm theory, in which each cell of the embryo would develop autonomously. He boldly proposed that the sperm and egg provided equal chromosomal contributions, both quantitatively and qualitatively, to the new organism. Moreover, he postulated that the chromosomes carried the inherited potentials of this new organism.ⁱ However, not all the determinants on the chromosomes were thought to enter every cell of the embryo. Instead of dividing equally, the chromosomes were hypothesized to divide in such a way that different determinants entered different cells. Whereas the fertilized egg was hypothesized to carry the full complement of determinants, certain somatic cells were considered to retain the “blood-forming” determinants, others to retain the “muscle-forming” determinants, and so forth. (It sounds surprisingly similar to autonomous specification, doesn’t it?) Only the nuclei of those cells destined to become germ cells (gametes) were postulated to contain all the different types of determinants.

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ⁱ Embryologists were thinking in terms of chromosomal mechanisms of inheritance some 15 years before the rediscovery of Mendel’s work. Weismann (1882, 1893) also speculated that these nuclear determinants of inheritance functioned by elaborating substances that became active in the cytoplasm!