

Wilhelm August Oscar Hertwig (1849-1922) ^[1]

By: Brind'Amour, Katherine Garcia, Benjamin Keywords: Biography ^[2] Sperm ^[3] Ova ^[4] Fertilization ^[5]

[Wilhelm August Oscar Hertwig](#) ^[6] contributed to [embryology](#) ^[7] through his studies of cells in development and his discovery that only one spermatozoon is necessary to fertilize an [egg](#) ^[8]. He was born 21 April 1849 to Elise Trapp and Carl Hertwig in Hessen, Germany. After his brother Richard was born the family moved to Muhlhausen in Thuringen where the boys were educated. The two brothers later attended the university in Jena from 1868 to 1888 and studied under [Ernst Haeckel](#) ^[9], who later convinced Hertwig to leave chemistry and pursue medicine. Hertwig became an assistant professor of anatomy at Jena in 1878 and full professor three years later. He was the first chair of both [cytology](#) ^[10] and [embryology](#) ^[7] in Berlin from 1888 to 1921 and director of the new Anatomical-Biological Institute there. Hertwig also became a member of the Prussian Academy of Sciences in Berlin and the Leopoldina Academy in Jena.

Hertwig initially devoted himself to studying morphological development, a topic on which he wrote a prize essay at Jena in 1871 and a doctoral dissertation at Bonn in 1872. He switched to studying the nature of the [fertilization](#) ^[11] process, however, after reading Leopold Auerbach's *Organologische Studien*. The two main views in this field at the time were that either the [spermatozoa](#) ^[12] made contact with the [egg](#) ^[8] and stimulated development via the transmission of a subtle mechanical vibration (as proposed by Gottlieb-Wilhelm Bischoff), or that the [spermatozoa](#) ^[12] penetrated the [egg](#) ^[8] and mixed their chemical components with the [egg](#) ^[8] [yolk](#) ^[13]. However, when Auerbach found two nuclei in one [egg](#) ^[8], he concluded that they must have formed from the mixture of chemical components of the [sperm](#) ^[14] and the [egg](#) ^[8], not from previous nuclei.

Hertwig was dissatisfied with these findings, as he had expected to find a structural continuity between the [nucleus](#) ^[15] of the [egg](#) ^[8] before and after [fertilization](#) ^[11]. Hertwig knew that his brother Richard was about to join Haeckel on a research opportunity in the Mediterranean, so he quit his assistantship at Bonn to go with them. It was there that he discovered the [sea urchin](#) ^[16] was transparent due to its small size, finely divided [yolk](#) ^[13], and its lack of a membrane. Because of this, he was able to observe the [spermatozoa](#) ^[12] as they entered the [egg](#) ^[8] and fused with its [nucleus](#) ^[15] five to ten minutes later. Most importantly, however, Hertwig found that only one spermatozoon was required to fertilize an [egg](#) ^[8], and that once one spermatozoon entered the [egg](#) ^[8], the [egg](#) ^[8] formed a [vitelline membrane](#) ^[17] blocking any other [spermatozoa](#) ^[12] from entering.

Hertwig submitted his findings as his *Habilitationsschrift* and was forced to defend his claims against those who believed that the [egg](#) ^[8] cell did not pass through the monera stage in its development. In fact, Hertwig defended his claim even when the more modern theory of chromosome continuity was proposed. It took the work of [Thomas Hunt Morgan](#) ^[18] for Hertwig to accept that chromosomes exchanged [genes](#) ^[19] by crossing over. Hertwig passed away 25 October 1922 in Berlin. He will always be known for his work with his brother Richard on the [embryology](#)

[7] and [fertilization](#) [11] of [sea urchin](#) [16] eggs.

Sources

1. Olby, Robert. "Hertwig, Wilhelm August Oscar." *Dictionary of Scientific Biography* 6: 337-40.

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