

Caspar Friedrich Wolff

Caspar Friedrich Wolff is most famous for his 1759 doctoral dissertation, *Theoria Generationis*, in which he described embryonic development in both plants and animals as a process involving layers of cells, thereby refuting the accepted theory of preformation—the idea that organisms develop as a result of the unfolding of form that is somehow present from the outset, as in a homunculus. This work generated a great deal of controversy and discussion at the time of its publication but was an integral move in the reemergence and acceptance of the theory of epigenesis.

Wolff was born in Berlin, Germany, on 18 January 1734 to Anna Sofia Stiebeler and Johann Wolff, a tailor. He studied medicine at the Collegium Medico-Chirurgicum in Berlin from 1753 to 1754 and then enrolled at the University of Halle, graduating in 1759 with his MD. The controversy created by his dissertation, with its assertions challenging the accepted view of preformationism, made it difficult for Wolff to find work. In particular, his hypothesis was opposed by Albrecht von Haller, a strong proponent of the theory of preformation. Wolff attempted to obtain a position at the St. Petersburg Academy of Sciences with the help of Leonhard Euler, but was unsuccessful because many of the members of the Academy disagreed with the epigenetic contentions of his work. Wolff became a field surgeon for the Prussian army in 1761.

During his time in the military he gave some lectures at the Breslau Military Hospital on the subject of anatomy. He continued to seek a professorship in Berlin, attempting to obtain permission to lecture in 1762 while still in the army, and again as the Franco-Prussian War was ending, knowing that he would be losing his job at the military hospitals because they were closing. He was denied in both instances by the professors of the Collegium Medico-Chirurgicum. Because he had been denied one university professorship and foresaw more such denials in the future, Wolff began giving private, unsanctioned lectures on anatomy, physiology, and medicine in Berlin in 1763. In 1764 he published another paper, *Theorie von der Generation*, which responded to the criticism of his dissertation and restated his belief in epigenesis as the most valid theory of generation. This publication further alienated him from the professors at the college and thus did not help in his pursuit of a professorship.

In 1766, through the tenacity and initiative of Leonhard Euler, Wolff was offered a position in the anatomy department of the St. Petersburg Academy of Sciences, which he promptly accepted. Wolff moved to Russia with his wife in 1767. He finished his career working in Russia, writing thirty-one memoirs that were published in the Academy's Proceedings. He began work on a final paper, "Theory of Monsters," in which he tried to organize his ideas regarding epigenesis, but suffered a brain hemorrhage that caused his sudden death in St. Petersburg on 22 February 1794.

Wolff is remembered as a founder of modern embryology due to the publication of his dissertation, which both rejected the idea of preformation and reinvigorated the theory of epigenesis, an updated and well-supported explanation of embryonic development. At the time, the majority of scientists held the theory of preformation as the most probable explanation for the development of organisms. Wolff's demonstration of the logic and support behind the theory of epigenesis was thus both controversial and revolutionary for the field as a whole. In his dissertation Wolff used the example of a plant root that, despite its differentiated tissues, is able to regenerate a whole new plant if the stem and leaves are removed. This evidence directly invalidated the strongest versions of the theory of preformation, which stated that all parts of an organism were pre-formed in the embryo, development consisting of the unfolding of these parts. He later applied this same approach to the development of animals, providing evidence that the development of organs and extremities came from the growth of embryonic layers, further refuting the theory of preformation.

After this work, Wolff continued to work with anatomy, devoting a great deal of time to the study of embryos. He observed the growth of chick embryos and was able to track the development of various organs and extremities. This led to his discovery of the embryonic kidneys, or Wolffian bodies, whose ducts are also named in his honor. While working with the development of embryos of various organisms, Wolff postulated the theory of embryonic layers based on his observation of the proliferation and development of embryonic organs from discrete layers of cells.

Wolff desired to further his work in the developmental process of organs and began to develop a theory that could explain how organs develop the way they do from their initial liquid states. This theory focused around the *vis essentialis*, or essential force, which, he said, allowed for the entrance of vital liquids and nutrients into plants and embryos. He attempted to explain these forces by observing the differences between plants and animals and even between individual organisms, but eventually abandoned this research after deciding that the individual forces he was looking for did not exist but in fact were one universal natural force that affects all organisms. In his final unpublished writings, Wolff moved on to theories of the meaning of the soul and the way the soul manifests itself within a body, but he passed away before these theories gained any real prominence.

Wolff is remembered mainly for his work in refuting the theory of preformation and revitalizing discussion about the theory of epigenesis. Through his efforts regarding these theories, Wolff was a pioneer in the study of embryology. His work paved the way for the research of Karl Ernst von Baer as well as Heinz Christian Pander.

Sources

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