Eduard Friedrich Wilhelm Pflüger (1829-1910) [1]

By: Kearl, Megan Keywords: Biography [2] Frogs [3] Ova [4]

Eduard Friedrich Wilhelm Pflüger was a physiologist known for his research on respiration and the respiratory quotient, experiments on the effects of electricity on muscles and nerves, and his study of the ovaries and eggs development. His experiments on how the gravitational orientation of frog [5] eggs affects their cleavage plane inspired embryologists such as Wilhelm Roux [6] and Gustav Born [7] to conduct their own experiments usingfrog [5] eggs.

Pflüger was born in Hanau, Germany, on 7 June 1829 and was raised by his mother Charlotte Wilhelmine Richter and his father Johann Georg Pflüger, a businessman who later became a politician. Pflüger attended gymnasium in Hanau and went on to study politics and law at Heidelberg. He briefly became an ardent democrat in 1848, thus he advocated freedom and democracy in Germany. After his arrest during the 1849 Heidelberg student rebellions, he promptly gave up his political activism and changed his focus to medicine.

In the summer of 1850 Pflüger became a medical student at Marburg, and in 1851 he moved to the University of Berlin [8] to continue his medical studies. Pflüger frequently attended lectures by Johannes Müller [9] and Emil du Bois-Reymond [10], the founder of scientific electrophysiology. He had a passion for research and was fascinated by Müller's work, so he began working in Müller's laboratory while still a student. Under Müller's tutelage, Pflüger earned his MD in 1855 for his work on the different inhibitory effects of certain nerves on the intestines of rabbits.

At the end of 1858, a few months after Müller's death, Pflüger obtained a position as university lecturer at Berlin under du Bois-Reymond, to work in electrotonus [11]. Electrotonus is the effect achieved by passing electricity through a muscle or nerve. Pflüger eventually elucidated a basic law about changes in nerve sensitivity based on the direction, polarity [12], and strength of the current applied to the nerve, later called Pflüger's law of convulsion. Pflüger became the chair of physiology at Bonn in late February of 1859, succeeding Hermann von Helmholtz [13] on Helmholtz's strong recommendation. From 1889 to 1890 he served as a rector at Bonn.

The research accommodations at Bonn were less than spacious, forcing Pflüger to switch his research focus fromelectrotonus [11] to histology [14], or the study of tissues. He studiedembryology [15] for a few years, followed by nerve endings in salivary glands and gas exchange in blood cells. Pflüger was also fascinated by metabolism, studying the effects of protein, fat, and carbohydrates. His primary interest was in glycogen and he published more than sixty works on this subject alone. His fascination with glycogen lasted decades and led him to actively pursue new ways to determine glycogen levels. Later in his career his interest returned to the inner workings of embryos and what factors affected the sex and development of offspring. His earliest experiments during this period were to determine whether the amount of semen [16] that eggs came into contact with affected the gender of the offspring. He also tested the effect gravitational fields had on developing eggs by rotating frog [5] eggs sandwiched between glass plates in different orientations with respect to the earth's gravitational field. This test yielded fascinating results: the gravitational orientation of the eggs affected the cleavage plane, indicating that external stimuli could affect development. This experiment influenced embryologists including Gustav Born [7] and Wilhelm Roux [6] to conduct embryological experiments using frog [5] eggs.

Pflüger's home life was as successful as his research. He was extremely family-oriented, often taking time out of his busy schedule for long hikes with his wife, Christine Marc, and three daughters, Anna, Rosa, and Hildegard. In his professional life, Pflüger was quick to criticize and often this criticism degenerated into personal attacks rather than constructive comments. However, despite his social shortcomings, he was generally well-regarded among his peers and was a member of the German Academy of Sciences [17] Leopoldina, as well as other foreign academies. At the age of eighty-one he died of a liver carcinoma. His legacy and influence on the field of embryology [15] come not only from his findings, but also from the extensive and important experiments he inspired.

Sources

1. Maienschein, Jane. "Arguments for Experimentation in Biology." *Proceedings of the 1986 Biennial Meeting of the Philosophy of Science Association* 2 (1986): 180–95.
2. Rothschuh, K. E. "Pflüger, Eduard Friedrich Wilhelm." *Dictionary of Scientific Biography* 10: 578–80.

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Subject

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