William Keith Brooks (1848-1908) [1]

By: Smith, Kaitlin Keywords: Biology [2] Education [3]


William Keith Brooks [4] was born on 25 March 1848 in Cleveland, Ohio, to Ellenora Kingsley [7] and Oliver Allen Brooks [8]. He attended public school before entering Hobart College [9], in Geneva, New York, for two years of honors study. He then transferred to Williams College [10], in Williamstown, Massachusetts, where he would receive his Bachelor of Arts in 1870. At Williams College [10], Brooks excelled at mathematics, was known as an independent scholar, and belonged to Phi Beta Kappa.

Being proficient in many subjects, including Greek and biology, Brooks was unsure what area to choose after college. He had always been interested in natural phenomena, and as a boy he had paid special attention to the life and habits of aquatic animals and read books on natural history [11] and Darwinism [12]. These past experiences influenced Brooks’ decision to focus on biological studies and especially on the study of development.

Brooks entered Harvard as a graduate student and there met Louis Agassiz [13], a professor at the university. Agassiz was at the height of his career, having become a leader in the field of biology; his work influenced many young researchers who were set to become influential in the field. Brooks spent the first of two summers at a new marine laboratory on Penikese Island off the coast of Massachusetts with the founder, Agassiz. The following summer was spent at the laboratory under the direction of Alexander Agassiz [14], Louis’ son. In 1875, Brooks received his PhD from Harvard and late that summer was employed by Alexander Agassiz [14] as a tutor. At Agassiz’s private laboratory at Newport, Rhode Island, Brooks was able to study the development of gastropods as well as begin his life-long work with tunicates, specifically Salpa.

Brooks' best known morphological study, “The Genus Salpa,” includes original sketches and photolithographic plates now held in a collection at Johns Hopkins University [6]. Through the use of a microscope [15] and serial sections, Brooks was able to accurately represent the embryological development of these free-swimming tunicates. Drawings of the stages of development were central to Brook’s morphological studies. Brooks knew the development of an embryo was an important part of evolutionary study, and felt that observations of this nature would help to confirm Darwin’s theory of evolution [5].

After his work at Alexander Agassiz’s laboratory, Brooks became an assistant to Alpheus Hyatt [16] at the museum of the Boston Society of Natural History [17], where he continued to study invertebrates. In 1876, Brooks received one of twenty fellowships given by Johns Hopkins University [6], which had been founded that same year, and was appointed an associate of biology under H. Newell Martin [18]. In the summer of 1883, the year he was promoted to associate professor, Brooks attended a meeting of the American Association for the Advancement of Science [19] (AAAS) where he outlined his theory of heredity. Based on his study of invertebrates, particularly germ-cells, Brooks found evidence to explain variation among species by means of ancestral heredity as well as Darwin’s theory of pangenesis [20].

In 1878, Brooks founded the Chesapeake Zoological Laboratory. The lab was modeled after Louis Agassiz’s laboratory on Penikese Island. The two labs were the first two marine laboratories in the US devoted to zoological studies. One main difference between them was that Brooks established a floating laboratory, allowing the lab to be relocated every summer. The second summer after its formation the laboratory was located at Crisfield, Maryland, where Brooks had been commissioned by the state of Maryland to study the development of the American oyster [21]. His findings led to the conclusion that fertilization [22] of this oyster [21] occurred outside the body, and Brooks was able to rear an oyster [21] embryo through all stages of development by mixing sperm [23] and egg [24] together.

Brooks became Professor of Morphology in 1889 and became head of the biology department from 1894 until his death in 1908. Many who knew Brooks, such as Edwin G. Conklin, found Brooks’s greatest achievement to be that of teacher and director. Through his prominent position at Johns Hopkins, he was able to influence his students, many of whom would become distinguished scientists.

During Brooks’s career at Johns Hopkins, he authored many books. His first textbook Handbook of Invertebrate Zoology [25], was
published in 1882. Brooks outlined his theory of heredity, originally discussed at an AAAS meeting, in 1883. In 1891, he published *The Oyster* [26], which outlined his findings at the Chesapeake Laboratory at Crisfield. *The Foundations of Zoology* [27], published in 1899, was based on a series of lectures regarding the philosophical side of science, and outlines Brooks' admiration for George Berkeley [28] and Charles Darwin [29].

Recognition of Brooks extended beyond *Johns Hopkins University* [6]. He received honorary degrees from *Hobart College* [9], *Williams College* [10], and the *University of Pennsylvania* [30]. Brooks was elected member of the *National Academy of Sciences* [31] and the National Philosophical Society in 1884 and 1886, respectively. He was also a member of Academy of Natural Science of Philadelphia, the *Boston Society of Natural History* [17], the Maryland Academy of Arts and Sciences, and the *American Society of Zoologists* [32]. Brooks was a fellow of both the *American Association for the Advancement of Science* [19] and the Royal Microscopical Society. He received the medal of the *Société d'Acclimatation* of Paris for his work on the *oyster* [21]. He was Lowell Lecturer in 1901 and in 1907 gave the principal address to the International Zoological Congress. Brooks died in 1908 after battling a congenital heart defect.

**Sources**


Biologist William Keith Brooks studied embryological development in invertebrates and used his results as evidence for theories of evolution and ancestral heredity. He founded a marine biological laboratory where his and others' embryological studies took place. Later in life, Brooks became head of the Biology Department at Johns Hopkins University where he helped shape the minds of leading embryologists.

**Subject**

*Brooks, William Keith, 1848-1908* [35]

**Topic**

*People* [36]

**Publisher**

Arizona State University. School of Life Sciences. Center for Biology and Society. Embryo Project Encyclopedia.

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**Format**

*Articles* [37]

**Last Modified**

Wednesday, July 4, 2018 - 04:40

**DC Date Accessioned**

Tuesday, May 8, 2012 - 20:33

**DC Date Available**

Tuesday, May 8, 2012 - 20:33

**DC Date Created**

2010-07-01