Charles Manning Child (1869-1954) [1]

By: Sunderland, Mary E. Keywords: Biography [2] Gradients [3]

Born in Ypsilanti, Michigan, on 2 February 1869, Charles Manning Child [4] was the only surviving child of Mary Elizabeth and Charles Chauncey Child, a prosperous, old New England family. Growing up in Higganum, Connecticut, Child was interested in biology from an early age. He made extensive collections of plants and minerals on his family farm and went on to study biology at Wesleyan University [5], commuting from his family home. Child received his PhB in 1890 and MS in biology in 1892, and then went on to study in Leipzig [6] after his parents? death. He worked for a short time in the psychology laboratory of Wilhelm Wundt [7], and then pursued studies in zoology under the supervision of Rudolf Leuckhart. His doctoral dissertation investigated morphological aspects of insect sense organs. Leuckhart emphasized the functional purpose of morphological structures and led many of his students to develop and defend the notion of teleology, including Child, who completed his PhD in 1894.

The preformation [8]-epigenesis [9] controversy further fueled Child?s interest in early development and form. His career was devoted to finding the mechanisms that govern development and his working hypothesis posited a role for physiological factors. These factors were thought to play a key role in communication between protoplasmic units and were responsible for many processes in an organism?s life cycle. By the late 1890s, Child identified simple organisms as the best way to investigate these factors and life processes. He began to focus his research on a variety of lower organisms, particularly those with regenerative capacities. Regeneration [10] was interpreted as a sort of ?experimental reproduction,? offering a model to study how these hypothetical factors might function in key developmental processes.

The gradient theory [11], recognized as Child?s most significant scientific contribution, brought together his elaborate body of work on lower organisms, synthesizing his interests in development and the general reactivity of organisms. The gradient theory [11] grew from his studies of regeneration, which were largely based on work conducted with planaria [12]. Child observed that regeneration in planaria [12] occurred in a graded process along the axis of the organism, wherein each physiological process seemed determined by its location along the axis. He posited the existence of physiological factors working to guide the regenerative process and was convinced that these differences could be explained quantitatively. Child?s ideas were rooted in the concept of polarity [13], which was first introduced by Theodor Boveri [14] and later developed by both Thomas Hunt Morgan [15] and Julius Sachs [16], all of whom Child acknowledged and credited.

In 1895 Child joined the University of Chicago [17] where he remained until 1937. He worked his way from beginning faculty member to full professor by 1916, and finally to head of the zoology department. In 1899 Child married Lydia Van Meter. A great mentor for many graduate students, including Libbie Hyman [18], Child was often described as reserved in his personal relationships. Child founded the journal *Physiological Zoology* [19] in 1928, a publication designed to showcase the type of biology he had devoted his life to, and which

continues today as *Physiological and Biochemical Zoology* [20]. In 1937 Child retired to California, continuing to conduct research and write until his death in December 1954.

Child used much of his evidence to argue that we need to think differently about development and about life cycles. Child thought that our own human form and our life-long progression towards senescence [21] and death biased our thinking about development. He argued that thinking about development in this way ignored a fundamental developmental process: rejuvenescence [22]. Although his ideas were controversial and disputed by many of his contemporaries, in some ways Child?s gradient theory [11] has stood the test of time. His work on metabolic gradients [23] paved the way for current work in metabolic signaling [24] and has inspired other researchers who followed Child.

Sources

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