

Beadle's One Gene-One Enzyme Hypothesis ^[1]

By: Pribadi, Amy Keywords: Genetics ^[2]

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Between 1934 and 1945, George Beadle developed a hypothesis that each gene within the chromosomes of organisms each produced one enzyme. Enzymes are types of proteins that can catalyze reactions inside cells, and the figure shows that each enzyme controls a stage in a series of biochemical reactions. The top box in this figure represents a normal process of enzyme production and biochemical reactions, and the bottom box shows how Beadle's experiments affected the normal biochemical process. In this figure, each box represents the borders of the cell, and the dashed lines inside the box represent the nucleus. In the normal cell depiction, three genes (represented as colored rectangles) in the nucleus influence the production of three corresponding enzymes (represented as colored squares). The collections of black circles, orange triangles, green squares, and purple circles represent organic molecules, which the enzymes affect through metabolic reactions. In the normal box, gene 3 somehow produces enzyme 3, which catalyzes a reaction in which the first two molecules combine to form a larger molecule. Enzyme 2 catalyzes the second step in the reaction in which the enzyme modifies the chemical composition of the molecule. Enzyme 3 catalyzes the third step in the reaction in which a carbon atom is added to the molecule. This figure also represents an abnormal process (bottommost box) of enzyme production and biochemical reactions. In the abnormal process, X-rays damaged gene 2, preventing the production of enzyme 2. As a result, neither the second nor the third steps of the chemical reaction can occur.

Subject

Cells ^[3] Beadle, George Wells, 1903-1992 ^[4] California Institute of Technology ^[5] Stanford University ^[6] Genetics ^[7] Enzymes ^[8] Genes ^[9] Amino Acids ^[10]

Topic

Theories ^[11] Processes ^[12]

Publisher

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

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Format

Graphics ^[13]

Last Modified

Wednesday, July 4, 2018 - 04:40

DC Date

2016-10-12

DC Date Accessioned

Wednesday, October 12, 2016 - 17:27

DC Date Available

Wednesday, October 12, 2016 - 17:27

DC Date Created

2016-10-12

DC Date Created Standard

Wednesday, October 12, 2016 - 07:00

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<https://hpsrepository.asu.edu/bitstream/handle/10776/11361/OImage1Gene1EnzymeAP.jpg>

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