

# Epigenetics as Dynamic Entity

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## INTRODUCTION

Epigenetics was first defined by Conrad Waddington in 1950s as the branch of biology that investigates the normal interactions between genes and their products which gives rise to phenotype. Later, Arthur Riggs and his colleagues defined it as study of heritable changes in function of gene through mitotic and meiotic division which cannot be explained by DNA sequence change [1]. Functional morphologists, on the other hand, are more likely to be familiar with a definition of Herring's (1993) that defines epigenetics as "the full chain of interactions among cells and its products that leads to morphogenesis and differentiation." In current the definition most commonly used refers to the information that is present beyond the encoded DNA sequence [2]. Waddington have provided insights later for coining the term epigenetics with his reasons. The development course was by the interaction of numerous genes with each other and with the environment influenced the outcome. He also understands the similarity between genes and characteristic traits that many of the geneticists didn't. We know that at the time of development, zygote is equipped with the enacted characters, but these characters must interact with one another before adult state is obtained, these interactions are in the process called epigenesis [3].

Conrad Waddington was one among many researchers who realized that genetics and development biology are related, hence should be brought under one domain. His book *The Epigenetics of Birds* deals largely on the development of chicken. His coined term epigenotype is defined as "The overall developmental system, which consists of interconnected developmental pathways that lead to an organism's mature form." The other scientist who wanted to make relation between genetics and development biology are Hardon, Richard Glodschmidt, Julian Huxley and J.B.S Haldane. Though it was evolved as important field of science in 19<sup>th</sup> century, but it isn't recognized as a distinctive subject. Till 1950s, the word epigenetics is used widely to categorize all the events of development from fertilized zygote to mature organism but today it is a heritable phenotypic characteristic caused by changes in chromosome but not by the DNA sequence [4]. Biologists of 19<sup>th</sup>

considered the development and inheritance as one. Sandler and Sandler explained in his scholarly review that why Gregor Mendel, the pioneer of genetics was ignored by the top biologist at his time. Gregor Mendel in his famous experiments demonstrated that inheritance can be studied by its own, without involvement of development.

Words that have diverse meanings for different people had a place in biology for a long time. Epigenetics is a not any special to that, as it has multiple meanings with distinct roots from various scholars [3]. Though epigenetics is considered in the beginning as combined field of genetics and developmental biology by many scholars, later in the 20<sup>th</sup> century they are seen as diverged entities. In recent years this field was widened involving RNA and with enhancement of relationship between gene expression and DNA methylation. Including the establishment of experimental studies in epigenetics. The epigenome project is following the sequencing of the human genome and will eventually reveal the role of DNA methylation in the control of specialized gene activities [5]. Waddington definition for epigenetics was about the events leading to unfolding of genetics for development. Robin Holliday, British molecular biologist says in his paper that it's no wrong with that except that his information was not specific.

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