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Original Article

Contribution of International Level Work on Developmental Biology by Women Scientist

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ABSTRACT

The basis for both descriptive and evolutionary embryology was anatomy. The emerging biological discipline of physiology, however, started to encroach on embryological research by the end of the nineteenth century. "How?" queries were used in place of "what?" questions. According to a new generation of embryologists, the field should answer the question, "How does an egg become an adult?" in addition to guiding the study of anatomy and evolution. Embryologists were supposed to study the processes of differentiation and organ formation (morphogenesis). This new program was designated as "developmental mechanics," "physiological embryology," or "causal embryology." Its objectives were to pinpoint the chemicals and processes that cause the noticeable changes in embryos. In the study of embryos, experimentation was meant to supplement observation, and by seeing how embryonic cells reacted to perturbations and disruptions, embryologists were expected to gain insight into the characteristics of the embryo. The process by which organisms grow and develop from a single fertilized cell into a complex multicellular organism is the subject of the interesting science of developmental biology. In this subject, researchers from all over the world have generated ground-breaking discoveries that have illuminated basic mechanisms such as gene control, pattern development, and cell differentiation. An outline of the numerous noteworthy scientists' contributions that have greatly advanced developmental biology on a global scale.

Keywords: Developmental biology, Pluripotent Stem Cells, Embryonic Induction, Gene Regulation

INTRODUCTION

The effects of external factors on the development of the embryo are the focus of significant research projects in experimental embryology. There is no separation between the developing embryo and its environment. A significant part of many species' life cycles involves environmental cues. Additionally, removing or altering specific environmental components may affect development as a whole. Scientists like Christiane Nüsslein-Volhard, Mary Lyon, Barbara McClintock, Helen Blau, and many others have made significant advances to our understanding of how cells organize, specialize, and function during development. In addition to expanding our knowledge of biology, their discoveries in fields like embryonic induction, X-inactivation, genetic regulation, stem cell biology, and reprogramming have had a long-lasting effect on medical research by providing novel treatments for developmental diseases, genetic disorders, and other illnesses.

International Work on Developmental Biology -

In the areas of reproductive health, fertility, and gender-specific disorders, international developmental biology plays a crucial role in expanding our understanding of female biology. Developmental biology has made significant advances in the research and comprehension of female development, including the following

1. Hans Spemann: German embryologist Hans Spemann is credited with developing the idea of the organizer and discovering embryonic induction in 1901. His early 20th-century research made a substantial contribution to our knowledge of how cells interact during development. For his work in developmental biology, he received the 1935 Nobel Prize in Physiology or Medicine.

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2. Marie Curie: She was a Polish-French physicist and chemist, renowned for her pioneering work on radioactivity. She was the first woman to win a Nobel Prize and remains the only person to have won Nobel Prizes in two different scientific fields: Physics (1903) and Chemistry (1911). Her discoveries, including the elements polonium and radium, significantly advanced medical treatments and scientific understanding of radiation.

3. Cori cycle: Cori cycle, which explains how the body breaks down glucose, was discovered by Czech-American researcher Gerty Cori and her husband Carl Cori. Her research on enzyme-catalyzed processes in living cells earned her the 1947 Nobel Prize in Physiology or Medicine, making her the first female recipient of the honor.

4. Margaret Kennard: American neurobiologist Margaret Kennard is renowned for her innovative research on the prefrontal cortex and behavior. She carried out significant research on primates in the 1940s and 1950s, which advanced our knowledge of brain development and the neurological underpinnings of emotions and thought.

5. Rosalind Franklin: She was a British biophysicist whose X-ray diffraction images of DNA in the early 1950s led to the discovery of its double-helix structure. Her critical work provided key insights into the molecular structure of DNA, although she was not fully recognized during her lifetime. Her contributions significantly impacted the fields of genetics and molecular biology.

6. Mary Lyon: Mary Lyon was a British geneticist known for her discovery of X-inactivation in 1961, the process by which one of the two X chromosomes in females is randomly inactivated. Her work significantly advanced the understanding of genetic regulation and sex chromosome-related diseases.

7. Dorothy Hodgkin: She was a British chemist who won the Nobel Prize in Chemistry in 1964 for her work on the structure of important biochemical substances using X-ray crystallography. She is best known for determining the structures of penicillin and vitamin B12, which had major implications for medicine and biochemistry.

8. Patricia Donahoe: American pediatric surgeon Patricia K. Donahoe discovered the function of Müllerian inhibiting substance (MIS) in the development of male and female reproductive organs and its potential for treating some cancers in the 1980s. Donahoe is renowned for her studies on the development of the Müllerian duct and sexual differentiation.

9. Helen Blau: Is an American biologist known for her pioneering work in stem cell biology. Her research, particularly in the 1980s and 1990s, advanced the understanding of muscle regeneration and the role of stem cells in tissue repair, contributing significantly to the field of regenerative medicine.

10. Elaine Fuchs: Is an American biologist known for her groundbreaking research on stem cells and skin development. In the 1980s and 1990s, she advanced the understanding of epidermal stem cell biology and their role in tissue regeneration and repair, significantly impacting the field of regenerative medicine.

11. Barbara McClintock: She was an American geneticist renowned for her discovery of transposable elements or "jumping genes" in maize. Her groundbreaking work demonstrated that genes can move within and between chromosomes, challenging the traditional understanding of genetics. McClintock's pioneering research earned her the Nobel Prize in Physiology or Medicine in 1983, making her one of the most influential figures in genetics. 12. **12. Rita Levi-Montalcini:** She was an Italian neurologist who co-discovered the nerve growth factor (NGF), a protein crucial for the growth and survival of nerve cells. Her work significantly advanced the understanding of neurobiology and cell growth. She was awarded the Nobel Prize in Physiology or Medicine in 1986 for her contributions to neuroscience.

13. Anne Ephrussi: Is a French-American biologist known for her research on RNA localization and protein synthesis during development. Her work, particularly in Drosophila, advanced the understanding of how mRNAs are localized within cells to regulate gene expression. She made significant contributions to developmental biology and molecular biology in the 1990s.

14. Christine Petit: Is a French neuroscientist known for her research on the genetic basis of hearing loss. In the 1990s, she made key discoveries about the genes involved in auditory function, advancing our understanding of sensorineural deafness and the molecular mechanisms of hearing.

15. Janet Rossant: Is a Canadian developmental biologist, best known for her work on embryonic stem cells and early mammalian development. In the 1980s and 1990s, she made significant contributions to understanding cell differentiation and gene regulation during the formation of tissues and organs in mammals.

16. Ruth Lehmann: Is a German-American biologist known for her research on germ cell development. In the 1990s, she discovered key mechanisms involved in the formation and migration of germ cells during early development, advancing our understanding of reproductive biology and cellular fate determination.

17. Christiane Nüsslein-Volhard: Is a German biologist known for her pioneering work in Drosophila (fruit fly) genetics. She discovered key genes that control body segmentation and pattern formation during embryonic development. Her research has been fundamental in understanding developmental biology.

18. Nüsslein-Volhard: Nüsslein-Volhard was awarded the Nobel Prize in Physiology or Medicine in 1995 for her contributions to our understanding of gene regulation in development. Nitra Ben-Arie is an Israeli-American scientist known for her research on the genetic regulation of neural development. In the early 2000s, her work focused on understanding the role of specific genes in the development of the nervous system, contributing to the understanding of neural differentiation and related disorders.

19. Shinya Yamanaka: Shinya Yamanaka is a Japanese stem cell researcher known for his groundbreaking discovery in 2006 of induced pluripotent stem cells (iPSCs). By reprogramming adult cells to become pluripotent, capable of developing into any cell type, he revolutionized the field of regenerative medicine. Yamanaka's work has significant implications for disease modeling, drug testing, and potential therapies for various conditions. He was awarded the Nobel Prize in Physiology or Medicine in 2012 for this discovery.

20. Emmanuelle Charpentier: Emmanuelle Charpentier is a French microbiologist who co-developed the CRISPR-Cas9 gene-editing technology alongside Jennifer Doudna. This revolutionary discovery allows precise, targeted changes to DNA and has had a profound impact on genetics and biotechnology. Charpentier was awarded the Nobel Prize in Chemistry in 2020 for this groundbreaking work.

21. Jennifer Doudna: Jennifer Doudna is an American biochemist known for her role in developing the CRISPR-Cas9 gene-editing technology, which allows precise modifications to DNA. Her groundbreaking work has revolutionized genetics and biotechnology. Doudna was awarded the Nobel Prize in Chemistry in 2020, shared with Emmanuelle Charpentier, for their development of CRISPR-Cas9.

CONCLUSION:

In this regard, the work of these experts offers a strong basis for further investigation and has great potential for disease treatment, tissue regeneration, and enhancing human health. In order to keep the study of life's developmental processes at the forefront of the biological sciences, their work continues to motivate upcoming generations of developmental biology researchers.

CONFLICT OF INTEREST:

No other researchers have shown a conflict of interest concern with our research**.**

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