



FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES

Pre- Mendelian Concepts of Heredity

Preformation theory (Swammerdam and Bonnet. 1720- 1793)

Preformation theory proposes that the only male and female is responsible for heredity. The male gamete consists of a miniature figure of man's body called as homunculus which is responsible for heredity.

Epigenesis (C.f.wolf (1733-1794) and K.E. Von Baer (1792-1876)

States that different organ and tissues of adult plant and animals developed from the uniform embryonic tissue and not from mere growth expansion of the miniature homunculi present in eggs / sperms. Von Baer proposed that they developed through a sequential modification of the embryonic tissue. This concept is universally accepted.

Swammerdam (1637-1680)

Proposed that a tiny preformed frog occurred in the animal hemisphere of the frog egg and that became simply larger by feeding on the food stored in the vegetal hemisphere of the egg.

Spallanzani (1729-1799) and other workers of 17th and early 18th centuries. With the development of improved microscopy and other cytological techniques in 17th and 18th centuries, it became clear to biologists that neither the egg nor the sperm contained a preformed individual but that each was a relatively uniform, homogeneous mass of protoplasm.

Particulate Theory

A French biologist Maupertius in 1698-1759 discards the preformation theory and forwarded the concept of biparental through many tiny particles. According to him both the parents produce the semen, which composed of many tiny particles. The semen of both the parents unite and the embryo formed each organ of the embryo was supposed to be formed by two particles. Each of which came from each parent.

In the year 1732-1806 J.C. Koelreuter was the first person to get fertile hybrids by artificial crossing two species of tobacco and concluded that the gametes were the physical basis of heredity.

Pangeneses

Charles Darwin proposed this theory. According to pangeneses that each organ of an individual produces very small almost invisible identical copies of itself called gemmules or pangenes. These gemmules from various parts collected into the blood stream of animals. The blood transports the gemmules into the reproductive organ, which produce gametes. Male and female gametes unite to form zygotes. When these gives rise to a new organism, the gemmules of different parts of the body give rise to the same kind of organs, tissues and cells, which produced them in the parents.

Lamarckism

A French biologist Lamarck (1774-1829) considered the inheritance of acquired characters to be the most important, if not the sole, mechanism of evolutionary changes. According to urgent need, use and disuse of organs, the modification thus acquired will be transmitted to their off spring.

Germplasm theory

August Weismanís (1834-1914) Germplasm theory explains that body of individual consists of two distinct types of tissues, (1) somatoplasm (2) germplasm. Somatoplasm consists of all body tissues, which do not contribute to the sexual reproduction. The germplasm on the other hand produces gametes that are the basis of heredity. It is only applied to animals and plants in which distinction between soma and germ can be made. Weismannís famous experiment of cutting off the tail of mice for 22 generations and observing that the progeny still had tail of normal length, proved that the somatoplasm is not responsible for transmission of characters.

Cell Theory (1838)

Schleiden and Schwann proposed cell theory 1838. They concluded that all plant and animal tissues were made of cells. It was also postulated that cell is the functional unit of living organism. In 1846 Negeli said that all cells originated from preexisting cells. Virchow 1853 elaborated this and referred it as cell linkage theory.

Mendelian concept of hereditary

The laws of inheritance were derived by Gregor Mendel, a 19th century monk conducting hybridization experiments in garden peas (*Pisum sativum*). Between 1856 and 1863, he cultivated and tested some 29,000 pea plants. From these experiments he deduced two generalizations which later became known as Mendel's Laws of Heredity or Mendelian inheritance. He described these laws in a two part paper, "Experiments on Plant Hybridization" that he read to the Natural History Society of Bruno on February 8 and March 8, 1865, and which was published in 1866. Mendel's findings allowed other scientists to predict the expression of traits on the basis of mathematical probabilities.