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Class: Part-I

College: R.M. College, Saharsa Title: **Cyatogenetics- Mendelian inheritance**

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- ❖ The Mendelian inheritance is a type of biological inheritance that follows the principles originally proposed by Gregor Mendel in 1865 and 1866, rediscovered in 1900 and popularized by William Bateson.
- ❖ The principal of Mendelian inheritance were named for and first derived by Greger Johann Mendel, a nineteenth century Moravian monk who formulated his ideas after conducting simple **hybridisation** experiments with pea plants (*Pisum sativum*), he had planted in the garden of his monastery.



- Fig. Gregor Mendel, the moravian Augustinian monk who founded the modern science of genetics (Source: www.en.wikipedia.org)
- ❖ In 1900, however, his work was rediscovered by three European scientists, Hugo de Vries, Carl correns and Erich von Tschermak.
- Regardless, the rediscovery made Mendelism an important but controversial theory. Its most vigorous promoter in Europe was William Bateson, who coined the term “**genetics**” and “**allele**” to describe many of its tenets.
- Thomas Hunt Morgan and his assistants later integrated Mendel’s theoretical model with the chromosome theory inheritance, in which the chromosome of cells were thought to hold the actual hereditary material and created what is known as classical genetics.
- ❖ When mendel crossed purebred white flower and purple flower pea plants (the parental or p generation) by artificial pollination, the resulting flower colour was not a blend Rather than being a mix of the two, the offspring in the first

generation (F_1 generation) were all purple flowered. Therefore, he called this biological trait dominant when he allowed self fertilization in the uniform looking F_1 generation with a purple to white flower ratio of 3:1. In some of the other characters also one of the traits was dominant.

- ❖ He then conceived the idea of heredity units which he called hereditary “**factors**”-Mendel found that there are alternative forms of factors now called genes that accounts for variations in inherited characteristics. For example, the genes for flower colour in pea plants exists in two forms, one for purple and the other for white. The alternative forms are now called **alleles**. For each trait, an organism inherits two alleles, one from each parent. These alleles may be same or different alleles for a gene is said be heterozygous for that gene (and is called heterozygous).
- ❖ Mendel hypothesized that allele pairs separate randomly or segregate, from each other during the production of the gametes in the seed plants (egg cell) and the pollen plant (sperm). Because allele pairs separate during gamete production, a sperm or egg carries only one allele for each inherited traits. When sperm and egg unite at fertilization, each contributes its allele, restoring the paired condition in the offspring. Mendel also found that each pairs of alleles segregates independently of the other pairs of allele during gametes formation.
- ❖ The genotype of an individual is made up of the many alleles it possesses. The phenotype is the result of the expression of all characteristics that are genetically determined by its alleles as by its environment. If these two alleles of an inherited pair differ (the heterozygous condition), then one determines the organism’s appearance and is called the **dominant allele**, the other has no noticeable effects on the organism’s appearance and is called the **recessive allele**.