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A Brief Review Study of Chromosome

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The microscopic threadlike part of the cell that carries hereditary information in the form of genes. Heinrich Wilhelm Gottfried Waldeyer coined the term chromosome in 1888. A defining feature of any chromosome is its compactness. For instance, the 46 chromosomes found in human cells have a combined length of 200 nm (1 nm = 10− 9 metre. The compactness of chromosomes plays an important role in helping to organize genetic material during cell division and enabling it to fit inside structures such as the nucleus of a cell, the average diameter of which is about 5 to 10 μm, or the polygonal head of a virus particle, which may be in the range of just 20 to 30 nm in diameter.

Normally Chromosomes are of two types

- **Autosomes** - Control characters other than sex characters or carry genes for somatic characters.
- **Sex chromosomes (Synonym: Gonosomes)** - Chromosomes involved in sex determination.
  - Humans and most other mammals have two sex chromosomes X & Y, also called heterosome, dd chromosome, or idiosome.
  - Females have two X chromosomes in diploid cells; males have an X and a Y chromosome.
  - In birds the female (ZW) is hetero-gametic and male (ZZ) is homogametic.

Chromosome Number

Chromosome number, precise number of chromosomes typical for a given species. In any given asexually reproducing species, the chromosome number is always the same. In sexually reproducing organisms, the number of chromosomes in the body (somatic) cells typically is diploid (2n; a pair of each chromosome), twice the haploid (1n) number found in the sex cells, or gametes. The haploid number is produced during meiosis. In some sexually reproducing organisms, individuals may be produced from unfertilized eggs and therefore are haploid; an example is a drone (a male bee).

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An organism with any multiple of the diploid number of chromosomes is said to be polyploid. Polyploidy is a normal evolutionary strategy among many plant groups but appears to be quite rare in animals. Examples of polyploid plants and animals are the potato (Solanum tuberosum). The number of chromosomes does not correlate with the apparent complexity of an animal or a plant: in humans, for example, the diploid number is 2n = 46 (that is, 23 pairs), compared with 2n = 78, or 39 pairs, in the dog. There is an equally great range of numbers among plants.

Ploidy, in genetics, the number of chromosomes occurring in the nucleus of a cell. In normal somatic (body) cells, the chromosomes exist in pairs. The condition is called diploidy. During meiosis the cell produces gametes, or germ cells, each containing half the normal or somatic number of chromosomes. This condition is called haploidy. When two germ cells (e.g., egg and sperm) unite, the diploid condition is restored. Polyploidy refers to cells the nuclei of which have three or more times the number of chromosomes found in haploid cells. This condition frequently occurs in plants and may result from chromosome duplication without division of the cytoplasm or from the union of two diploid gametes. Polyploid animals, because they have more than the normal number of sex chromosomes, are usually sterile. Some cells have an abnormal number of chromosomes that is not a whole multiple of the haploid number. This condition, called aneuploidy, is most often caused by some error resulting in an unequal distribution of chromosomes to the daughter cells.

Sex chromosome, either of a pair of chromosomes that determine whether an individual is male or female. The sex chromosomes of human beings and other mammals are designated by scientists as X and Y. In humans the sex chromosomes consist of one pair of the total of 23 pairs of chromosomes. The other 22 pairs of chromosomes are called autosomes. Individuals having two X chromosomes (XX) are female; individuals having one X chromosome and one Y chromosome (XY) are male. The X chromosome resembles a large autosomal chromosome with a long and a short arm. The Y chromosome has one long arm and a very short second arm. This path to maleness or femaleness originates at the moment of meiosis, when a cell divides to produce gametes, or sex cells having half the normal number of chromosomes. During meiosis the male XY sex-chromosome pair separates and passes on an X or a Y to separate gametes; the result is that one-half of the gametes (sperm) that are formed contains the X chromosome and the other half contains the Y chromosome. The female has two X

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chromosomes, and all female egg cells normally carry a single X. The eggs fertilized by X-bearing sperm become females (XX), whereas those fertilized by Y-bearing sperm become males (XY).

Homologous Chromosomes-

Diploid organisms have two copies of each chromosome (except the sex chromosomes). Both the copies are ordinarily identical in morphology, gene content and gene order and hence known as homologous chromosomes. Each pair of chromosomes made up of two homologs. Homologous chromosome is inherited from separate parents; one homolog comes from the mother and the other comes from the father.