RAMA UNIVERSITY

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FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES

SPECIAL TYPES OF CHROMOSOMES

1. **Giant or salivary gland chromosomes:**

The giant chromosomes were first observed in the cells of salivary glands, gut, trachea and other body parts of dipteran insects by E.G. Balbiani in 1881.

The giant chromosomes consist of a bundle of chromonemal fibrils which arise by a series of about 10 consecutive duplications of the initial chromonemata that increase the DNA content about 1,000 times the DNA content of somatic cells. Because of the multi-stranded condition, these chromosomes are called polytene chromosomes. The process of reduplication of strands without separation is called endoduplication. The homologous polytene chromosomes always remain closely paired in mitotic prophase. This is called somatic pairing and these chromosomes are thought to be in permanent prophase.

2. The polytene chromosomes bear along their entire length a series of dark bands alternated by light bands or interbands. The dark bands are narrow or broad disc shaped structures. They are euchromatic in nature and contain large amount of DNA, small amount of RNA and certain basic proteins. They are feulgen positive and absorb ultraviolet (UV) light of 2600 A. The light bands or interbands are fibrillar, feulgen negative, heterochromatic regions containing small amount of DNA. large amount of RNA and acidic proteins and they absorb little amount of UV light. The number, distribution and localization of discs o2.r bands are notably similar in homologous polytene chromosomes of Drosophila. The centromeres of all these chromosomes fuse to form chromocentre in Drosophila. During certain developmental stages, the single bands or adjacent bands of polytene chromosomes produce local reversible swellings which are called ‘chromosomes puffs’ or bulbs.

The chromonemata of polytenic chromosomes give out many series of loops laterally. These loops or rings are known as the balbiani rings and they are rich in DNA and RNA.

3. **Lampbrush chromosomes:** are special type of giant chromosomes found in the nuclei of oocytes of many vertebrates, such as fishes, amphibians, reptiles and birds during the prolonged diplotene stage of first meiosis. They are also found in the nucleus of Drosophila spermatocyte. Lampbrush chromosomes were first observed by Flemming in 1882 and given the name by Ruckert in 1892.

These chromosomes may sometime become even larger than the polynemic or polytenic chromosomes of salivary glands of dipterans. The largest chromosomes may sometime be as long as 1 mm in urodele amphibians. These chromosomes consist of main axis and many fine lateral projections or loops which give them the appearance of a test tube brush or lampbrush.