Basrah University
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Human Biology

The movement parts

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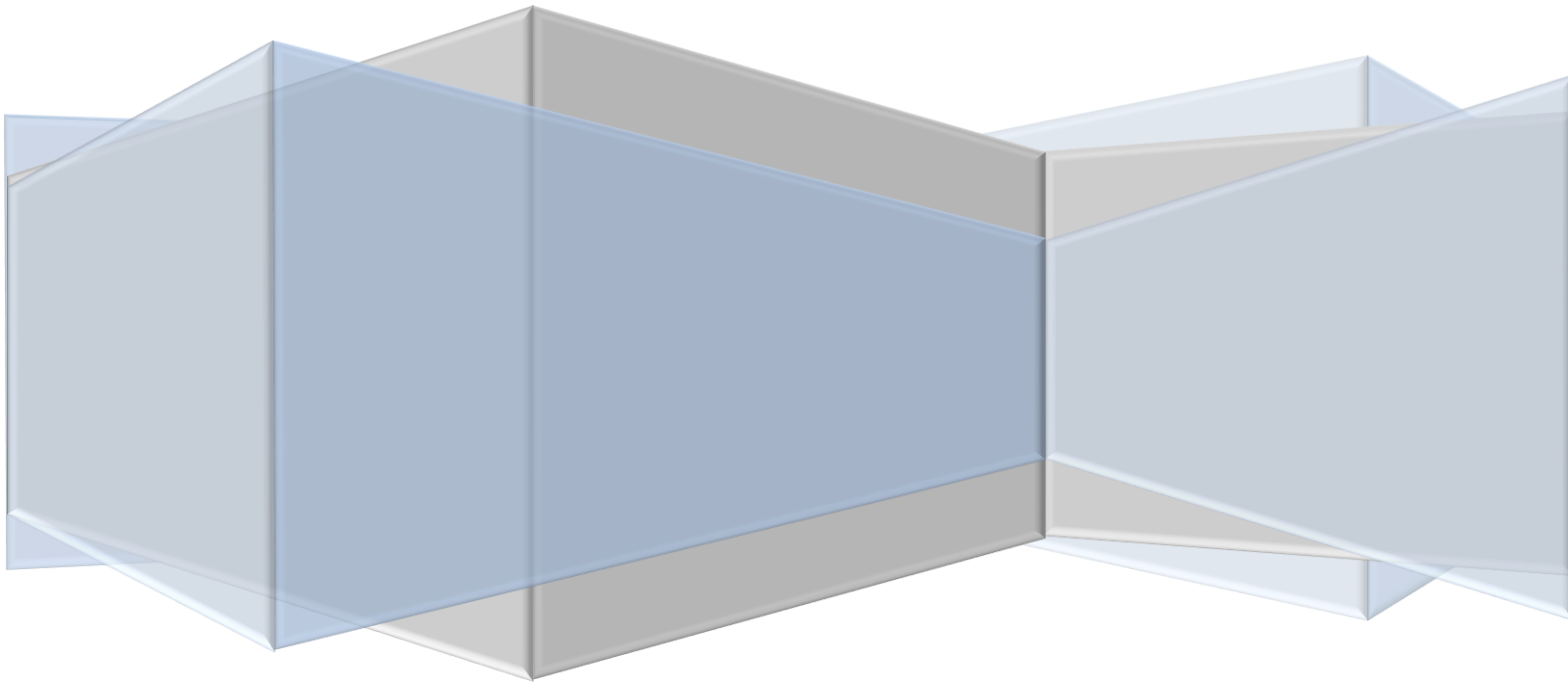

The movement-related parts (microfilaments, centrioles and cilia)

Within the cytoplasm there would still be ions and organic molecules, plus a network of protein fibres that help maintain the shape of the cell and secure some organelles in specific positions. This network of protein fibres is known as the **cytoskeleton**. The cytoskeleton is the framework of the cell which forms the structural supporting component. There are three types of fibres within the cytoskeleton: **microfilaments**, **intermediate filaments**, and **microtubules**.

Microfilaments

Microfilaments are the thinnest part of the cytoskeleton, are used to give shape to the cell and support all of its internal parts. They made of the proteins **actin** and **myosin**. Actin works with myosin to produce muscle movements and cell division.

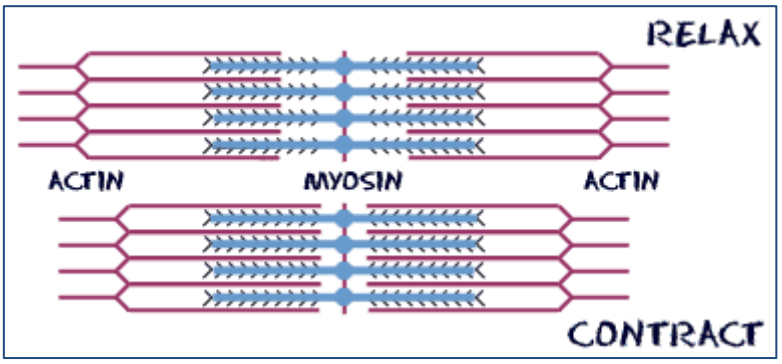

Figure 1: Arrangement of actin and myosin filaments

Microtubules

Microtubules are small hollow tubes made of proteins called **tubulin**. Microtubules are the largest element of the cytoskeleton. They are the structural elements of **centrioles**, **cilia**, and **flagella**, they help the cell resist compression, provide a track along which vesicles move through the cell, and pull replicated chromosomes to opposite ends of a dividing cell.

Centrioles

Centrioles are found in animal cells but not in plant cells. They are extremely small tubules (microtubules) located in pairs near the nucleus. In the cross section, centrioles have a bundles of microtubules arranged in threes in a circle nine pairs **(9+0 pattern).** Centrioles lie at the right angles to one another and as a cell begins to undergo division one of the

pair moves around to the opposite side of the nucleus from the other centriole. Fibres spread out from each centriole towards the centre of the cell and in some way act to move the chromosomes in cell division (**mitosis or meiosis**).

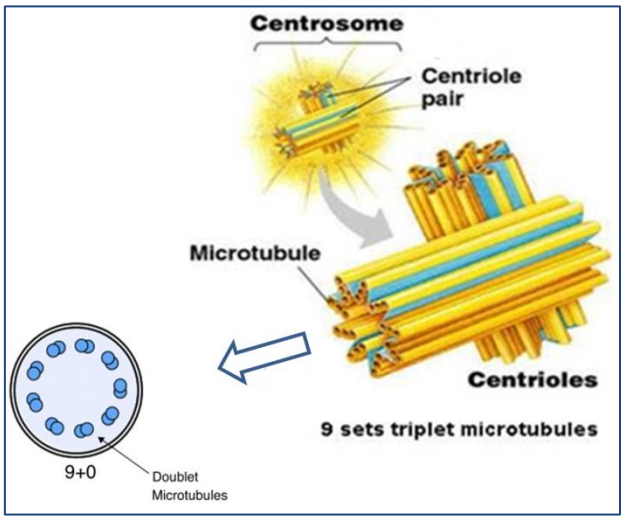

Figure 2: The 9+0 pattern of microtubules in the centrioles

Cilia and Flagella

Cilia are short, hair-like projections from cell membranes. They are lining the cells of the respiratory tract that trap particulate matter and prevents them getting into our lungs.

Flagella (singular = flagellum) are similar to cilia but they are longer, hair-like structures that extend from the plasma membrane and are used to move an entire cell. Both cilia and flagella have a bundles of microtubules arranged in nine pairs and an extra central pair of tubules **(9+2 pattern)**.

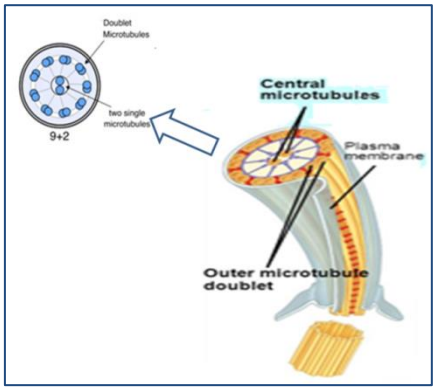

Figure 3: The 9+2 pattern of microtubules in a cilia or flagella

Transport between cells and their surroundings

Cells are grouped together to form tissues, where the membrane of one cell touches that of another they tend to join up. They glued together by one means or another.

Cell junctions are of different sorts:-

1- Tight junctions: proteins from each membrane fuse and thereby seal in the cell contents.

2- Desmosomes: cell to cell links by means of thin filaments.

3- Gap junction: the cells are joined by means of protein channels between the membranes across which substances such as salts, sugars, amino acids, vitamins and water may be transported.

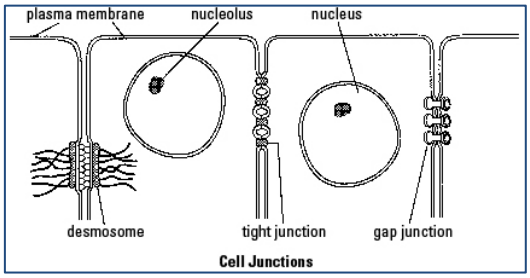

Figure 3: The Cell junction