CENTROSOME

It was discovered by Van Beneden in year 1887 A.D. T. Boveri in 1888 A.D. described its structure

except mature mammalian R.B.C

They are present only in animal cells and very few lower plants and protists. In interphase it is seen just near the nuclear envelope. It is generally only one in a cell but in giant bone marrow cells, they are many. It consists of two centrioles placed at right angle to each other and embeded in a colourless centrosphere. During cell division each centriole moves towards opposite pole and form astral rays. At the metaphase they form spindle fibre. They are 0.3 - 0.5 μm in length and 0.15 μm in thickness.

Thin ultrastructure reveals that the two centrioles are like two hollow cylinders. Each one of them is a microtubular structure and is formed of microtubules arranged in (9+0) manner. All the (9) nine microtubules are forming periphery. The centre is hollow.

Each microtubule is formed of three subtubules. They are in triplet and arranged from inner to outer side. A, B, C. A subtubule is 45 A° in thickness. A subtubule is formed of thirteen (13) parallel protofilaments. But B & C subtubules is formed of (10) ten parallel protofilaments. Each protofilament in turn is made up of a row of αβ - tubulin dimers. C subtubules of one microfilament is attached with A subtubules of adjacent filament by a dense material (DM) known as A-C linker. Each microtubule are about 45 A° in size and tilted at 40°.

In the hollow space
In the inner space surrounded by nine
(9) nine set microtubules, there is an
intra - centriolar or cart-wheel structure.
At centre there is a hub about 25 A° in diameter.
From this hub (9) nine fibres radiates
like spokes. Each one of them ends into
a thickening of dense material known as
foot or X-body. X-body is linked to sub-tubule
A. There is one more DM thickening between
two adjacent X-bodies. It is known
as Y-body. This Y body is also linked
with A-C linkers on its outerside.

Each centriole is surrounded by
two pericentriolar structures known as
satellites, or crowns or massules. Each of
the pericentriolar structure is made
up of (9) nine rounded, amorphous
thickening of dense material known
as corpuscles or spheroids. One is linked
to each microtubule. These regulate the
growth of microtubules during duplication
of centrioles and aster formation. They
are also known as Nucleating Centre.

Chemically a centriole
consists of mainly of protein (main
protein is tubulin) and some lipids,
Nucleotides (very less) and variable
amount of Carbohydrate.

They originate from pre-existing
centriole in G2 phase of interphase.

Function:- 1. They form basal bodies and asters.
2. In case of sperm they form axial filament
or axoneme of sperm-tail.

BASAL BODIES

They are also known as blepharoplast or basal granules or kinetosomes. They are almost similar to centriole, but differs in position, number, size and function.

They are found in ectoplasm just beneath the cell-membrane. Their number may be more They are one to many per cell. They are associated with cilia or flagella and which control their movement. They give rise to rhizoplast or root lets like root

CILIA AND FAGELLA

Engleman was first to report Flagellum

Engleman was first to report flagellum in the year 1868 A.D. Later on its structure was described by Jensen in 1887 A.D. Cilia are flagella are almost similar in ultra structure, but differs in size. They are microscopic ones. Their origin is intracellular but they are present outside the cell.

Flagella are present in Flagellate protistans, Chlamydomonas sps., Euglena etc, spermatozoa of animals and lower plants, all They are absent in red algae, Angiosperms, Nematodes and arthropods and nematodes.

Cilia are present in ciliate protistans e.g. ~~paramecium~~, ~~to~~ Paramecium sps., Vorticella sps.; ~~flame~~ flame cells of flat worms in some body structures, e.g. trachea, ~~kid~~ nephrons and fallopian tubes etc.

Ultra structure of a flagellum or ci
Ultrastructure of a flagellum or cillium reveals that it is made up of two parts:
(i) Protoplasmic sheath
(ii) Axial filament or Axoneme.

(i) Protoplasmic sheath: It is continuous with plasmamembrane. It is 90 Å thick, two layered and outer. It is a protective coat around a fluidy matrix having ~~axone~~ axial filament.

(ii) ~~Axoneme~~ Axial filament or Axoneme: It is contractile central part ~~former~~ made up of eleven (11) microtubules arranged in 9+2 manner. Microtubules are of two types:
(a) Central
(b) Peripheral

(a) Central microtubules: They are two in number. Each one is 250 Å in diameter at ~~and They are~~ 360 Å apart from one another. They are surrounded by a common central sheath. ~~or~~ They A and are interconnected by double bridge. Each of the central tubules are formed of thirteen (13) protofilaments.

(b) Peripheral microtubules: They are present along the periphery. They are nine in number Each one is made up of two - subtubules A & B giving a figure of 8.