

- (d) **H.J.Dutrochet** (1824), a French scientist, boiled some tissues and separated the cells from one another. He expressed the idea of individual cells i.e., cells were not just spaces between a network of fibres, but that these were separate and separable units.

4. Concept of Protoplasm :

Corti (1772) first of all observed that all cells contain a living substance. This was first observed by Corti (1772). **Felix Dujardin** (1836), observed it in living amoebae, and called it 'Sarcodé'. In 1839, **J.E. Purkinje** used the word 'protoplasm' to describe the living substance. **Hugo von Mohl** (1846), also suggested the same name – protoplasm – for the similar substance found in plant cells.

Robert Brown, an English naturalist, described in 1828, characteristic dancing of cell particles. It is now, therefore, known as Brownian movement.

Nucleus : In 1831, **Robert Brown** saw that small spherical body was present in every plant cell. He used the word 'nucleus' to identify them.

Cell Theory : Two German biologists, **M.J. Schleiden** (1838) and **Theodor Schwann** (1839) proposed cell theory (or cell doctrine) – which unified the ideas prevailing at that time. He stated that –

- (a) living things are composed of cells and cell products.
- (b) cells are the fundamental structural units of living organisms.

In fact, Schwann coined the word "**metabolism**" for all chemical processes carried on in the cell. Actually, he called cells "**the unit of life**".

Rudolf Virchow (1858), a German pathologist, developed the idea of generation to generation continuity of cell that *Omnis cellula e cellula* (i.e. cells arise from pre-existing cells). This occurs by the division of cell.

Nucleolus: In 1781, **Fontana** had seen dense spherical body inside nucleus. Schleiden (1838) also described it. But, it was given the name "nucleolus" by Bowman (1840).

Nageli and Cramer (1855) gave the name "cell membrane" to the outer boundary of the protoplasm. Overton (1899) proved its existence. J.Q. Plowe (1931), later on, called it 'plasmalemma'.

Protoplasm Theory : **Max Schultze** (1861) proposed the protoplasm theory. According to it "cell is an accumulation of living substance (or protoplasm) which is limited by an outer membrane, and possesses a nucleus".