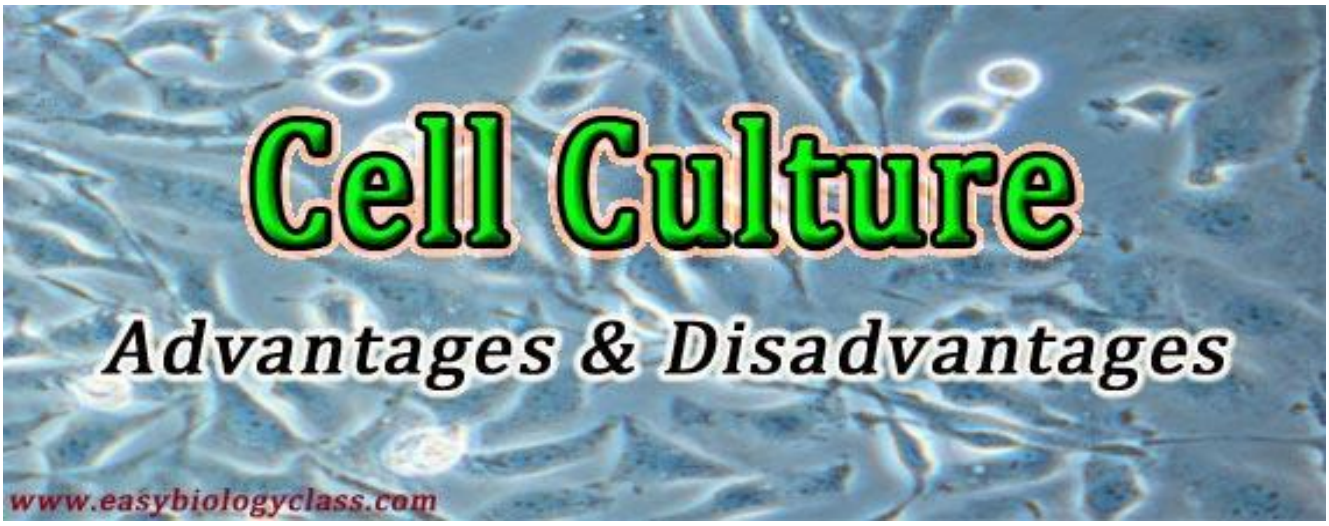


ADVANTAGES AND DISADVANTAGES OF CELL / TISSUE CULTURE

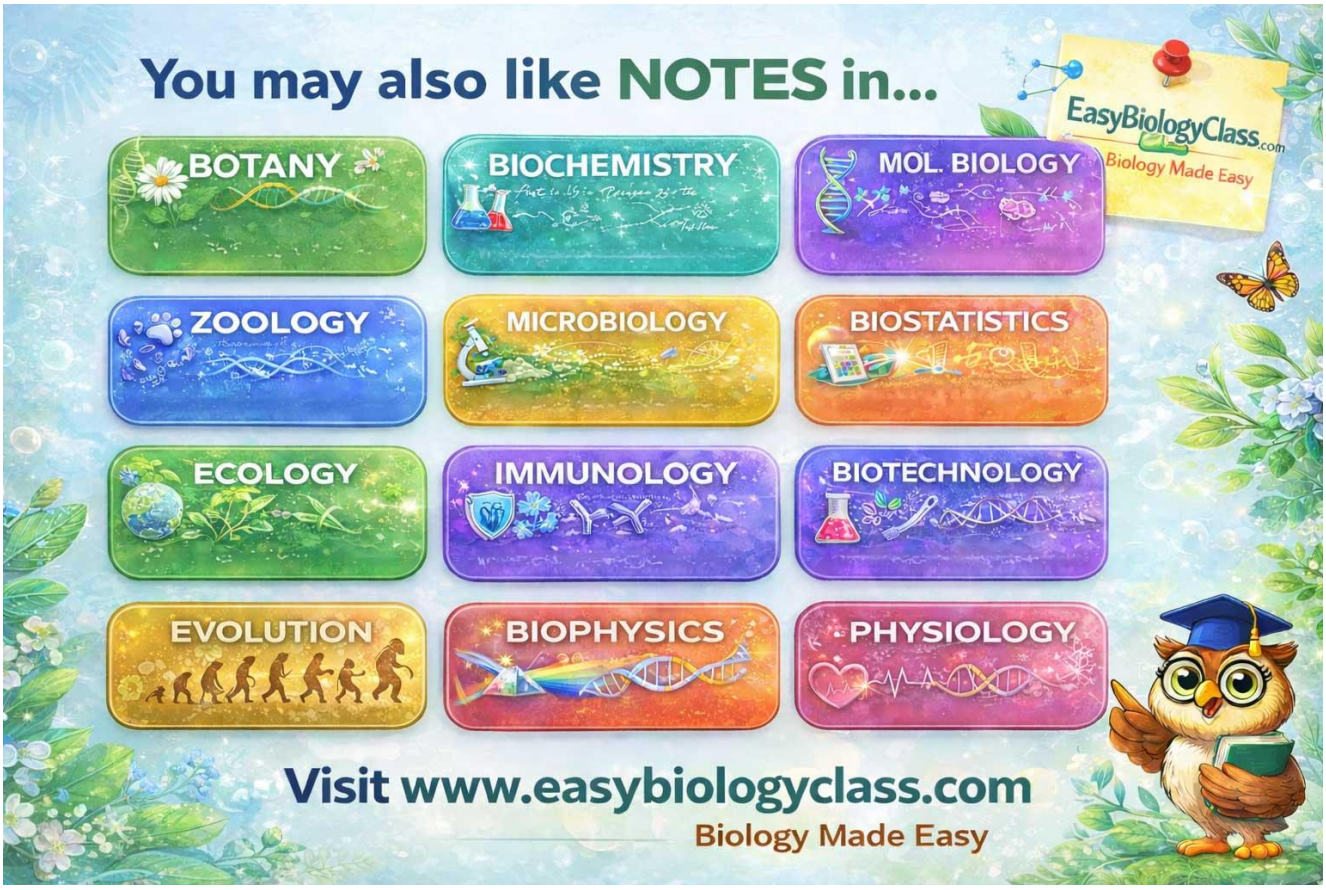
Tissue culture is an aseptic *in vitro* culture of animal or plant cells in a precisely controlled environmental condition. The term "tissue culture" was for the first time coined by Thomas Burrows. Even though the *in vitro* culture of prokaryotes and both plant and animal cells are possible now, the term 'Tissue Culture' generally denotes to Animal Cell / Tissue culture. The term 'Plant Tissue Culture' symbolizes the *in vitro* culture of plant cells.

In cell culture the cells are maintained in an artificial environment consists of a suitable culture vessel containing a culture medium. The medium supplies all the nutrients, growth factors, and required gases for the growth of the cells. Moreover, the physiochemical environment of the culture system is strictly monitored most probably through automated systems. The control of the physiochemical environment in the culture system is one of the most important advantages of cell culture system. However, the tissue culture process is not always profitable and there are a plenty of difficulties in maintaining the cells in in vitro conditions. The present post describes the Advantages and Disadvantages of animal cell or tissue culture techniques.

Advantages of Animal Cell Culture:

- Physio-chemical environment in the culture such as pH, temperature, osmolarity and level of dissolved gases can be precisely controlled in the *in vitro* system.

- Physiological conditions such as level of hormones and nutrients in the cell culture can be controlled.
- It is possible to control the micro-environment of the cells in the culture such as regulation of matrix, cell-cell interactions and cell substrate attachment.
- Cell culture techniques allow us to maintain the homogeneity of cells by the use of selective media.



- Cells in culture can be easily characterized by cytological or immune-staining techniques.
- Cells cultures can be stored in liquid nitrogen for very long time with a suitable cryopreservation medium such as DMSO.
- Cells in the culture can be easily quantified by different cell quantification techniques.

- The concentration (C) and time (T) dependent (C X T) effects of compounds such as pharmacologically active molecules, drugs or toxins can be easily studied by cell culture methods.
- The cell culture technique can be used for in vitro cytotoxicity studies to test the possible toxicity of compounds or drugs.
- More importantly, the uses of animals in scientific experiments (research) were significantly reduced with the invention of animal cell culture techniques.
- Cell culture can be used to produce monoclonal antibodies with hybridoma technology.
- Most of the molecular pathways that taking place inside a cell was elucidated by the use of cell culture techniques.
- With the invention of live cell imaging technique and fluorescent tagging methods, many physiological and molecular events in the cells can be visualized in a relatively inexpensive way through the use of *in vitro* cultured cells.
- Using molecular techniques, primary cells can be transformed and then it can be sub-cultured for unlimited passages.

Disadvantages of Animal Cell Culture

- Maintaining the sterile aseptic condition is the most difficult part of cell culture.
- Chances of chemical and microbial contamination are very high in *in vitro* methods.
- High possibility of cross contamination of different types of cells in culture.
- Experience and expertise are required for an effective maintenance most of the cells.
- The capital investment to set-up a cell culture facility is very high.
- Require through standardization of medium, concentration of nutrients and serum. All these vary with different types and origin of cells.
- Due to the rapid growth rate of cells artificial culture, there is a high chance of genetic variation within in a cell population.
- The high genomic variability can ultimately lead to heterogeneity of cells within the population and that cannot be easily distinguished.
- Identification of cell type is often difficult since in most of the cases the marker proteins will not express in ample quantity under *in vitro* conditions.

- The micro-environment in the culture vessel can induce many physical, chemical and physiological changes in the cells.
- Most of the primary cell in culture will only have limited number of passages.

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