

SYNCHRONOUS CULTURE

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Definition

- A synchronous or synchronized culture is a microbiological culture or a cell culture that contains cells that are all in the same growth stage.

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- Since numerous factors influence the cell cycle, some of them are random, normal, non-synchronous cultures have cells in all stages of the cell cycle.
- Obtaining a culture with a unified cell-cycle stage is very useful for biological research.
- Since cells are too small for certain research techniques, a synchronous culture can be treated as a single cell
- Synchronous cultures have been extensively used to address questions regarding cell cycle and growth, and the effects of various factors on these.

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Obtaining of Synchronous Culture By Changing of External Factor

- External conditions can be changed, so as to arrest growth of all cells in the culture, and then changed again to resume growth.
- The newly growing cells are now all starting to grow at the same stage, and they are synchronized.
- For example, for photosynthetic cells light can be eliminated for several hours and then reintroduced.
- Another method is to eliminate an essential nutrient from the growth medium and later to reintroduce it.

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**Obtaining of
Synchronous
Culture using
chemical growth
inhibitors**

- ❑ Cell growth can also be arrested using chemical growth inhibitors.
- ❑ After growth has completely stopped for all cells, the inhibitor can be easily removed from the culture and the cells then begin to grow synchronously.
- ❑ Nocodazole, for example, is often used in biological research for this purpose.

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Obtaining of Synchronous Culture using Cell Physical Properties

- Cells in different growth stages have different physical properties.
- Cells in a culture can thus be physically separated based on their density or size, for instance.
- This can be achieved using centrifugation (for density) or filtration (for size).

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Obtaining of Synchronous Culture using Cell Physical Properties

- In the Helmstetter-Cummings technique, a bacterial culture is filtered through a membrane.
- Most bacteria pass through, but some remain bound to the membrane. Fresh medium is then applied to the membrane and the bound bacteria start to grow.
- Newborn bacteria that detach from the membrane are now all at the same stage of growth; they are collected in a flask that now harbors a synchronous culture.

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Thankyou