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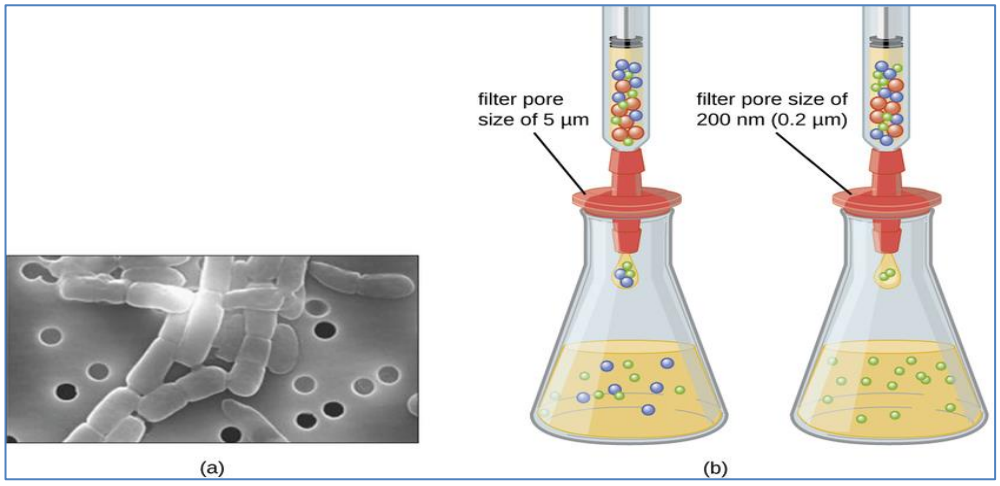
Isolation of Viruses

Unlike bacteria, many of which can be grown on an artificial nutrient medium, viruses require a living host cell for replication. Infected host cells (eukaryotic or prokaryotic) can be cultured and grown, and then the growth medium can be harvested as a source of the virus.

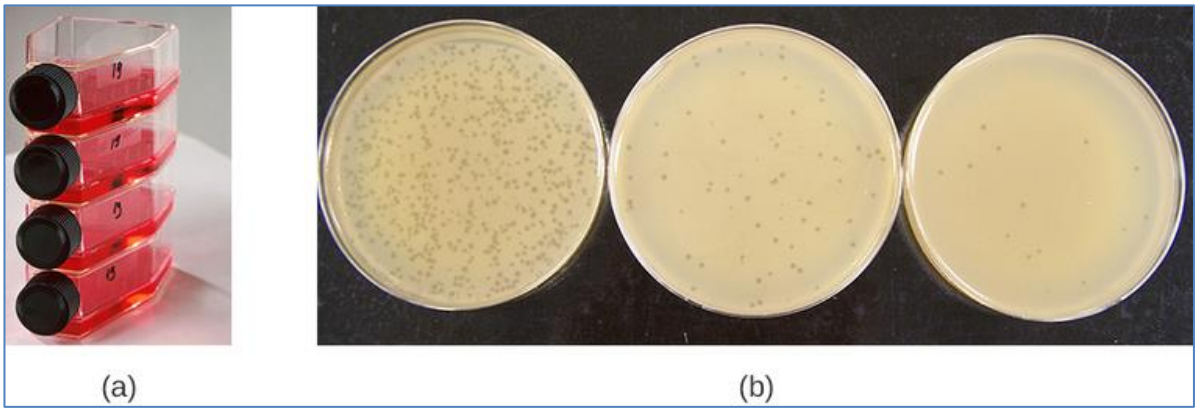
Virions are capsid-encapsulated viruses with DNA or RNA molecules. in the liquid medium can be separated from the host cells by either centrifugation or filtration. Filters can physically remove anything present in the solution that is larger than the virions; the viruses can then be collected in the filtrate.



Cultivation of Viruses

Viruses can be grown in vivo (within a whole living organism, plant, or animal) or in vitro (outside a living organism in cells in an artificial environment, such as a test tube, cell culture flask, or agar plate). Bacteriophages; viruses that infect and replicate only in bacterial cells bacteriophage can be grown in the presence of a dense layer of bacteria (also called a bacterial lawn) grown in a 0.7 % soft agar in a Petri dish or flat (horizontal) flask (Figure a). For lytic bacteriophages, lysing of the bacterial

hosts can then be readily observed when a clear zone called a plaque is detected (Figure b). As the phage kills the bacteria, many plaques are observed among the cloudy bacterial lawn.



(a) (b)

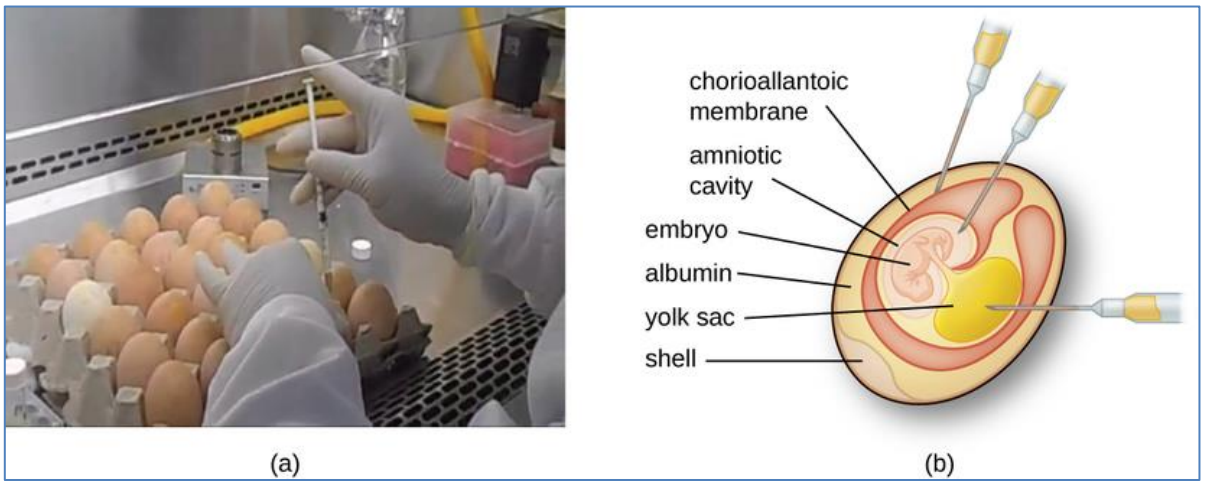
Animal viruses require cells within a host animal or tissue-culture cells derived from an animal. Animal virus cultivation is important for:

1) identification and diagnosis of pathogenic viruses in clinical specimens,

2) production of vaccines

3) basic research studies.

In vivo host sources can be a developing embryo in an embryonated bird's egg (e.g., chicken, turkey) or a whole animal. The embryo or host animal serves as an incubator for viral replication.



(a) (b)

For in vitro studies, various types of cells can be used to support the growth of viruses. Primary cell culture is freshly prepared from animal organs or tissues. Cells are extracted from tissues by mechanical scraping or mincing. To prevent contact inhibition, cells from the primary cell culture must be transferred to another vessel with a fresh growth medium. This is called secondary cell culture.

Periodically, cell density must be reduced by pouring off some cells and adding fresh medium to provide space and nutrients to maintain cell growth. In contrast to primary cell cultures, continuous cell lines, usually derived from transformed cells or tumours, are often able to be subcultured many times or even grown indefinitely (in which case they are called immortal).