

4 Bryophytes possess a waxy cuticle that prevents the body, the zygote, and the embryo from drying out.

5 a) Eustele

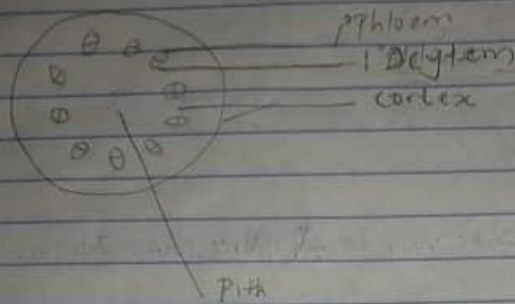


DIAGRAM OF EUSTELE

An Eustele is a stele typical of dicotyledonous plants that consist of vascular bundles of xylem and phloem strands with parenchymatous cells between the bundles.

b. Actinostele

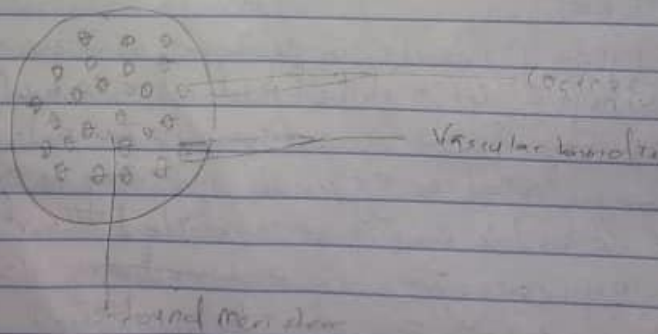


Diagram of Actinostele

Actinostele is a type of eustele found in monocots, in which the vascular tissue in the stem exists as scattered bundles.

c Siphonostele

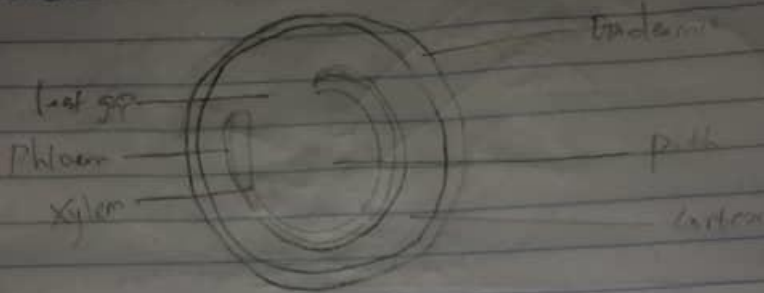
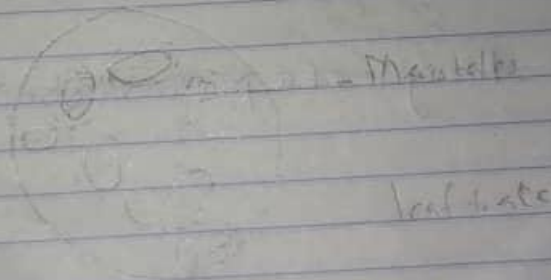


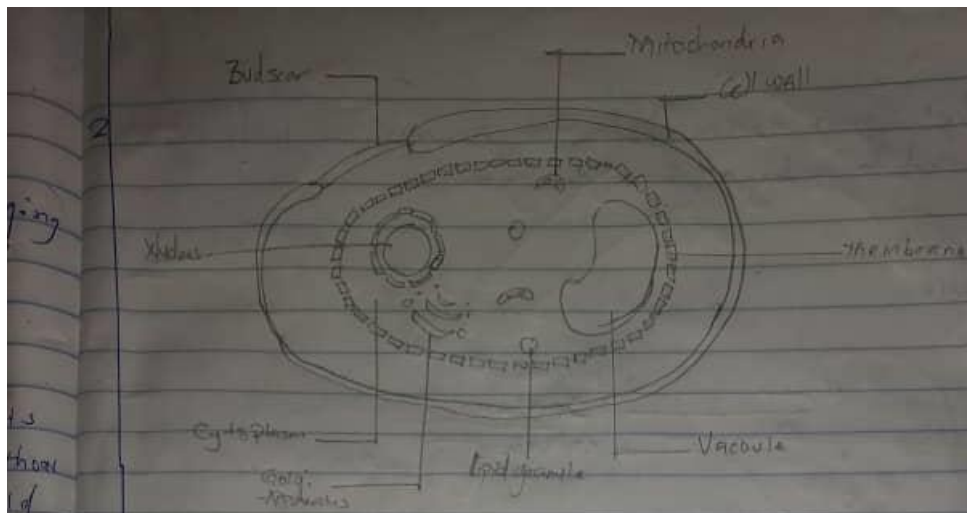
Diagram of Siphonostele

Siphonostele is a stele in which the vascular tissue is in the form of a cylinder surrounding the pith, as in the stems of most ferns and other seedless vascular plants.

d Dictyostele



A dictyostele is a stele in which the vascular cylinder is broken up into a longitudinal series of network of vascular strands surrounding a central pith.



A WELL LABELED DIAGRAM OF ~~A~~ UNICELLULAR FUNGUS: YEAST

3. Sexual reproduction in the fungi consist of three sequential stages: Plasmogamy, karyogamy and Meiosis. The diploid chromosomes are pulled apart into two daughter cells, each containing a single set of chromosomes (a haploid state).

Plasmogamy, the fusion of two protoplasts (the contents of the two cells), brings together two compatible haploid nuclei. At this point, the two nuclear types are present in the same cell, but the nuclei have not yet fused.

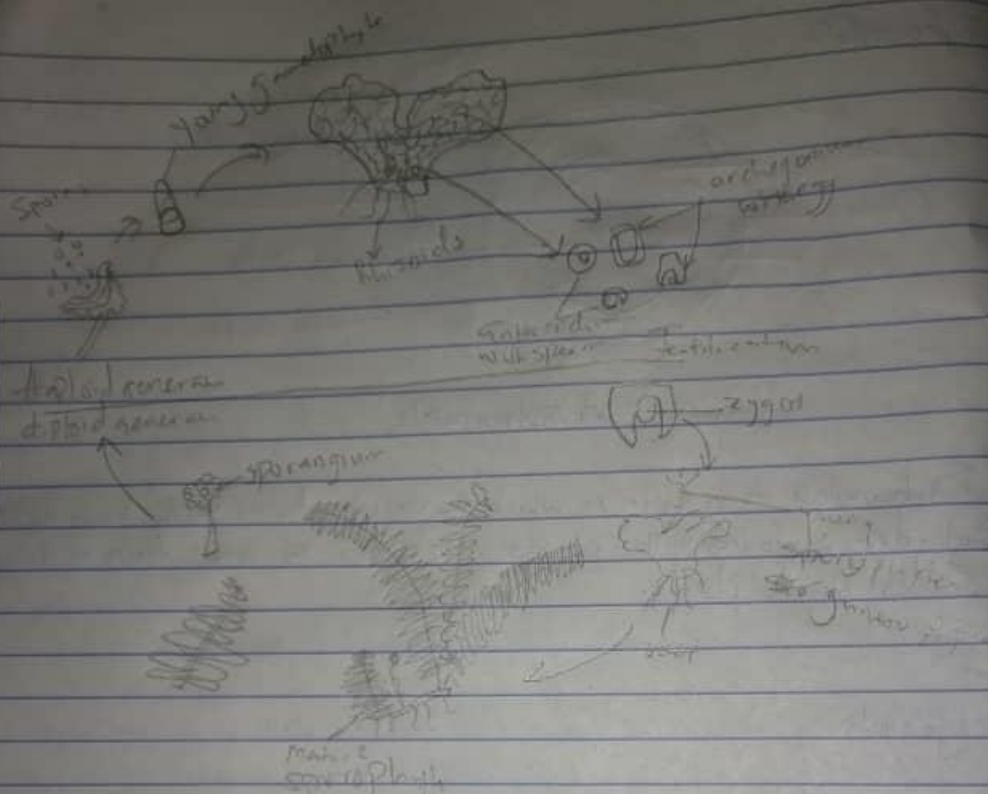
Karyogamy results in the fusion of those haploid nuclei and the formation of a diploid nucleus (i.e., a nucleus containing two sets of chromosomes, one from each parent). The cell formed by karyogamy is called the zygote. In most fungi the zygote is the only cell in the entire life cycle that is diploid. The dikaryotic state that results in plasmogamy almost immediately is often a prominent condition in fungi and may be prolonged over several generations. In the lower fungi, karyogamy usually follows plasmogamy almost immediately. In more evolved fungi, however, karyogamy is separated from plasmogamy. Once karyogamy has occurred meiosis generally follows and restores the haploid phase. The haploid nuclei that result from meiosis are generally incorporated in spores called Meiospores.



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- i) **Biological Insecticides:** Fungi helps to control the population of damaging pests. These fungi are very specific to the insects they attack; they do not infect animals or plants. Example *Beauveria bassiana* is used for the control of the recent spread of emerald ash borer.
- b) **Farming:** The mycorrhizal relationship between fungi and plant roots is important and essential for the productivity of farmland. In fact, the fungal partner in root systems, 80-90% of trees and grass would not survive.
- c) **Food:** Fungi figures prominently in the human diet. Morels, Shiitake mushrooms, chanterelles and truffles are considered delicacies. Fermentation of grains to produce beers and of fruits ~~and~~ to produce wine by the use of wild yeasts from the environment is an ancient art that humans in most cultures have practised for millennia. *Saccharomyces cerevisiae* known as baker's yeast is an important ingredient in most food consumed by humans in most modern times.
- d) **Medicine:** Many secondary metabolites of fungi are of great commercial importance. Fungi naturally produce antibiotics to kill or inhibit the growth of bacteria limiting their competition in the natural environment. Important antibiotics such as penicillin and the cephalosporins, can be isolated from fungi. Valuable drugs isolated from fungi include the immunosuppressant drug cyclosporine (which reduces the risk of rejection after organ transplant), the precursors of steroid hormones, and ergot alkaloids used to stop bleeding.

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Life cycle of a primitive vascular plant: Fern