

10.1.4. Internal Structure of Lichen (Anatomy of Lichen)

The internal structure of the lichen thallus is well revealed by a vertical section of it. A vertical section of the thallus reveals 3 zones in a foliose lichen—cortex, algal zone, medulla. The main mass of the thallus is due to the fungal hyphae that grow and anastomose with each other, branch, and embed the algal cells.

1. Cortex

Cortex is the densely packed fungal filaments. In foliose lichens there is an upper cortex on the dorsal side and a lower cortex on the ventral side. The dense packing of the fungal filaments make it a protective layer. On the upper side it protects the algal cells from drying out due to excessive sunlight. The cortex may at time, has an upper epicortex formed out of secretions from cortex but not composed of cells. [Fig. 10.2(a), (b)]

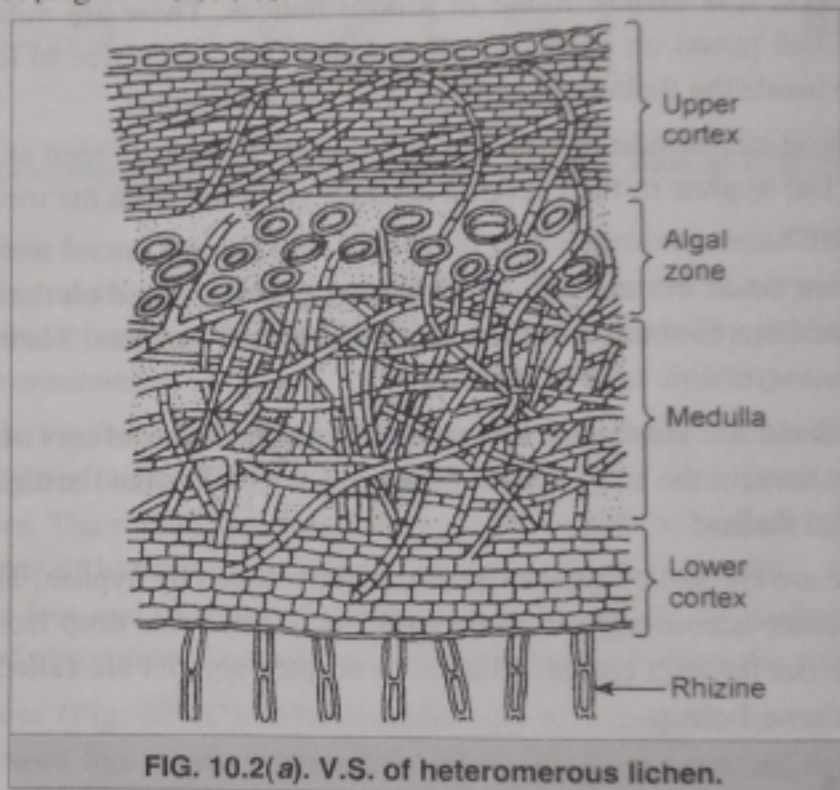


FIG. 10.2(a). V.S. of heteromerous lichen.

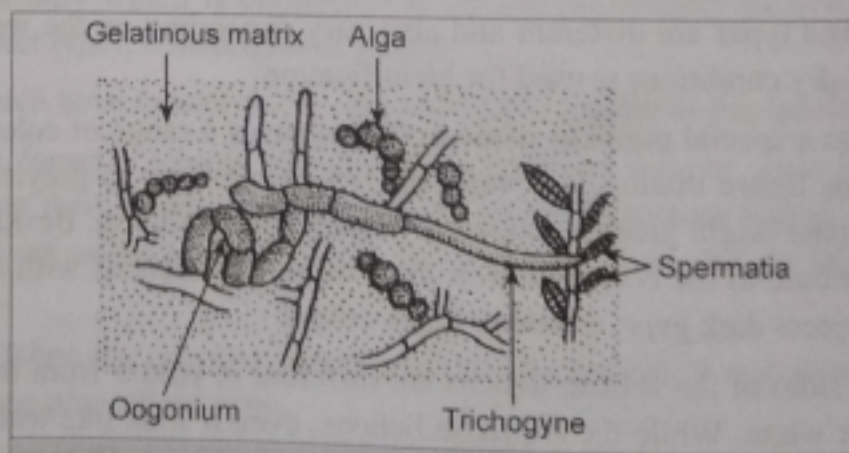


FIG. 10.2(b). V.S. of lichen.

Fruticose lichens have only one cortex surrounding from all sides. Crustose and squamulose lichens have only upper cortex and the lower side cells directly remain attached to the substratum. Cortex is not seen in other lichens growth forms like filamentous, byssoid, leprose, gelatinous for which these are called **ecorticate lichens**.

The cortex layer may be several hundred micrometers in thickness. The interwoven fungal hyphae form a pseudoparenchymatous type of tissue in the cortex.

2. Algal Zone

Below the cortex the algal zone is present in all lichens. The algal zone is otherwise called **Photobiontic layer** or **symbiont layer**.

It contains loosely arranged fungal filaments in which the algal cells are embedded. The loose arrangement of fungal filaments help in circulation of air. The enveloping fungal hyphae sometimes send haustoria into the algal cells.

The algal cells may be uniformly scattered among the enveloping fungal hyphae (called as homoisomerous) or they may be restricted to a single layer (called as heteromerous).

The algal cells multiply in that layer by cell division or by aplanospore formation.

In crustose lichens the algal distribution in the photobiontic layer is diffused and decrease in gradation to the layers below. In fruticose lichen, this is a distinct circular layer of algal cells.

3. Medulla

It is the central region of the thallus and composed of loosely arranged fungal hyphae sometimes with large spaces. The fungal hyphae run in all directions.

In fruticose lichens the medulla may be hollow at times. Crustose and squamulose lichens lack the lower cortex for which the medulla is in direct contact with the substrate.

10.1.5. Photobionts and Mycobionts

(a) **Photobionts.** The photosynthetic partner of this mutualistic symbiotic associations are either the members of Chlorophyceae or Cyanophyceae. When a Chlorophycean alga is a photobiont it is called **phycobiont** and when a blue green algal species is a partner it is called **cyanobiont**.

Nearly 100 species of photobionts from 40 genera from five distinct classes are found associated with lichens. About 90% known lichens contain a green alga as their photobiont. The different eucaryotic algal partners are the species of *Trebouxia*, *Trentepohlia*, *Chlorella*, *Pleurococcus*, *Cystococcus*, etc. *Trebouxia* is the most common algal partner.

About 10% of the known lichens have cyanobacteria as the photobiont. Such lichens are sometimes referred as **cyanolichens**. Species of *Nostoc*, and *Rivularia*, *Scytonema*, *Calothrix*, *Strigonema*, are the main blue-green algal partner in lichen association.

(b) **Mycobionts.** The fungal component of a lichen is called as mycobiont. The fungus is sometimes referred to as lichenized fungi. This term refers both to the fungus as well as to the lichen.

Mostly the fungi belonging to Ascomycota and Basidiomycota are found in lichens and according to the lichens are named as Ascolichen and Basidiolichen respectively. Nearly 95% of lichen are formed by fungi of Ascomycota. They form apothecia, perithecia or pseudothecia. Members of Aphyllaphorales and some Agaricales of Basidiomycota form lichens. Some members of Deuteromycota are also found as mycobiont in lichens. The fungal component constitutes the major portion of the thallus. A lichenized fungus may get associated with different algal members and form different lichen. Sometimes one fungus may be associated with more than one algal member.