

1) Breathing pore:-

In some foliose lichen (e.g. *Parmelia*), the upper cortex has some opening, called breathing pores, which help in gaseous exchange.

2) Cyphellae:-

on the lower surface of some foliose lichen (e.g. *stricta*) small depressions develop which appear as cup like white spots, known as cyphellae. They help in aeration.

3) Cephalodium:-

These are small warty outgrowth on the upper surface of the thallus. They contain the fungal hyphae of the same type as the mother thallus, but the algal component is always different. They probably help in retaining the moisture.

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may break in to patches and serve the function of photosynthesis. It is also known as gonidial layer.

3) Medulla:-

It is the central region/zone of the thallus and is composed of loosely interwoven, thick walled fungal hyphae with large space between them.

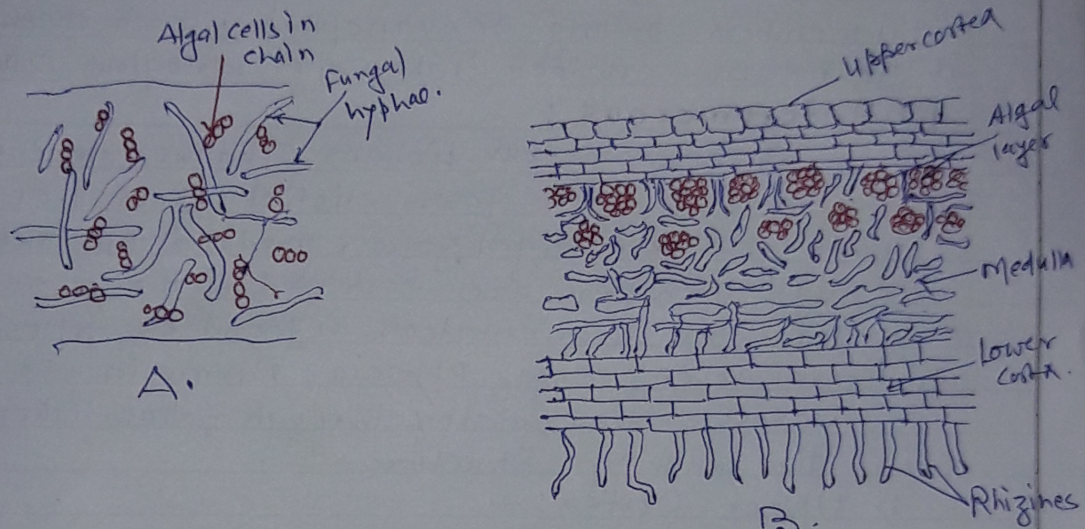


Fig. Internal structure of Lichen Thallus:

A - Section of Homoisomerous thallus

B - Heteroisomerous thallus.

4) Lower Cortex:-

It is the lower most layer which is composed of compactly arranged hyphae. Some of the hyphae in the lower surface may extend downwards and penetrate the substratum for anchorage. They are called - Rhizines.

ii) Internal Structure of Thallus:-

Based on the distribution of algal member inside the thallus, the lichens are divided into 2 groups -

a) Homoisomerous:

Here, the algal cells and fungal hyphae are more or less uniformly distributed inside the thallus. The algal members belong to cyanophyta. Such arrangement is found in crustose lichen e.g., *Leptogium*, *Collema* etc.

b) Heteromerous:

In heteromerous lichens, Thallus remains differentiated into four distinct layers i.e., upper cortex, algal zone, medulla and lower cortex. The algal members are restricted to the algal zone only. This type of orientation is found in foliose and fruticose lichens e.g., *Physcia*, *Parmelia* etc.

A cross section passing through foliose lichen shows the following structure -

1) Upper Cortex:-

It is a thick, outermost protective covering, made up of compactly arranged interwoven fungal hyphae. Usually no intercellular spaces are found in upper cortex, but if present, these are filled with gelatinous substances.

2) Algal zone:-

Just below the upper epidermis, algal zone is found. They are found entangled with fungal hyphae. The common algal members may belong to cyanophyta e.g., *Gloecapsa*, *Nostoc*, *Rivularia* etc. or to chlorophyta e.g., *Chlorella*, *Cystococcus*, *Pleurococcus* etc. This layer is either continuous or

• Department: Botany
• Subject: LICHEN
• Topic: Structure & Repro.
• Medium of Teaching: WhatsApp & College Website.

• Date - 25.07.2020
• Time - 11.00 - 12.00
• Name of the Teacher - Dr. S.S. Sharma
• Class - B.Sc. (Bot) PT - Hon's
- Biotech PT - Sub

6) Thallus Structure :-

i) Morphology: ~~i) Morphology of the thallus~~ Thallus structure shows the diversity of morphology of Lichens. Lichens are generally gray or brown when dry, but when they come in contact of water they look green. They have different growth forms. Based on the thallus morphology Lichens are divided ^{mainly} into three groups -

- Crustose (crustaceous) lichen -
- Foliose, and
- Fruticose lichen.

Hawksworth and Hill (1984) categorised the Lichens into five types.

(a) Leprose:- Simplest type, where the fungal mycelium envelops either single or small cluster of algal cells. The lichen appears as powdery mass on the substratum e.g., *Lepraria incana*.

(b) Crustose:- Here, the lichen thallus is inconspicuous, and appears as thin, flat layer of crust on substratum like barks, rocks etc. They are either wholly or partially embedded in the substratum e.g., *Graphis*, *Strigula*, *Lecidia*, *Rhizocarpon*, etc.

(c) Foliose lichen:- These are flat, dorsiventral, broad, much lobed and leaf like. The lower surface may be white or spongy. Edges are curled. They are

Teacher's Signature

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Found attached to rocks and twigs by Rhizines, developed from lower surface. Eg. Parmelia, Collema, Physcia, Poltigeria, Parmelia, Cetraria etc.

d) Fruticose lichen:-

They have well developed, shrub like, cylindrical and branched thallus which give more or less bushy structure. They grow or hang (Pendant to upright) from the substratum such as tree bark e.g., Usnea, Cladonia, Ramalina etc.

Fruticose lichens have well organised internal structures and are considered most advance thallus among lichens.

e) Filamentous:-

Here, algal members are filamentous and well developed. They remain covered by only a few fungal hyphae. The algal members remains as dominant partner e.g., Ephebe, Racodium, Cystocoleus etc.

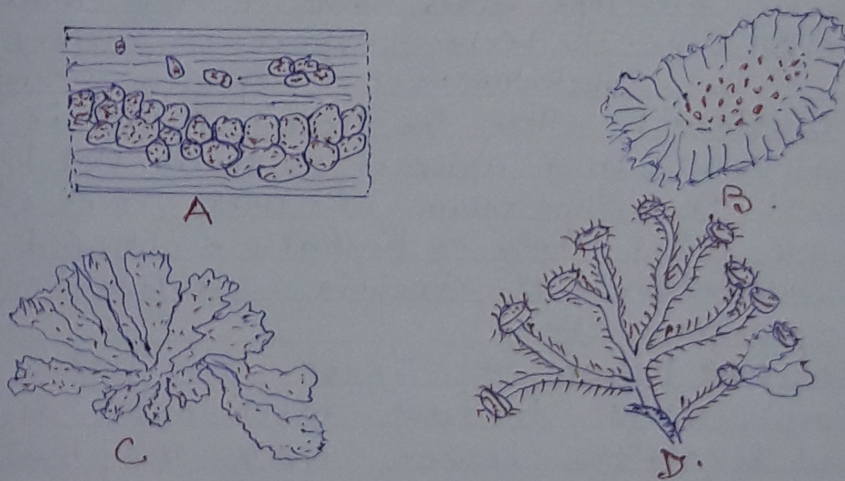


Fig. A-D. - Lichen Thallus different forms

A. Leprose, B. Crustose, C. Foliose, D. Fruticose.