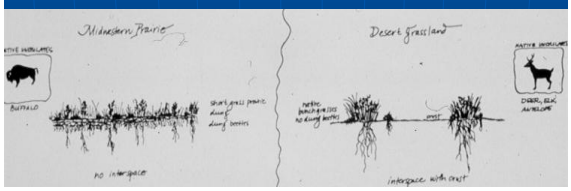
Biological soil crusts in arid habitats

Bunch grass and shrubs

Arid lands without crusts!

Arid lands without crusts!

Different ecosystems have different processes that they are adapted for

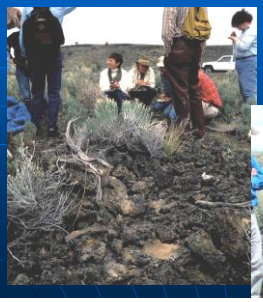


The arid steppe

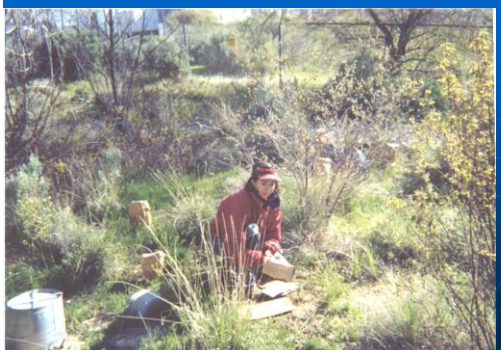
All Crusts are not created equal

Warm versus Cold deserts

"Crusts are where they are needed"

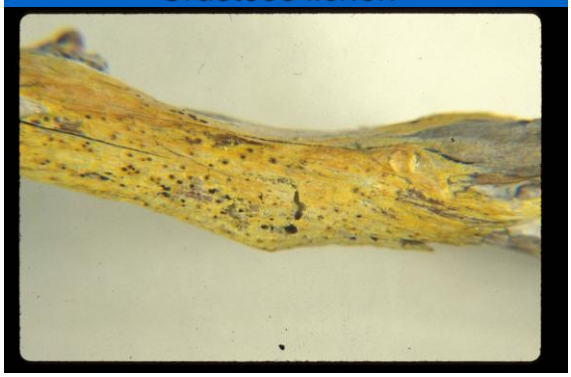


Build the structure and the crusts will come!



Clumped vegetation, Jacks Cr.

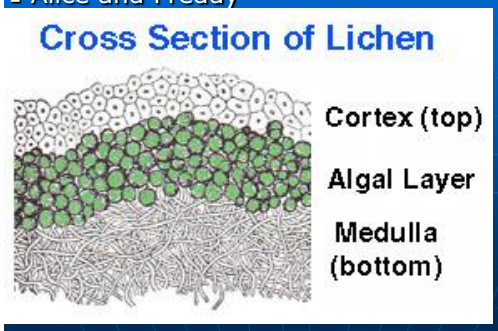
Crustose lichen



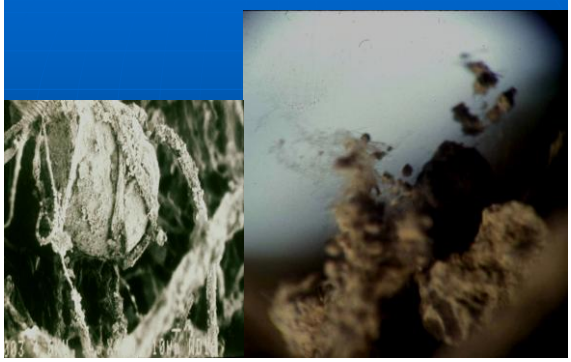
Squamulose lichen

Lichens

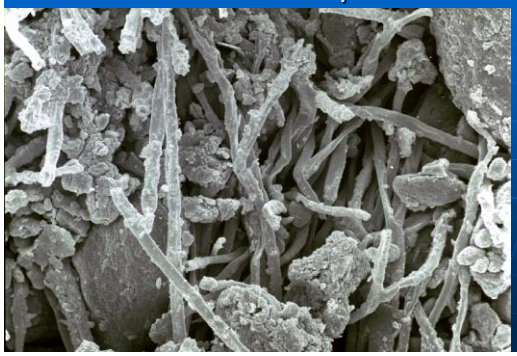
- Alice and Freddy



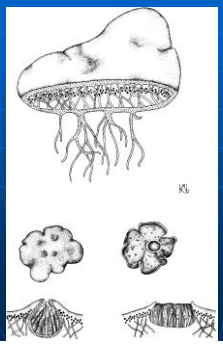
Lichen roots!



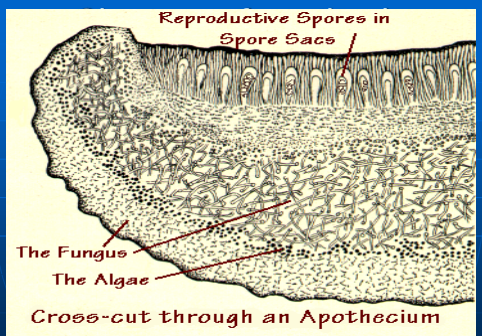
Lichen roots up close



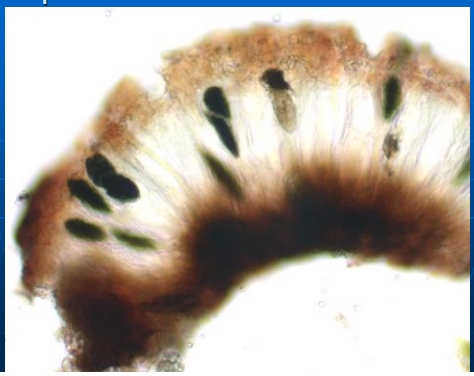
Lichen roots!



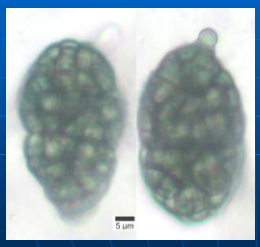
Apothecia on a lichen

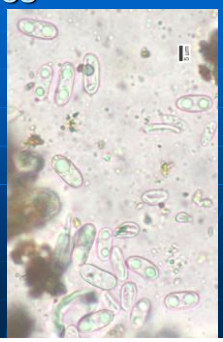


Spores of the crustose lichen

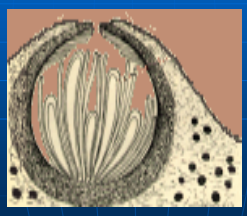


Different size and shaped spores





Perithecia



Cross section of a lichen

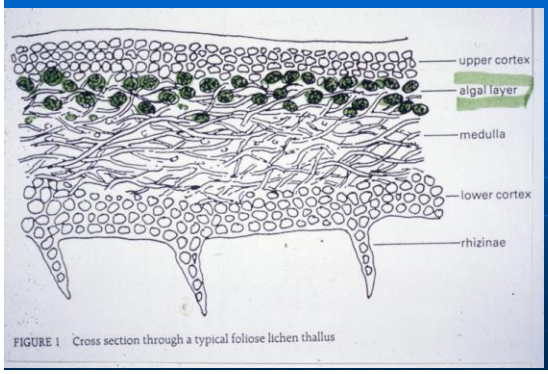
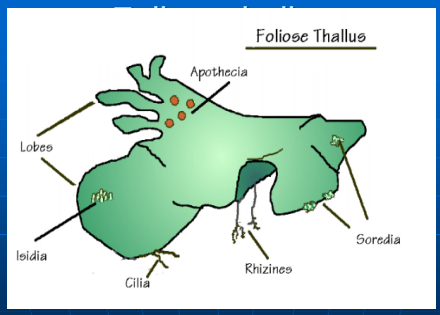


FIGURE 1 Cross section through a typical foliose lichen thallus



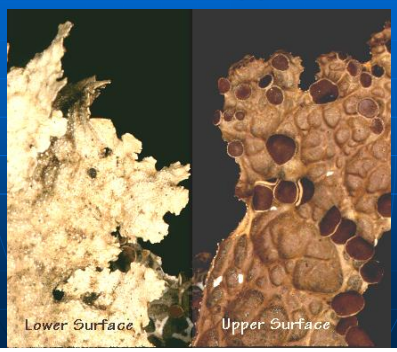
soredia erupting from inside the lichen

note how the fungus wraps around the algal cells

soredia

Fungal hyphae surrounding the algal cells forming the soredia

Lower and upper surface



Different Growth Forms

Morphological groups

- Cyanobacteria- Algae
- lichens
  - Crustose, Gelatinous, squamulose, foliose, fruticose
- Bryophytes
  - Short mosses, tall mosses
  - Liverworts

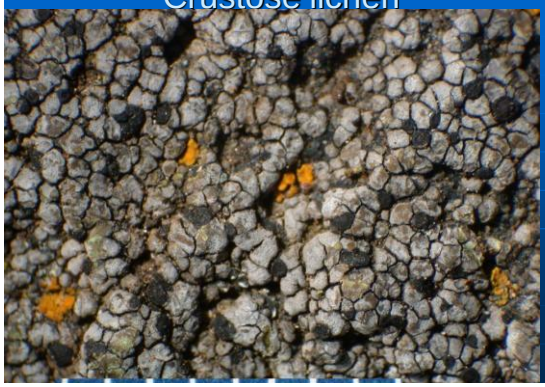
Cyanobacteria

Cyanobacteria

Morphological groups

- Cyanobacteria- Algae
- lichens
  - Crustose, Gelatinous, squamulose, foliose, fruticose
- Bryophytes
  - Short mosses, tall mosses
  - Liverworts

Crustose lichen

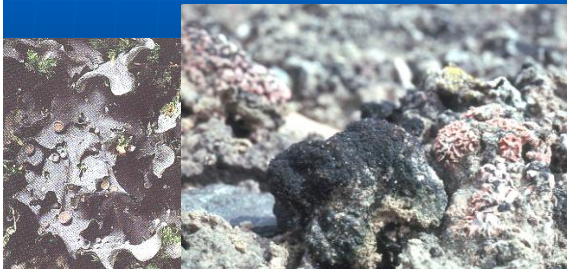


- Why did the soil cross the Road?

- Because there were not enough biological soil crusts to hold the soil in place.

Gelatinous lichen

Gelatinous Lichens



Squamulose lichen

Squamulose lichen

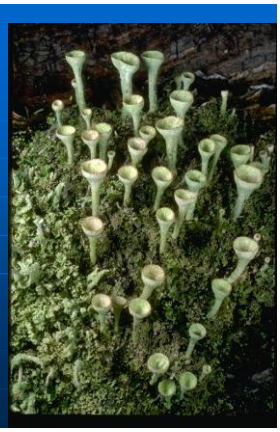
Psora, a squamulose lichen

Foliose lichen

Fruticose Lichen

Fruticose lichen

Fruitcose lichen, Cladonia



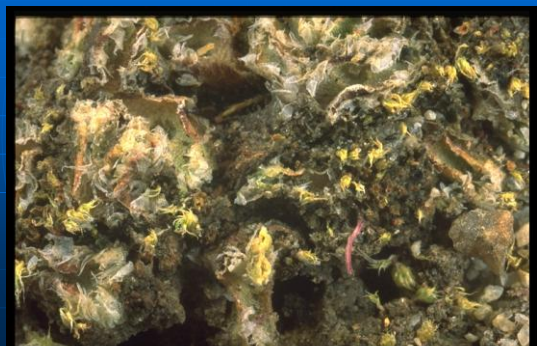
Morphological groups

- Cyanobacteria- Algae
- lichens
  - Crustose, Gelatinous, squamulose, foliose, fruticose
- Bryophytes
  - Short mosses, tall mosses
  - Liverworts

Short mosses

Tall Moss, twisted moss, *Tortula ruralis*

Liverwort



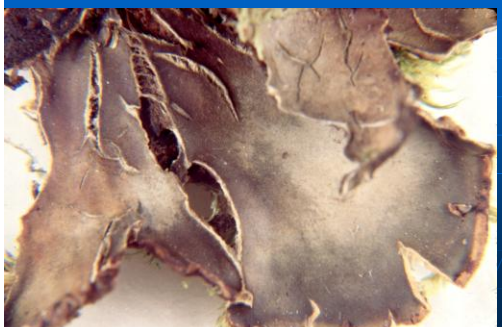
Bryophytes,

Mosses & Liverworts

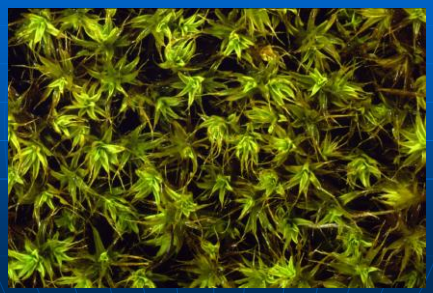
Morphological groups

- Cyanobacteria- Algae
- lichens
  - Crustose, Gelatinous, squamulose, foliose, fruticose
- Bryophytes
  - Short mosses, tall mosses
  - Liverworts

What type of Crust?



What type of Crust?



Why not use species level data?

Biological considerations

1. **Morphological groups are functionally similar**
2. **Difficult to identify in the field**
3. **Is independent of continent, region or area**

Why not use species level data?

Efficiency considerations

1. **Easier to measure with less indecision and > repeatability**
2. **More rapid and statistically powerful data analysis**
3. **Rapid field measurements**
4. **Less costly to monitor**