

A photograph of a forest with tall, thin trees and a dense undergrowth of green plants and ferns. The scene is captured from a low angle, looking up at the trees. The lighting is soft, suggesting an overcast day. The text 'Community Ecology' is overlaid in white, serif font in the upper center, and 'Chapter 15' is overlaid in the same font below it.

Community Ecology

Chapter 15

Community Ecology Defined...

Assemblage of plants, animals,
bacteria and fungi that live in an
environment and interact...

Whittaker 1975

Communities and Ecosystems

The biotic part of the ecosystem
-lacks physical boundaries

Community Characterization

- Species Composition (plants, animals, microbes)
 - Vertical Arrangement
 - Spatial Pattern
 - Change over Time (succession)
 - Biomass
 - Energy Flow
 - Nutrient Cycling
- } structure
- } functional processes

The Link between Structure and Life Form

- Structure - vertical and horizontal arrangement of plants
- Layers in vegetation
 - Distinct groups within layers (synusiae)
- Determinants of Vertical Structure
 - Site and Region
 - Growth Form (physiognomy)
 - both of dominant plant species, and also of other layers

Layers of a Forested Community

- Trees (dominant growth form)
- Shrubs - multiple woody stems
- Herbs - grasses, ferns, forbs
- Thallophytes - non-vascular plants
- Epiphytes - grow above the surface
- Decomposers (fungi) -
- *Lianas (but in tropical - not in PNW)*

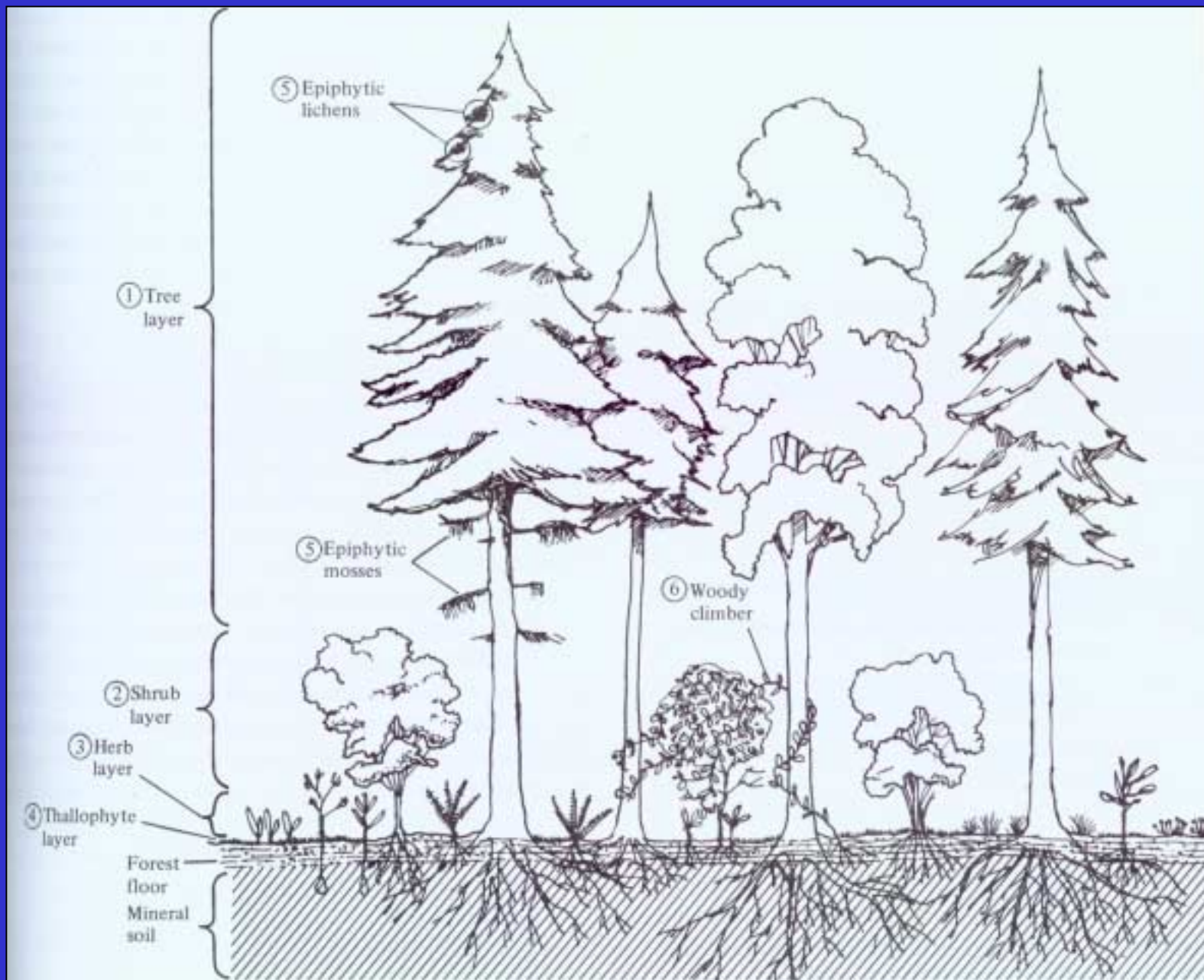
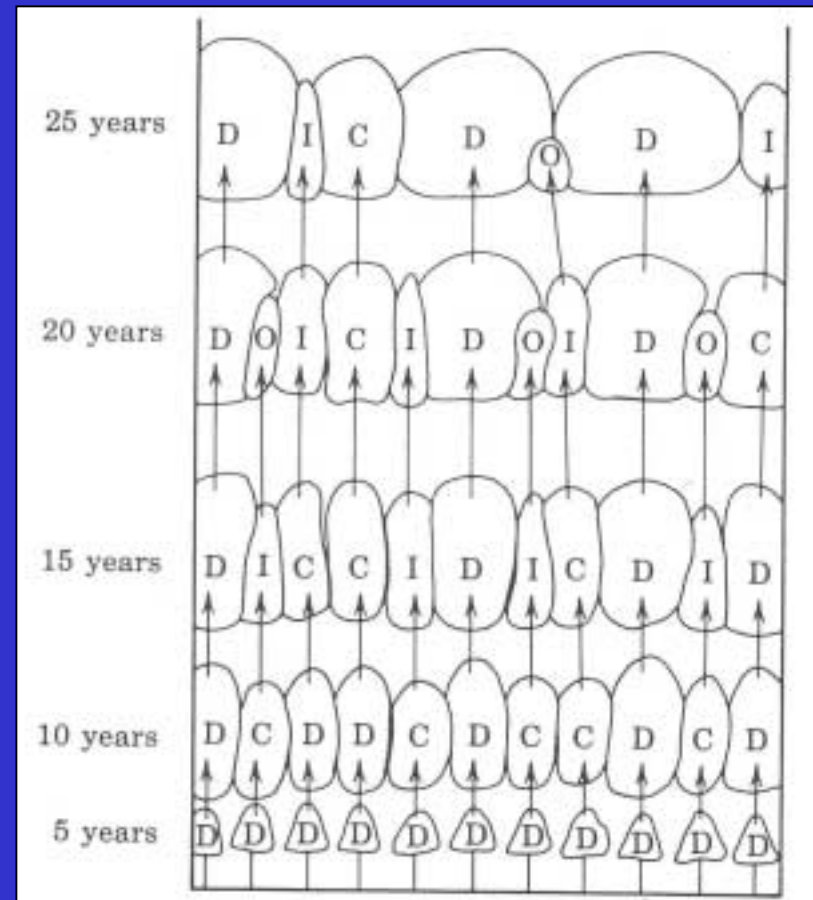


Fig. 15.2

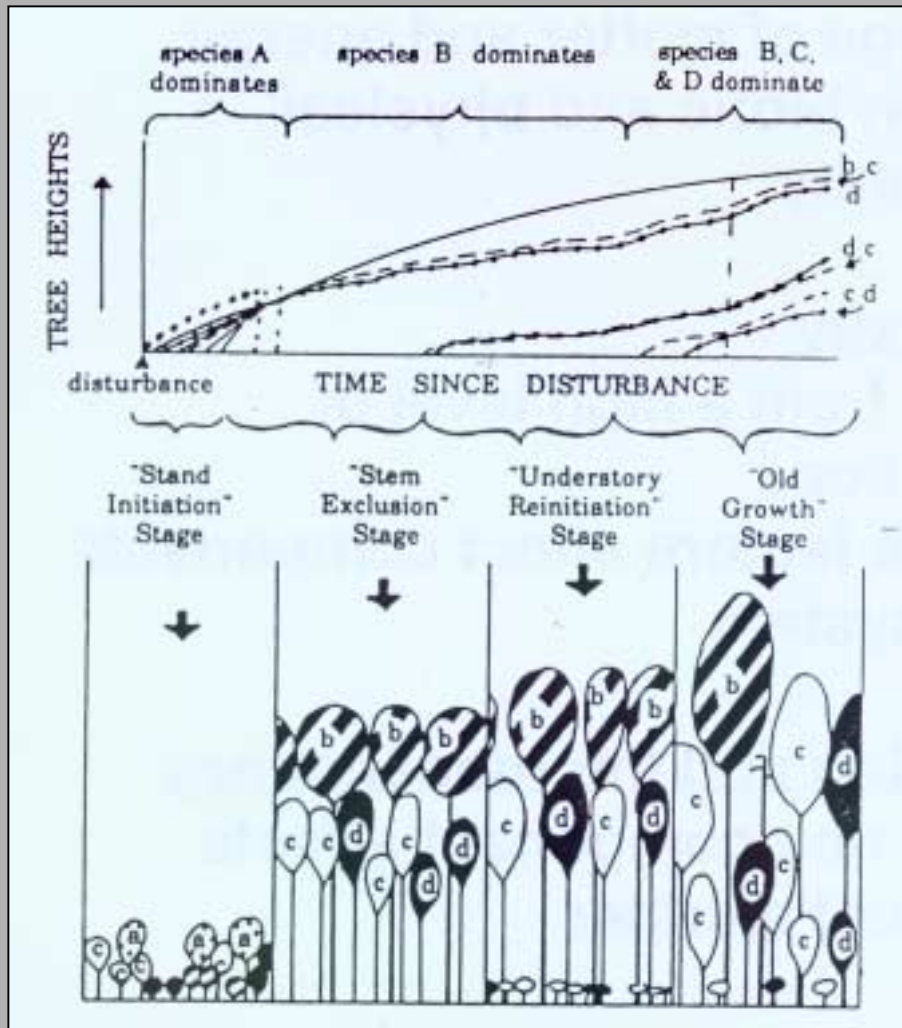
Structure of components are adapted to their layer

Sub-Layers in the Trees

- Dominant
- Co-Dominant
- Intermediate
- Suppressed/Overtopped



The Role of Disturbance and Succession



Community composition and structure are always changing

- within the landscape
- over time

Don't Forget Dead Wood!

- Snags = standing, dead trees
- Decomposing logs (coarse woody debris)
 - Wildlife habitat (e.g. woodpecker nesting or feeding, small mammal shelter, bat roosting)
 - Safe Sites for seed establishment: “Nurse Logs”
 - Sites for nitrogen fixation of microbes
 - Provides long term soil organic matter

* depends on the forest

Inter-Species Relationships within a Community

| Interaction | | Effect on | |
|-------------|------------------------------------|-----------|-----------|
| Category | Type | Species A | Species B |
| Symbiosis | Mutualism | + | + |
| | Commensalism | + | 0 |
| Antagonism | Exploitation | | |
| | physical | + | - |
| | parasitism | + | - |
| | predation | + | - |
| | Antibiosis (including allelopathy) | + | - |
| | Competition | - | - |

Table 15.3

Symbiotic

- Generally beneficial or lacking a negative effect
 - Mutualism (both partners benefit)
 - Continuous Contact
 - Without Continuous Contact
 - Commensalism (one partner benefits)

Symbiosis Examples

- Mutualism: Continuous Contact
 - Plant and mycorrhizal fungi (obligate in pines)
 - Lichens: algae + fungus (obligate)
 - Alder and *Rhizobium* - fix N in root nodules
- Mutualism: Without Continuous Contact
 - Ungulates and birds
 - Insects and Plants they pollinate
- Commensalism
 - Epiphytic plants and lichens with trees

Antagonistic (Exploitation)

- At least one partner is adversely (negatively) affected
 - Exploitation (Non Consumptive or Consumptive)
 - Physical (NC) – physically hindering host
 - climbing plants - IVY! and bird nesting - cowbirds
 - Parasitism (C) – consuming part of tissues or blood/ weakening and sometimes killing, smaller than host
 - Dutch Elm Disease, *Sudden Oak Death (SOD)
 - Predation (C) – consuming all or part / killing or weakening, larger than prey
 - Herbivores eating plants

Physical Exploitation



[www.goecuador.com/ezine/enghtml/
features/laperla.htm](http://www.goecuador.com/ezine/enghtml/features/laperla.htm)



www.nps.gov/plants/alien/fact/hehe1.htm

Consumptive Exploitation (Parasitism)

Sudden Oak Death in California Oaks

Coast live oak (*Quercus agrifolia*)

Californian black oak (*Q. kelloggii*)

Interior live oak (*Q. parvula* var. *shrevei*)

Tanoak (*Lithocarpus densiflorus*)



[www.defra.gov.uk/planth/
pestnote/sudden.htm](http://www.defra.gov.uk/planth/pestnote/sudden.htm)



www.fs.fed.us/r6/nr/fid/index.shtml

Sudden Oak Death

- Previously unknown Phytophthora – fungus-like brown alga species related to pathogen that caused Irish potato famine
- Probably imported on rhododendrons from Europe - * danger of invasives!
- Spreads via spore dispersal during wet and windy weather
- Girdle of dead tissue underneath bark around its circumference – destroys the trees vascular system (girdles it)
- Trees can die within a few weeks = SUDDEN!

Exploitation

(Physical or Consumptive or BOTH?)

White fir dwarf mistletoe
Arceuthobium abietinum

