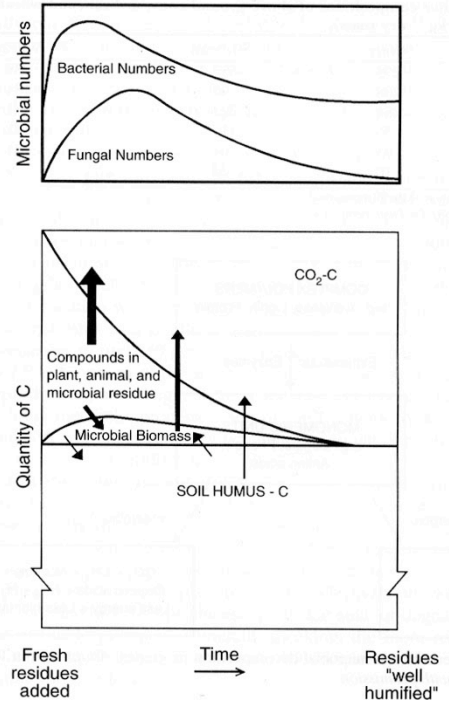


Succession of decay organisms

- Sugar fungi & bacteria
- Early stage decomposers
- Mid stage decomposers
- Late stage decomposers

Dying cells release cell contents

- Nutrients lost to leaching
- Dominant organisms minimize investment in enzymes
- Motile bacteria within a cell/tissue can move towards nutrients
- How do they know where to go?



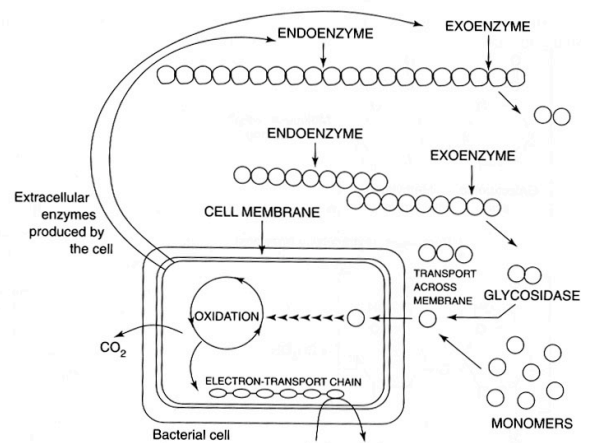
Sugar fungi & bacteria

- Get in quickly and assimilate nutrients in solution
- Often produce antibiotics

Phylloplane fungi

Decomposition begins with the production of extracellular enzymes

- Remaining compounds are too large to enter fungal or bacterial cells



Overview of decay process

Function of soil fauna

Fragmentation of organic matter

- Increase surface area/volume ratio
- Decrease C/N ratio in feces and biomass

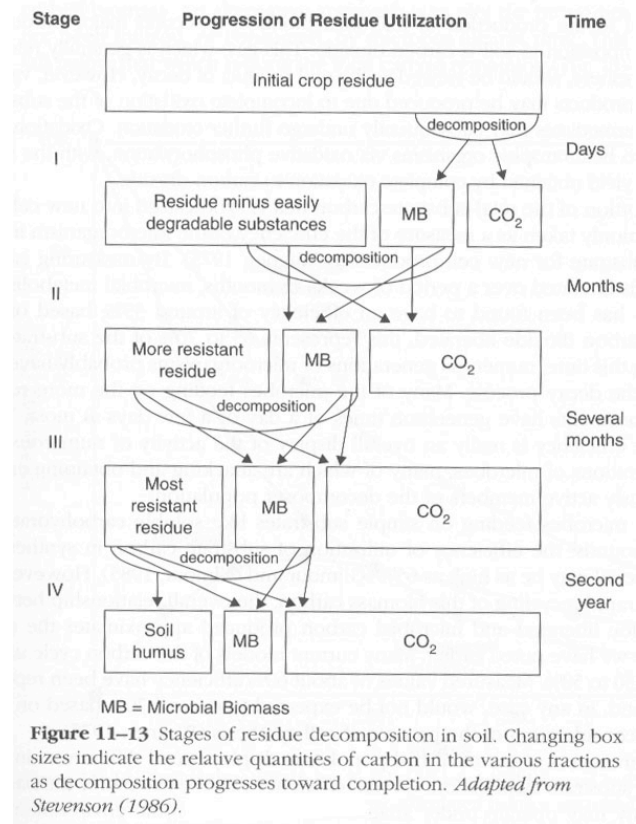
Consumption of other soil microorganisms

- Affects nutrient cycling
- Control populations of decomposers

Consortia of bacteria and fungi

The most competitive organisms follow what strategies?

- How might this evolve?
- Why don't their neighbors "punish" them?
- What conditions are necessary for this to happen?



Early to mid-stage decomposers

Actinomycetes app 5×10^6 CFUs/g soil

- Primarily *Streptomyces*
- Degrade pectins, hemicelluloses, cellulose, and some lignin (mostly side chains)
- Produce geosmin

Bacteria- primarily spore formers app 5×10^7 CFUs/g soil

- Bacillus*
- Clostridium*
- Pseudomonas*

Late stage decomposers

Primarily fungi - Basidiomycetes & Ascomycetes
 Produce cellulase

Ligninase

Lignin degradation

Lignin degraders can also clean up pollutants

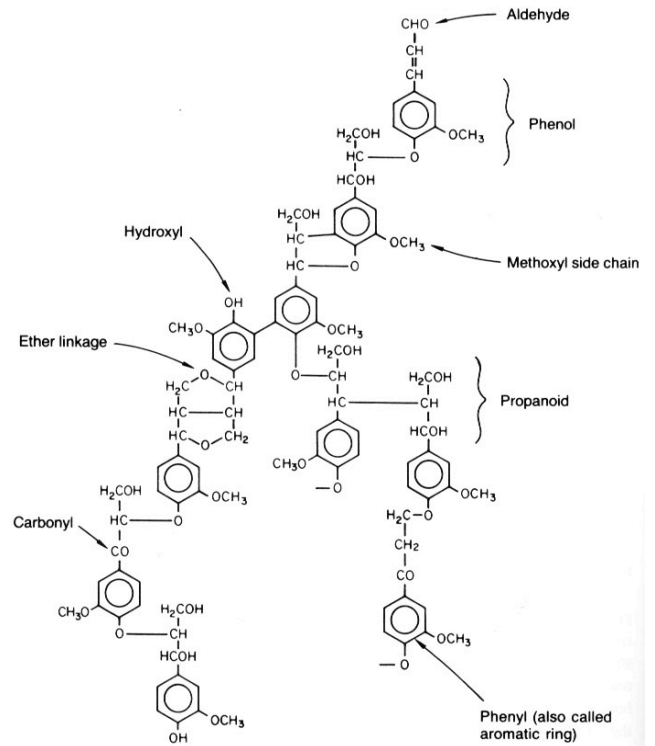


FIGURE 6.5 Generalized lignin structure, showing the common functional groups.

Organic matter degradation

Decay rates are exponential

The proportion of litter that decays remains constant over time

–This means that the amount that disappears each time interval decreases

$$L_t = L_0 e^{-kt}$$

- Error in your book on page 157, should read $1/k$, not l/k

Influence of decay constant on soil carbon

Factors controlling decay rate

Temperature

Moisture

Litter quality

Location in soil profile

Time

Soil carbon has a variety of MRTs

Humus is a product of tough-to-degrade compounds

Humus can bind to soil particles

Decomposition in rhizosphere is different

Why?

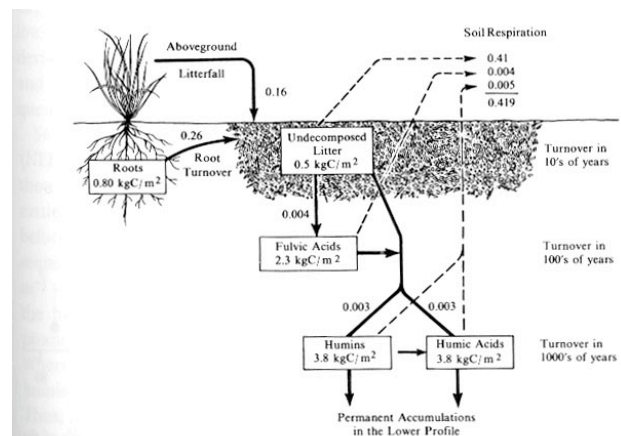


Figure 5.17 Turnover of litter and soil organic fractions in a grassland soil. Note that mean residence time can be calculated for each fraction from measurements of the quantity in the soil and the annual production or loss (respiration) from that fraction. Flux estimates are in $\text{kg C m}^{-2} \text{ yr}^{-1}$. From Schlesinger (1977).