



#### # 2 THE LIVING SOIL: ARTHROPODS

Arthropods, like many bugs, make their home in the soil. Their name comes from their jointed (arthros) legs (podos). They have no backbone and rely instead on an external covering called an exoskeleton. A square yard of soil will contain 500 - 200,000 arthropods. Arthropods range in size from microscopic to several inches in length. They include insects, such as springtails, beetles, and ants; crustaceans such as sowbugs; and arachnids.

#### WHAT ARTHROPODS DO?

Arthropods shred organic material, stimulate microbial activity, mix microbes with their food, mineralize plant nutrients, enhance soil aggregation, burrow, stimulate succession of species and control pests. The root-feeders and dead-plant shredders are less abundant.

**PICTURE:** Sowbugs are relatives of crabs and lobsters. Their powerful mouth-parts are used to fragment plant residue and leaf litter.

**CREDIT:** Gerhard Eisenbeis and Wilfried Wichard. 1987. Atlas on the Biology of Soil Arthropods. Springer-Verlag, New York. P. 111.



#### #4 THE LIVING SOIL: BACTERIA

Bacteria are tiny, one-celled organisms – generally 4/100,000 of an inch wide (1  $\mu\text{m}$ ) and somewhat longer in length. A teaspoon of productive soil generally contains between 100 million and 1 billion bacteria.

#### WHAT BACTERIA DO?

Bacteria perform important functions related to water dynamics, nutrient cycling, and disease suppression. Some bacteria affect water movement by producing substances that help bind soil particles producing stable aggregates. These aggregates improve water infiltration and the soil's water-holding ability.

#### A FEW IMPORTANT BACTERIA

Nitrogen-fixing **bacteria** form symbiotic associations with the roots of legumes.

**Nitrifying bacteria** change ammonium ( $\text{NH}_4^+$ ) to nitrite ( $\text{NO}_2^-$ ) then to nitrate ( $\text{NO}_3^-$ ).

**Denitrifying bacteria** convert nitrate to nitrogen ( $\text{N}_2$ ) or nitrous oxide ( $\text{N}_2\text{O}$ ) gas.

**Actinomycetes** are a large group of bacteria that grow as hyphae like fungi; they are responsible for the characteristically "earthy" smell of soil.

**Photo Credit:** [www.littlerotters.org.uk](http://www.littlerotters.org.uk)



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