



The Endowment of Roots

PLANTS are workers, earners, creators of real wealth, all their lives. They take the low-value minerals of the soil, the almost valueless carbon dioxide of the air, the unpriced yet priceless water,

and finally the intangible gold of sunlight, and weave it all into food and framework tissue. Some the plant is permitted to use for itself, some is appropriated by hungry humans, animals, fungi, bacteria—uncreating exploiters, all of us.

That the dead plant returns to the dust from whence it came is a commonplace. The least observant, least scientific of us realizes that. We see the dead leaves on the ground, the crop of clover or cowpeas plowed under by the farmer. We realize, at least in a vague general way, what it is all about.

But probably few of us ever take time to notice the role of the roots that are left in the soil when the top of the plant dies. These, no less than the over-ground parts, were created out of the same raw materials, contain much the same finished products, are capable of enriching the soil in the same way.

Indeed, they are already in place to do their best work of soil enrichment—

they do not even need to be plowed under, or to be carried down by the combined activities of decay organisms and rain, as do the decaying leaves and stems. They can be acted on right where they are, and when the fungi and bacteria and small nameless animals have done their work, the final product, humus, is exactly where it is needed by the next generation of roots that send their living finger-feeders down through the soil.

It is a significant thing that the topsoil which conservationists are nowadays so anxiously talking about, and working about, is in most places practically identical with the depth to which the great mass of roots penetrates. "Thin" soils are found in places of shallow root penetration, "deep" soils where plants found conditions favorable, through long ages, and sent their roots down farther. The dark "A horizon," that is the really valuable part of a soil, is marked out by the roots, and partly made by them.

This dark zone on top of the soil is what makes human life possible on the millions-scale known to civilization, because it makes large-scale production of food possible. Our very lives are the endowment of the roots.

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of those taking part in the experiment declared that the feat was impossible, they all found that they were able to make this judgment of a tone just half as high as another and a numerical scale of psychological pitch was made up in this way. Further experiments indicated that the apparent size of just perceptible increases in pitch remains constant regardless of their location on the scale. This is just the reverse of the way sound intensities are heard. The smallest loudness difference that can be perceived depends upon the intensity of the first sound heard.

It would seem that pitch and intensity are not perceived by the same type of physiological mechanism, the investigators concluded. Loudness appears to depend upon the total number of fibers stimulated in the auditory nerve. Pitch depends upon the location of that stimulation on the basilar membrane, they hold.

When a person picks out a tone he feels is just half as high in pitch as another, he picks one that stimulates a portion of the membrane just halfway between that stimulated by the first tone and the end of the membrane.

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