The Structure of a Root

By Cindy Grigg

[1] Have you ever tried to pull a dandelion plant out of the ground? It's not easy, is it? That's because most roots are good anchors. Roots have two important functions. Roots anchor a plant in the ground and absorb water and nutrients from the soil. The more root area a plant has, the more water and nutrients it can absorb. The roots of a walnut tree may be as long as the tree's height above the ground. Some plants' roots also serve as a storage area for food. Carrots and beets are two plants which store their extra food in their roots.

[2] There are two types of root systems: taproot and fibrous. A **taproot** system consists of a long, thick main root. Thin branching roots grow off the main taproot. Turnips, radishes, carrots, dandelions, and cacti have taproots. Grass, corn, and most trees have **fibrous** root systems. They have several main roots that branch again and again to form a tangled mass of roots and soil. This is why grass is a good ground cover to hold the soil in place to prevent erosion.

[3] If we looked carefully at a root, we would see that the tip of the root is rounded. It is covered by a structure called the **root cap**. The root cap, which contains dead cells, protects the root from injury from rocks and other material as the root grows through the soil. The root cap also makes a slimy substance called mucigel (MUCE-i-jell). This works to lubricate the growing roots and makes it easier for them to push through the soil.

[4] **Root hairs** grow out of the root's surface. These hairs increase the surface area of the root that touches the soil. When more surface area is in contact with the soil, more water and nutrients can be absorbed by the process of osmosis. Most of the water taken in by the plant is done by the root hairs. The root hairs also help to anchor the plant in the soil. Root hairs don't usually live more than a few days. The plant continually grows new cells to replace them.

[5] Behind the root cap are cells that divide by mitosis to form new root cells. This area is the **apical meristem**. In the center of the root is the **vascular tissue**. Vascular tissue includes the xylem and the phloem. The water and nutrients that are absorbed from the soil quickly move into the xylem. From there, these substances are pulled upward by transpiration to the plant's stems and leaves.

[6] Phloem tissue transports food manufactured in the leaves to the root. The root tissues may then use the food for growth or store it for future use by the plant. The root also contains a layer of **cambium**, which produces new xylem and phloem cells.

[7] People eat many kinds of roots. Some are sweet potatoes, cassava, radish, yam, beet, carrot, and turnip. The root is usually the first plant structure to begin growing after germination. When a seed germinates, the root always grows downward with the pull of gravity. This is known as gravitropism.

Name _____ Science Pd _____

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1. What are the two important functions of a root? _____ _____	2. Name the two types of root systems. _____ _____
3. The tip of the root is covered by a: (A) Root hood (B) Root cover (C) Root cap	4. What is mucigel? (A) Mucous formed by the plant's stem (B) A slimy substance that makes it easier for a root to push through the soil (C) Mucous formed by the plant's leaves
5. What do root hairs do? (A) They give roots more surface area touching the soil. (B) They help the plant absorb more water and nutrients. (C) They help anchor the plant in the ground. (D) All of the above	6. What does the cambium layer do? (A) Makes food for the plant (B) Produces more xylem and phloem cells (C) Takes in water