6 ZONE OF MATURATION - l.s. - Stained (45x)

Behind the zone of elongation (Microslide 5) there is still another zone in the young root. This is called the **zone of maturation** (M). By the time the cells reach their full growth, they have matured into specialized types of cells for special purposes. *How many different kinds of cells can you identify in this Microslide? What peculiar growth do you see in the epidermal cells marked with arrows? Do you see any sign that a central cylinder is beginning to develop?*

7 ROOT TIP - ROOT HAIRS - w.m. - Stained (20x)

This low-power shot of a whole young root tip can serve to summarize what we learned from Microslides 4, 5, and 6. All four zones are visible here. *Can you identify them?*

The most striking thing is the collection of **root hairs** (H) growing out of the epidermis in the zone of maturation. Try to estimate how many root hairs are visible in this tiny segment of root. These root hairs play an important role in the absorption of water and dissolved minerals.

8 EPIDERMAL CELL - ROOT HAIR - l.s. - Stained (260x)

This enlargement makes it clear that a root hair is really an outgrowth of a single epidermal cell. Yet a root hair may grow to a length of one centimeter or more. If you want to see real root hairs without a microscope, sprout some radish seeds or grass seeds on wet paper.

Biologists have estimated that a single rye plant has over 14,000,000,000 root hairs, with a surface area of 4,000 square feet. *From your knowledge of the process of diffusion, can you explain why root hairs play such an important part of absorption?*

Perhaps what you observe in these Microslides or what you read in this text folder will cause questions to arise in your mind. You may find the answers in your textbook or you may have to continue your inquiry in the library, in the laboratory, or in discussions with teachers and fellow students. However, even if you cannot arrive at an answer, do not be discouraged. You may be asking a question for which an answer has not yet been found.

SET 77

THE ROOT OF A FLOWERING PLANT

INTRODUCTION

A flowering plant carries on its life functions with the aid of specialized organs, such as roots, stems, leaves, and reproductive parts.

Roots perform four general functions in the life of a flowering plant:

1. Roots absorb water and dissolved minerals from the soil.
2. Roots anchor the plant firmly in the ground.
3. In some plants (beets, carrots, etc.), roots serve as storage depots for extra food.
4. In some plants (hops, dahlias, etc.), roots can reproduce the plant.

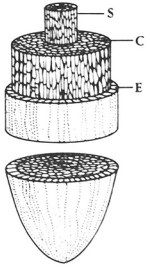
Microslides 1, 2, and 3 deal with the basic structure of a mature root. Microslides 4, 5, and 6 deal with the growth and development of a root. Microslides 7 and 8 explain how the root is equipped to absorb water and minerals.

The magnification given, for example, Microslide 3 (75x), means that the microscope was set at that power when the photograph was taken.

1 BUTTERCUP ROOT - x.s. - Stained (40x)

A root is built of 3 cylinders of plant tissue:

- Inner **central cylinder** of conducting tissue (S)
- Middle cylinder (**cortex**) of storage tissue (C)
- Outer cylinder (**epidermis**) of protective tissue (E)



In the upper half of the drawing, each cylinder has been cut at a different level so you can visualize how each fits into the next. However, the lower half of the drawing shows a complete cross section such as you see in this Microslide.

Examine this Microslide and locate the three cylinders of the root. *How would you describe the cells of each region, considering size, shape and arrangement?*

By Philip Goldstein