

Bulb Botany

Overview: Bulbs are plants growing from an underground mass of food storage tissues. The storage capacity of a bulb is a special adaptation for survival.

Grade Level/Range: Grades 3 to 6

Objectives:

Students will:

- Learn about bulbs.
- Learn the different parts of a bulb and what they do.
- Explore the parts of the bulb through dissection.

Time: 30 minutes to 1 hour

Materials:

- bulbs (onion and/or spring-flowering bulbs)
- a knife
- cutting board
- plastic bags
- paper towels
- paper
- pencils

Background Information:

The word bulb is loosely used by gardeners to describe plants growing from an underground mass of food storage tissues. Bulbs store enough food to enable them to grow and flower with no additional nutrients during the first year. To help students relate to this concept, tell them the storage tissue is like the bulb's lunch box - a big lunch box packed with enough food for the whole growing season!

A true bulb is a modified stem containing a complete miniature plant including embryonic leaf, stem and flower parts surrounded by fleshy scales (provide food for the young plant) and a basal plate (produces roots). Some true bulbs, called tunicate bulbs, are also surrounded by a thin protective layer called a tunic that protects the bulb scales from drying and allows them to be stored out of the ground for an extended time. Tulips, daffodils and onions are tunicate bulbs. If you slice a bulb in half horizontally, you'll see rings formed by the scales, and if you are looking at one close to planting time, the small plant will be developed enough for you to be able to see it in the center (an onion left in the refrigerator for too long makes a great example).

Some other plants we think of as bulbs are botanically not considered true bulbs because they do not contain the parts listed above and are more accurately called "bulb-like" structures. These include corms, tubers, and rhizomes. For instance, a crocus is botanically a corm. A corm differs from a bulb because it stores most of its food in an enlarged basal plate rather than in its scales. Tubers, such as dahlias and begonias, differ from true bulbs because their new stems and roots grow from "eyes" on their surface, while rhizomes are horizontal underground stems that produce shoots and roots. Examples of rhizomes include iris, calla lilies and cannas. To a botanist, the distinctions between these storage organs are very important and can provide information for scientific classification and offer clues about the plants' origin and evolution. However gardeners approach plants in a more practical sense. Because most of the plants with underground storage capacity rely on similar planting instructions, gardeners usually lump them all together as bulbs.

Laying the Groundwork:

Ask students, What is a bulb? (*Plants growing from an underground mass of food storage tissues. This mass is also called a bulb.*) Do you know any common plants that are grown from bulbs? (*Examples include tulips, daffodils, paper white narcissus, onions.*)

Exploration:

1. Introduce students to bulbs using the details provided in the Background Information. Talk about their unique ability to store enough energy to produce leaves and flowers for the next growing season.
2. Show students example bulbs. If possible, have multiple types of bulbs (onion, tulips, daffodils, hyacinths and paperwhites) so they can compare and note similarities and differences. First, ask them to describe what each looks like from the outside. Instruct them to draw a picture of each type of sample bulb you have available.
3. On the chalkboard or dry erase board, draw an outline of the parts of a bulb on the board. Talk about the different parts and what they do (see Background Information).
4. Cut sample bulbs in half (you can either use onions from the grocery store or spring-flowering bulbs if they are available). Place the bulbs in a plastic bags* and then give students a chance to view the cut bulbs. It is best to have enough bulbs so that students can have their own or share in a small group.

***Note:** most bulbs are poisonous if eaten in large quantities (even onions are harmful if consumed in large quantities) and can cause skin irritation in some individuals. So that is why it is recommended to place it in a plastic bag. Another option is for students to wear gloves while handling the bulbs.

5. Ask students to draw the inside of the bulbs and then label the different parts. Depending on the maturity of the bulb and the conditions it has been exposed to you, they may or may not be able to clearly see the young leaves and flowers. If you do not see any leaves or flowers in this batch of bulbs, try to find a few more mature bulbs so they can see an example.

Making Connections:

Ask students, do all plants have the ability to store enough food for one growing season? (*No.*) What are some of the benefits to a plant with this food storage capacity? (*This is an adaptation for survival because they have enough food stored to survive at least one season with poor environmental conditions.*)

Branching Out:

Science - As the students discovered in the botany lesson, the roots of the bulb grow from the basal plate and the shoots grow above the basal plate. So does it matter which end is up when planting? Ask students to hypothesize what they think is the best planting method for a bulb and then as a class plant a few bulbs facing different directions. Observe the bulbs for several weeks and keep a journal of the growth. After several weeks, compare the results and make a conclusion about the hypothesis. The students should find that bulbs planted upside down use a lot of energy growing around the bulb and up and so they may not survive and/or bloom.

Math - Plant several bulbs in pots (either plant paperwhites or follow the directions for forcing bulbs provided in the Background Information). Measure the plants daily as they grow (metric and English measure) and then chart the data on a graph. Discuss the growth patterns observed.

English - Read the book "A Flower Grows" by Ken Robbins (Dial Books, New York, NY;1990) detailing the growth of an amaryllis bulb. Plant an amaryllis in the classroom and compare the observed growth with the book.

Art - Using old plant catalogs, make a color wheel using pictures of bulb flowers. Discuss the concepts of primary, secondary and complementary colors.

History - Read about "Tulipmania," a period of time in Holland when tulip bulbs were so popular they were traded on the market at extreme prices, eventually leading to an economic crisis. Discuss the effects of supply and demand on prices. Introduce the concepts of trade markets, speculation and inflation.