

Fruits And Seeds

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Fruit formation is an important phase of sexual reproduction in flowering plants. Fruits protect and help distribute seeds. Fruits often are eaten by animals. The seeds enclosed within the fruit are not digested; they pass through the animals. Thus, some seeds are dispersed by animals. Because they are associated with reproduction, fruits and seeds are related to flower parts. Fruits are enlarged ovaries. Seeds are enlarged and thickened ovules.

In this investigation, you will

- (a) examine and compare traits of six different fruit types.
- (b) examine the inside parts of a string bean and okra fruit.
- (c) examine and compare outside and inside parts of a bean and corn seed.

Materials



string bean
 peach
 pistachio
 peanut
 cucumber
 green pepper
 okra
 bean seed soaked in water
 hand lens
 razor blade (single-edge)
 corn seed soaked in water—2

Procedure

Part A. Fruit Comparison

- Examine samples of the fruits listed in Table 1. Use a razor blade to cut open the fruits to examine their interiors. **CAUTION:** *Blade is sharp. Cut away from your fingers.*
- Complete Table 1. Base your answers on the following brief explanations.
 - (a) "Nature of fruit" should be either *dry* (hard or brittle) or *fleshy* (soft and usually thick).
 - (b) "Number of seeds" should be a number. For some fruits (cucumber, green pepper), an estimate rather than an actual number should be given.
 - (c) "Fruit edible" should be yes or no, considering humans as the consumers.
 - (d) "Seed edible" should also be yes or no, considering humans as the consumers.

- (e) "Evidence of flower parts" should be answered yes or no. A scarlike structure appears on the ends of certain fruits showing remains of reproductive parts no longer present (stigma, petals, and so on). Do not confuse this with the stalk end where the fruit was connected to the plant.

Part B. Fruit Parts

String bean pods are the fruit of a string bean plant. The string bean pod was the ovary of the bean flower. Evidence of this can be seen inside the string bean pod.

- Using a razor blade, cut the string bean pod open lengthwise. Use the "line" found along its outside as a guide.

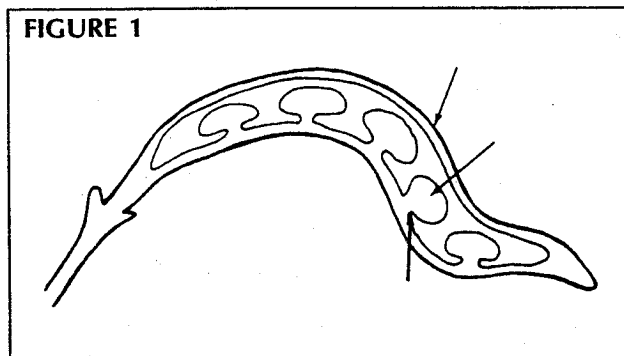
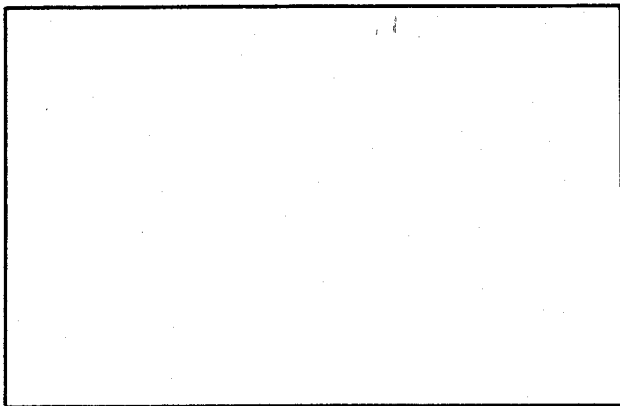
TABLE 1. CHARACTERISTICS OF SOME FRUITS

FRUIT	NATURE OF FRUIT	NUMBER OF SEEDS	FRUIT EDIBLE	SEED EDIBLE	EVIDENCE OF FLOWER PARTS
Okra					
Peach					
Pistachio					
Peanut					
Cucumber					
Green pepper					

- With the string bean pod open, identify the seeds inside. A small thin stalk can be seen connecting each seed to the fruit or pod. This stalk is the funiculus.

- Correctly add the following labels to Figure 1: *fruit, seed, funiculus*.

- Make a cross-sectional slice through an okra fruit. Observe and diagram what you see in the space below. Label these parts: *fruit, seed, and funiculus*.



The thick, outer covering of the seed is the seed coat. It protects the seed.

- Correctly add the following labels to Figure 2: *hilum, micropyle, seed coat*.

- Using a razor blade, carefully remove the seed coat from your bean seed.

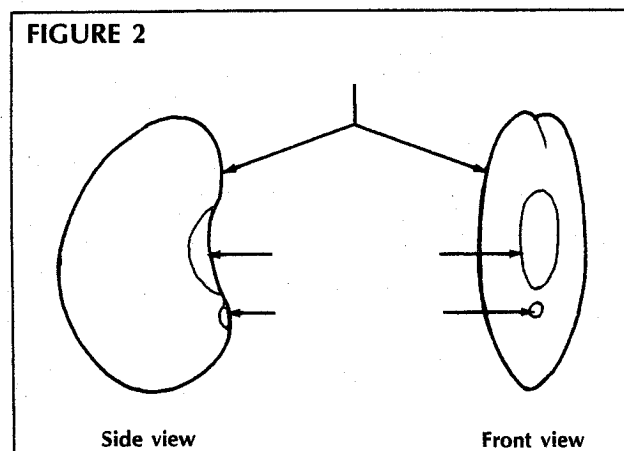
- Open the seed into two equal halves. Four internal structures should be visible with the aid of a hand lens.

Part C. Seed Parts

- Examine a bean seed that has been soaked in water. Three structures should be visible.

An oval scar on the side of the seed is the hilum. It represents the point of attachment of the ovule by the stalklike funiculus.

The tiny dot directly below (or above) the hilum is the micropyle. It is the opening through which the pollen tube entered the ovule and the egg was fertilized.



The bulk of the seed is two cotyledons. They store food which is used by the developing plant during germination.

The other three parts of a seed located near the edge of one of the cotyledons form the young plant. The stemlike structure is the hypocotyl. It will form the stem of the plant. The lower tip of the hypocotyl is the radicle. It will form the roots of the new plant. The small leaflike structure connected to the hypocotyl is the epicotyl. It will form the first true leaves of the plant during its early growth.

● Correctly add the following labels to Figure 3: *epicotyl, hypocotyl, radicle, cotyledons*.

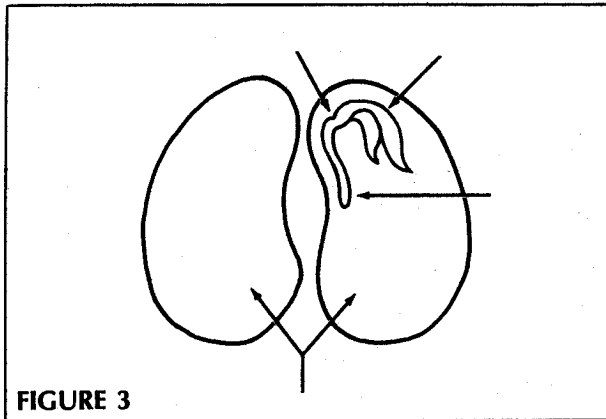
● Examine the outside of a soaked corn seed.

1. Can you see the same outer parts as easily on corn as you did on the beans? _____

● Using a razor blade or fingernail, carefully remove the seed coat from your corn seed.

2. Does the corn seed split open easily into two equal halves? _____

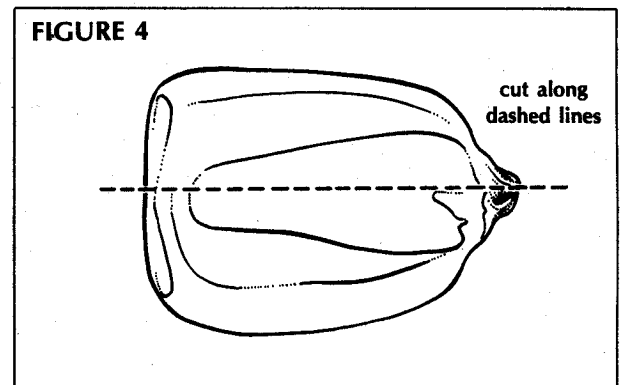
Flowering plants are grouped into two categories, monocotyledons and dicotyledons. These groups refer to the number of cotyledons present in the seeds. Mono- means one, di- means two.



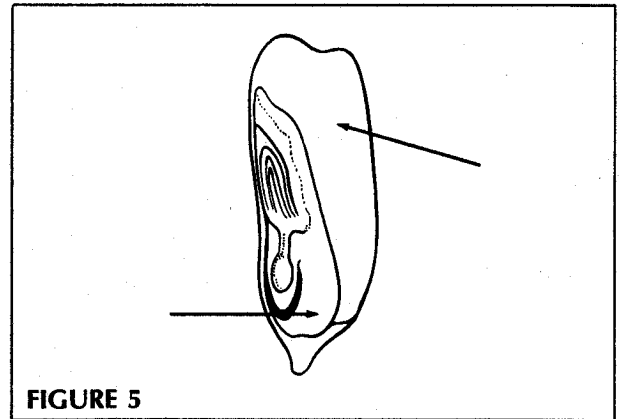
3. (a) Are beans a mono- or dicotyledon plant? _____

(b) Is corn a mono- or dicotyledon plant? _____

● Cut a second soaked corn seed in half. Use Figure 4 as a guide.



● Examine the cut edge. Those parts which appear white are the cotyledons, radicle, epicotyl, and hypocotyl. Together these parts form the embryo or future plant. The remaining part is a tissue called endosperm. Endosperm serves as a food source for the young embryo as it first grows. Label the *embryo* and *endosperm* in Figure 5.



Analysis

1. Did all fruits examined in Part A have seeds in them? _____

2. (a) Is there a relationship between the nature of a fruit (Table 1) and its edibility? _____

(b) Explain. _____

3. (a) Is there a relationship between number of seeds (Table 1) and seed edibility? _____

(b) Explain. _____

4. (a) A string bean pod usually has five to seven seeds in it. How many ovules were present in a bean flower ovary before fertilization? _____

(b) A tomato may have over 500 seeds in it. How many ovules were present in a tomato flower ovary before fertilization? _____

5. What structure found in string beans, green peppers, tomatoes, and cucumbers tells you that they are all fruits? _____

6. Categorize each of the following plant parts as either fruits or vegetables. (Consider vegetables as a nonscientific category assigned to any plant or plant part other than a fruit.) Give reasons to support your decisions.

(a) strawberry _____

(b) beet _____

(c) squash _____

(d) pumpkin _____

(e) lettuce _____

(f) carrot _____

7. Explain what each of the following parts is or does.

(a) hilum scar _____

(b) micropyle _____

(c) cotyledon _____

(d) embryo _____

(e) endosperm _____

8. Explain what becomes of each of the following seed parts as the seed sprouts.

(a) hypocotyl _____

(b) epicotyl _____

(c) radicle _____

9. Define

(a) monocotyledon (monocot). _____

(b) dicotyledon (dicot). _____

