THE SOLANACEAE
LESSON ONE
FRUIT

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In this lesson we will begin to learn about the Solanaceae. We will spend most of our effort over the next year on the potato. However, the family is so interesting and important, we need to spend some time on other members of the family. Parts of the lesson are underlined. Younger members can ignore these parts. **Make sure you do everything that is in bold print,** answer all the questions and do one of the projects at the end of the chapter. Bring the project to the next meeting. WORDS PRINTED IN ALL CAPITAL LETTERS may be new vocabulary words. For help, see the glossary at the end of the lesson.

INTRODUCTION

The Solanaceae family is a large plant family. There are about 90 GENERA with 3000 SPECIES. There are 8 groups (GENERA) that we will work with over the next year. These are:

1. *Solanum* - potato, eggplant, climbing nightshade, and horse nettle
2. *Lycopersicon* - tomato
3. *Capsicum* - pepper
4. *Petunia* - petunia
5. *Nicotiana* - flowering tobacco and tobacco
6. *Brugmansia* - Angel's Trumpet
7. *Datura* - Jimsonweed
8. *Physalis* – Chinese Lantern and tomatillo

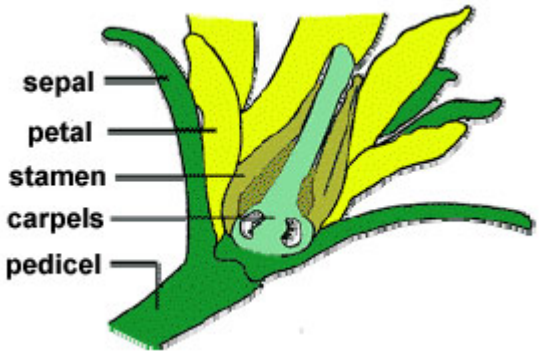
The Solanaceae are fascinating, including one of our most important food crops, the potato. But, the family also includes some very poisonous plants. Even parts of the potato can be poisonous.

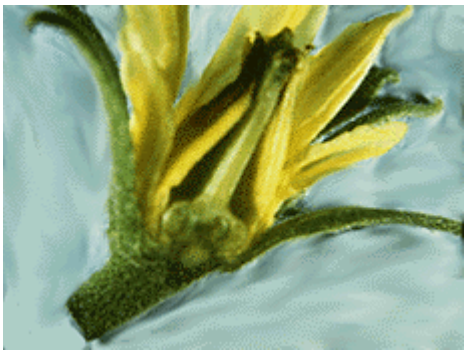
Flower to Fruit

What do plant scientists mean when they talk about FRUITS? A FRUIT is the part of a plant that contain SEEDS. When OVARIES of flowers mature (develop), they become FRUITS. Some FRUITS still have other parts of the FLOWER that are visible. On some fruit you can still see the SEPALS (all of them together are the CALYX) from the FLOWER. On the fruit this is also called the CALYX. The stem of the FRUIT is called the PEDICEL. This PEDICEL

was the stem of the flower**.** Compare the tomato flower and fruit in the diagrams and photo below.

Review the parts of the flower in the diagram below. In the photo of a tomato flower, label the SEPALS, OVARY and the PEDICEL.

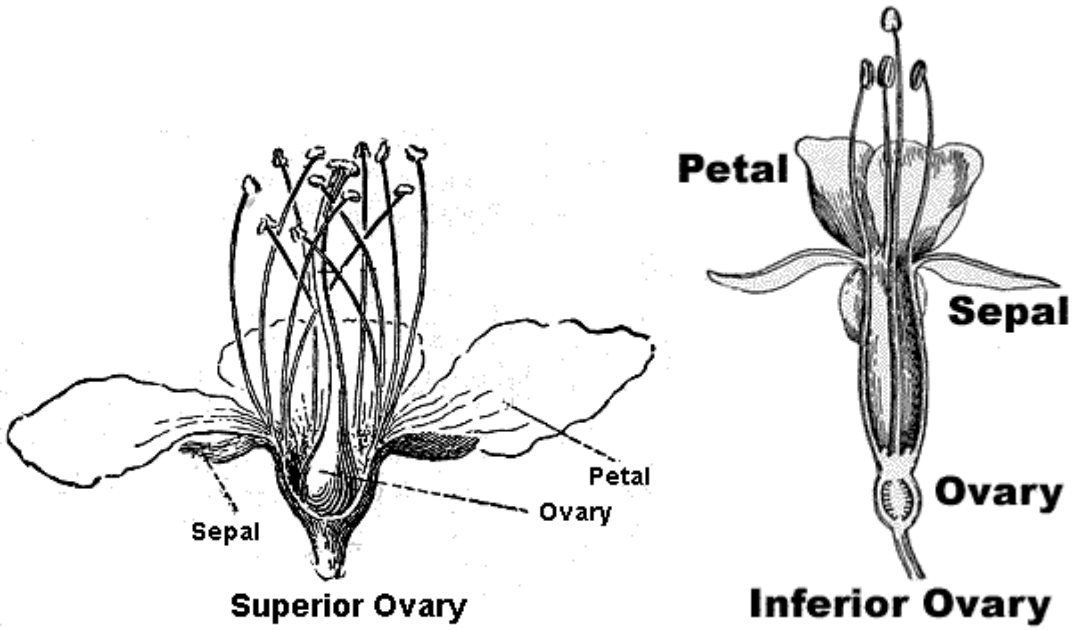




Please note: the word carpel is used in the diagram above. For the purposes of this lesson, we will use the word OVARY. The OVARY is the bottom part of the carpel or bottom parts of more than one carpel which are fused.

Below is a photo of a tomato. **Circle the CALYX and the PEDICEL in the photo below.**

Some flowers have a SUPERIOR OVARY. The OVARY is above the junction point of the petals. Below you can see the difference between SUPERIOR and INFERIOR OVARIES.



L. H. Bailey *Botany An Elementary Text for Schools* 1917

Look at the diagram and photo of the tomato flower on the previous page. Is the OVARY of the tomato flower inferior or superior?

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Fruits

FRUITS are divided into dry and fleshy FRUITS. Some of our favorite things to eat are fleshy FRUITS, for example strawberries and cherries. Fleshy FRUITS are usually juicy and brightly colored, so animals will notice them.

Why is it important for animals to notice a fleshy fruit?

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Some of the most important crops have dry fruits, for example corn and wheat.

[What type of FRUIT do sunflowers produce? Is it a fleshy FRUIT?]

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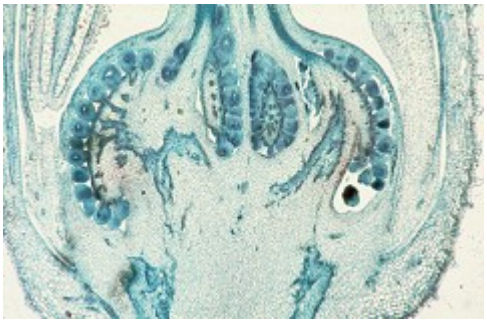
One type of fleshy FRUIT is called a BERRY. BERRIES are very fleshy with seeds spread throughout the flesh. Some types of BERRIES you might enjoy are grapes and bananas. Most of the members of the Solanaceae produce a BERRY.

[What type of fruit is produced by cucumbers, squash, and melons? _____]

[Review different fruit types at http://www.geauga4h.org/plants]



http://www.uri.edu/artsci/bio/plant_anatomy/

The MICROGRAPH (photo through a microscope) on the left shows the details of the inside of a tomato OVARY. Can you see the future SEEDS? **Circle the future SEEDS.** Compare the MICROGRAPH of the OVARY with the mature FRUIT on the right. Can you see how the OVARY becomes the FRUIT?

Fruits have several different parts. The fleshy part of a berry is called the PERICARP. The outer layer of the PERICARP is called the EPIDERMIS or the EXOCARP. The PERICARP forms from the wall of the OVARY of the flower.

On the next page, you see a tomato cut in half. The outer part of the FRUIT is called the EXOCARP or EPIDERMIS. The EXOCARP, the skin, is very thin. The sweet juicy middle is called the MESOCARP. **Can you see the SEEDS?**

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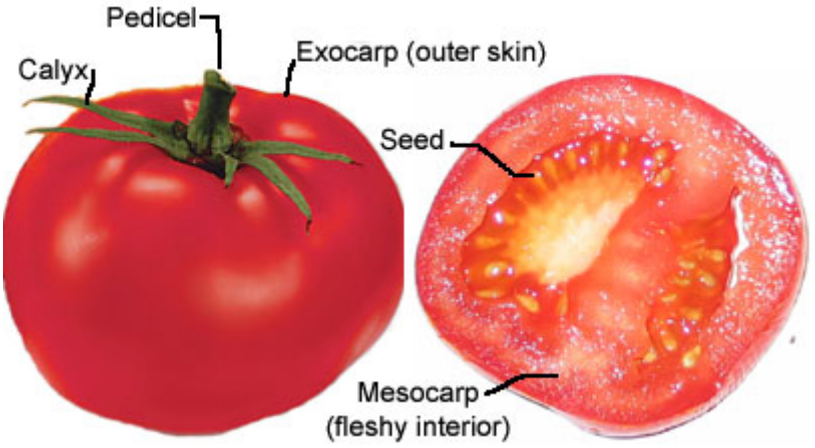
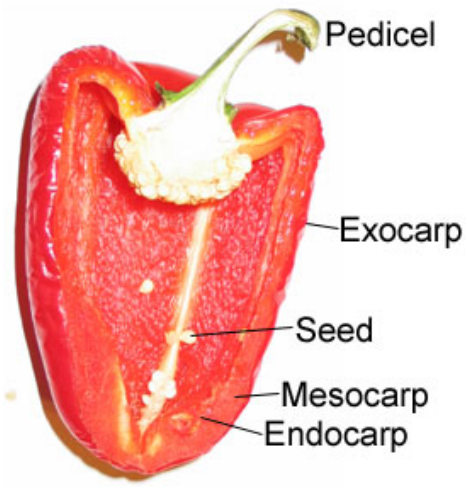


Photo on left © Park Seeds. Used with permission. Photo on right © Jeffrey La Favre

Sometimes it is easy to see three different parts of the PERICARP. The EXOCARP or EPIDERMIS, noted above is the outer layer of the PERICARP. The MESOCARP is the middle area and the inner edge is called the ENDOCARP.

Below you see a pepper cut in half. The PEDICEL and SEEDS are labeled. The EXOCARP, MESOCARP and ENDOCARP are also labeled.



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LABORATORY FOR LESSON ONE

1. Take a tomato and cut it in half. Make a drawing showing the EXOCARP (EPIDERMIS), CALYX and PEDICEL (if present), the PERICARP, and the SEEDS. Also label the MESOCARP and THE ENDOCARP if you can.

2. Take one of the peppers and cut it in half. Make a drawing showing the EXOCARP (EPIDERMIS), CALYX and PEDICEL (if present), the PERICARP, and the SEEDS. Also label the MESOCARP and THE ENDOCARP if you can.

3. Look at the inside of an eggplant BERRY. On the photo below label the seeds and the EXOCARP.

4. Look at the inside of the BERRIES from the tomato, pepper, and eggplant and compare them. What is the main difference you see?

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5. <u>Carefully find the FRUITS on the petunia stems. Very carefully open the FRUITS and look at them with a magnifying glass. Also look at the BERRIES using the microscope. HOW is the petunia BERRY similar to the other BERRIES we have looked at?</u>

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6. **Below you see the fruits of the Chinese Lantern. The picture on the left shows a plant covered with orange 'lanterns'. The FRUIT is inside a papery covering. The FRUIT is a round BERRY. The "lantern" is a part of the flower. Can you guess what part of the flower grew into the "lantern"?**

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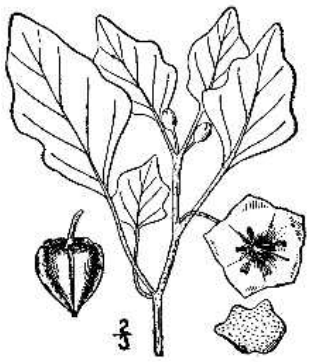

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7. When we eat a potato are we eating the fruit of a potato? _____

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Here you can see the fruits of the potato plant. They are about 1 inch in diameter. They are filled with seeds and are fleshy inside. Would you consider it a BERRY? Is it similar to a tomato?

PROJECTS FOR LESSON ONE

Do one of the projects listed below.

1. Find a recipe which uses potato, tomato, pepper or eggplant. Do something ADVENTUROUS. Prepare the recipe and serve it to your family. Make a recipe card, including the opinions of your family. Put the card in this notebook.

2. Appendix A has a key with descriptions and examples of many different types of fruits. Make a poster of these different types of fruits. Use pictures from magazines or draw your own. Make sure you use the scientific name for the fruit type.

APPENDIX

Appendix A is at http://waynesword.palomar.edu/fruitid1.htm

GLOSSARY FOR LESSON ONE

berry - a type of fleshy fruit with seeds throughout the flesh
calyx - a word for all the sepals
epidermis - outer layer(s) of an organ
endocarp – the inner layer of the pericarp
exocarp – the outer layer of the pericarp
flower - the reproductive unit of some plants (angiosperms). Parts of the flower include petals, sepals, ovary (the female reproductive organ), and stamens (the male reproductive organs).
fruit – the plant structure (organ) that develops from the ovary, usually after fertilization by pollen; mature ovary of a seed plant which contains the seed(s)
genus (pl. genera) – a group of plants (or other living things) between a family and a species. A genus has one or more species which have certain characteristics in common. The italicized names are the scientific names of plants. Plants can have many common names, but they each have only one scientific name. The genus (first part of the scientific name) is always capitalized and the species (second part of the scientific name) is not capitalized unless the plant is named after a person.
inferior ovary - ovary which is below the petals and sepals
mesocarp – the middle part of the pericarp
micrograph – photo taken through a microscope
ovary – part of the pistil, female part of the flower
pedicel - stem like structure which attaches the flower and fruit to the stem

pericarp –the fruit wall, developed from the ovary wall
petal – a leaf-like part of a flower, commonly brightly colored
seed – plant part containing the plant embryo
sepal – a leaf-like part of a flower, usually green, attached just below the petals
species – a group of similar organisms which breed only among themselves, see genus above.
superior ovary - ovary which is above the petals and sepals