

W 1073-B

PLANTS

SCIENCE



PERSONAL GROWTH

TENNESSEE 4-H ROOT CURRICULUM
4-H MEMBER GUIDE

INSPIRING SCIENTIFIC EXPLORATION AND PERSONAL GROWTH THROUGH PROPAGATION.

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Tennessee 4-H Root Journal

Written by: Anna Duncan
Extension Agent, Coffee County

On these pages, reflect on your project and answer a question every week. You may also draw in the spaces provided to include sketches of your plants or to illustrate your experiences.

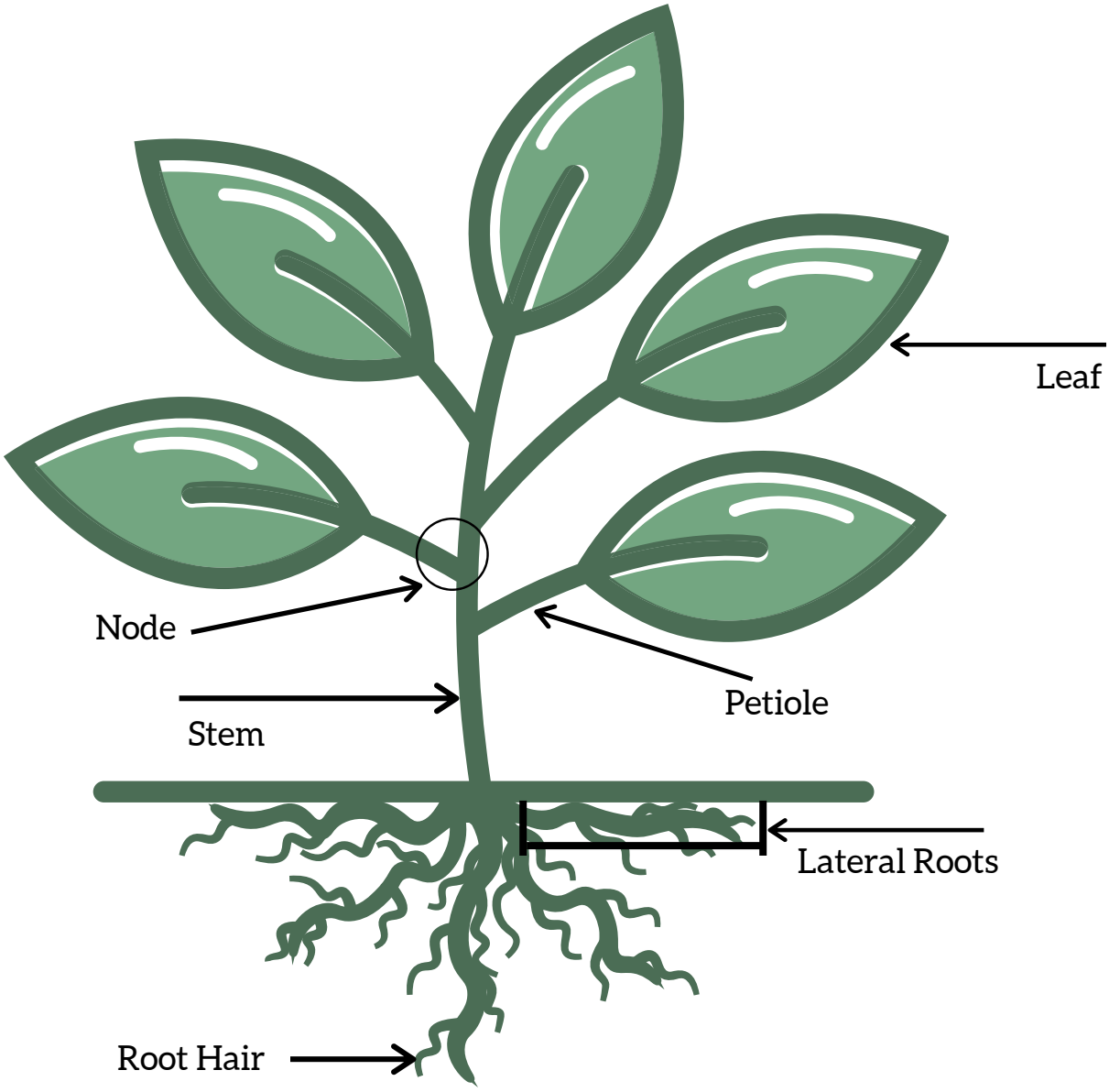
Record sheets have also been provided for you to record your plants' progress throughout the year.

Please hang on to these sheets and keep them in a folder for future reference.

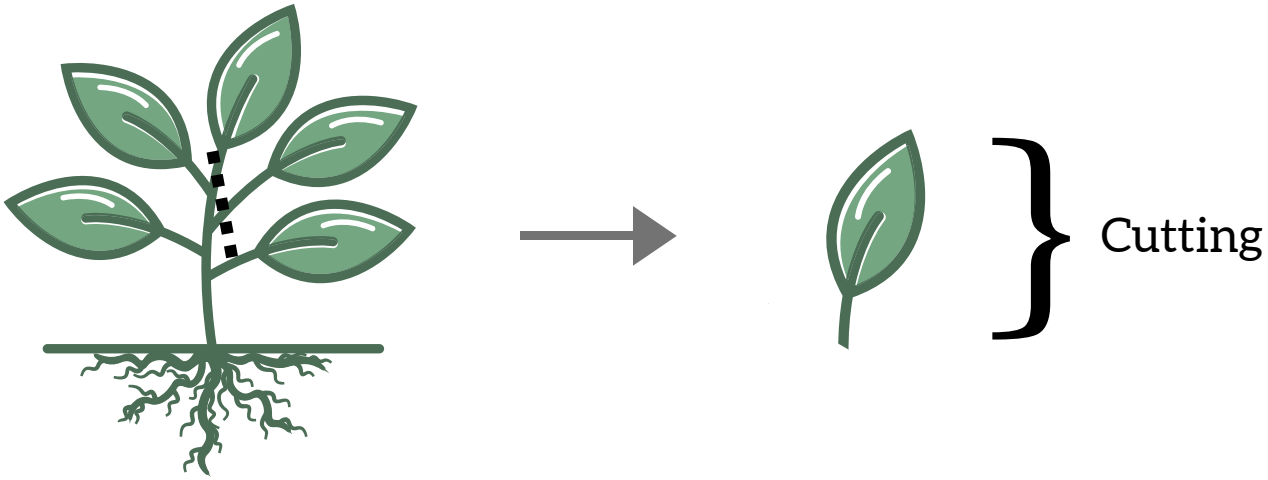
4-H ROOT Vocabulary

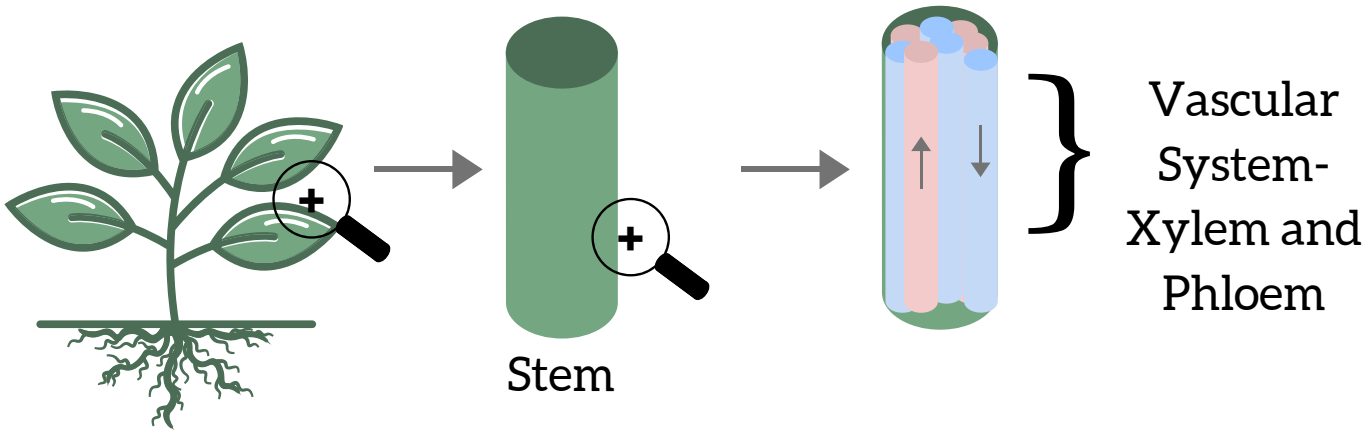
- Aerial Root- roots that develop above ground often on stems or plantlets.
- Flower- the reproductive and often colorful portion of the plant.
- Lateral Root- the smaller roots that branch out to the sides and help to stabilize the plant while absorbing water and nutrients.
- Leaf- the vegetative portion of the plant that conducts photosynthesis.
- Node- the point at which the leaf or branch joins the stem.
- Petiole- the stem of the leaf that connects it to the plant.
- Phloem- the vascular structures that transport sugars made by photosynthesis from the leaves to the rest of the plant.
- Plantlet- the offspring of a plant that may be planted through propagation.
- Propagate/ Propagation- utilizing a piece of a larger parent plant to create a new plant.
- Root Bound- when a plant's roots become constricted by the plant's container.
- Root Hair- extensions of the lateral roots that absorb water and nutrients from the soil.
- Runner- vegetative structures formed by plants that may become new stems or form plantlets for propagation.
- Soil- the living, evolving ecosystem of organic matter, microscopic organisms, minerals, water, plants, animals, and more that supports all life.
- Stem- the vegetative structure of a plant that provides structure and support.
- Tap Root- a straight root that anchors a plant.
- Vascular System- the system of xylem and phloem that allows water and nutrients to be moved throughout the plant.
- Variegated- Having lighter and darker portions of leaves not caused by stress or disease.
- Xylem- the vascular structures that transport water and nutrients absorbed through the roots to the rest of the plant.

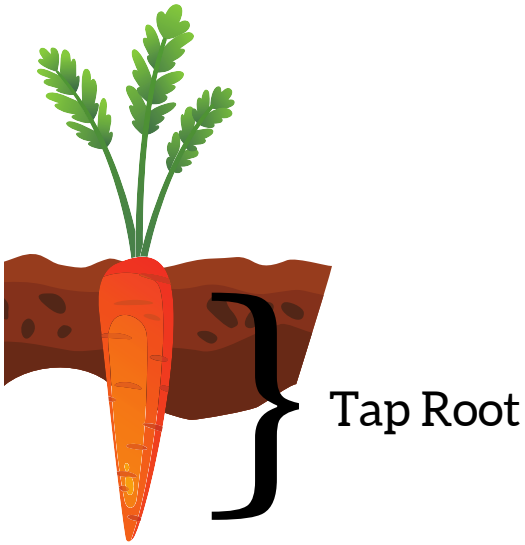
Basic Plant Parts



Basic Plant Parts







How to Propagate Basil



Using sharp scissors or pruners, cut a 3-4 inch section off at a node.



Place your cutting in a glass of water for 2-3 weeks or until roots appear. Keep the glass in bright, indirect sunlight. Change the water every 3-4 days.



Once the roots are about 1 inch long, prepare a pot with drainage holes and potting mix. Dig a hole deep enough to contain all of the roots . Place the cutting in the hole and pack the soil around it until it is secure and stands upright.

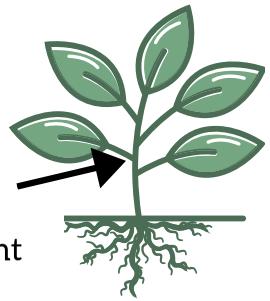


Water the basil lightly at planting. Then, check the soil moisture every few days by inserting your finger into the first inch of soil. If the soil is dry, water the plant. If not, leave it be.

Keep your basil in bright, indirect sunlight as direct, hot sunlight can scorch the delicate leaves of the plant.

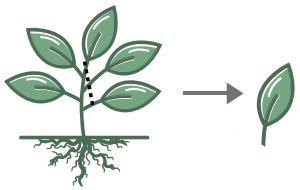
Pinch off flowers and buds as they appear, and harvest the leaves for cooking as needed!

Terms to Know



Node

The point where a leaf or branch joins a stem forming a V shape.



Cutting

After a piece of the stem has been removed to be used to start a new plant, it is called a cutting.

Basil Walnut Pesto

From Clemson University

Pesto Ingredients:
2 peeled, medium-sized garlic cloves
½ cup walnut pieces
1 cup Parmesan cheese
4 cups packed basil leaves
⅓ cup extra-virgin olive oil

In a food processor, briefly mince two garlic cloves. Add ½ cup walnuts and process until thoroughly ground. Add 1 cup Parmesan cheese and briefly mix with garlic and walnuts. Add 2 cups basil leaves and half of the ⅓ cup olive oil. Pulse the food processor until leaves are ground. Add the remaining 2 cups of basil leaves and remaining olive oil. Again, pulse leaves until ground. Cook ½ pound pasta and drain well. Return the drained pasta to the cooking pot. Add half of pesto, and mix thoroughly with the pasta. Pesto tends to adhere best to either angel hair or rotini pasta. Serve hot.

Scrape the remaining half of pesto from the food processor into a quart-size freezer bag, label and date, and immediately freeze. Pesto freezes well without loss of flavor or color. To use frozen pesto, thaw in refrigerator or defrost in microwave. Don't allow pesto to overheat in microwave, as it should not cook. Once pesto is warm, spoon onto hot pasta, mix thoroughly and serve.

Williamson, J. (2019, May 1). Basil. Retrieved February 27, 2020, from https://hgic.clemson.edu/factsheet/basil/

How to Propagate and Care for Basil

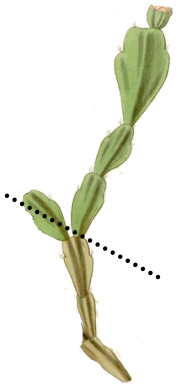
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How to Propagate Holiday Cacti



Find planter or pot with drainage holes. Fill the pot about 3/4 full with a soil mix for cacti and succulents.



Carefully break off a stem that has at least 3 segments when it is not budding or blooming. Be sure to break the stem at the joint. You can let the stem dry out for an hour or two or plant immediately.

Push the root end of the stem into the soil until it is 1-2 inches deep or until the stem is stable.

Place your cactus in a spot that receives bright light but no direct sunlight. Maintain warm temperatures, and avoid letting the temperature fall below 50 degrees Fahrenheit.



Water the plant thoroughly, allowing the excess water to run out through the drainage hole. Allow the soil to dry almost completely before watering again. Never let the soil sit wet. You will know if the soil is too dry if the leaves start to pucker and shrivel. The soil should be kept lightly moist during the growing season.

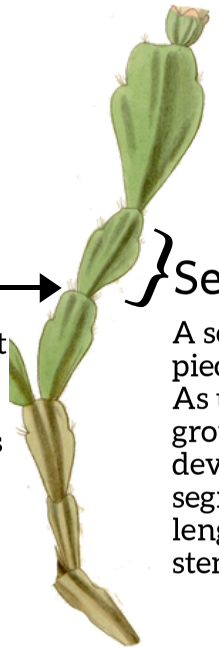


The cutting should start putting on new growth in 2-3 weeks. This comes in the form of a tiny segment forming on top of the previous segment, or maybe at the joint between two segments indicating that your cutting is making a side shoot.

Tip: Plants like to focus on roots first and leaves after. So, there might be a lot going on under the soil that you can't see. Be patient.

Good news: Holiday Cacti are NOT toxic to cats or dogs.
-University of New Hampshire Extension

∞ Terms to Know

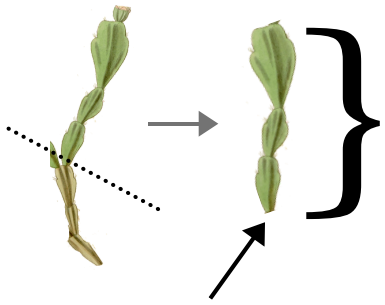


Joint

The point where two segments meet.

Segment

A section or piece of a stem. As the cactus grows, it develops more segments to lengthen its stems.



Cutting

After a piece of the stem has been removed to be used to start a new plant, it is called a cutting.

Root End

The end of a cutting that now has an open wound from being removed from the parent plant will be the end that grows roots. Place this end in the soil.

Getting Your Christmas Cactus to Bloom

Tip: The cactus will probably not bloom the year it is planted as it will need to grow first.

- In mid-October, reduce watering. Only water when the soil feels dry about an inch below the surface. Do not fertilize.
- Keep your Christmas cactus cool. Ideally, you want it at 50 to 55 degrees F.
- Begin to limit the amount of light the plant receives. The plant can remain in indirect light during the day, but it will need at least 12 to 14 hours of total darkness at night for the flower buds to develop. (If the room is warmer than the ideal 50 to 55 F, give your plant an extra couple of hours of darkness each day.) The easiest way to do this is to place the cactus in a room or closet with a door that does not get opened at night. In about 6 to 8 weeks, you should see flower buds developing on the stems.
- Once you see flower buds, move your cactus out of the darkness and near a bright window. Make sure it is not near any drafts, or the cold will cause it to drop its buds.
- The flowers should start opening within a couple of weeks. Each flower will remain open for at least 6 days, probably more, and the plant should continue to bloom for 4 to 6 weeks.

Tip: Holiday Cacti can bloom throughout the year.

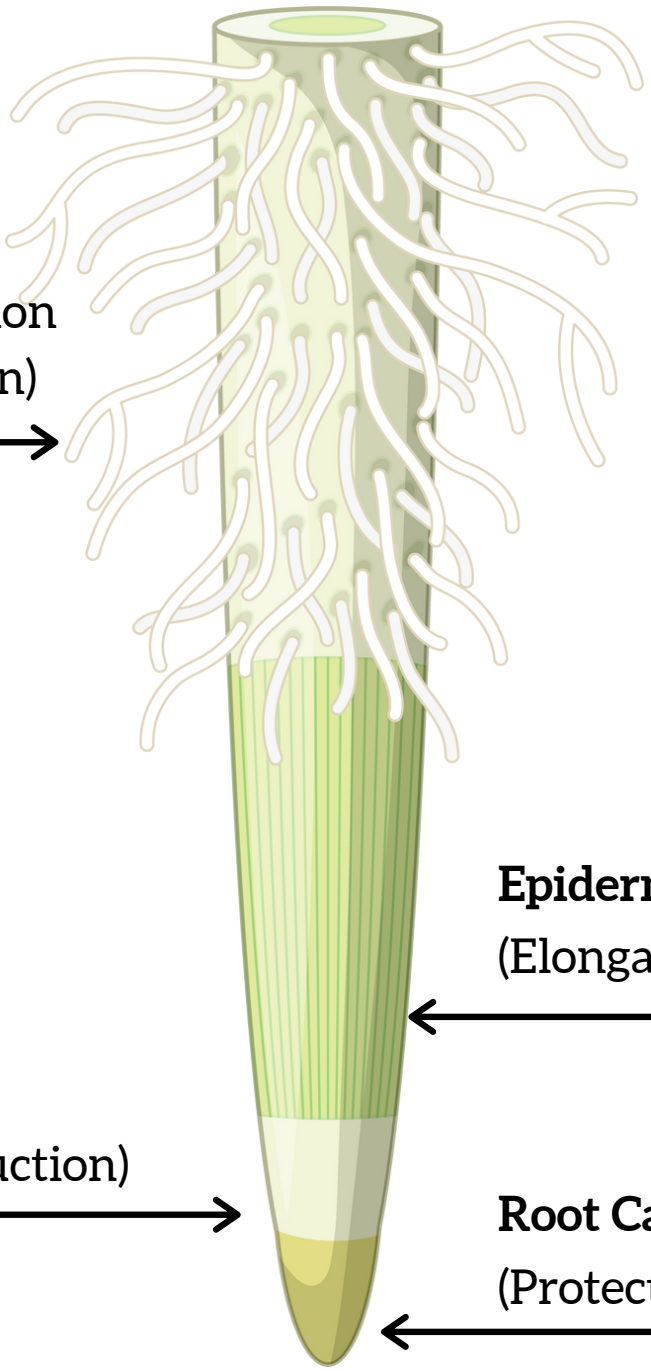
How to Propagate and Care for Holiday Cacti

Annette Graham
Tennessee Extension Master Gardener
Crimson Clover
Master Gardener Association

Anna Duncan
Extension Agent
Coffee County

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Root Parts and Functions



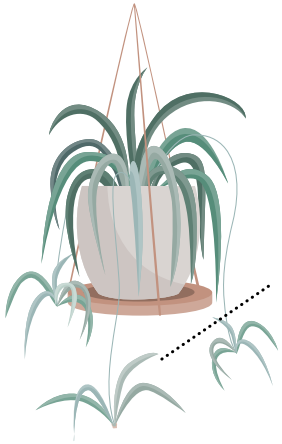
Root Hairs
(Differentiation or Maturation)

Epidermis
(Elongation)

Meristem
(Cell Production)

Root Cap
(Protection)

How to Propagate Spider Plants



When aerial roots form on the plantlets, use clean scissors or pruners to remove the plantlet from the runner.



If the aerial roots are very small, you can place them in a glass of water for a couple weeks. Be sure to keep the leaves out of the water. When the roots have grown a few inches, you can pot the plantlet.

If the aerial roots were already a couple inches long, or if they have now grown in water, prepare a clear plastic cup with drainage holes in the bottom and fill it with potting soil.



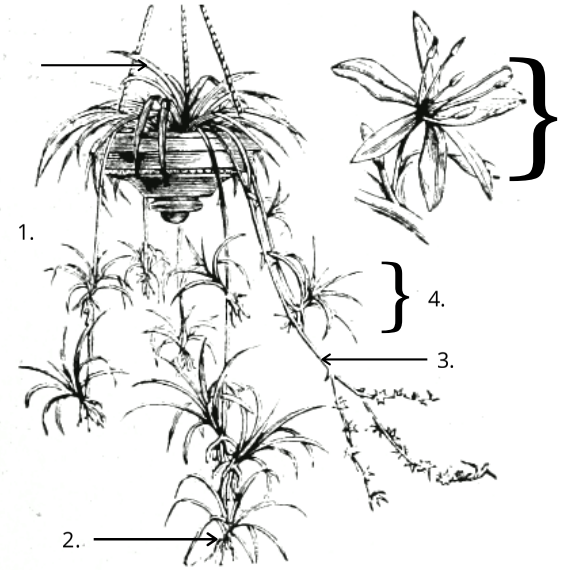
Dig a hole large enough for the roots to spread out in, and place the plantlet's roots in the hole. Pack the soil around the plantlet, and place the clear cup in a solid colored cup.

Keep your new spider plant in bright, indirect sunlight as direct, hot sunlight can scorch the delicate leaves of the plant.

Water when the top inch of soil begins to feel dry.

Using the clear cup, check for root development periodically. When your plantlet becomes root bound, it will form a runner of its own.

Terms to Know



1. Leaf
2. Aerial Root
3. Runner
4. Plantlet
5. Flower

Variegated- Having lighter and darker portions of leaves not caused by stress or disease.

Root Bound- when a plant's roots become constricted by the plant's container.

Spider Plant Tips

Fertilizing

Fertilize your spider plant once a month during the growing months (spring through mid-fall) to encourage root and vegetative growth.

Browning/ Brown Tips

Browning of the leaves may be caused by a lack of nutrients or water. Assess your fertilizer and watering schedule and make adjustments as needed.

Winter Care

It is best to keep spider plants indoors during the harsh winter months. Also, reduce watering and stop fertilizing during the winter to help the spider plant enjoy its dormant period.

Dammer, U. (2007, October 3). Chlorophytum comosum [Figure from book]. Retrieved May 28, 2019, from https://commons.wikimedia.org/wiki/File:Chlorophytum_comosum.png

Knight, T. (n.d.). Chlorophytum (Spider Plant). Retrieved February 27, 2020, from https://www.ourhouseplants.com/plants/spiderplant

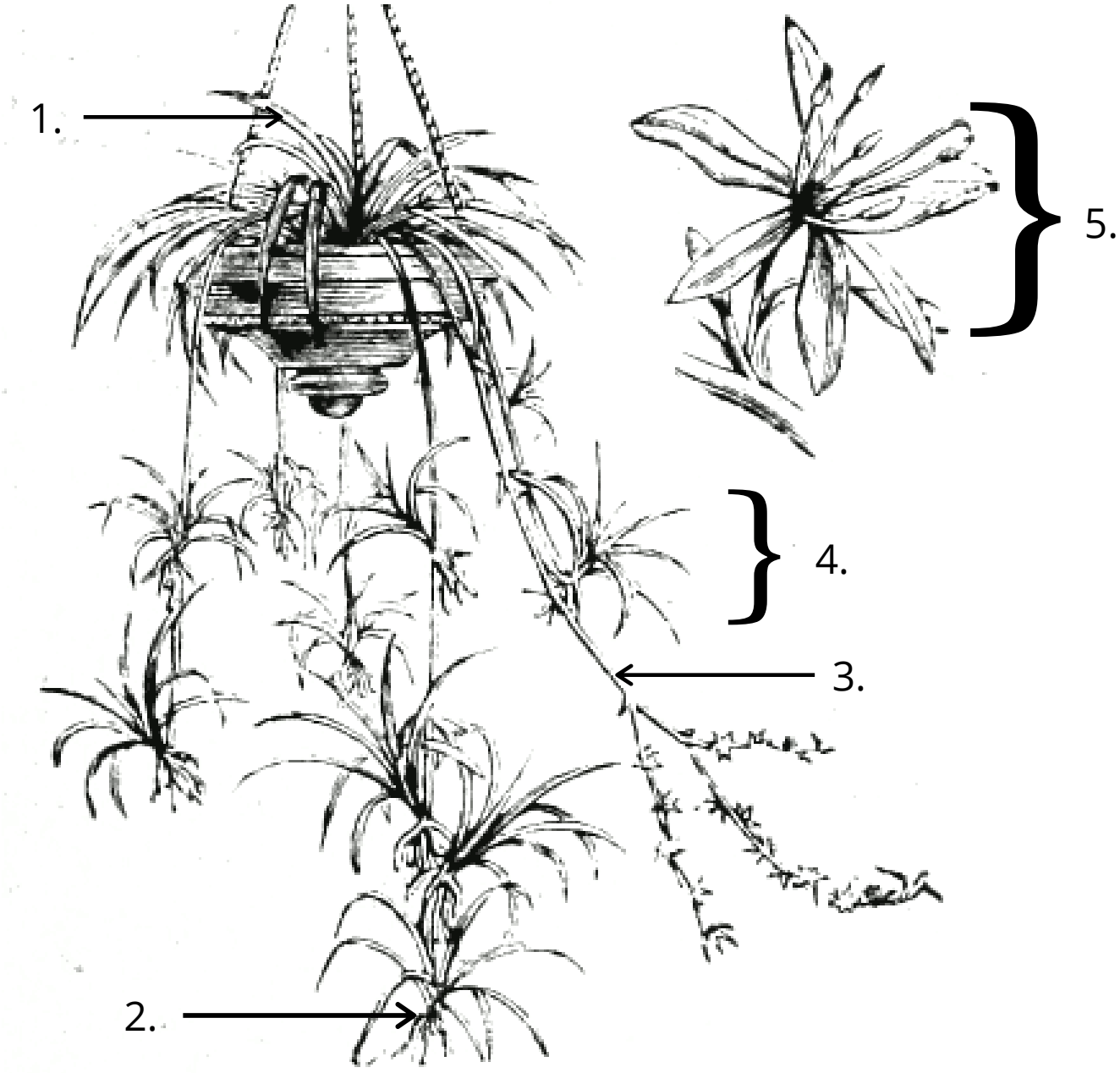
How to Propagate and Care for Spider Plants

Chlorophytum Comosum

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Spider Plant Parts



1. Leaf
2. Aerial Root
3. Runner
4. Plantlet
5. Flower

Dammer, U. (2007, October 3). Chlorophytum comosum [Figure from book]. Retrieved May 28, 2019, from https://commons.wikimedia.org/wiki/File:Chlorophytum_comosum.png

4-H Root Record Sheets

Week of	Plant ID	Water	Sunlight	Growth	Other Changes	Notes

4-H Root Record Sheets

Week of	Plant ID	Water	Sunlight	Growth	Other Changes	Notes

4-H Root Record Sheets

Week of	Plant ID	Water	Sunlight	Growth	Other Changes	Notes

Date:
What herbs have you eaten before?

Date:
What are you most excited about concerning the 4-H ROOT Program?

Date:
What is your secret to getting your roots to grow?

Date:
What does propagation mean in your own words?

Date:
Why is communication important?

Date:
What is your favorite part about the 4-H ROOT Program so far?

Date:
How are your plants doing?

Date:
What is your favorite plant?

Date:
What is the hardest part about propagating a plant?

Date:
If someone asked you how to propagate something, what would you say?

Date:
What else would you like to learn about propagation?

Date:
What other plants would you like to try and propagate?

Date:
What do you not like about this program?

Date:
If someone asked you to describe the 4-H ROOT Program, what would you say?

Date:
What is your favorite fun quote about gardening? (You can create your own if you would like to.)

Date:
What have you learned so far in this program?

Date:
What are you most proud of from your time in the 4-H ROOT Program?

Date:
How can you expand or grow you current project or garden?



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