



Name _____ Station# _____

Homeroom Teacher _____

Discovery Lab
Science Notebook

WHAT ARE RAINFORESTS?

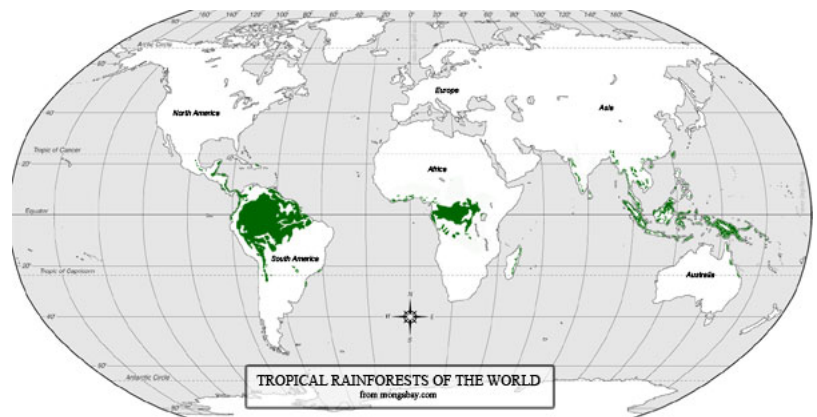
Tropical rainforests are forests with tall trees, warm climate, and lots of rain. In some rainforests it rains more than one inch every day!

Rainforests are found in Africa, Asia, Australia, and Central and South America. The largest rainforest in the world is the Amazon rainforest.

WHERE ARE RAINFORESTS LOCATED?

Rainforests are found in the tropics, the region between the Tropic of Capricorn and Tropic of Cancer. In this region the sun is very strong and shines about the same amount of time every day all year long making the climate warm and stable.

1. Brazil
2. Congo (Democratic Republic)
3. Peru
4. Indonesia
5. Colombia
6. Papua New Guinea
7. Venezuela
8. Bolivia
9. Mexico
10. Suriname



WHAT MAKES A RAINFOREST?

Each rainforest is unique but there are certain features common to all tropical rainforests.

- Location: rainforests lie in the “tropics”
- Rainfall: rainforests receive at least 80 inches of rain per year
- Canopy: rainforests have a canopy which is the layer of branches and leaves formed by closely spaced rainforest trees. Most of the plants and animals in the rainforest live in the canopy. The canopy may be 100 feet above the ground.
- Biodiversity: rainforests have a high level of biological diversity or biodiversity. Biodiversity is the name for all living things—like plants, animals, and fungi—found in an ecosystem. Scientists believe that about half of the plants and animals found on earth’s land surface live in rainforests.
- Symbiotic relationships between species: species in the rainforest often work together. A symbiotic relationship is a relationship where two different species benefit by helping each other. For example, some plants produce small housing structures and sugar for ants. In return the ants protect the plants from other insects that may want to feed on the plant’s leaves.

WHAT IS THE CANOPY?

In the rainforest most plant and animal life is not found on the forest floor but in the leafy world known as the canopy. The canopy, which may be over 100 feet above the ground, is made up of the overlapping branches and leaves of rainforest trees. Scientists estimate that 70-90 percent of life in the rainforest is found in the trees, making this the richest habitat for plant and animal life. Many well-known animals including monkeys, frogs, lizards, birds, snakes, sloths, and small cats are found in the canopy.

The environment of the canopy is very different from the environment of the forest floor. During the day, the canopy is drier and hotter than other parts of the forest, and the plants and animals that live there are specially adapted for life in the trees.

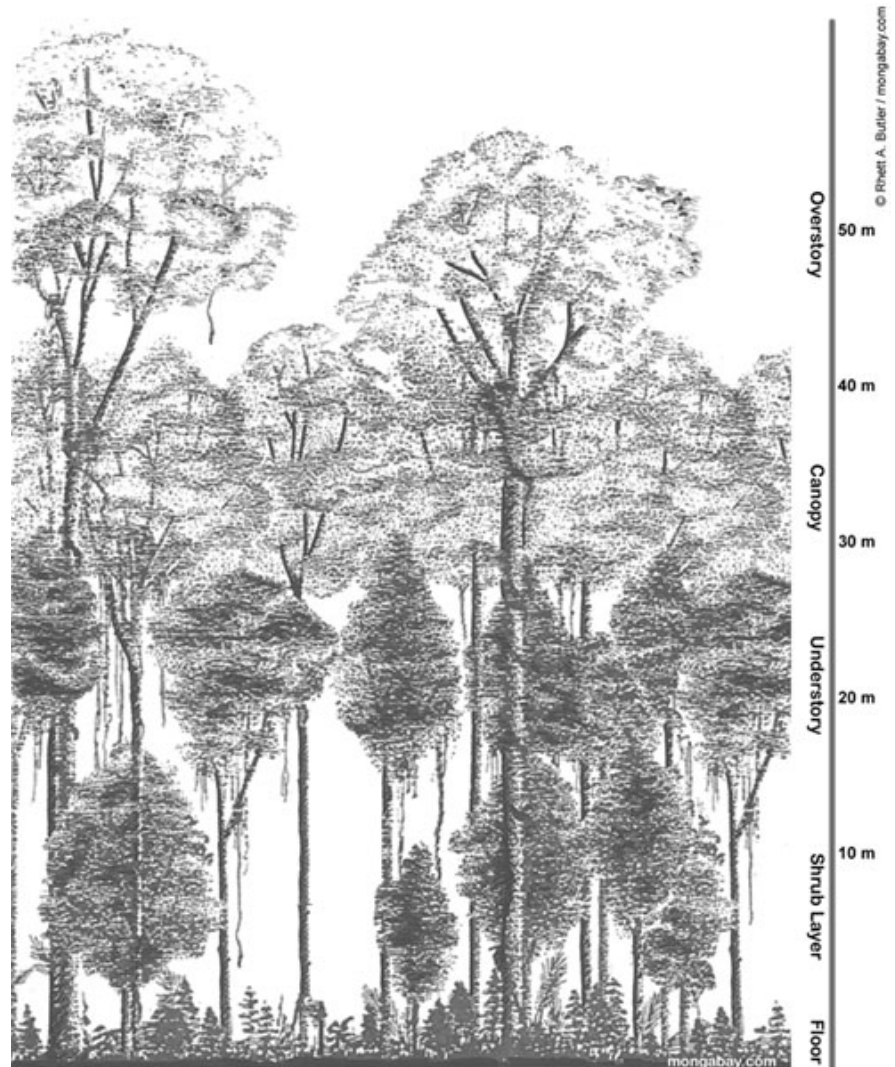
For example, because the amount of leaves in the canopy can make it difficult to see more than a few feet, many canopy animals rely on loud calls or lyrical songs for communication. Gaps between trees mean that some canopy animals fly, glide, or jump to move about in the treetops.

Scientists have long been interested in studying the canopy, but because of the height of rainforest trees research has been difficult until recently. Today there are special facilities with rope bridges, ladders, and towers to help scientists discover the secrets of the canopy.

The canopy is just one of several vertical layers in the rainforest. Take a look at the diagram on the left to see the other layers (the overstory, understory, shrub layer, and forest floor).

THE RAINFOREST FLOOR

The leaves of the canopy often make the ground layer of the rainforest a dark and humid place. However, despite its constant shade, the rainforest floor is an important part of the forest ecosystem.



The forest floor is where decomposition takes place. Decomposition is the process by which decomposers like fungi and microorganisms break down dead plants and animals and recycle essential materials and nutrients.

Many of the largest rainforest animals are found on the forest floor. Some of these include elephants, tapirs, and jaguars.

WHY DO RAINFORESTS HAVE SO MANY KINDS OF PLANTS AND ANIMALS?

Tropical rainforests support the greatest diversity of living organisms on Earth. Although they cover less than 2 percent of Earth's surface, rainforests house more than 50 percent of its plants and animals. Here are some examples of the richness of rainforests:

- rainforests have 170,000 of the world's 250,000 known plant species
- the United States has 81 species of frogs, while Madagascar which is smaller than Texas, may have 300 species.
- Europe has 321 butterfly species, while a park in the rainforest of Peru (Manu National Park) has 1300 species.

Rainforests have an abundance of plants and animals for the following reasons:

- **Climate:** because rainforests are located in tropical regions, they receive a lot of sunlight. This sunlight is converted to energy by plants through the process of photosynthesis. Since there is a lot of sunlight, that means there is a lot of energy in the rainforest. This energy is stored in plant vegetation which is eaten by animals. Because there is a lot of food there are many species of plants and animals.
- **Canopy:** the canopy structure of the rainforest means there are more places for plants to grow and animals to live. The canopy offers new sources of food, shelter, and hiding places, and provides another world for interaction between different species. For example there are plants in the canopy called bromeliads that store water in their leaves. Animals like frogs use these pockets of water for hunting and laying their eggs.

Poison Dart Frog Facts

Fast Facts:

Type: Amphibian

Diet: Carnivore

Average lifespan in the wild: 3 to 15 yrs

Size: 1 in (2.5 cm)

Did you know? The only natural predator of most of the poison dart frog family is a snake called *Leimadophis epinephelus*, which has developed a resistance to the frogs' poison.



Poison dart frogs, members of the *Dendrobatidae* family, wear some of the most brilliant and beautiful colors on Earth. Depending on individual habitats, which extend from the tropical forests of Costa Rica to Brazil, their coloring can be yellow, gold, copper, red, green, blue, or black. Their elaborate designs and hues are deliberately ostentatious to ward off potential predators, a tactic called aposematic coloration.

Some species display unusual parenting habits, including carrying both eggs and tadpoles on their backs. Although this "backpacking" is not unique among amphibians, male poison arrow frogs are exceptional in their care, attending to the clutch, sometimes exclusively, and performing vital transportation duties.

Dendrobatids include some of the most toxic animals on Earth. The two-inch-long (five-centimeter-long) golden poison dart frog has enough venom to kill 10 grown men. Indigenous Ember people of Colombia have used its powerful venom for centuries to tip their blowgun darts when hunting, hence the genus' common name.

Scientists are unsure of the source of poison dart frogs' toxicity, but it is possible they assimilate plant poisons which are carried by their prey, including ants, termites and beetles. Poison dart frogs raised in captivity and isolated from insects in their native habitat never develop venom.

The medical research community has been exploring possible medicinal uses for some poison dart frog venom. They have already developed a synthetic version of one compound that shows promise as a painkiller.





MAKE A FROG SANDWICH

Student Instructions

To make your Frog Sandwich, you will need to label and color the organs, bones and major systems of a frog. You will then need to cut parts out and glue them together. All the information you need is in this packet and in the other resource materials provided.

Although you must do – and be responsible for – your own work, feel free to consult, challenge and question other students. Good scientists collaborate and so should you!

Let's get started.

Frog Body / Dorsal View:

The frog body consists of a *head*, *trunk*, *forelimbs* and *hind limbs*. The dorsal view shows what a frog looks like laying on its stomach. Label and color these parts of a frog's body:

1. eye
2. nictitating membrane
3. nostril
4. tympanic membrane
5. head
6. trunk
7. forelimb
8. hind limb

Skeleton:

Frog skeletons consist of *bones*, *cartilage* and *connective tissue* all of which function like our skeletons to protect internal organs, support our bodies and allow to move. Find the skeleton, and label and color these parts of the skeleton:

1. upper jaw
2. braincase
3. phalanges (forelimbs)
4. metatarsal bones (forelimbs)
5. humerus (forelimbs)
6. radioulna (forelimbs)
7. phalanges (hind limbs)
8. metatarsal bones (hind limbs)
9. tarsal bones (hind limbs)
10. tibiofibula (hind limbs)
11. atlas, dorsal and sacral vertebrae and urostyle, found in the trunk

Nervous System:

The nervous system has two major functions – to inform frogs about their internal and external environments (also known as stimuli) and to help frogs respond to those stimuli (also known as motor response). Label and color these parts of the nervous system:

1. olfactory lobe
2. cerebrum
3. optic lobe
4. cerebellum
5. medulla oblongata
6. olfactory, optic, facial and auditory nerves, also known as *cranial nerves*
7. hypoglossal, brachial plexus and sciatic nerves, also known as *spinal nerves*

Circulatory System:

A frog's circulatory system consists of its *heart* – a muscular pump – and the *arteries*, *capillaries* and *veins* – the network of vessels through which its blood flows. Label and color these parts of the heart and circulatory system (arterial) on:

1. left atrium
2. right atrium
3. ventricle
4. carotid arch
5. pulmocutaneous arch
6. systemic arch
7. dorsal aorta
8. urogenital artery
9. common iliac artery

Digestive System:

The digestive system includes the *alimentary canal* which runs from the mouth – also called the *buccal cavity* – all the way to the *cloaca*. This system processes food and waste, and includes a variety of parts.

The *tongue* is used to catch prey. *Vomerine teeth* are used for holding prey until pressure – supplied in part by eyes turned inside out – can push food down a frog's throat. The *esophagus* conducts food through the body cavity on its way to the *stomach*, a saclike receptacle used for storing food, although some digestion does take place there.

The stomach narrows to become the *small intestine*, which digests food further, before merging with the *large intestine*, which absorbs water and packages fecal material. The large intestine opens into the *cloaca*, which empties wastes from the body. The *liver* receives nutrients from the intestines, then stores and releases them as needed. The liver also produces bile, a substance which allows fats to be digested. *Bile* is stored in the *gall bladder*. Other enzymes in the *pancreas* also assist in the chemical digestion – or breakdown – of fats, proteins and sugars. The *spleen* breaks down old red blood cells and produces new ones.

Find the digestive system. Now label and color these parts:

1. stomach
 2. small intestine
 3. large intestine
 4. liver
 5. gall bladder
 - 6 pancreas
 7. spleen
-

Name: _____ Date: _____

Owl Pellet Lab Report

My lab partner's name _____

We predict we will find these things in our owl pellet: _____

Outside of Owl Pellet

Here is a sketch of the outside of our owl pellet:




Our owl pellet feels like _____

Our owl pellet looks like _____

Inside of Owl Pellet

Here is a sketch of the inside of our owl pellet:















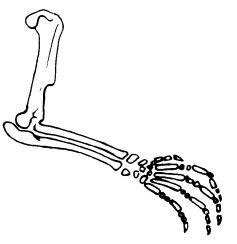
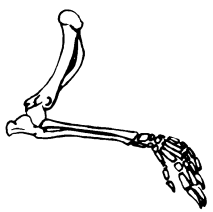
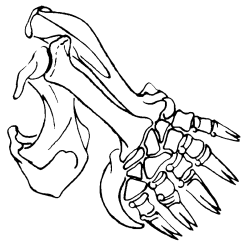
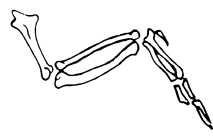
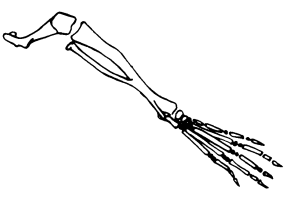
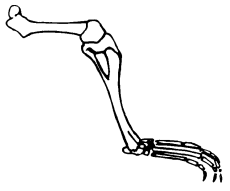
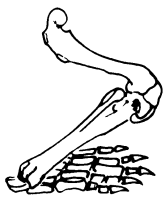
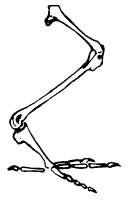







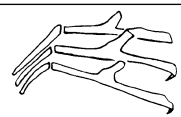


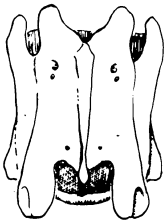
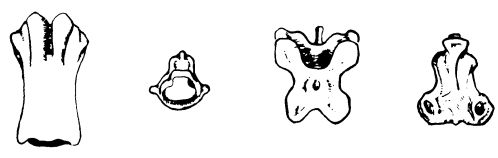
Here is what we found inside _____

Details we see are _____

Now we know that owls _____

Our predictions were _____

Owl Pellet Bone Chart

	Rodent	Shrew	Mole	Bird
Skull				
Jaw				
Scapula				
Forelimb				
Hindlimb				
Pelvic Bone				
Rib				
Vertebrae				

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AMAZON PLANTS



Introduction to Amazon plants

- 90% of photosynthesis takes place in the **canopy** (the top layer of leaves that is found high above the forest floor, ap. 100 feet)
- Most of the sunlight is absorbed by the canopy leaves, the forest floor is dark under the cover of the canopy
- Rain and wind cause high branches to break and leaves to fall to the forest floor, where they are **QUICKLY** broken down, nutrients are returned to the soil, and allow trees and other plants to grow
- Decomposition occurs rapidly in the tropics because of the warm, moist conditions, which allows decomposers (bacteria, fungi, insects) to thrive

Philodendron (ap. 3 feet or 0.914 meters wide)

- Popular houseplant, easy to grow
- One of the most effective houseplants for removing pollutants from the air. It filters formaldehyde in the home (e.g. carpets, particle boards, and silk flowers).
- Philodendrons produce aerial roots that grow from the limbs and trunk to the ground, providing additional support in the shallow soils of the rainforest, as well as drawing water and nutrients
- The name derives from the *Greek*: philo=love and dendron=tree (because they often use other trees for support to grow towards the light)
- Over 500 different species
- Should not be eaten! It's toxic.

Banana (ap. 6 feet or 1.828 meters long)

- Bananas are the most popular fruit in the world
- Comes from the Arabic word for finger (because of the shape of the fruit)
- According to the *MABB*, there are 35 species of bananas and 1000 cultivars, sub-divided into 50 groups (International network for the improvement of banana and plantain). The ones we eat are usually the sweet Cavendish bananas (some types of bananas must be cooked to be edible)
- Fibers from the plant are strong—used in tea bags, paper money
- Leaves can be used for roofing, umbrellas, cooking, and to make mats
- Nutritious- lots of potassium, needed for brain functioning

Giant Waterlily (ap. 5 feet or 1.524 meters wide)

- Two species *Victoria amazonica* and *Victoria cruziana* are known
- It has 12" flowers (the size of a football) that open at night and are pure white, a chemical reaction heats flowers to as much as 20°F above outside temperature and releases a sweet pineapple smell to attract scarab beetles covered in pollen from other flowers. The bloom closes and traps the beetle inside who pollinate this flower, collect more pollen, and then are released at dusk the next day. Once pollinated, the petals change from white to purple, no longer attracting other scarab beetles. The seed takes a year to sprout after pollination.
- The bottom of the waterlily is covered in 1 inch spikes to protect it from herbivorous fish
- The ribs on the bottom of the leaf are filled with air that keeps the lily pad afloat

AMAZON PLANTS

Breadfruit, *Artocarpus altilis* (ap. 3 feet or 0.914 meters long)

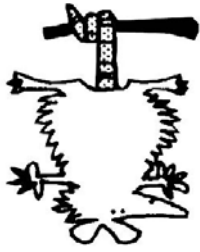
- Native to South East Asia, brought to the Amazon by Europeans
- Pollinated by Old World fruit bats
- Grapefruit-sized, edible fruit, related to figs
- Flesh, when roasted said to taste like fresh baked bread
- The trees provide construction materials, medicine, fabric, glue, mosquito repellent, animal feed, and more
- Provide shelter and food for Amazon animals
- Can produce 800+ fruits a season, although this is variable and dependant on the location, species, etc.

Why are these leaves so big?

1. To catch sunlight beneath the canopy - much of the forest floor is shadowed by the taller forest canopy, many plants have large leaves to create more surface area for light absorption.
2. Because the growing season is YEAR ROUND (rainforest are near the equator so there is ample sunlight and warmth all the time, plants never have to deal with winter)
3. There's constant 12 hours night/day
4. There's plenty of rainfall, so water is not a limiting resource



How Do Seeds Travel ?



Producing seeds is a plant's reason for being. It is the reason for sprouting, growing and flowering. Most plants produce a large number of seeds, but only a few survive to sprout and grow.

Seeds travel from the parent plant in many different ways. If you have ever blown the seeds off a dandelion, shot a watermelon seed out of your mouth, or thrown a maple seed into the air to watch it helicopter to the ground, you have participated in seed dispersal. If seeds weren't carried away from their parent plant, they would fall directly under the parent plant, and would compete for the same sunlight, soil, water and nutrients. Seed dispersal also helps spread the plant into new areas.

Some fruits, like apples, are eaten by animals, and the seeds are eliminated far from the parent plant. Other fruits, such as the burdock, have hooks on them and hitch a ride on passing animals. Others have tufts or wings, allowing them to fly with the wind; maples are a good example. Still others, like the touch-me-not, project their seeds from their fruits like catapults. Finally, some fruits just float in the water (coconut).

Airborne = AE
Windblown = WB
Hitchhiker = H
Other = O

