THE LEARNING EXPERIENCE GUIDEBOOK: ADAPTATIONS

See the back of this card for instructions on how to use this guide!
HOW TO NAVIGATE YOUR EXPERIENCE
ANYTHING IN **GREEN** CAN BE READ DIRECTLY OUT LOUD TO YOUR STUDENTS!

On the FRONT of each card, you will find...

- The room in which the plant is found.
- The name of the plant.
- Where the plant is naturally found.
- A photograph of the plant.
  **Not all plants may be flowering at the time of your visit!**
- A map of the room where you can find the plant, which includes a red dot to direct you to its specific location.
- A blurb, which you can read to your students!

On the BACK of each card, you will find...

- The type of adaptation (root, leaf, stem, or seed dispersal)
- Questions you can pose to your students.
- An in-depth explanation of the plant’s adaptation(s).
TABLE OF CONTENTS

How to Navigate your Experience—An explanation of how to use the cards for each plant that you will observe through the experience today.

Why Adapt?—Provides teachers with background on what adaptations are and why living things adapt.

Types of Adaptations—Provides teachers with some detail regarding four main types of plant adaptations you will encounter in the Conservatory.

Plants by Room—A master list of all of the plants included in the experience. The plants are organized by room.

Plant Info Cards—Each card is a stop where you and your students will learn about a different plant!

Adaptations Vocabulary—Teachers: brush up on old vocabulary and learn some new terms! Refer back to these cards throughout your time at the Conservatory today.
WHY ADAPT?

Adaptations are traits or characteristics that help living things survive in their environment.

Adaptations evolve over hundreds, thousands, and even millions of years! An individual does NOT evolve an adaptation in its lifetime. For example, a single plant in the desert did not transform its leaves into spines in one day. Rather, some plants in the population randomly (often through genetic mutation) were born with thinner leaves. These thin leaves allowed those plants to retain water more effectively than those plants with normal leaves. The thin-leafed plants were then more likely to survive and reproduce. They therefore were able to pass on their genes for thin leaves to their offspring; plants with normal, bigger leaves were less likely to survive and reproduce in this environment. Overtime, the population of plants contained only plants with thin leaves. Eventually, these thin leaves evolved further to become what we know today as spines. Spines are a very important leaf adaptation common to all cacti, as spines retain water more effectively than leaves. These modified leaves divert water to the base of the cactus, enabling the roots to absorb the maximum amount of water. Spines keep the cactus cool in the heat by providing shade and protecting the stem from sunburn. In the cold nights, the spines also keep the cactus warm by trapping heat close to the surface of the plant.

Cacti are not the only plants that have evolved over time! Even though we cannot see it, all living things — even people, are constantly evolving to better adapt to their environments.
TYPES OF ADAPTATIONS

**ROOT**

Roots adapt to provide stability for the plant and to facilitate nutrient exchange. For example:

- In places where soil is loosely packed, plants, like mangroves, will adapt to have aerial roots, which grow down from the trunk and branches to the ground and keep the plant firmly in the ground. These roots can also absorb important nutrients from the air.

**STEM**

Stems often adapt to aid the plant in reproduction and nutrient exchange. For example:

- Rhizomes are modified stems from which new plants will grow.
- In extremely wet areas, stems might have extra structures, which help the plant obtain important gases even though it is submerged in water.
LEAF

Leaves adapt to ensure that the plant receives the proper amounts of sunlight and water. For example:

- In lush climates, leaves will often adapt to be very large in order to maximize the amount of sunlight they receive.
- In dry climates, leaves will often adapt to have a smaller surface area to reduce water loss.

SEED DISPERSAL

Plants adapt creative methods of seed dispersal in order to increase chances of reproductive success. For example:

- A plant may release seeds when it feels rain on its leaves to ensure the seeds get the right amount of water needed to germinate.
# PLANTS BY ROOM

## PALM HOUSE
- Scheelea Palm
- Ficus
- Painted Bamboo
- Firecracker Plant
- Walking Iris

## SUGAR FROM THE SUN
- Mangrove
- Bromeliad
- Taro
- Spanish Moss
- Vanilla Vine
- Banana
- Pineapple

## CHILDREN’S GARDEN
- Ant Plant
- Sensitive Plant
- Variegated Peace Lily
- Bird of Paradise
## PLANTS BY ROOM CONT’D

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Our Scheelea palm is the tallest plant we have here at the Conservatory! In 1926, the Field Museum gave us a Scheelea palm seed, which has grown into the big, beautiful tree you see today.
**SCHEELEA PALM**

**Type of Adaptation: Leaf**

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**I wonder...**

- How tall do you think the Scheelea palm is?
- Can you describe the shape of the leaves of the Scheelea palm?
- Why do you think the leaves are so big?
- Do you see the big brown pods on the tree? What do you think is inside?

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**Adaptation:** The Scheelea palm that we have here at the Conservatory is about 65 feet tall!! Its fronds are extremely big so that it can capture lots of sunlight to do enough photosynthesis to feed the entire tree. The fronds of the Scheelea are in a feather pattern, where there are many thin leaves growing out of a central spine. There are two other major categories of palm frond shape: fan and fishtail. The Scheelea palm also has very interesting flowers! They grow in a boat-shaped pod. After flowering, the fruit remains in the pods where insects and animals can come eat it and then disperse the seeds. You can see a few of these large pods on the ground of the Palm House! You can also see a new Scheelea palm growing just north of the old one.
FICUS

Where it grows:
SE Asia, Portugal through Afghanistan, throughout the tropics

Look at the ficus tree! Do you see the long things growing down towards the ground? They kind of look like branches, but they also kind of don’t. I wonder what they are? What do you think?

FERN ROOM

PALM HOUSE

Where it grows:
SE Asia, Portugal through Afghanistan, throughout the tropics

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FICUS

Type of Adaptation: Root

I wonder...

What are the branches doing?

Do you think they are branches or something else?

Why do you think these structures are reaching for the ground? How do you think this helps the ficus?

Adaptation: Aerial roots of a ficus grow down towards the ground. When they reach the ground, the roots embed themselves in the soil, where they can then absorb nutrients for the ficus. By growing its roots down from the existing trunk and branches, the ficus is able to remain stabilized in the incredibly wet, tropical soil. This adaptation also keeps its roots from getting waterlogged.
The painted bamboo is the fastest growing plant in the world! Sometimes, it can grow as much as 3 feet in 24 hours!
PAINTED BAMBOO

Type of Adaptation: **Stem**

**I wonder...**

What does the painted bamboo feel like?

What is something interesting you notice about the painted bamboo?

How tall do you think the plant is?

Why do you think it grows so quickly and so tall?

**Adaptation:** This is the fastest growing plant in the world. In the lush forest where it grows, the painted bamboo has to compete for light with many other species of plants. The Painted Bamboo has thus adapted to be able to grow incredibly quickly in order to be able to access enough sunlight for photosynthesis. It will even grow above the canopy!
If you are lucky enough to be by the firecracker plant while our floriculturists are watering it, you are in for a treat! When the seed pods of the firecracker plant get wet, the seeds explode out of the pods, making a big popping sound...just like fireworks!

Where it grows:
Mexico and Guatemala
I wonder...

What are three things you can observe about this plant?

What do you notice about the seed pods?

Why do you think the firecracker plant shoots out its seeds when it gets wet?

Why don’t you think the firecracker plant shoots out its seeds when it is dry?

Type of Adaptation: Seed dispersal

Adaptation: The firecracker plant has seed pods that dry out during periods of no rain. When it rains and the seed pods become wet, they “explode” shooting seeds up to 200 feet away from the original plant! This ensures that when the firecracker plant disperses seeds, the plant is doing so at a time where the environment is conducive to growing — the seeds will get all the water they need to grow!
WALKING IRIS

Where it grows:
Mexico, Central and South America, Trinidad and Tobago

The walking iris: what a funny name for a plant! How do you think this iris “walks”? Here is a hint: it has to do with their flowers. Look closely. What are some things you can observe about the flower?
WALKING IRIS

Type of Adaptation: Stem

I wonder...

How do you think the walking iris got its name?

What part of the plant do you think the iris uses to “walk”?

Why do you think the walking iris needs to “walk”?

Adaptation: The flowers of a walking iris will emerge from what looks to be a leaf. In fact, the new flowers sprout from a flower stalk that looks like a leaf. When the flowers are pollinated, a new plant emerges in the place of the flowers and the stalk will grow taller and taller. Eventually, it will get tall and heavy enough that the plant will flop over towards the ground, which allows this new plant to send its roots into the soil. It is almost as if the plant is walking (albeit VERY slowly)!
SUGAR FROM THE SUN

Palm House

Lobby

Sugar From the Sun

Fern Room

Children’s Garden
MANGROVE
Where it grows:
Tropics and subtropics

What interesting roots mangroves have! Do you usually see the roots of a plant above the ground? Look down into the pond! What do you see?
Type of Adaptation: Root

I wonder...

Why do you think the mangrove’s roots grow above the ground?

How do you think mangrove roots get the nutrients they need to survive if they are mostly above the ground?

How do you think the roots help other animals?

Adaptation: Mangrove roots exist largely above-ground and are extremely robust. Because they prop themselves up above the water level with their roots, mangroves are able to tolerate flooded conditions. The roots are able to absorb oxygen and other important gases through pores in their bark. To combat high levels of salt in the water, the aerial roots of the mangrove are largely impermeable to salt. Additionally (and most importantly!), the strong roots help stabilize the mangrove in the very wet soil — just like the ficus in the Palm House! The complex root systems of mangroves also help prevent erosion and create ecosystems that support myriad unique wildlife.
BROMELIAD

Where it grows:
Tropical and subtropical Americas, tropical West Africa

There are many different species of bromeliads here at the Conservatory — see how many you can find! Their leaves all have a similar pattern and usually all have spines, so don’t touch them! Look down into the center of the bromeliads. What do you see?
Adaptation: Since bromeliads do not have a well-developed root structure, their leaves have adapted to make sure the plant gets enough water to survive. Bromeliad leaves create a cup-like center, which collects water for the plant to use. Not only do bromeliads use this water, but so do many other species of animals. Salamanders, frogs, crabs, insects, and more rely on these little pools of water for drinking, shelter, and raising young!

Type of Adaptation: Leaf

I wonder...

What do you see in the center of the bromeliad?

How do you think this helps the plant?

Do you think other living things benefit from what you see in the center of the bromeliad? How so?
Have you ever heard of the taro plant? Maybe not, but people all over the world actually use the root of this plant for food! Taro grows where there is a LOT of water, so its stem has special adaptations to keep from drowning in flooded conditions.
I wonder...

How do you think taro is able to survive in extremely wet (and sometimes even flooded!) conditions?

How do you think the taro’s stem is able to keep the plant from drowning?

If you could eat any part of the plant, which part would you want to eat and why?

Adaptation: Taro thrives where water is abundant. It grows in flooded conditions because of a structure it has, called a petiole. The petiole is a little stalk that attaches the leaf to the stem and it allows for the exchange of gases between the taro plant and the water. The stem has adapted to hold and transport large amounts of water and starch. On the inside of the stem, there are little pockets that hold the water, kind of like a sponge. Where some leaves absorb water, the taro leaf does not! The leaf of the taro is covered with tiny hairs that prevent water from landing directly on the leaf. This makes the leaves water repellent and helps the plant survive in the rainforest.

Type of Adaptation: Stem & Leaf
SPANISH MOSS
Where it grows:
SE U.S., Mexico, Bermuda, Bahamas, Central and South America, West Indies

Do you see the curly, pale green plants hanging from the branches? It is called, and the cool thing about it is that it does not have any roots!
SPANISH MOSS

Type of Adaptation: Root

I wonder...

What does the Spanish moss remind you of? What does it look like?

What do you think birds and small animals, like squirrels, use Spanish moss for?

How do you think humans use Spanish moss?

Since Spanish moss does not have any roots, how do you think it gets the nutrients it needs in order to survive?

Adaptation: Spanish moss has no roots! Instead, it absorbs nutrients and water through its leaves, as well as from the trees it lives on. Its long, curly leaves hang down from tree branches, looking like a thick beard! Since it does not have roots, it often spreads with the help of other animals, like birds, that will take Spanish moss from one tree and bring it to another tree to use to build nests. In the South, people used to use Spanish moss to stuff their cots. Native Americans used the fibers of the Spanish moss to create ropes, baskets, and more!
Can you think of foods you eat that contain vanilla or are vanilla flavored? Well the vanilla plant is where that comes from! Inside the long, green pods are seeds that we can turn into vanilla flavoring that we use in our cakes, cookies, ice cream, and other delicious treats.
I wonder...

Why do you think the leaves of the vanilla vine are so thick?

Why do you think the leaves of the vanilla vine are so waxy?

**Adaptation:** Vanilla grows on a vine, which means it attaches to other structures for support and grows as high up as the structure that it is growing on! On a vine, opposite the leaves, there are small bumps called nodes. On a vanilla vine, aerial roots actually grow from the nodes to help the plant get the air it needs. The leaves are also pretty special, the thick waxy leaves serve a dual purpose: the help the plant retain water, and they also stop the plant from absorbing water through its leaves. The vanilla vine produces yellow flowers with a very short life-span! These flowers typically open at sunrise and close a few hours later in the early afternoon, when they close forever! If the flower is not pollinated during this time, the plant sheds the flower.

**Type of Adaptation:** Stem, Root, Leaf, & Seed Dispersal
Where it grows: Asia

What do monkeys, birds, insects, and people all have in common? We all love bananas! Take a look at the leaves of the banana plant. What do you notice?
BANANA PLANT

Type of Adaptation: Stem and leaf

I wonder...

How do you think banana plants make new banana plants?

How do you think people can use banana leaves?

Adaptation: Bananas, which are a part of the same family as ginger, reproduce with rhizomes. Banana plants fruit only once in their lifetime. When this happens, the banana plant sends down a signal to shoot out a rhizome. This rhizome will make a new, baby banana plant. So, every time you see a banana plant with fruit, look for a baby banana plant nearby! Additionally, banana plants have big leaves, which people use to wrap and hold food they are cooking, processing (beans from a chocolate tree are wrapped in banana leaves to ferment), and storing.
Do you like to eat pineapple? Did you know that pineapples grow from a plant in the ground? The pineapple plant makes around 200 flowers. Then, all of these flowers grow together into one fruit to create a pineapple!
I wonder...

You see that the pineapple grows from a stem. What do you think happens when the pineapple grows very big?

Have you ever seen what a pineapple looks like when the top is chopped off? What does it look like?

Type of Adaptation: Seed dispersal

Adaptation: The pineapple plant will produce around 200 flowers. When this happens, the individual fruits of the flowers grow together to create the fruit we know as “pineapple.” The cool thing about the pineapple is that it is not like a traditional fruit with seeds just in the middle. Since one pineapple is really many smaller fruits that have grown together into a single fruit, we call the pineapple a “compound fruit.” Because the pineapple is many fruits growing together, it has many seeds growing inside the many fruits throughout the pineapple. Most people think that pineapples grow underground because you see the top of the pineapple (crown) poking out of the soil. Pineapples actually use the central stem of the crown as a root structure to grow above ground!
CHILDREN’S GARDEN
ANT PLANT

Where it grows:
SE Asia, Australia

There are ants in this plant! If we were to cut open the trunk and branches, we would see tunnels full of ants. Just like an ant city!
I wonder...

The ant plant actually likes that ants live inside of it! Can you think of why that may be?

Why do you think the ants like living in the plant?

What do you think the inside of the ant plant looks like?

Type of Adaptation: Stem

Adaptation: The tubers (a stem-like structure that forms from a rhizome) of the ant plant are hollow and chambered. This provides a space for the ants to inhabit. The ant plant provides food and shelter for the ants, while the ants provide protection against unwanted visitors, trespassing herbivores, invading fungi, and competing plants. Nutrients from the ants’ waste also help nourish the plant!
SENSITIVE PLANT
Where it grows:
Central and South America

Using one finger, gently brush the side of the leaves of the sensitive plant. What happens?
I wonder...

What happens when you touch the leaves of the sensitive plant?

Why do you think the leaves react this way when touched?

**Type of Adaptation: Leaf**

**Adaptation:** When the leaves of the sensitive plant are touched or shaken, they shrivel up and look as though they are dead. A few minutes later, they return to their original (and very much alive!) state. This is thought to be either a protective mechanism to scare herbivores away, to protect against the abrupt movement of predators, or a way to dislodge harmful insects that have landed on the leaves.
Where it grows: Tropical America, SE Asia

Can you see the flowers on the peace lily? The peace lily plays a little trick…the white “petal” is actually not a petal at all! It is a leaf that just looks like a flower petal. But then where are the flowers??
I wonder...

Why do you think the peace lily has a white leaf that looks like a flower petal?

Where do you think the flowers are on the peace lily?

Type of Adaptation: Seed dispersal

**Adaptation:** The ‘flower’ of the variegated peace lily, as well as those of all other anthuriums, is a bit different from what you might think. The big “petal” is actually not a petal of a flower at all. In fact, this is a modified leaf called the spathe. The flowers of the variegated peace lily are actually on the spadix, the cone-like structure surrounded by the spathe. If you look closely, there are actually hundreds of tiny flowers that are on the spadix! Female flowers usually lie towards the bottom of the spadix, while male flowers are found towards the top. Since the flowers are so small, the peace lily and other anthuriums have adapted their spathe to attract pollinators. The spathe also serves as a landing strip for these pollinators!
Look at the beautiful bird of paradise! Do you like its flowers? You are not the only one! Sunbirds also like the bird of paradise. They perch on the flower to get its nectar!
I wonder...

When sunbirds perch on the bird of paradise to drink its nectar, how do you think this helps the bird of paradise?

Where do you think the sunbird lands on the bird of paradise?

**Type of Adaptation:** Seed dispersal and Stem

**Adaptation:** The blue protrusion from the bird of paradise’s orange flower is called the spathe. When a sunbird comes to get nectar from the bird of paradise, the sunbird will perch on the spathe. The weight of the bird on the spathe opens it, exposing the sunbird’s feet and belly to the pollen of the plant. When the sunbird leaves the bird of paradise, the pollen is stuck to its feet and stomach. Then, when the sunbird arrives at the spathe of a different bird of paradise, the bird deposits the pollen it brought over from the first plant. The bird of paradise can also reproduce through rhizomes.
DESERT HOUSE

CHILDREN'S GARDEN

AROID HOUSE

FERN ROOM

DESSERT HOUSE

LOBBY
GOLDEN BARREL CACTUS
Where it grows:
Southwestern United States

The golden barrel cactus looks like a ball that you might want to pick up and throw to your friend…but don’t do that! The sharp spines would hurt a lot!
GOLDEN BARREL CACTUS

Type of Adaptation: Stem

I wonder...

What does the shape of the cactus remind you of?

How do you think the shape of the cactus helps it survive in the hot, dry weather?

What do you think keeps the golden barrel cactus from rolling away in the wind?

Adaptation: The golden barrel cactus has adapted to grow into a spherical shape because this shape enables the cactus to store more water. The cactus also grows away from the sun in order to avoid the harshest of the sun’s rays, and can sometimes result in the barrel cactus toppling over (though it will not roll away because of its roots)!
**EVE’S NEEDLE**

*Where it grows:*
Peruvian Andes

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**DESERT HOUSE**

What do the leaves on Eve’s Needle look like? That’s right! They look very much like spines! This is a primitive cactus that has both leaves and spines. Can you see the spines, as well?
EVE’S NEEDLE

Type of Adaptation: Leaf

I wonder...

How are the leaves of the Eve’s needle plant different from its spines? How are they similar?

How do you think the shape of the leaves and spines help the Eve’s needle?

What do you think might happen to the leaves when it is hot and dry for a long time?

Adaptation: Eve’s Needle has both spines and rudimentary leaves that look almost like spines in their shape. The spines, like in other cacti, are modified leaves, which help cacti conserve water, protect them from insects/animals and sunlight, and divert water down to the base of the stem. The leaves are thin to minimize evaporation of water from the cacti. When the weather is consistently hot and dry, the Eve’s needle leaves will become yellow, shrivel up, and drop off of the stem. When it rains or is cooler, the leaves will grow back.
CLIPPED WINDOW PLANT

Where it grows: South Africa

Look at the tops of the thick leaves of the clipped window plant. Do you see how they are a little bit clear, like a window? When it is very dry and hot, the roots will shrink up and pull the leaves of the plant down towards the ground!
I wonder...

Why do you think the leaves are so thick? What do you think is inside?

Why do you think the tops of the leaves are rough and a little bit clear?

We know what happens to this plant when it is hot and dry for a long time... what do you think happens to the plant when it rains?

**Type of Adaptation:** Leaf and root

**Adaptation:** The tops of the leaves of the clipped window plant are rectangular, flat and are either clear or very light — like a window. This part of the leaf actually does not do photosynthesis! Only the core of the leaf can perform photosynthesis. The clear/light surface of the leaf filters the light so that the photosynthetic core of the leaf receives enough light for photosynthesis, but not any light that would be severe enough to damage this part of the leaf. Additionally, when the weather is particularly hot and dry, the roots of the clipped window plant actually shrink, pulling the leaves of the plant down close to the ground. This reduces both water loss and sun damage to the plant. When the weather is cooler or if there is rain, the roots become larger, pushing the plant up and away from the ground, giving the plant more access to water and light.
MADAGASCAR OCOTILLO

Where it grows:
Southern Madagascar

What a beautiful plant! Look closely at its leaves. What do you observe? ...That’s right! They are standing straight up instead of lying flat!
I wonder...

What animal does the Madagascar ocotillo remind you of?

Why do you think the leaves stand straight up? How do you think this helps the plant?

Adaptation: Instead of lying flat, exposing most of their surface area to the sun, the leaves of the Madagascar ocotillo are oriented vertically. This exposes much less of the leaf to the sun, protecting the plant from severe UV rays and reducing water loss.
GIANT SEA GRAPE

Where it grows: Coastal beaches throughout tropical America and the Caribbean

Look at the leaves of the giant sea grape!
What do you notice?
How do you think it got its name?
GIANT SEA GRAPE

Type of Adaptation: Leaf

I wonder...

How do you think the Giant Sea Grape got its name?

Why do you think the leaves are so giant?

Adaptation: The leaves of the giant sea grape are ENORMOUS. Since the giant sea grape lives in lush, tropical areas, they must compete with many other plants for sunlight. They do so by growing massive leaves. Large leaves maximize the amount of sunlight they can use.
**CALABASH TREE**

Where it grows:
Central and South America

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Find the flowers on the calabash tree! Is this where you usually find flowers on a tree or plant? There is something very special about these flowers: they only bloom at night!
I wonder...

Where do we usually find flowers on a tree? How is this different from where we find the flowers on the calabash tree?

What types of creatures do you think pollinate the calabash tree?

Adaptation: The flowers of the calabash tree grow directly out of the branches and only bloom at night. Like many species of cacti, these flowers only bloom at night because bats, which are nocturnal, are the primary pollinators of the calabash tree.

Type of Adaptation: Seed dispersal
GARFIELD ANTHURIUM

Where it grows:
The Garfield Park Conservatory— it was hybridized here!

Look at the trunk of the Garfield anthurium. It looks like spaghetti is growing on the tree! While that sounds delicious, this is not what these structures are... do you have any idea what they might be?
I wonder...

We said that the things growing around the trunk of the Garfield Anthurium look like spaghetti — can you think of something else they look like?

What do you think these structures are? What do you think their job is?

Adaptation: The roots of the Garfield anthurium, as well as those of many other naturally occurring aroids, are adaptive. While the Garfield anthurium has roots in the ground, it also has aerial roots, which grow all around the stem/trunk of the plant, looking like a bunch of spaghetti or snakes! These aerial roots then look for stems, trunks, and branches of other trees to cling to. This provides stabilization for the anthurium. The aerial roots also absorb nutrients and moisture from the air.
**SWISS CHEESE PLANT**

*Where it grows:*
Southern Mexico through Panama

Do you like Swiss cheese? Then you will like the Swiss cheese plant, though it does not taste like Swiss cheese!

What do you see when you look at the Swiss cheese plant?
**SWISS CHEESE PLANT**

**Type of Adaptation: Leaf**

**I wonder...**

What do the Swiss cheese plant and Swiss cheese have in common?

How do you think the unique structure of its leaves helps it survive? Hint: the Swiss cheese plant lives in places where it rains a lot!

**Adaptation:** The Swiss cheese plant grows in tropical areas that get a lot of rain. The leaves of the Swiss cheese plant are lobed and have holes so that water does not pool. If the leaves did not have holes and water did pool there, this could damage the leaves by putting too much stress on them, smothering them, and preventing them from performing photosynthesis.
FERN ROOM
GREEN WAVE FERN
Where it grows:
Florida, Texas

Look at how the green wave fern twists upward!
Isn’t it pretty? The green wave fern is also known as the twister fern.
Why do you think this is?
**I wonder...**

How do you think the cool shape of the leaves helps the fern survive?

What do you notice at the top of some of the ferns?

**Type of Adaptation: Leaf**

**Adaptation:** The leaves of the green wave fern twist as they grow upward. Because of the twisting, waving shape of the leaves, the green wave fern is also known as the twister fern. This unusual shape helps the leaves funnel water down towards the roots of the fern. Additionally, the green wave fern grows in areas of dense foliage, so twisting as it grows straight up enables its leaves to make more contact with sunlight. The fern’s spores are at the top of mature leaves so they can easily be blown away by the wind.
SPIKE MOSS

Where it grows:
Tropical America

You can find spike moss in the Fern Room, but it is not a type of fern! It looks spiky, but you can touch it and it will not hurt you! When the weather is very dry, the spike moss will become brown and will roll up into a ball.
SPIKE MOSS

**I wonder...**

Why do you think the spike moss shrivels up into a brown ball when the climate is very hot and dry?

What do you think will happen to the spike moss when it rains?

Why do you think spike moss lives in the Fern Room?

**Adaptation:** In dry conditions, spike moss can become brown and the whole plant body (leaves and stems) rolls up into a ball. However, it is not dead! It simply stops growing in the absence of water, preserving its nutrients in its roots. Once conditions become wetter, the spike moss will become green again, unroll, and resume growth. While spike moss is not a type of fern, it is considered a “fern ally” because, like ferns, it reproduces by shedding spores.

**Type of Adaptation:** Leaf and stem
**TREE FERN**

*Where it grows:*
Temperate rainforests in South Africa, Australia, and New Zealand, Latin America

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Tree ferns are a special type of fern that look like trees! Some people think they look like palm trees but, in fact, they are ferns. The thick stalk lets the fern grow big and tall.
Adaptation: Tree ferns, which have been around since the dinosaur era, are ferns whose stems grow up, elevating the fronds of the fern. The stems appear trunk-like and can grow up to 33 feet tall! Sometimes the inside of the stem/stalk is edible. Since the stem raises the fronds up off of the ground, the fronds have better access to sunlight. The spores are found on the trunk of the tree fern and are thus exposed to the wind, which is what carries them away from the mother plant.
BEAR’S PAW FERN
Where it grows:
Taiwan, Philippines

How do you think the bear’s paw fern got its name? That’s right! It’s because of its fuzzy rhizomes. Reach out and touch them to feel how soft they are!
I wonder...

What do you think the rhizomes feel like?

Why do you think the rhizomes are furry?

Look at the leaves! What do you notice? What do you think is happening?

Adaptation: The “roots” of the bear’s paw fern are actually rhizomes, which are dark brown and furry like the paw of a bear! The “furriness” helps the plant absorb and retain moisture. All ferns, when they reach reproductive maturity, have spores instead of seeds and flowers. As you go through the Fern Room, look at the underside of the fronds of different species of ferns and you will see that each fern has its own unique spore pattern of dots or lines! The tiny brown dots on the ends of the fronds are spores! When spores are mature, they will drop off the fronds and get carried by the wind. When a spore falls into moist soil, it will eventually grow into a new fern. The fronds of the bear’s paw fern have adapted to have their spores at their ends so that when the spores fall, they fall farther away from the mother fern. This increases the chances that the mother fern and new, baby fern will not compete for the same resources.

Type of Adaptation: Stem and seed dispersal
DIAMOND MAIDENHAIR FERN

Where it grows:
West Indies, Cuba

Look at how delicate and feathery the leaves of diamond maidenhair fern are! You can touch the leaves, as long as you are gentle!
DIAMOND MAIDENHAIR FERN

Type of Adaptation: Leaf

I Wonder...

How is the shape of the maidenhair fern leaves different from the shapes of the leaves of other ferns you have seen today?

What do you think happens to water when it lands on the leaves of the fern?

Adaptation: Maidenhair fern leaves do not have a typical fern shape. They are quadrilateral and diamond-like in structure. This shape allows water to drip off without over-saturating the plant.
ADAPTATIONS VOCABULARY

**Adaptation** – A change that develops over time to enable an organism to be better suited to its environment.

**Aerial Roots** – A plant’s adaptation of its root system; aerial roots grow above ground as opposed to below ground.

**Frond** – The leaf of a palm tree or fern, specifically.

**Leaf** – A part of basic plant anatomy, which allows for transpiration of water, release of carbon, and absorption of energy from the sun. The biological structure of leaves allows for photosynthesis.

**Photosynthesis** – The process by which a plant uses carbon dioxide, water, and energy from the sun to make food (glucose) and oxygen.

**Propagation** – A term referring to either the natural or artificial (assisted by human interference) process of producing a new plant.

**Rhizome** – A plant’s adaptation of its stem containing all of the essential nutrients and structures to produce a new plant. Rhizomes are often found underground. Plants form rhizomes intentionally.
ADAPTATIONS VOCABULARY CONT’D

**Root**—A part of basic plant anatomy, which is responsible for pulling nutrients, air, and water from the soil, and also for keeping the plant in place. Usually grows under the soil.

**Seed**—A part of basic plant anatomy, which allows the plant to reproduce.

**(Seed) Dispersal**—The process by which a plant moves or transports its seeds any distance away from the parent plant for the purpose of propagation and survival.

**Spine**—A modified leaf common to all cacti that provides protection from predators. Spines also assist with temperature and water regulation.

**Spore**—A part of basic fern anatomy, which allows the fern to reproduce. The fern uses spores instead of seeds. Each fern has its own unique spore pattern of dots or lines on the underside of its leaves.

**Stem**—A part of basic plant anatomy, which carries water and nutrients throughout the vascular structure of the plant. Stems usually grow above the soil in the opposite direction of roots and are essential in providing physical above-ground support for the plant.
THIS CONCLUDES THE ADAPTATIONS EXPERIENCE

We hope you enjoyed it and learned something new! Please complete our survey to give us feedback on how we can improve this experience.

Thank you for visiting the Garfield Park Conservatory — come again soon!