WEEKDAY WONDERS

Content developed by the Tennessee Aquarium Education Department

TENNESSEE AQUARIUM

Mad Scientists: Day 5

Science is an important part of our lives, even when we do not realize it. This week, young scientists will have a chance to explore some of the science topics that we encounter around us every day. Whether it is plants or weather, water or colors, this week young scientists have a chance to find out more about the science around us.

These curated activities are listed in a suggested sequence but may be done in the order that works best for you and your young scientists. Learn more about this series in the Introduction to Weekday Wonders.

Question of the Day

How can you discover preferences of wild animals that share your outdoor space?

Daily Nature Journal

Ask your young scientists to spend some time outside completing their daily nature journal. Use the Guide to Nature Journaling to see the other prompts to help your scientist nature journal each day.

Who's Out There?

Have your young scientist spend a little bit of time looking out the window or sitting quietly in his/her outdoor space. Ask him or her watch for the animals, such as birds or small mammals (squirrels and chipmunks, for example), and to keep a tally of the animals. It is not important to know the specific names of the animals, but rather broad categories, such as "bird" and "mammal." Once your scientist has made observations, discuss what s/he found and whether s/he was surprised by any of the data.

To extend the activity have your young scientist choose one of the broad categories and answer the following questions.

- Is there only one member of this category visiting?

- If not, how many different members are there? For example, if your scientist chooses the broad category of birds, is there only one type of bird coming to the space or are there different types of birds?
- How do you know they are different? (color, size, etc).
- What do you think the different types of birds (or mammals) have in common?
- How are they different?

For more experienced scientists, s/he may want to start trying to identify the individual types of animals, such as cardinals, sparrows, or robins. First field guides and apps for cellphones or tablets such as iNaturalist may be helpful in this stage.

What's on the Menu?

Have your young scientist make a list of all the different kinds of birds s/he can. His/her list may include birds such as ducks, penguins, songbirds (blue jays, robins, cardinals), birds of prey (eagles, hawks), humming birds, and whatever other types of birds s/he can add. Once the list is complete, ask him/her to think about all the birds on their list and whether or not they all eat the same thing. Ask your scientist to explain why s/he chose the answer s/he did.

It may be helpful to look at pictures of the some of the different birds with very distinct beaks. Have the scientist reflect on why the birds may have different beaks.

An alternative way to do this part of the activity would be to give the scientist several pictures that show birds with very distinct beaks to let them come to the conclusion that different beaks would be function differently. For example, a duck's beak would be good for acting like a sieve and filtering food from the water but not so good at cracking open a sunflower seed.

Once your scientist has had a chance to start thinking about how birds may eat different foods and how the shape of their beaks is designed to help eat the preferred food for the type of bird, set up a fun experiment using tools and foods you may have in your home.

Place different food choices (see table on next page) around the room or an outdoor space. Put all the tools in central location. Have your scientist go out to find the food then return to choose a tool. Once s/he has chosen a tool, s/he should return to the food source test the tool. If it is an effective tool, leave the tool there and search for the next food.

Along the way, your scientist may find that s/he needs to revise a choice. For example, s/he may decide that the tweezers are good for grabbing the yarn worms and leave the tweezers at that site only to discover that the tweezers are needed to reach into the small crevices in the bark to grab the rice. Then s/he must find a new tool for the worms that can reach deep into the hole.

Food Birds Eat	Food Representation	Tools
Insects in a tree	Rice in bark crevices of trees	Tweezers
Worms underground	Yarn under a piece of cardboard with holes cut into it	Chopsticks or tweezers
Hanging fruit	Grapes hung on a doorknob or branch	Pasta or salad tongs
Seeds	Unshelled sunflower seeds on the table or ground	Pliers for cracking shells
Nectar in flowers	Small amount of liquid in a tall cup	Small paintbrush or straw
Plants in a pond	Pieces of paper or packing peanuts in a shallow pan of water	Slotted spoon

I am a Scientist!

In this activity, your young scientist will have a chance to design and carry out a scientific study. Please make sure that all studies are respectful to the animals being observed so your wild neighbors continue to feel safe in visiting your outdoor space.

Step 1: Ask a question.

The following are some examples of possible questions that may be good ones for young scientists to study.

- What types of foods do birds like to eat?
- Do all birds like the same foods?
- Do birds that eat seeds prefer one type of seed over another?
- Is there a particular time of day that birds prefer to eat?

For this example, we will use the question “Do seed eating birds prefer one type of seed over another?” but encourage your young scientist to choose a question s/he is interested in.

More experienced scientists may wish to delve a little deeper to determine if specific birds prefer one seed over the other. Even if s/he does not know the specific birds, s/he can write down brief descriptions of each and do some research later to figure out which birds they may have been.

Step 2: Make a claim.

A claim is an answer to the question. It is often a prediction about what your scientist expects to see. Your scientist should use anything that he or she already knows to help with the claim, such as observations about a backyard bird feeder.

To answer the question in this example—make a claim about it—a young scientist might write one of the following.

- All birds like all seeds equally.
- Birds prefer mixed bird seed over one type of seed.
- Birds prefer black oil sunflower seeds.

Step 3: Design an investigation.

Have your scientist plan out a way to get information to help him or her answer the question. You may need to help him or her gather materials and clarify whether the data s/he gathers will really help answer the question.

In the example here, the scientist might gather or make two or more similar feeders. A simple feeder to make would be to have your scientist gather small sticks (about the width of their small (pinky) finger and about 3-6 inches long), tie a string to one end of the stick, paint the sticks with honey or peanut butter (sunflower butter if your scientist has a peanut allergy), roll one stick in each type of seed being compared (roll one in black oil sunflower seed and roll one in mixed sunflower seeds). Make sure each is coated evenly. Hang the feeders on the same tree branch or in near proximity to each other at the same height, etc.

Having similar feeders will mean that those are not a variable in the investigation. A bird will not eat more from one feeder than the other because one is easier to perch on or has more food. The only difference will be the type of food.

Step 4: Carry out the investigation.

Your scientist should do the steps s/he designed to observe what happens. Make sure s/he has considered what data to collect and that s/he has a place to write it down. Your scientist should also decide how long to run the investigation and whether s/he needs to observe at different times of the day.

In this example, a young scientist might watch the feeders for 10 minutes at the start of each of 3 hours to see which feeder the birds visit most frequently. S/he might draw a chart with a column for each type of seed and write the name of each type at the top of the column. Each time a bird visits a feeder, the scientist would draw a tally mark in the appropriate column.

Step 5: Analyze the data.

Once your scientist has finished collecting data, have him or her count up the tally marks. Write the number at the bottom of each column.

Step 6: Develop an explanation.

Ask your scientist what they saw in their investigation that will help answer the question. Each observation is evidence. For each piece of evidence, he or she should explain what that piece of evidence tells him or her about the question. Once your scientist has added all of their evidence, ask him or her to put it together in an explanation. He or she should include whether the original claim was correct.

Extend the activity by having your scientist determine if there are ways to get more information, similar studies, or new questions that arise. He or she may wish to do additional investigations.

Report the Findings

Have your young scientist take a few minutes to reflect in his/her journal on the experience of designing and conducting his/her study. Ask him or her to include what the most challenging part of the experience was as well as s/he learned about the visitors to the local area.

Extension of today's activities: If you and your young scientist enjoy activities like the ones today, consider getting involved in a citizen science project. Many of them are set up so you can participate right where you live. Organizations such as Cornell Lab of Ornithology, Great Smokey Mountains Institute at Tremont, and the Tennessee Amphibian Monitoring Project are a few of the organizations that conduct exciting citizen science projects.