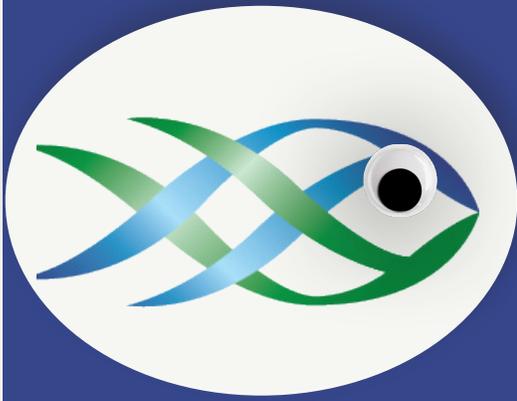




IMET Virtual Open House

May 2 - May 16





I'm Temi, IMET's mascot! Today, I can't bring you to my home in the Inner Harbor in person, but I want to show you a bit about where I live and why I think it's so special.

In the following pages, you'll find activities on science topics. I love science because it helps my friends and me answer big questions. You'll also hear from some of those friends - scientists who are learning about how sharks stay healthy, what fish need to grow up big and strong, and what's living in the water in Baltimore.

Will you come on this journey with me? I hope that you'll learn something new, have some fun, and feel like a scientist for the day!



There are activities for everyone in here! If you complete activities from May 2 - May 16, you'll receive a prize! When my friends can come back to see me at IMET, we'll send out a set of special IMET utensils that you can proudly bring to use for lunch on your first day back at school.



For each activity I'll also enter your name in a drawing so that you can come see my friends and me on a special, behind-the-scenes tour.

When you're done, email your packet (or send a photo if you printed it out) to me at temi@umces.edu!

I hope I'll get to meet you on a tour sometime. And I hope that we'll be able to come together for the 2021 Open House!



What are algae?

Algae are plants that live in both freshwater and saltwater environments. You may have heard people refer to some algae as **pond scum** because it can form a layer on the top of ponds. Algae live on or near the **surface** of water, so that they can receive **sunlight**. They use sunlight to produce energy in a process called **photosynthesis**.

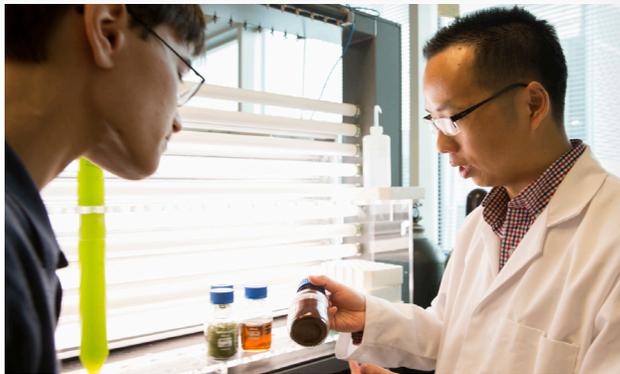
Some algae are multicellular, which means that they have many connected cells. Animals like humans are also multicellular. These algae are also called **seaweed**! They typically live in **salty** water and create an important habitat for **fish**.

Other algae are unicellular, meaning that the entire plant only has one cell. These are called **microalgae** and include a wide range of **diverse** organisms.

Why do my friends at IMET study algae?



1. **Algae as fish feed:** Algae are nutritious for fish grown in **aquaculture**, which is the process of farming fish. Algae produce omega-3 **fatty acids**, which are important for the health of fish. We use algae to feed the fish we raise, like **salmon**, sea bass, and tilapia.

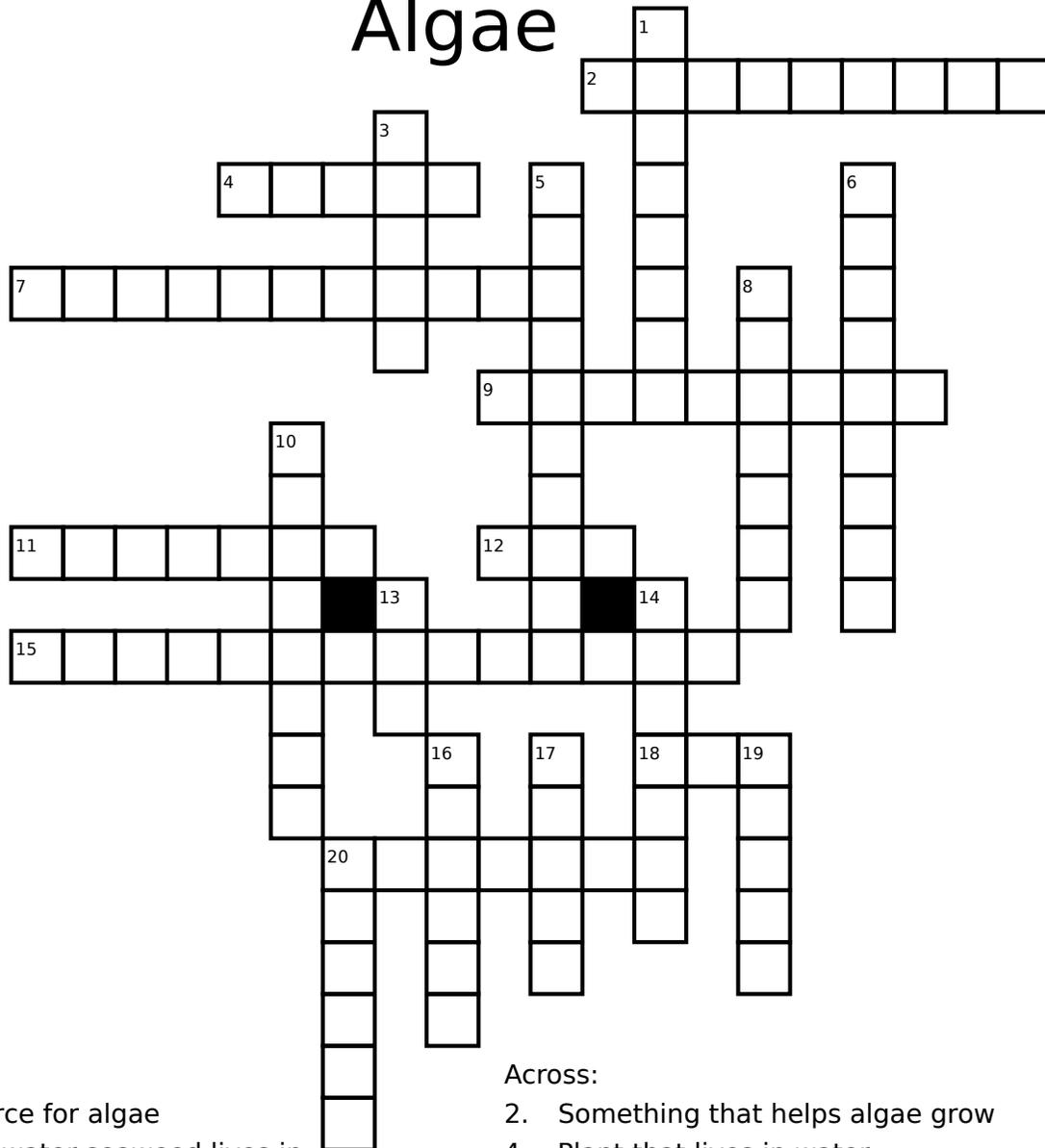


Dr. Yantao Li and his students study different kinds of algae that could be used for nutrition. He has algae that are green, brown, and even red!

2. **Algae as an energy source:** My friends are working to make a **biofuel** from algae. A biofuel is a source of energy from a **plant** or other organic material. Algae may be a good source of fuel because it is high in **fat**.

3. **Harmful algal blooms:** Sometimes, too much algae grows in our water. This happens when there are a lot of **nutrients** in the water from **farming** and other human activities. Some algae can release **toxins** that are harmful to fish. This is called a harmful algal bloom (**HAB**). My friends are using new techniques, such as filtering water through **barley** to prevent HABs in Baltimore and the Chesapeake Bay.

Algae



Down:

1. Energy source for algae
3. The kind of water seaweed lives in
5. large bay where IMET scientists work
6. city where IMET scientists work
8. A type of algae with many cells
10. Algae that grows on small bodies of water
13. The number of cells microalgae have
14. An energy source that could be made from algae
16. a grain that could be used to prevent harmful algal blooms
17. Algae is not an animal. It is a _____
19. Something released into the water during a harmful algal bloom
20. A fish sometimes grown in aquaculture known for its pink color

Across:

2. Something that helps algae grow
4. Plant that lives in water
7. The process of farming fish
9. A compound in algae that is healthy for fish and humans
11. One source of nutrients
12. Abbreviation for when too much algae grows
15. Process algae use to convert sunlight to energy
18. Something common in algae that makes it good for use as a biofuel
20. Where on the water algae grows



Why do my friends at IMET study sharks?

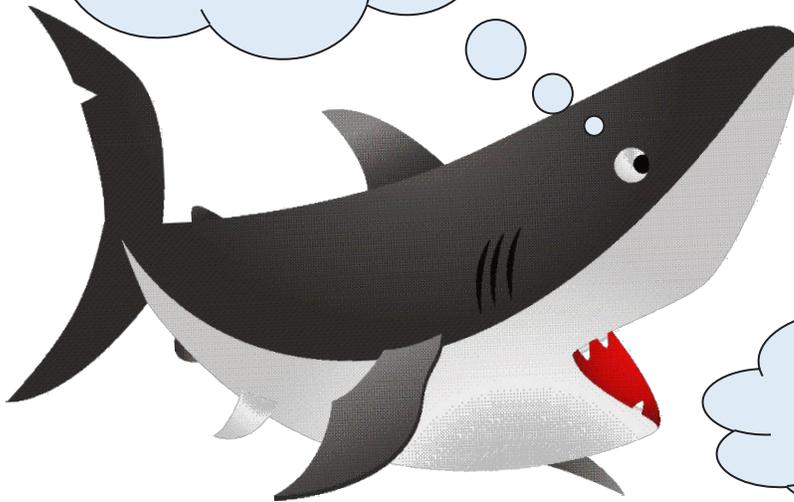
Sharks have been around over 450 million years (long before the dinosaurs!), & some species can live hundreds of years.

This is partly due to their powerful immune system, which they use to fight off infection.

By studying the molecules that sharks use to protect themselves we hope to develop new & improved treatments for human disease.

To do this we immunise our sharks then take small blood samples to study their immune molecules.

We can then make synthetic versions in the lab and test their ability to kill bacteria or viruses harmful to humans



 @hdooley13



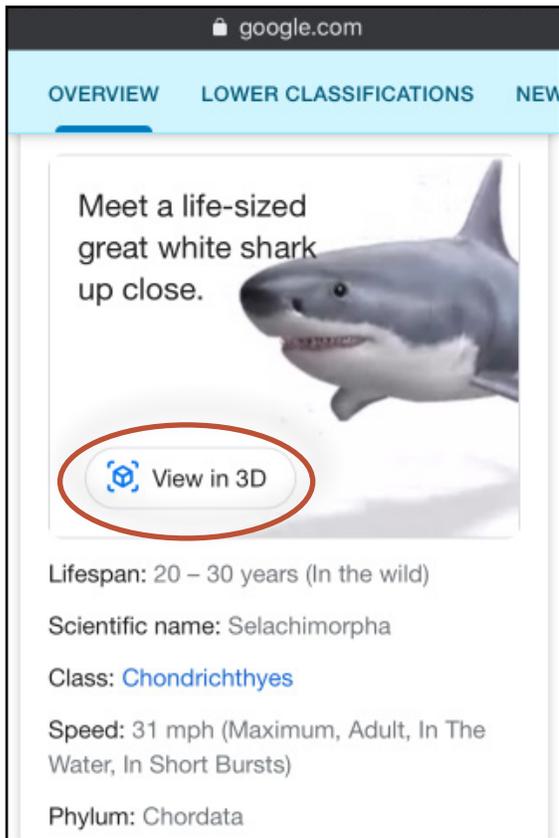
Dr. Helen Dooley studies the immune systems of sharks. Here she is with her hammerhead statue named Belle.

Want to learn more about how sharks and how they fight off disease?

You can find links to a short video on Dr. Dooley's research and a full lecture for advanced learners at

imet.usmd.edu/activities/sharks

There's a shark in the kitchen!



1. Google great white shark on a smartphone. Click "view in 3D" and follow the instructions on your screen to make a shark appear in your home. (If you don't have a smartphone available, just find images of the shark from different angles.)
2. Look at the shark from different angles and start writing down some things you notice. This is your chance to get up close to a great white shark!
3. Try crawling under the shark and looking up at its belly.

What color is the belly? _____

What color is the top of the shark? _____

You'll see that the belly of the shark is a much lighter color than the top. This is called **countershading** and it helps the shark to blend in with its surroundings. The shark is darker on top where the sun hits and lighter on bottom, making it harder for prey to see its approach. Do you have a pet at home? Some cats and dogs also have a lighter colored belly

What are three things you observe on the shark?

1. _____
2. _____
3. _____

What is one thing you wonder about the shark?

1. _____



If I have an answer, I'll write back to you!!

Meet the Little Brown Bat

- Weighs only **9 grams**, about the same as 3 or 4 pennies
- Found throughout the U.S. and Canada, including **in Maryland**
- Has only 1 baby per year, called a **pup**
- Makes its home, or **roost**, in trees, rock outcrops, and structures like bridges during the summer
- Can eat over **1,000 insects** in an hour
- Needs to **live near clean water**, where there are insects to eat
- **Hibernates**, or stays inactive throughout the winter



Researcher holds a little brown bat.

Why do scientists study bats?



Scientists make observations of bats in Frostburg, Maryland. All of this work happens late at night because that's when bats take to the sky!

Little brown bats eat insects, helping to protect plants from pests and reducing the need for pesticides on farms. They're a very important part of our ecosystem.

Little brown bats are in danger in Maryland and elsewhere for two main reasons:

- **Habitat loss:** Bats need to live near clean water and forests with large trees. As people move into their habitats and clear some of the forests, bats may not be able to find a home.
- **Disease:** In some caves, a fungus can spread and cause White-nose Syndrome. Bats with the syndrome wake up from their hibernation while

it's still winter. They use a lot of energy to stay warm and active, but can't get enough food. When a fungus spreads in a cave, all of the bats' lives are at risk.

Scientists at the Appalachian Lab of UMCES study how bats are affected by White-nose Syndrome and other dangers to their survival. This helps wildlife managers protect bats so they can continue to keep eating thousands of insects every night.

Make Your Own Little Brown Bat

Start with a square piece of paper. You can cut off part of a newspaper, magazine, or paper bag to make your bat!



Send me a photo of your origami bat or post it on Twitter/Facebook and tag IMET!

How Fast Does Ice Melt?

All of our scientists ask questions and design experiments to answer those questions. What makes up a research project? Below, we try to understand how fast an ice cube melts under different conditions - in plain tap water or in water with salt.

PROBLEM: Does adding salt make ice melt faster or slower?

HYPOTHESIS: What do you think? Will salt make the ice melt faster or slower?

PROCEDURE: Below are the steps to answer our question. Ask an adult in your house if you can give it a try.



1. Pick out two cups of equal size. Using tape, label one "control" and one "salt." Fill them with equal amounts of water.
2. We won't add anything to the **control**. It is useful for making comparisons. Add a big spoonful of salt to the cup labeled salt.
3. Add one ice cube to each cup and start a timer or make a note of the time.
Start Time: _____

DATA AND OBSERVATIONS: We're going to use a table to take notes. We'll compare the two samples, so just write a + for the sample that has more ice at each time point and a - for the one that has less ice.

Time After Start Time

	30 seconds	60 seconds	90 seconds	Time until fully melted
Control				
Salt				

CONCLUSIONS: Based on your data table, can you answer the question: Does adding salt make ice melt faster or slower? If so, what is the answer?

APPLICATIONS: At IMET, we also like to think about how our research may be used to improve lives. Can you think of any reasons why we might want to melt ice faster?

Designing an Experiment (or solving a mystery)



In the last activity, we guided you through designing an experiment to answer a question. What have you been wondering about recently? Maybe there's a strange noise in the house you can't identify. You could take notes each time you hear it to figure it out. Maybe you wonder whether cake batter bakes faster in muffin tins or cake pans. Design your experiment below then ask an adult if they can help you.

PROBLEM: _____

HYPOTHESIS: _____

PROCEDURE: What are the steps to answer your question? Do you need a control (like the plain tap water) for comparison?

DATA AND OBSERVATIONS: How will you track your results? Will you take notes in a notebook? Will you make a table? Will you take videos or audio recordings?

CONCLUSIONS: Based on your data, can you answer your question? If so, what is the answer?

APPLICATIONS: How could your conclusions help you and/or other people?

It's alive!

There's life all around us, even in the city! At the end of April, thousands of people participated in the City Nature Challenge, which asked people to identify species living in their city. There are great resources available for finding and identifying plant and animal species in and around your home.

If you want to be able to identify species that you see, you can use the iNaturalist app. With this app, you can take a photo and get suggested species IDs. Scientists can also help verify your observation. With the help of an adult, you can make an iNaturalist account and learn more at :

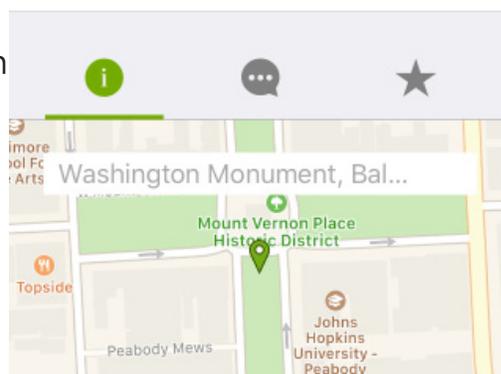
inaturalist.org/pages/getting+started

Right now, you're probably staying close to home, but you can still observe nature! Here are some possible ways to spot species:

- Look for insects in and around your home. Check under stones and boards outside and look around trees wells on the sidewalks.
- Look at the grasses growing in your neighborhood - even between cracks in the sidewalk. Are they all the same? Are there any small plants you haven't noticed before?
- Look up at the sky! Who's flying by? It may be hard to get a good picture of a bird, but people often identify birds by their songs. Make an audio recording of the birds around you.



basswood
Tilia americana



Here are some observations made on iNaturalist around Baltimore:



Dandelion



Isabella Tiger Moth



Eastern Gray Squirrel



Biodiversity Bingo

BIO - DIVERSITY

"Bio" means life

"Diversity" means having a range of different elements

Biodiversity means a range of different living beings or a large variety of plant and animal species

What kind of biodiversity is around you? Play biodiversity bingo!

You don't have to find everything. Just sit outside or near an open window for ten minutes and mark down what you observe.

Evidence of an animal: tracks, fur, scat	A bird hopping on the ground	A leaf with smooth edges	A dog or cat	THINK: a place a rabbit might live
LISTEN: the sound of an insect	A flower with two or more colors	THINK: a good place to search for insects	A yellow flower	A species of grass
An animal with eight legs	THINK: a place you wish there was a tree for shade	A human	A squirrel	LISTEN: the sound of trees in the wind
A tree with smooth bark	An animal with four legs	A leaf smaller than your hand	LISTEN: a bird with a short song	An animal with six legs
LISTEN: a bird with a long song	A moth or butterfly	THINK: a place a bird might build a nest	A plant growing through the road or sidewalk	LISTEN: footsteps from a human or other animal

Science and Entrepreneurship

What is an entrepreneur? An entrepreneur is someone who creates a new business. This person has new ideas that they think other people will value.

Who is an entrepreneur? Anyone can be an entrepreneur! There are a lot of risks to starting a business, but it can also be a very rewarding job.

Why do my friends at IMET study entrepreneurship?



IMET trains graduate students in both science and entrepreneurship because some of the best business ideas come from scientific research. The Ratcliffe Environmental Entrepreneur Fellowship Program teaches business skills to young scientists. Students define a problem that exists and develop a business plan to solve that problem.

The Problem:

Lauren's Solution:



The Problem:

Taylor's Solution:

Established in the Fall of 2014, the REEF Program is supported by the Philip E. and Carole R. Ratcliffe Foundation.

What problem can your business solve?

Entrepreneurs come up with creative solutions to problems and build businesses around their solution. In this activity, think of a problem in your home or community and some possible ways to help.

What is a problem in your home or community that you'd like to address?

What are three things you think could be done to address that problem?

1.

2.

3.

Pick one of your ideas. What are three things you need to have in order to do this? Would you need other people to help? Would you need materials or tools?

1.

2.

3.

One entrepreneur can't do everything on their own. Who would make a good business partner and what kind of advice or help would you want from them?

What is the name of your business?
