Twenty Thousand Leagues Under the Sea

TEACHER RESOURCE GUIDE

School Matinee Performances

Presented by

University Hospitals

Rainbow Babies & Children's

Playhouse Square®

Teacher Resource Guide

TWENTY THOUSAND LEAGUES UNDER THE SEA

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COMMUNITY ENGAGEMENT & EDUCATION

Playhouse Square®

The lessons and activities in this guide are driven by the Ohio Learning Standards (2017) in English Language Arts and Science.

21st century skills of creativity, critical thinking and collaboration are embedded in the process of bringing the page to the stage. Seeing live theater encourages students to read, develop critical and creative thinking skills and to be curious about the world around them.

This Teacher Resource Guide includes background information, questions, and activities that can stand alone or work as building blocks toward the creation of a complete unit of classroom work.

cuyahoga arts & culture

Ohio Arts Council

The Ohio Arts Council helps fund this organization with state tax dollars to encourage economic growth, educational excellence and cultural enrichment for all Ohioans.

Playhouse Square is supported in part by the residents of Cuyahoga County through a public grant from Cuyahoga Arts & Culture.

ABOUT PLAYHOUSE SQUARE

Playhouse Square is an exciting field trip destination! As the country's largest performing arts center outside of New York, the not-for-profit Playhouse Square attracts more than one million guests to 1,000+ shows and events each year. Five of Playhouse Square's 11 performance spaces are historic theaters that first opened in the early 1920s. By the late 1960s, they had been abandoned. A group of volunteers saved the theaters from being turned into parking lots. Now, all five historic theaters are fully restored.

You'll find Broadway, concerts, comedy, dance and family shows on Playhouse Square's stages, along with performances by Playhouse Square's six resident companies: Cleveland Ballet, Cleveland Play House, Cleveland State University's Department of Theatre and Dance, DANCECleveland, Great Lakes Theater and Tri-C JazzFest.

When you visit, be sure to check out the GE Chandelier, the world's largest outdoor chandelier, and the retro Playhouse Square sign with its 9-foot-tall letters!

Coming to the Theater

We look forward to welcoming you and your students to Playhouse Square! To prepare for a successful field trip, we encourage you to spend some time discussing the differences between coming to the theater and watching a television show or movie or attending a sporting event, especially if you have students who have not yet had the opportunity to attend a live theater performance. Here are a few points to start the discussion:

- You and your students will be greeted and helped to your seats by members of Playhouse Square's staff and "RedCoat" volunteers.
- Theaters are built to magnify sound. Even the slightest whisper can be heard throughout the theater. Remember that not only can those around you hear you, the performers can too.
- As you watch the performance, feel free to respond by laughing or applauding.
- Food, drink and gum are not permitted in the theater for school matinee performances.
- Photography and recording of performances are not permitted.
- Mobile phones and other devices that make noise or light up should be silenced and put away before the performance begins.
- When the houselights dim, the performance is about to begin. Please turn your attention toward the stage.
- After the performance, a member of the Playhouse Square staff will come out on stage to dismiss each school group by bus number. Check around your seat to make sure you have all of your personal belongings before leaving.

ABOUT THE SHOW

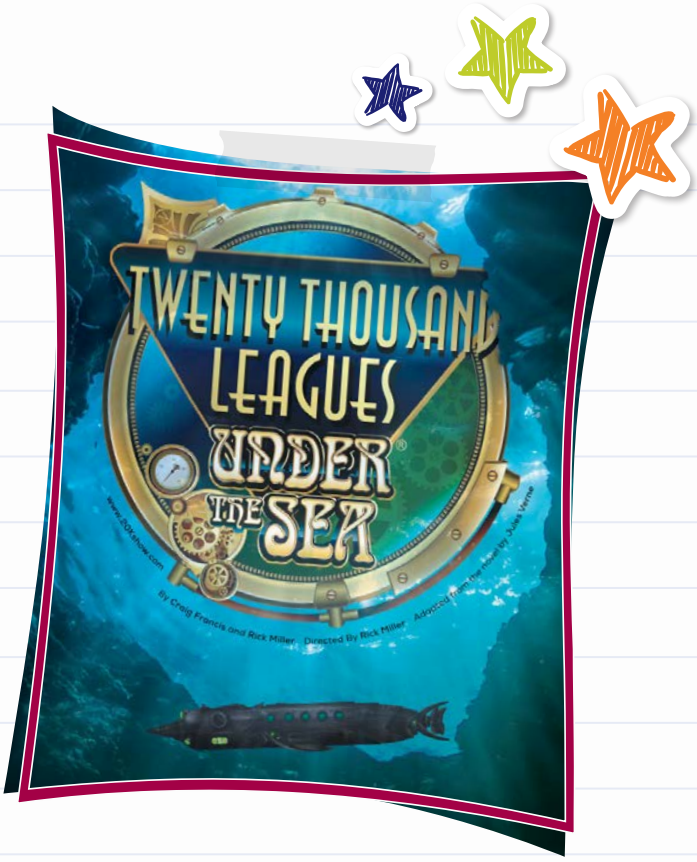
The Story

Mysterious sea creatures, a spectacular aquatic vessel, a thrilling adventurous journey – plunge into a multisensory experience with unforgettable characters, eye-popping projections and creative technology as Jules Verne's classic adventure novel is brought to life on stage!

At its heart, *Twenty Thousand Leagues Under the Sea* is a thrilling adventure tale. The story's vision foretold issues from water to colonialism to whaling; it predicted many uses of electricity, the submarine, diving suites, and the stun gun. This new stage production retains all the original relevance and power of the novel, while expanding its vision in an exciting, character-driven narrative across and under Earth's oceans.

Co-created by Kidoons Network and WYRD Productions, this inventive, reimagined adaptation of the beloved underwater tale follows Jules, a modern-day doctoral student stuck in a state of gloom and desperation about the current-day condition of our oceans. As he is working on his thesis, he is reminded of his favorite story, Jules Verne's *Twenty Thousand Leagues Under the Sea*. In his recounting of the story, he is transported back in time to the year 1868 where he meets Professor Claire Aronnax. Jules hopes for some clarity and understanding regarding his woes, but the mysterious Captain Nemo has his own agenda, whisking Jules, Professor Aronnax and Ned Land aboard the Nautilus for a journey of marvel and danger!

Rediscover the sense of wonder at human ingenuity, as well as the oceans themselves – which 200 years later, we continue to explore – in this special retelling of Jules Verne's classic tale, exploring the nature of power and the power of nature.



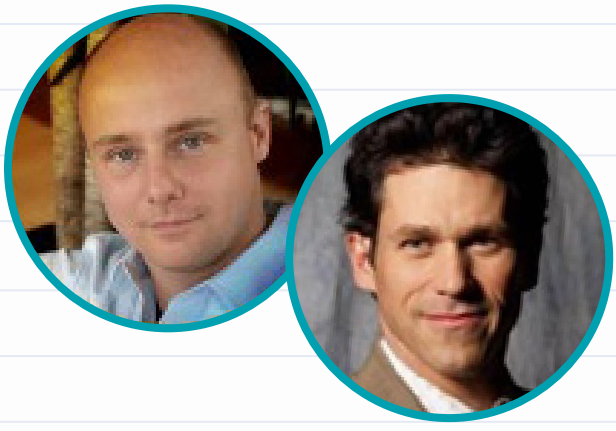
stagecraft and online interactive tools, they have, along with theater artists across Canada, reimagined Jules Verne's classic tale of adventure.

In addition to theater-making, Kidoons and WYRD productions also create online educational tools and web series that bring environmental issues to the attention of young viewers. They even made an app for *Twenty Thousand Leagues Under the Sea*! Check it out on the Resources page of this guide.

Concerned with protecting the planet for future generations, in 2015, Kidoons began a partnership with Earth Day Canada's Ecokids program with the goal of getting kids across Canada to plant 25,000 trees. That's 5,000 more trees than leagues traveled in the Nautilus!

The Creators

Twenty Thousand Leagues Under the Sea was created through a collaboration between Craig Francis of Kidoons and Rick Miller of WYRD Productions, based in Montréal, QC, Canada. Francis has a background in theater activism for young audiences, while Miller and WYRD focus on multimedia and transmedia storytelling in theatrical productions. Through stimulating visuals,



Art Forms

META THEATER

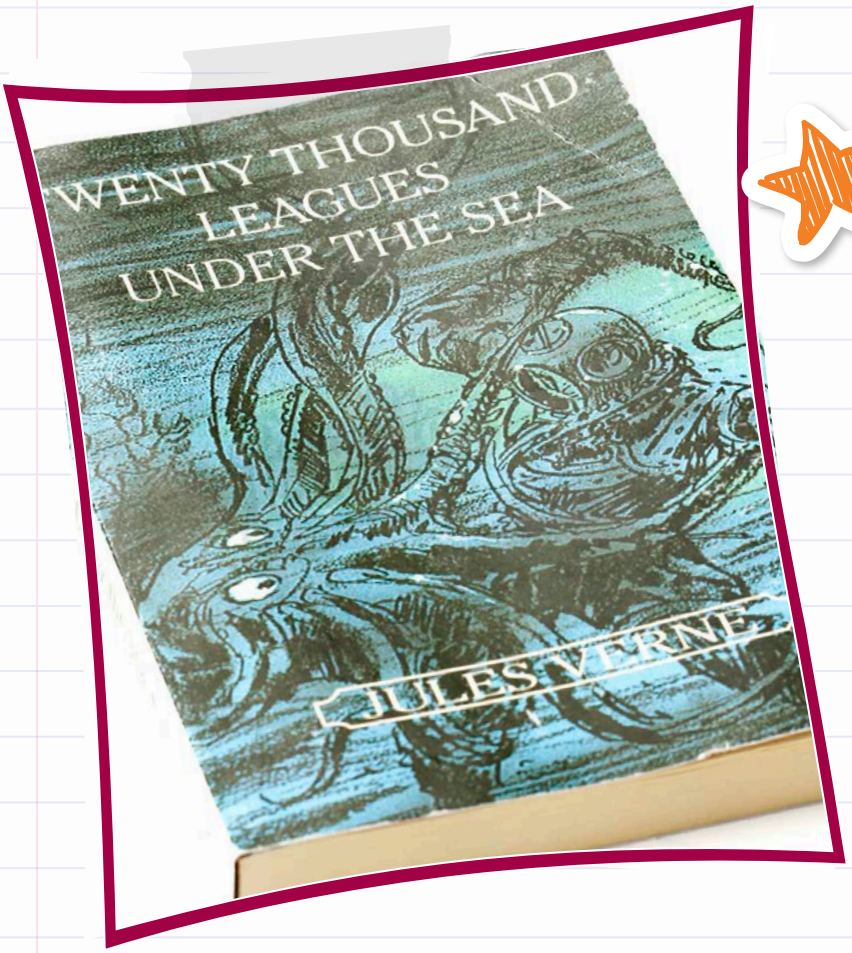
Meta Theater is a form of theater that is known for commenting on its own story, making the audience aware of the fact that they are watching a theatrical piece. In *Twenty Thousand Leagues Under the Sea*, Kidoons/WYRD accomplish this by having the play narrated by a 21st Century college student (Jules), who is writing his thesis about how plastic is destroying our oceans. He then ventures into one of his favorite novels and becomes a part of the story.

THEATRICAL ADAPTATION

Plays you see on stage are often adapted from books, movies and stories that are re-told by playwrights in new ways. Kidoons/WYRD's production of *Twenty Thousand Leagues Under the Sea* is adapted by Canadian theater artists Rick Miller and Craig Francis from Jules Verne's 1870 novel of the same name. This is not the first adaptation of this novel! There are well over twenty adaptations made for stage, television and film, the most famous being Walt Disney's famous retelling, released in 1954.

MULTIMEDIA DESIGN

Multimedia Design combines an array of artistic mediums such as film, literature, visual arts, music and sound into a theatrical performance. In this adaptation of *Twenty Thousand Leagues Under the Sea*, video and image projection is used to create elaborate scenes, such as the control center of a submarine or an underwater diving expedition.



Under the Sea Book Club

The Ohio Learning Standards listed below are addressed in the following Pre-Show Activity:
CCR.RI.2.9, CCR.RI.3.9, CCR.SL.2.1, CCR.SL.3.1

Additionally, while the Ohio Learning Standards for The Nature of Science are in review, the below Next Generation Science Standards from Appendix H can be linked to the following Pre-Show Activity:
NGSS: Science is a Human Endeavor, Grades K-2

The play *Twenty Thousand Leagues Under the Sea* captures the imagination of the ocean as well as some of the things that we know for sure about the ocean – especially oceanic life. How do we know all of these things about the ocean? Many people in history were curious and were determined to learn as much as they could about the creatures in the ocean – even what the ocean floor looked like.

Before watching the play, divide your students into groups and have them create a book club to learn about the people who contributed to what we now know about the ocean. Assign each group a book (or a YouTube read aloud version of the book) and give each person a literature circle role. Have each group share with the class what they learned about their person.

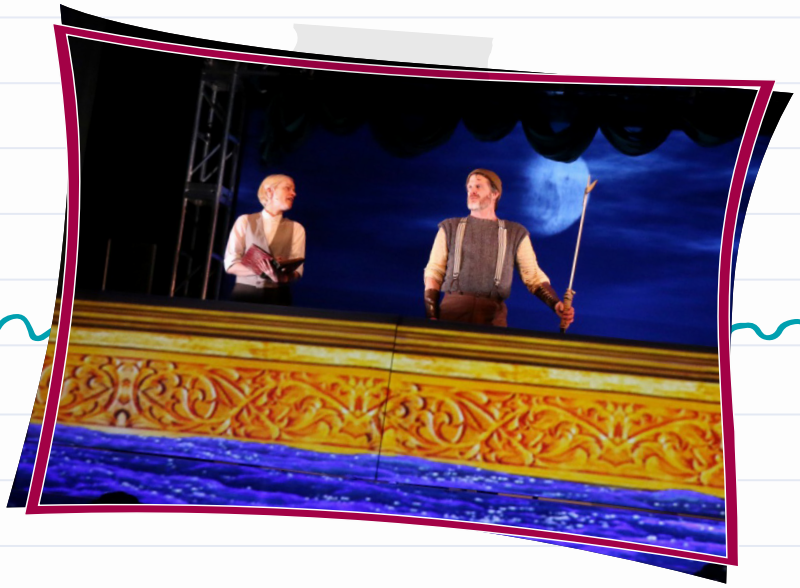
Literature Circle Roles:

Groups do not need to have each role represented. Extra roles are provided to allow for teachers to match roles with students' needs and abilities.

- **Arty the Artist:** While reading the story, pay attention for a part that you want to draw.
- **Creative Connector:** Are there parts of the story that you or your group members experience in your life? Your job is to find those connections.
- **Discussion Director:** Your job is to help your book club members discuss the questions that your teacher gave you.

  Teachers: Suggested questions for each oceanographer might be "Describe the person and what they were like?" and "What have they taught us about the ocean?"
- **Curious Questioner:** Does your group have questions after reading the story? Your job is to write these questions down and share them with the whole class.
- **Speedy Summarizer:** Your job is to be able to tell the main events of the story.
- **Word Wizard:** Keep a list of interesting words, unfamiliar words, or words that stand out to you and your group.

Suggested books located on the Resources Page of this guide.



Ocean Adaptations

The Ohio Learning Standard listed below is addressed in the following Pre-Show Activity:
4.LS.1

There are many ocean creatures that your students will see in *Twenty Thousand Leagues Under the Sea*. Some have very strange features as a result of adapting to their environment in order to survive. Ask students to consider the following organism: a human, kelp (show them an image of a kelp forest) and a dolphin. Ask them to discuss with a partner how each of these organisms survive in the following conditions:

How does a human survive in:	**How does a kelp forest survive in:**	**How does a dolphin survive in:**
• Cold climates • Hot climates • Stormy weather • Under water	• Cold temperatures • Hot temperatures • Dark areas • Stormy weather • The water	• Cold temperatures • Hot temperatures • Stormy weather • The water
How does a human find: • Food • Shelter • Water	**How does a kelp forest find:** • Food • Shelter • Water	**How does a dolphin find:** • Food • Shelter • Water

Explain to your students that the physical and behavioral traits of organisms are called adaptations. As a class, discuss what students listed as survival mechanisms and see if you can add more to the list. Make one list for animals and one list for plants.

Once the two lists are made, circle all the animal adaptations that are physical red and all the animal adaptations that are behavioral blue. Circle all the plant adaptations that are growth green, and all the plant adaptations that are reproductive black. Examples of specific adaptations are provided in the table below

Animal Adaptations		**Plant Adaptations**	
Physical	Behavioral	Growth	Reproduction
Specialized body parts: claws, teeth, beaks, etc. **Defense**: poison, spray, hard shell, etc. **Mimicry** **Camouflage**	**Food**: carnivore, omnivore, scavenger, herbivore) **Activity**: Nocturnal, Diurnal, Crepuscular **Temperature/seasonality**: hibernation, migration, tolerate	**Defense**: spikes, bark, irritating, poisonous **Competition** **Nutrients**	**Pollination**: flower odor, flower color **Seed dispersal**: made for wind transportation, made for animal transportation, seed/fruit palatability (eaten and dispersed)

Next, have your students think of organisms in the ocean that have needed to make adaptations in order to survive. Have pairs of students find one animal and have them answer the following:

1. Name of organism: _____
2. Where do they live: _____
3. Range: _____
4. Adaptation: _____
5. Why is that adaptation needed: _____

Finally, talk with your students about the anglerfish. It's an ancient looking, scary creature and it has a "lightbulb!" Discuss the different adaptations that are needed in order for this fish to survive. What conditions does it need to adapt to darkness, pressure, etc.? How does the anglerfish get its food? How does it protect itself from other animals?

Tell your students that they will design a creature that has to adapt to harsh environments. You can give pairs of students a different harsh environment. Have your students draw what the creature will look like and have them include the environment and the adaptations that are needed to survive in that environment.

Harsh environment examples:

- 24 hours of sunlight
- 365 days of overcast skies
- Day time temperatures of 130 degrees Fahrenheit
- Very little pressure (opposite from the adaptations that the organisms on the sea floor made)
- No oxygen

Sparkling Seas

The Ohio Learning Standards listed below are addressed in the following Pre-Show Activity:
6.LS.3, 7.LS.1

During the play, your students will see some interesting sea creatures; however, it is the anglerfish that intrigues students the most. The esca, or "light bulb," often provokes the most questions from students. How does it light up? Why does the fish have it? Do they have it for their entire life? This lesson will help your students understand what bioluminescence is, how it works, and how animals who can't produce their own bioluminescence can still use it to their advantage.

Introduce the concept of bioluminescence to your students by showing them a video clip of the *Sea of Stars* located in the Maldives. Have your students create an O-W-L chart like the one below. As they watch the video, have them write down their observations in the "O" column (you may need to play the video a couple of times). After watching the video, ask your students to write any "I wonder" statements in the "W" column. Discuss their wonderments as a class, but do not yet answer their questions.

Observe	**W**onder	**L**earn

Allow Your Students to Observe This Glowing Water First Hand!
Briefly explain to your students that a single-celled organism called dinoflagellate, a type of phytoplankton, is what is glowing in the water. They will spend the next several days observing and making "I wonder" statements about these dinoflagellates.

Preparing your classroom dinoflagellates (teachers, this will take roughly a week):

1. Order bioluminescent dinoflagellate culture from Carolina Biological Supply Company (information provided on the resource page of this guide), or a similar supply company.
2. Once you've received your package, reestablish the dinoflagellate circadian cycle. Directions are provided with your order, and a video is available online. A timed UV light works very well to help reestablish the circadian cycle.

Once the rhythm has been established, students can look at the dinoflagellates under a microscope. As they look at the dinoflagellates under a microscope, have them add to their observations and "I wonder" statements. Allow them to observe the dinoflagellates for several days. Have them draw what they observe. Have them describe their behaviors. Do they notice any patterns?

After observing the dinoflagellates, show the videos *Sea of Stars – Vaadhoo Island, Maldives* and TedEd *The Brilliance of Bioluminescence* (found on the resource page of this guide). These videos will begin to explain bioluminescence to your students. As they watch these clips, have them write answers to their wonder statements in the "L" column of their O-W-L chart. Again, you may need to replay the clips a couple of times.

Before allowing them to work in groups or pairs to discuss the answers to their "I wonder" statements, reinforce concepts shown in the TedEd video. Give each student a glow stick or use a single glow stick as a class demonstration. Most students have played with glow sticks, however, they may not be familiar with why the material glows. Ask students how they are able to make the stick glow. Most will say that you need to break the stick and shake it. Shaking is the key component. By shaking the stick, you are mixing the chemicals together and this produces a chemical reaction. Glow sticks are man-made and the process is called chemiluminescence. Bioluminescence, light created inside of an organism, is a type of chemiluminescence that occurs naturally.

Allow students to discuss their O-W-L charts and conclude the activity with a group discussion on bioluminescence.

The Longest Swim

The Ohio Learning Standards listed below are addressed in the following Pre-Show Activity:
ENV.ER.3, ENV.GP.9

The play your students are about to watch has added a modern twist to the book *20,000 Leagues Under the Sea.* In this version, your students will hear the main actor talk about the Great Pacific Garbage Patch a number of times. What exactly is the Great Pacific Garbage Patch? Your students may have heard about it, but they may have some misconceptions. Prior to viewing the play, have your students complete a webquest to help them learn about the garbage patch. The following videos are short clips, under five minutes each, and they explain the garbage patch in age appropriate terms.

The Majestic Plastic Bag – A Mockumentary is an excellent introduction video for your students to watch. It provides an accurate description of the garbage patch and how it formed, while adding some humor. As your students watch this video, have them identify true statements, exaggerated claims, and claims that are purposely added for entertainment value (i.e. the plastic bag is a species).

Video link:
https://www.youtube.com/watch?v=GLgh9h2ePYw

The Swim introduces your students to Ben Lecomte, a long-distance swimmer who swam across the Atlantic Ocean, and attempted to swim across the Pacific Ocean this past year. He was able to swim from Tokyo to Hawaii before his ship suffered irreparable damages and he and his team had to call it quits. While swimming across the Pacific, he and his team collected over 1,000 pieces of data (plastic) to help scientists understand the enormity of the microplastics in the ocean. This video introduces your students to Ben and the goals behind The Longest Swim - All Hands on Deck.

Video link:
https://www.seeker.com/videos/earth/the-swim-ended-with-1000-new-scientific-samples-heres-whats-next

A second video from *The Swim* explains more about the science that is being done.

Video link:
https://www.youtube.com/watch?v=6HBtl4sHTqU

The Pacific Garbage Patch does a great job providing accurate information about the garbage patch.

Video link:
https://www.youtube.com/watch?v=IgAGmkJaQXI

The Nurdles Quest for Ocean Domination is a video that will help to explain what microplastics are and the dangers that they possess.

Video link:
https://www.youtube.com/watch?v=KpVpJsDjWj8

The final video is from the dirtiest beach in the United States - Kamilo Beach in Hawaii. The aim for this video is to try to help students realize that the microtrash problem is our problem.

Video link:
https://vimeo.com/16915737

This lesson will tie in nicely with any Earth Day learning activities that your school might participate in.

Webquest Handout

The Majestic Plastic Bag – a Mockumentary

Statements that are true	Statements that are exaggerated	Statements for entertainment purposes

1. Who is Ben Lecomte and what is he trying to do?
2. What are microplastics?
3. What types of plastics did the team find in the Pacific Ocean? Which objects do you use?
4. How do microplastics in the ocean harm us even though we live hundreds of miles from an ocean?
5. What are gyres?
6. What was the Great Nike Shoe Spill?
7. The Great Pacific Garbage Patch is often described as islands of trash. What is it like in reality?
8. Where and why do garbage patches form? Do garbage patches form only in the Pacific Ocean?
9. How can we solve this problem?
10. What are nurdles and how are they "planning" global ocean domination?
11. How do nurdles get into our waterways?
12. Residents near Kamilo Beach have numerous beach clean-up days. Why do they have to clean up their beach on a continuous basis? From where does the trash originate?
13. What can you do to use less plastics?

ONE PLASTIC BAG

The Ohio Learning Standards listed below are addressed in the following Post-Show Activity:
CCR.W.2.1, CCR.W.3.1

Throughout the play, the actor mentions the Pacific Garbage Patch. Much of the plastic that humans throw away makes its way to the Pacific Ocean and accumulates in the middle. The environmental impact is huge as it effects water quality and the animals that must now live with this trash. However, plastic doesn't just impact the oceans. It is easy for plastic not to make it to recycling centers and landfills. It blows away and becomes litter, harming animals on land – including humans.

The story *One Plastic Bag: Isatou Ceesay and the Recycling Women of the Gambia* is a true story about the women in a village who had enough of the plastic garbage. They find a way to reuse the plastic, and by doing so, they make the area cleaner, protect the animals and even earn money for things that they need. The author has a read aloud version on YouTube where she provides some additional background information about how the story was written. It concludes with a quick clip of Isatou Ceesay.

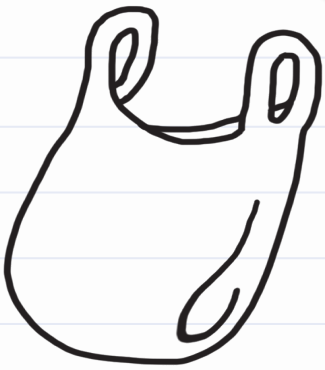
Read the story or watch the read aloud with your students (found on the resource page of this guide). Then lead a discussion with your students about the dangers of plastic bags that they learned about in the book or saw during the play. You may want to show students images of the Pacific Garbage Patch.

Suggested Discussion Questions:

- How is throwing plastic away harmful for the environment?
- Can plastic trash effect people? How?
- Isatou Ceesay decided that something had to be done. What was her way of solving this problem?
- What are things that you and your family can do to help reduce plastic trash?

Finally, tell your students that they are going to create a plastic bag campaign. Give them the sheet with the plastic bag drawn on it. For kindergartners, have them draw a picture that shows how they can reuse plastic bags. For older students, have them write why it is important to recycle or reuse plastic bags.

WRITING PROMPT



WHERE NO MAN HAS GONE BEFORE!

The Ohio Learning Standard below is addressed in the following Post-Show Activity:
CCR.W.5.3

Oceans cover over two-thirds of the earth's surface. The oceans are so large, scientists from the National Oceanic and Atmospheric Administration (NOAA) claim that we have only explored five percent of them! There is so much that we don't know about our oceans. Some scientists even claim that we know more about the surface of Mars than we do about our own oceans.

Have your students imagine that they have just been given a grant to explore part of the ocean, and the possibilities are endless for what they can study. The grant requires them to write a blog about their experiences – to be read by first graders.

In the blog your students should tell the first graders:

- Which ocean they are exploring
- The part of the ocean that they will explore (surface, sea floor, twilight zone)
- The materials that they will need during their expedition (ship, submersible, wet suits)
- How long they will be gone
- The types of animal and plant life they expect to see
- The conditions they expect to encounter (cold, stormy weather; hot, humid weather; dark conditions, etc.)

They can be creative with their blog or can fill it with factual information.

OCEAN ZONES AND BIOLUMINESCENT CREATURES

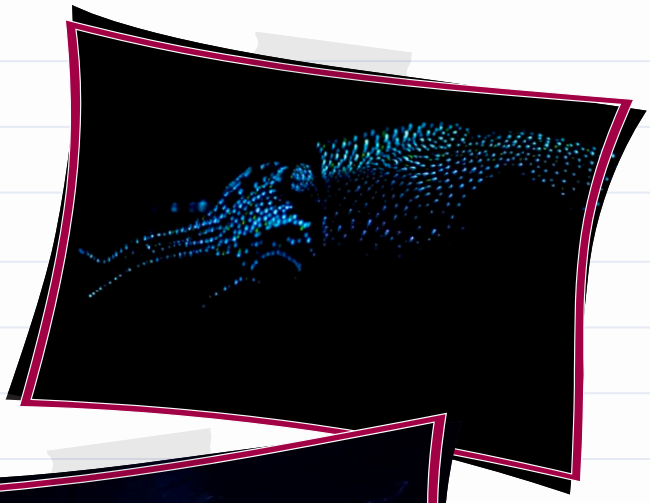
The Ohio Learning Standards listed below are addressed in the following Post-Show Activity: 7.LS.1, 7.LS.2

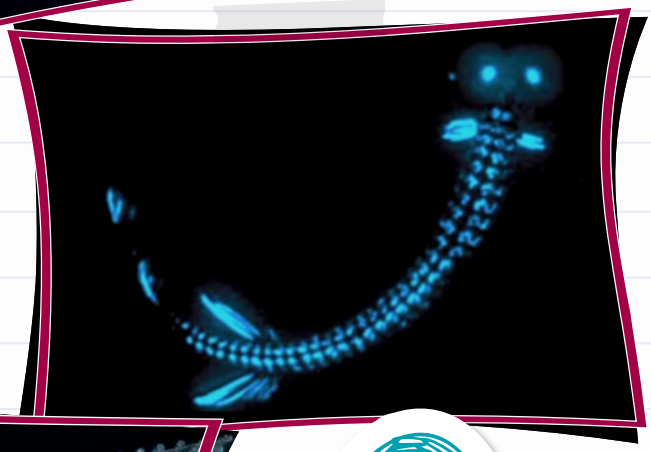
While aboard the Nautilus, Captain Nemo and his crew travel through the various zones of the ocean. During their trip, they see many sea creatures that are very different from terrestrial organisms. Perhaps the most perplexing creatures are those that glow! Have your students explore these glowing creatures while reinforcing what they learned about biomes this academic year.

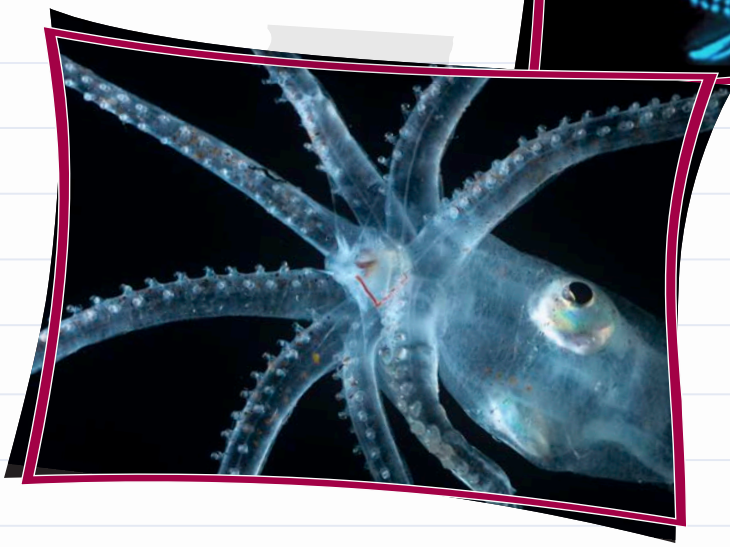
First, have students explore each of the ocean zones. They should describe each zone and the abiotic and biotic factors associated with each zone.

Ocean Zone	Features, including abiotic and biotic factors, and at least 3 organisms that are bioluminescent	
Sunlight	Amount of sunlight: Pressure: Examples of life:	Temperature: Depth:
Twilight Zone	Amount of sunlight: Pressure: Examples of life:	Temperature: Depth:
Midnight Zone	Amount of sunlight: Pressure: Examples of life:	Temperature: Depth:
Abyss	Amount of sunlight: Pressure: Examples of life:	Temperature: Depth:
Trench	Amount of sunlight: Pressure: Examples of life:	Temperature: Depth:

Next, have students learn more about the organisms that are bioluminescent. For each organism listed below, have them identify their type of life (plant, animal, bacteria, single cellular organism, etc.), the ocean zone where they live, and how they use their bioluminescence (clouds of "glow," signaling to others, confusing predators, mating, attracting prey, escaping, symbiotic relationships). Students should have at least three examples for each ocean zone. Encourage them to illustrate their finding in their chart, corresponding with the correct zone for that organism.







Bioluminescent Marine Life:

Copepods
Dinoflagellates
Krill
Sea Fireflies
Anglerfish
Netdevil Anglerfish
Jelly fish
Vampire Squid
Bioluminescent Squid
Deep Sea Fish
Decapod Shrimp
Bioluminescent Bacteria
Flashlight Fish
Cookie-Cutter Shark
Siphonophores
Viper Fish
Octopus
Bermuda Fire

THE OCEAN CLEANUP

The Ohio Learning Standards listed below are addressed in the following Post-Show Activity:
ENV.ER.3, ENV.GP.9, CCR.SL.9-10.4, CCR.SL.11-12.4

The Longest Swim had students learning about how scientists are studying the Great Pacific Garbage Patch. This activity will allow students to critically examine one method for cleaning the ocean's plastics. Students will use Bono's hats to critique this cleanup method.

Bono's hats, also known as the "Six Thinking Hats" was created by Edward de Bono. It is an excellent tool to use when looking at a solution from multiple angles. Each hat is assigned a different color and the color represents a different lens from which the student will look at the solution. The colors are:

White: Information – the person with this hat considers what information is available. What are the facts?

Red: Emotions – the person with this hat considers intuition, instincts, gut reactions, or statements of emotional feeling (but no justifications)

Black: Discernment – the person with this hat considers logic that can be applied to identifying reasons to be cautious and conservative, practical and realistic.

Yellow: Optimism – the person with this hat considers logic that can be applied to identifying benefits, the pros to the proposed solution

Green: Creativity – the person with this hat thinks creatively and outside the box

Blue: Managing – this hat is worn by the teacher. The teacher's role is to summarize all viewpoints, synthesize the information, and to help the class come to an agreed response. This hat also keeps everyone on task while looking at the bigger picture.

Break the class into five groups, one for each color. Assign each group their "hat" and explain what each color represents. Tell your class that you are going to show them a five-minute video clip about The Ocean Cleanup (found on the resource page of this guide), the first attempt at removing the plastics from the ocean. As they watch the video, they must watch it from the perspective of the hat that they represent. For example, students in the white hat group will identify the facts while students in the yellow hat group will find the pros to this method.

Once they are done watching the video, have them visit the website for The Ocean Cleanup to find additional information to support their claims. The video is on the website and they will be able to watch it as many times as they need to. Have them write a position statement about The Ocean Cleanup.

Once the students have finished gathering information from their perspective and they have written a position statement, do a jigsaw. Break them into groups, but this time, each group will have one representative from each color group: white, red, black, yellow and green. Each person will share the position statement that their group wrote. After all of the students have shared their position statements, they will then discuss each of the points of views and come up with a position statement that they agree upon. Each group will then present their position statements to the class.

This activity is a continuation of The Longest Swim activity found on page 11.

RESOURCES

Reading

Solving the Puzzle Under the Sea: Marie Tharp Maps the Ocean Floor
By Robert Burleigh and illustrated by Raul Colon (Grades PreK-3)

Shark Lady: The True Story of How Eugenie Clark Became the Ocean's Most Fearless Scientist
By Jess Keating and illustrated by Marta Alvarez Miguens (Grades PreK-4)

Life in the Ocean: The Story of the Oceanographer Sylvia Earle
Written and Illustrated by Claire A. Nivola (Grades PreK-3)

The Fantastic Undersea Life of Jacques Cousteau
Written and illustrated by Dan Yaccarino (Grades 1-4)

Manfish: A Story of Jacques Cousteau
By Jennifer Berne and illustrated by Éric Puybaret (Grades K-3)

One Plastic Bag: Isatou Ceesay and the Recycling Women of the Gambia
Written by Miranda Paul and illustrated by Elizabeth Zunon (Grades K-3)

Web

Kidoons *Twenty Thousand Leagues Under the Sea*
http://www.twentythousandleaguesunderthesea.ca/

The Sea of Stars on Vaadhoo Island
https://www.youtube.com/watch?v=zLdNhh4R38E

Sea of Stars - Vaadoo Island, Maldives
https://www.youtube.com/watch?v=vOPliKfxk8Y

The Brilliance of Bioluminescence
https://ed.ted.com/lessons/the-brilliance-of-bioluminescence-leslie-kenna#watch

YouTube Read Aloud of *One Plastic Bag: Isatou Ceesay and the Recycling Women of the Gambia*:
https://www.youtube.com/watch?v=_B6p04Zph04

The Ocean Cleanup
https://www.theoceancleanup.com/technology/
https://www.theoceancleanup.com/
https://www.businessinsider.com/boyan-slat-ocean-cleanup-launch-into-pacific-on-september-8-2018-7

Dinoflagellate Culture Order
Carolina Biological Supply Company www.carolina.com
Bioluminescent Dinoflagellates, Living
Item # 153305
$8.30 +tax +shipping +live organism fee

Instructional Video – https://www.carolina.com/teacher-resources/Interactive/living-organism-care-guide-bioluminescent-dinoflagellates/tr41209.tr

Carolina Biological Supply Company also carries sea fireflies. They are another great way to allow students to explore bioluminescence in a hands-on way. 500mg cost approximately $70. Directions are provided with the sea fireflies.

CURRICULUM STANDARDS INDEX

Standard	Description	Grade	Activity	Page
CCR.RI.2.9	Compare and contrast the most important points presented by two texts on the same topic.	2	Under the Sea Book Club	7
CCR.SL.2.1	Participate in collaborative conversations with diverse partners about 2nd grade topics and texts with peers and adults in small and larger groups.	2	Under the Sea Book Club	7
CCR.W.2.1	Write opinion pieces in which they introduce the topic or book they are writing about, express an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section.	2	One Plastic Bag	13
CCR.RI.3.9	Compare and contrast the most important points and key details presented in two texts on the same topic.	3	Under the Sea Book Club	7
CCR.SL.3.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.	3	Under the Sea Book Club	7
CCR.W.3.1	Write opinion pieces on topics or texts, supporting a point of view with reasons.	3	One Plastic Bag	13
4.LS.1	Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.	4	Ocean Adaptations	8
CCR.W.5.3	Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.	5	Where No Man Has Gone Before	15
6.LS.3	Cells carry on specific functions that sustain life.	6	Sparkling Seas	10
7.LS.1	Energy flows and matter is transferred continuously from one organism to another and between organisms and their physical environments.	7	Sparkling Seas Ocean Zones and Bioluminescent Creatures	10 16
7.LS.2	In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.	7	Ocean Zones and Bioluminescent Creatures	16

CURRICULUM STANDARDS INDEX

Standard	Description	Grade	Activity	Page
CCR.SL.9-10.4	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.	9-10	The Ocean Cleanup	18
ENV.ER.3	Earth's Resources: Water and Water Pollution	9-12	The Longest Swim The Ocean Cleanup	11 18
ENV.GP.9	Global Environmental Problems & Issues: Waste Management	9-12	The Longest Swim The Ocean Cleanup	11 18
CCR.SL.11-12.4	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.	11-12	The Ocean Cleanup	18

While the Ohio Learning Standards for Science are in review, the following Next Generation Science Standards from Appendix H can be linked throughout this resource guide.

Standard	Description	Grade	Activity	Page
Science is a Human Endeavor	Men and women from all cultures and backgrounds choose careers as scientists and engineers.	3	Under the Sea Book Blub	7
Science is a Human Endeavor	Men and women of diverse backgrounds are scientists and engineers	2	Under the Sea Book Club	7