Science & Literacy Activity

ACTIVITY OVERVIEW

This activity, which is aligned to the Common Core State Standards (CCSS) for English Language Arts, introduces students to scientific knowledge and language related to how scientists study ocean organisms.

This activity has three components:

1. **BEFORE YOUR VISIT**, students will read a content-rich article that will provide context for the visit, and also help them complete the post-visit writing task.
2. **AT THE MUSEUM**, students will read and engage with additional texts (including printed text, digital and physical/hands-on interactives, video, diagrams, models). This information will help them complete the post-visit writing task.
3. **BACK IN THE CLASSROOM**, students will draw on the first two components of the activity to complete a CCSS-aligned explanatory writing task.

Materials in this packet include:

For Teachers

- Activity overview (pp. 1-2)
- Article with teacher notes: "Listening to Life in the Deep" (pp. 3-6)
- Answers to student worksheet (pp. 7-8)
- Assessment rubric for student writing task (p. 9)

For Students

- Article: "Listening to Life in the Deep" (pp. 10-13)
- Student worksheet for *Unseen Oceans* exhibition visit (pp. 14-15)
- Student writing task and rubric (pp. 16-17)

Common Core State Standards

RI.K.1 With prompting and support, ask and answer questions about key details in a text.

RI.K.2 With prompting and support, identify the main topic and retell key details of a text.

W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.

Next Generation Science Standards

Connections to the Nature of Science

Scientific Investigations Use a Variety of Methods
- Scientist use different ways to study the world.

Science is a Human Endeavor
- Men and women of diverse backgrounds work as scientists and engineers.

SEP 8: Obtaining, Evaluating, and Communicating Information
- Obtain information using various texts, text features, and other media that will be useful in answering a scientific question.
- Communicate information in written forms using drawings and writing that provide details about scientific ideas.

1. BEFORE YOUR VISIT

Students will read a content-rich article about a scientist who uses sonar technology to learn about dolphin behavior. This article will provide context for the visit and help them complete the post-visit writing task.

Preparation

- Familiarize yourself with the student writing task and rubric (pp. 16-17).
- Familiarize yourself with the teacher version of the article (pp. 3-6), and plan how to facilitate the students' reading of the article.

Instructions

- Explain the goal: to complete a writing task describing students' own imaginary trip to the ocean to discover animals that live there. You may want to read through the writing task with students at this point.
- Tell students that they will read an article before visiting the Museum and read additional texts during the visit.
- Read and discuss the article, using the teacher notes to facilitate.

2. DURING YOUR VISIT

At the Museum, students will read and engage with additional texts (including printed text, digital and physical/hands-on interactives, video, diagrams, models). The information they'll gather from these multiple sources will help them complete the post-visit writing task.

Preparation

- Review the educator's guide to see how themes in the exhibition connect to your curriculum and to get an advance look at what your students will encounter. (Guide is downloadable at **amnh.org/unseen-oceans-educators**)
- Familiarize yourself with the student worksheets (pp. 14-15) and the map of the exhibition.

Supports for Diverse Learners

This resource has been designed to engage all learners with the principles of Universal Design for Learning in mind. It represents information in multiple ways and offers multiple ways for your students to engage with content as they read about, discuss, view, and write about scientific concepts. Different parts of the experience (e.g. reading texts, or locating information in the Museum) may challenge individual students. However, the arc of learning is designed to offer varied opportunities to learn. We suggest that all learners experience each activity, even if challenging. If any students have an Individualized Education Program (IEP), consult it for additional accommodations or modifications.

Instructions

- Explain the goal of the Museum visit: to read and engage with texts (including printed text, digital and physical/hands-on interactives, video, diagrams, models) and to gather information to help them complete the post-visit writing task.
- Distribute and review the worksheet and map. Clarify what information students should collect, and where.

Additional Suggestions for Facilitating the Museum Visit

- Have students explore the exhibition in pairs, with each student completing his or her own student worksheet.
- The answers to student worksheet page includes a list of the models in the exhibition to choose from, along with their locations on the exhibition map. Use this information to help them find suitable models to choose.
- Encourage student pairs to ask you or their peers for help locating information. Tell students they may not share answers with other pairs, but may point each other to places where answers can be found.
- For those who may have trouble taking notes in the exhibition, teachers and chaperones may use the included worksheets to transcribe students' observations. Teachers and chaperones may also take photos for students to refer to back in the classroom.

3. BACK IN THE CLASSROOM

Students will use what they have learned from the pre-visit article and at the Museum to complete a CCSS-aligned explanatory writing task describing their own imaginary trip to the ocean to discover animals that live there.

Preparation

- Plan how you will explain the student writing task and rubric (pp. 16-17) to students.

Instructions

- Distribute the student writing task and rubric. Explain that they will use it while composing, and will also use it to evaluate and revise what they have written.

Suggestions for Facilitating Writing Task

- Before they begin to write, have students use the writing task to frame a discussion around the information that they gathered at the Museum. They can work in pairs, small groups, or as a class, and can compare their findings.
- Referring to the writing prompt, have students underline or highlight all relevant passages and information from the article and from the notes taken at the Museum.
- Students should write their essays individually.

ARTICLE WITH TEACHER NOTES

Lexile: 550 **Word count:** 573

Text Complexity: The Lexile level for this text falls in the middle of the 2-3 CCSS grade complexity band. This text is suitable as a read aloud for students in grades K through 2. You should use your professional judgment and knowledge of students' independent reading levels regarding assigning this text for independent reading.

Notes:

- You may opt to use this article for shared reading as well as interactive read-aloud so that students can see the text on a projector as the teacher reads aloud.
- Set aside space on whiteboard or chart paper for a word wall.
- Assign each student a "talk partner" and have each pair designate "partner A" and "partner B."
- Children in the primary grades have varying scaffolding needs for engaging in peer conversation. This interactive read-aloud calls for Think-Pair-Share, but use your judgment in deciding when to pause and how to structure discussion to meet the needs of the learners in your classroom.

Key for Teacher Notes

- Green text
  specific strategies
- Regular text
  instructions for teachers
- *Italicized text*
  teacher's instructions to students
- Underlined text
  important domain-specific words

Listening to Life in the Deep

Kelly in elementary school.

When Dr. Kelly Benoit-Bird was in third grade, she visited an aquarium called SeaWorld. She saw dolphins there. She learned that dolphins make lots of clicking noises. The clicking sounds bounce off objects and other animals. They make echoes. The dolphins listen for the echoes to figure out where the objects and animals are. This is called "**echolocation**" (eh-ko-lo-CAY-shun). Kelly says, "Dolphins use echolocation because they can't see very well underwater. I got really excited when I learned this! The ocean is so different from our world. It's like another planet!"

Kelly Benoit-Bird is an ocean ecologist. She works at Oregon State University and the Monterey Bay Aquarium Research Institute.

Preview the text: *Before we read a nonfiction article, it helps to read the title and subtitles first to get an idea of what the article will teach us... Let's read these together.* Read aloud, showing the title and each subtitle as students follow along.

Think-Pair-Share: *Partners, take turns telling each other what you think this article will teach us.* Allow brief sharing out, based on what you hear during students' peer conversation.

2-A) Think-Pair-Share: *Look at the two photographs of Kelly Benoit-Bird. What do you notice?* Students should notice that she was a child in the first photo and an adult scientist in the second—emphasize that an interest she developed when observing dolphins at SeaWorld as a child led her to a career in science.

2-B) Word Wall: Scribe "echolocation" on the word wall and have students practice how to pronounce the term through choral reading and in partners. Create a definition for this term as a class based on how the text explains it, and scribe the definition on the word wall. (Students can chat about what the term means in pairs first, and you might select students to share ideas out with the whole group).

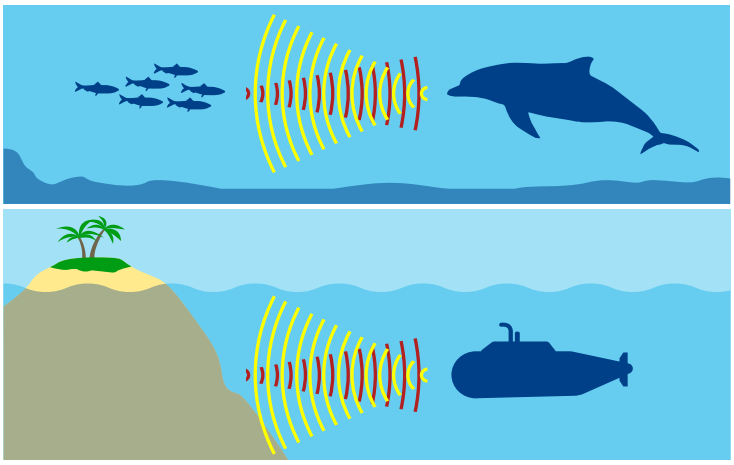
2-C) Think-Pair-Share: *At the end of this page there is a direct quote from Kelly in quotation marks. What do you think Kelly meant when she said: "The ocean is so different from our world. It's like another planet!"*

Now Kelly is an **ocean ecologist**. She is a scientist who studies how animals live in the ocean. She spends many days on boats observing ocean animals. She is trying to answer an important question. How do animals that live in the ocean interact with one another?

Word Wall: Add "ocean ecologist" to the word wall. Scribe the definition for this term from the text onto the word wall.

Using Sound to Study Life Underwater

The ocean is huge and deep. Below the surface it is also very dark. It is hard for people to get places underwater, and it is hard to see things there. This makes it hard to study. Kelly needs to make tools to help her. She is very good at inventing new tools. She grew up helping her father fix things in his garage. "My dad can fix and build pretty much anything!" she says. Most of Kelly's tools use echolocation. They make sounds that bounce off objects and animals. The tools use sound to "see" underwater, just like dolphins do!



A tool called sonar uses sound to "see" underwater. Dolphins use sound to "see" underwater too. The yellow lines show sound moving towards an object. The red lines are the echoes.

Think Aloud: *Wow, we learned a lot from that paragraph! We learned about a problem Kelly had when studying the ocean, and we learned about a tool she created to solve the problem.**

Think-Pair-Share:

1) What was the problem?

2) What tool did Kelly invent to solve this problem?

3) How does the tool work?

You might do a combination of Think-Pair-Share and guided discussion to answer these three questions. Students should know:

1) the problem—the deep ocean is difficult for people to get to, and it is too dark to see below the surface

2 & 3) Kelly invented tools that use echolocation, meaning they "use sounds that bounce off objects and animals" to "see" underwater. Guide students in making sense of the image that shows how the sonar tool uses echolocation like a dolphin does

*The underlined terms can be defined (in the context of science) and added to the word wall).

Kelly works with other scientists. Some of them are her students. They work as a team to make tools together. They all work together to find out new things about the ocean.

How Dolphins Herd Fish

Some animals eat other animals. They are called predators. Tigers and wolves are predators that live on land. Some predators, like tigers and polar bears, hunt alone. Others, like wolves and spotted hyenas, hunt in groups. They help each other catch animals to eat.

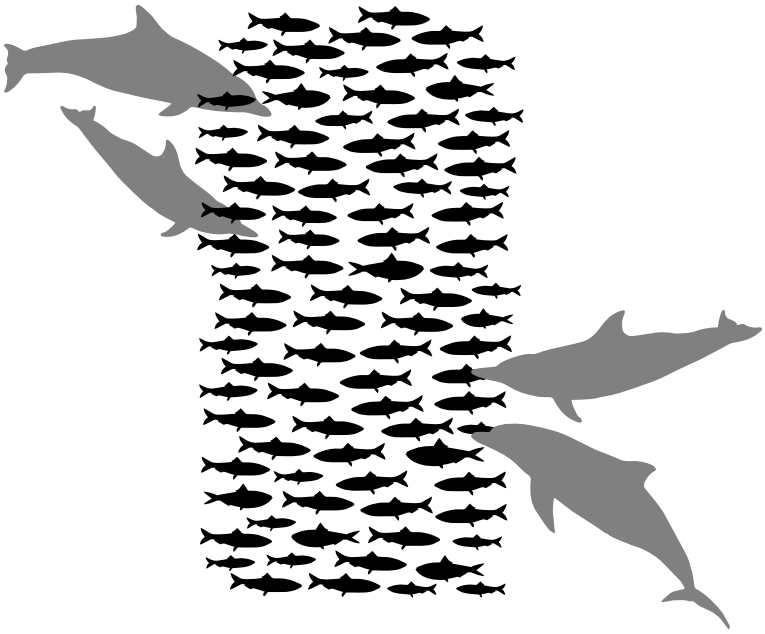
Dolphins are predators in the ocean. They eat smaller ocean animals, like fish. But nobody knew exactly how dolphins hunt. Kelly wanted to find out. Do dolphins catch fish by themselves? Or do they help each other catch fish?

Kelly decided to study groups of dolphins in the ocean near Hawaii. She went out on a boat and used her tools to watch them look for food in the water below. She discovered something new. These dolphins worked together to herd fish. First the dolphins made pairs, like kids with buddies. The pairs lined up. Then they swam together to look for a spot with lots of fish. When they found a large group of fish, the dolphins swam fast towards the fish. They pushed the fish ahead of them into a big group. Then they swam in circles around the fish.

Think-Pair-Share: *What question does Kelly want to answer?* Scribe the question on the whiteboard.

Think Aloud: *When a question is posed in a nonfiction text, it is usually answered... let's all have our eyes and ears open to see if Kelly discovers an answer to her question!*

The fish got confused and crowded even closer together. Then the dolphins took turns swimming in the middle. That's where there were lots of fish. The dolphins took turns eating the fish. They were all helping each other hunt.



Dolphins swim in pairs to herd fish. The pairs swim in circles around the fish.

Act it Out: After studying the diagram, have the class break into two groups, dolphins and shrimp. With your direction, have the "dolphins" act out the motion of circling around the "shrimp," who gather closer together inside the circle of "dolphins." Narrate as the students act out the movements of dolphins and shrimp.

Kelly loved learning new things about dolphins and fish. She wanted to know even more. She and her team put some tools on a robot. The robot can swim deep underwater! It can get really close to the animals there. It can tell different kinds of animals apart. It can watch them interact. Kelly keeps inventing more cool tools. She keeps learning more interesting things. The ocean is so big. There is always something new to discover!

Think-Pair-Share: *How does the robot help Kelly and her team learn about ocean animals?*

STUDENT WORKSHEET Name: _____ **ANSWER KEY**

1. Draw an animal you find in the exhibition. **Label** two to three of its parts.

Note to Teacher: Examples of animals can be found in many areas of the exhibition, especially in the "Mysterious Drifters" and "Secret Lives" sections. Make sure students choose animals that they can find names of and some information about.

Animal Name: _____

Write something special about the animal: _____

STUDENT WORKSHEET

Name: _____ **ANSWER KEY**

2. Draw another animal you find in the exhibition. **Label** two to three of its parts.

Animal Name:

Write something special about the animal:

ESSAY SCORING RUBRIC: TEACHER VERSION

	Exceeds	Meets	Approaches	Needs Additional Support
	4	3	2	1
Research: "Listening to Life in the Deep" Article	Accurately presents information relevant to all parts of the prompt with effective paraphrased details from the article	Presents information from the article relevant to the prompt with sufficient detail and accuracy	Presents information from the article mostly relevant to the purpose of the prompt with some lapses in accuracy or completeness	Attempts to present information in response to the prompt, but lacks connections to the article or relevance to the purpose of the prompt
Research: *Unseen Oceans* Museum Exhibition	Accurately presents information relevant to all parts of the prompt with effective paraphrased details from the exhibition	Presents information from the exhibition relevant to the prompt with sufficient detail and accuracy	Presents information from the exhibition mostly relevant to the purpose of the prompt with some lapses in accuracy or completeness	Attempts to present information in response to the prompt, but lacks connections to the exhibition content or relevance to the purpose of the prompt
Science Explanations	Integrates relevant and accurate science content with thorough explanations that demonstrate in-depth understanding of Kelly's discovery and an ocean animal	Presents science content relevant to the prompt with sufficient accuracy and explanations that demonstrate understanding of Kelly's discovery and an ocean animal	Presents science content mostly relevant to the prompt; shows basic or uneven understanding of exploration of Kelly's discovery and an ocean animal; some errors in explanation	Attempts to include Kelly's discovery and an ocean animal in explanations, but understanding of the topic is weak; content is irrelevant, inappropriate, or inaccurate
	Uses detailed labeled illustrations to effectively communicate relevant information about Kelly's discovery and an ocean animal; each illustration has one or more labeled part	Includes two labeled illustrations to communicate relevant information about Kelly's discovery and an ocean animal; each illustration has one labeled part	Includes two illustrations without labels or only one properly labeled illustration	No illustrations
Development	Maintains a strongly developed focus on the writing prompt for the entire essay	Maintains focus on the writing prompt for the majority of the essay	Addresses the prompt but is off-task some of the time	Does not address the prompt for most or all of the essay
	Description includes both Kelly's discovery and an ocean animal along with accurate and detailed information about them	Description includes both Kelly's discovery and an ocean animal along with sufficiently accurate and detailed information about them	Description does not include both Kelly's discovery and an ocean animal, and/or information is incomplete	Does not include Kelly's discovery or an ocean animal

ARTICLE

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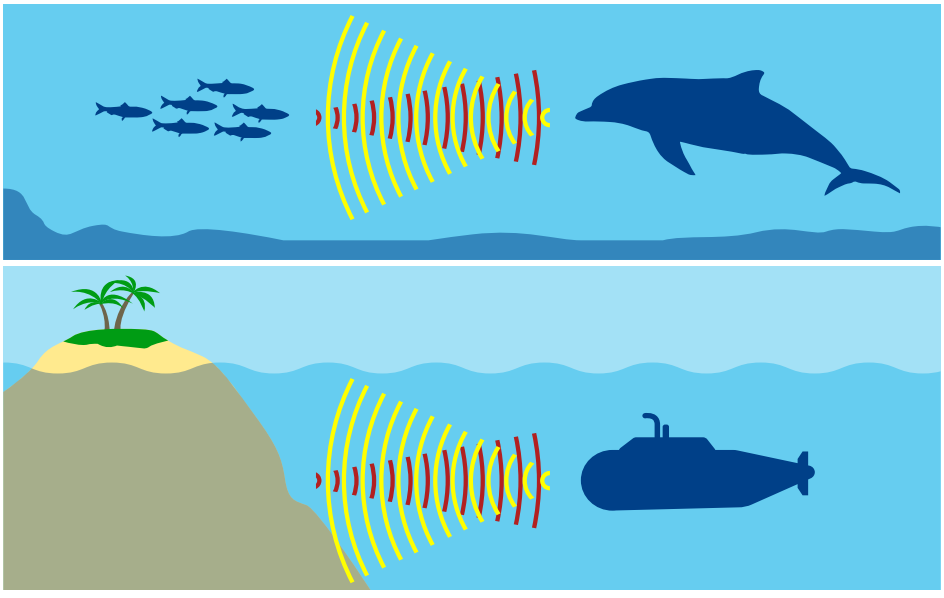

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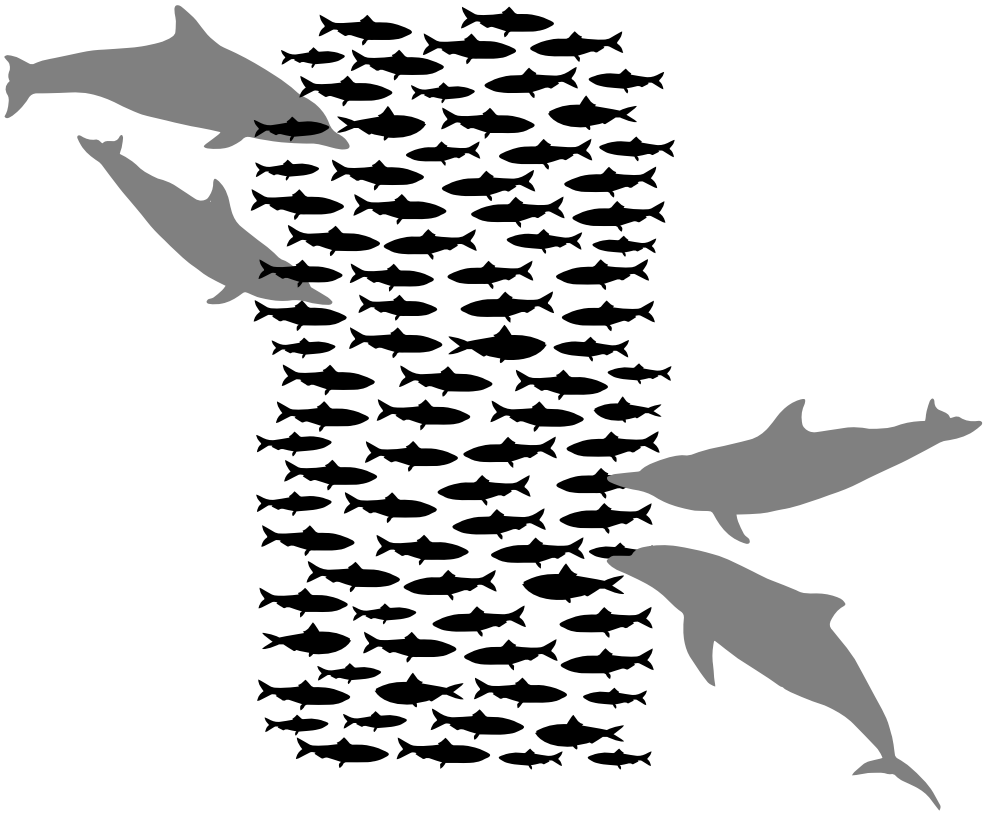

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IMAGES: Kelly Benoit-Bird as young girl, courtesy of Kelly Benoit-Bird; Kelly Benoit-Bird working, ©Todd Walsh/MBARI; Echolocation graphic, ©AMNH; dolphins hunting fish, ©AMNH

STUDENT WORKSHEET Name: _____

1. Draw an animal you find in the exhibition. **Label** two to three of its parts.

Animal Name: _____

Write something special about the animal: _____

STUDENT WORKSHEET **Name:** _____

2. Draw another animal you find in the exhibition. **Label** two to three of its parts.

Animal Name: _____

Write something special about the animal: _____

STUDENT WRITING TASK

Imagine you are a scientist who is going to explore the ocean to study an animal that lives there. Write an essay about your exploration. First, describe how another scientist studied animals in the ocean. Next, describe an animal that you find there.

Use the information that you read about in the article "Listening to Life in the Deep" and the information you found in the *Unseen Oceans* exhibition.

On Page 1, write about what Dr. Kelly Benoit-Bird discovered when she used her tools to study dolphins. Draw a picture of what the dolphins were doing.

On page 2, pretend you are exploring the ocean. Write about an animal that lives there. It will be one of the animals you saw in the *Unseen Oceans* exhibition at the Museum. Draw a picture of it. Label at least two of its body parts.

STUDENT RUBRIC

	Exceeds	Meets	Approaches	Needs Additional Support
	4	3	2	1
Research: "Listening to Life in the Deep" Article	I used what I learned in the article to write a detailed book in my own words.	I used what I learned in the article to write my book.	I used what I learned in the article to write my book, but I am not sure if everything I wrote is correct.	I did not use any information from the article to write my book.
Research: *Unseen Oceans* Museum Exhibition	I used what I learned in the exhibition to write a detailed book in my own words.	I used what I learned in the exhibition to write my book.	I used what I learned in the exhibition to write my book, but I am not sure if everything I wrote is correct.	I did not use any information from the exhibition to write my book.
Science Explanations	All of the information I wrote about Kelly's discovery and the ocean animal is correct.	Most of the information I wrote about Kelly's discovery and the ocean animal is correct.	Some of the information I included about Kelly's discovery and the ocean animal is correct.	None of the information I wrote about Kelly's discovery and the ocean animal is correct.
	I drew pictures of Kelly's discovery and an ocean animal and labeled their parts to give more information about them.	I drew pictures of Kelly's discovery and an ocean animal and labeled their parts.	I only drew a picture of Kelly's discovery OR I only drew a picture of an animal OR I drew both but I didn't label them.	I did not include any illustrations.
Development	My whole book is about ocean exploration and animals.	Most of my book is about ocean exploration and animals.	Some of my book is about ocean exploration and animals.	My book is not about ocean exploration and animals.
	I included both Kelly's discovery and an ocean animal and I gave details about both of them.	I included both Kelly's discovery and an ocean animal and I gave details about one of them.	I included both Kelly's discovery and an ocean animal, but I didn't give any details about them.	I did not include Kelly's discovery or an ocean animal.