Teacher's Guide for ODYSSEY

April 2013: Sushi Science

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Teacher's Note:
This guide contains project ideas, short answer, extended response, fill-in, and true/false with correction. The variation is designed to have the students think critically, as well as to test their comprehension. An answer key to the short answer sections can be found at the end of the guide.

Extended Response: Comprehension & Critical Thinking
The questions below can be used as written, simply answered in complete sentences or easily transformed into longer essay (ELA) style questions, or even research topics. In any case, have the students support their answers with details from the text or use critical thinking skills to create a thorough and interesting answer. The questions, essays and projects have been aligned with the **Common Core Standards**. Consider the level of your students when deciding how to use the questions.

"Sense Sushi - Sushi Sense - Sushi Sensei" p. 5-9

1. Explain how all of your senses are involved when you are sitting before a plate of sushi.
2. What does the author of this article mean when he says that there's more than food on a plate of sushi?
3. What is sushi?
4. Why do some people automatically say that they don't like fish? Why can this be inaccurate?
5. What 3 sensory perceptions encompass 'flavor'?
6. What are the basic types of taste?
7. Explain 'umami'.
8. What is 'mouthfeel' determined by?
9. Explain the phenomenon of chemesthesis.
10. What is the mechanical component of flavor known as 'astringency'?
11. Why is sushi considered to be such a healthy food?

"The Art of the Sushi Chef" p. 10-13

1. Why does Akimitsu Koyanagi compare making sushi to art?
2. Why do you think that an old Japanese saying claims that it takes 17 years to become a real sushi master?
3. Explain how the rice for sushi must be prepared perfectly.
4. What are the criteria for a good sushi knife?
5. Why is hygiene extra important in a sushi kitchen?

6. How are aesthetics important in the final preparation of the sushi dish?
7. What do historians believe is the origin of sushi?
8. How has 'American' sushi migrated to Japan?

"Cyber-Lunch" p. 16-19

1. Explain 'gastrophysics'.
2. How does buoyancy affect the texture of the fish we eat?
3. How does the presence of myoglobin affect the color of the fish?
4. What is the wrapping of sushi made from? What is it called?
5. What is biomass?
6. Why was sushi originally developed?
7. Explain the process of fermentation.
8. How can preparing sushi and eating it in an observant way be considered 'science'?
9. Define the term "ichthyology'.

"Clash of the Condiments" p. 29-21

1. What is wasabi?
2. What plants is wasabia japonica a relative of?
3. What fruit plant do chili peppers come from?
4. Name some varieties of the chili pepper.
5. Who introduced chilies to the non-American world?
6. What is the secret to the wasabi's pungency? How does this differ for the chili?
7. What is a Scoville rating?
8. How are pepper pungencies compared?

"Big Blue" p. 28-31

Mark the following statements TRUE or FALSE. Provide the correct answer if false.

_____ 1. The most valuable fish in the world is a tuna.

_____ 2. Yellowfin tuna is considered a delicacy.

_____ 3. Bluefin tuna is located at the bottom of the ocean's food chain.

_____ 4. To spawn means to deposit and fertilize eggs to produce young.

_____ 5. Many ichthyologists consider the bluefin tuna to be the pinnacle of fish evolution.

_____ 6. The bluefin tuna is a relatively simple fish to catch.

_____ 7. Overfishing is threatening the bluefin tuna.

_____ 8. Pectoral fins are located at the top and bottom of the fish.

_____ 9. All 8 tuna species migrate each year.

_____ 10. The bluefin tuna has been clocked at speeds of up to 35 mph.

_____ 11. Tunafish must always remain submerged under the water's surface.

_____ 12. Although most fish are cold-blooded, the bluefin is warm-blooded.

_____ 13. In the wild, tuna fish are voracious carnivores.

_____ 14. Over the past few decades, the number of bluefin tuna has increased.

"Farewell, Fish" p. 32-35

1. Why is it significant to the Pacific bluefin tuna population that over 90 percent of them are caught while they're juvenile?
2. What is one of the main incentives to fishing for bluefin tuna?
3. Other than profitability, what are some other threats that bluefin tuna and other species are facing?
4. What is the accurate definition of 'overfishing'?
5. Explain how overfishing brings biodiversity concerns.
6. What are some of the ideas suggested to stop the overfishing of certain species?
7. Why can it be so difficult to farm-raise a particular species of fish?
8. How does genetic diversity affect the health of a population of fish?
9. Why are scientists studying surrogate parenting for fish?
10. Why does the author of this article state that ultimately, we all have a stake in the problem of overfishing?

"Omegas-Oh, My!" p. 36-37

1. How do omega-3s benefit our bodies?
2. What is the difference between an unsaturated fatty acid, a monounsaturated fatty acid and a polyunsaturated fatty acid?
3. How many ounces of seafood does the federal government's Dietary Guidelines of Americans recommend that adults eat weekly?
4. Other than in fish, where else can you find a good supply of omega-3?
5. What type of disabilities can benefit from the use of fish oils?
6. Why is eating fish recommended over taking fish oil supplements?

"Kayla Lee, Sushi Sleuth" p. 38-41
Read the article in its entirety and then fill in the blanks. Refer back to the text if necessary.

1. In Japanese, the word _____ means 'inside out'.

2. FINS looks at _____ to reveal an organism's molecular identity.

3. DNA contains the _____ for constructing all the systems, bones and blood in animals or leaves and bark on trees that together make an organism what it is.

4. The _____ database contains the known DNA codes of a variety of organisms.

5. DNA extraction is like reverse _____.

ANSWER KEY:

'Big Blue'

1. True
2. False, bluefin
3. False, top of the food chain
4. True
5. True
6. False, ultimate fishing challenge
7. True
8. False, side fins
9. True
10. False, 50 mph
11. False, can burst out of water and into the air
12. True
13. True
14. False, decreased

'Sushi Sleuth'

1. uramaki
2. DNA
3. blueprint or code
4. BLAST
5. engineering