STEM Poster Lesson Plans

POSTER: PROBIOTICS

item # 410241

WHAT ARE PROBIOTICS?
Probiotics are microorganisms that help our body, particularly our gut, do a better job.

WHAT IS FERMENTATION?
Fermentation is a process where microorganisms convert carbohydrates into acids or gases.

WHICH FOODS ARE GOOD SOURCES?
- Yogurt
- Kefir
- Kimchi
- Miso
- Tempeh
- Sauerkraut
- Kombucha tea
- Pickled veggies

GOOD FOR YOUR GUT

Fermented Foods From Around the World:

SAUERKRAUT
Sauerkraut is fermented cabbage that is a popular accompaniment to most in Europe. The word sauerkraut means “sour cabbage” in German.

KIMCHI
Kimchi is a traditional Korean side dish made of spicy fermented vegetables usually cabbage, radish, scallions, cucumber, garlic, and hot chilies. A staple in the Korean diet, South Korea consumed 40 pounds of kimchi per person each year!

TEMPH
Tempeh is a traditional fermented soybean cake from Indonesia that is a popular vegetarian meat substitute. The process cultures and ferments whole soybeans or other whole grains into cake form, giving it a unique texture and flavor.

MISO
Miso is a paste made from fermented soybeans or barley or rice koji and used in Japanese cooking. The taste, texture, and appearance of miso varies by season and region. It is produced and typically there are two types: white or red.

KEFIR
Kefir is a tangy fermented drink from the north Caucasus Mountains in Russia. A combination of bacteria and yeast culture milk into a slightly sour, lightly carbonated drink. Kefir comes from the Turkish word “kef” which means “good feeling.”

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STEM CONNECTIONS

SCIENCE: Explore the science behind fermented foods like bread, yogurt, and pickles. What is fermentation? What is the chemical reaction that occurs during fermentation? What flavor characteristics does the fermentation process give to foods? How do temperature, pH, and time influence the outcome of a fermented food? Discover the difference between aerobic and anaerobic fermentation. Experiment with anaerobic fermentation by making your own sauerkraut or kimchi. Investigate the body process of digesting food and the role of probiotics in digestion. Research the differences and similarities of prebiotics and probiotics.

TECHNOLOGY: Research the history of natural fermentation through human history. How has fermentation evolved over time through scientific discoveries? What benefits or purposes does food fermentation offer? Explore fermented foods by region of the world or by primary ingredient. How are these foods prepared and what is the history? How has overuse of antibiotics impacted gut health?

ENGINEERING: Compare the fermentation requirements of three different soy foods: soy sauce or tamari, tempeh, and miso. How does fermenting food affect the environment through energy consumption or natural resource use? Research the meanings of the following words: fermented, pickled, and cultured. How are these preparation methods similar? How are they different? Research ways food manufacturers keep fermented foods safe through innovations in food packaging.

MATH: Research the lengths time required to ferment a variety of different foods and create a comparison chart. Investigate the different concentrations or levels of bacteria or yeast found in fermented foods and compare to the fermentation time, temperature, and pH requirements.
INQUIRY OPTIONS

1. What surprises you or catches your eye on this poster?
2. What facts are critical to understand this poster?
3. What information connects with you most on this poster?
4. How can knowledge about probiotics impact you? Your family? Your community?
5. What action do you feel called to take as a result of your new knowledge?
6. What is fermentation?
7. If a food contains beneficial bacteria, should the food have a special label? Why or why not?
8. What are the side effects of consuming too many foods containing probiotics?
9. How does the health of our digestive system ("gut") influence the body’s immune system?

KEY/RELATED VOCABULARY

Probiotic
Fermentation
Aerobic
Anaerobic
Cultured
pH
Lactic acid
Microorganisms
Antibiotic

Kimchi
Miso
Kefir
Tempeh
Sauerkraut
Kombucha
KEY CONCEPTS ADDRESSED:

Probiotics are microorganisms like bacteria and yeast that are believed to improve health. The digestive system is home to a majority of this bacteria and it plays an important role in maintaining a healthy immune system and digesting food. Researchers believe some digestive disorders are a result of overuse of antibiotics and consuming probiotic foods can help build and maintain healthy gut flora.

INTERNET RESOURCES:

WebMD: What Are Probiotics?
http://www.webmd.com/digestive-disorders/features/what-are-probiotics

Science of Pickles: Fermentation and Food
https://www.exploratorium.edu/cooking/pickles/fermentation.html

Probiotic Bacteria in Fermented Foods
http://ajcn.nutrition.org/content/73/2/374s.full

Kids Health: Digestive System
http://kidshealth.org/teen/your_body/body Basics/digestive_system.html

RELATED CAREER ROLES:

Food scientist
Microbiologist
Food chemist
Baker

Zymologist
Vinter or winemaker
Brewer