

**FOOD FROM THE SEA: FERMENTATION GR: 3-5 (LESSON 6)**

**Elder Quotation:** “We ate everything when I was growing up. I don’t ever remember a hungry moment...Some things I wouldn’t eat. They used to make these spoiled fish eggs. My uncle Jack had a dried, blown-up seal stomach in his shed. They’d put the fish eggs in there and make them like Limburger cheese, totally rotten and smelly. Then they’d put them on a plate and mix in blueberries and eat it. I couldn’t do it.”

- Avis Kompkoff<sup>i</sup>

**Grade Level:** 3-5

**Overview:** Subsistence living requires both the harvest and the preservation of local food resources. Not everything can be eaten fresh. To avoid waste and spoilage some food must be preserved for later consumption, especially during the long Alaskan winter. Prior to the advent of refrigeration and canning Native peoples developed a variety of successful preservation methods including fermentation. These techniques not only sustained them but became part of the Sugpiat cultural heritage.

**Standards:**

<i>AK Cultural:</i>	<i>AK Content:</i>	<i>CRCC:</i>
<b>D1:</b> Acquire in-depth cultural knowledge through active participation and meaningful interaction with Elders.	<b>Science B3:</b> A student should develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.	<b>L1:</b> Students should understand the value and importance of the Sugt’stun language and be actively involved in its preservation.

**Lesson Goal:** Students learn how traditional fermentation practices developed by the Sugpiat preserved food and enhanced their healthful properties.

**Lesson Objectives:** Students will:

- Discuss traditional Sugpiat food preservation methods, especially fermentation.
- Make a fermented food.
- Discuss steps necessary to the fermentation process.
- Learn the related Sugt’stun or Eyak vocabulary

Sugt’stun Dialects

**Vocabulary Words:**

English:	PWS:	Lower Cook Inlet:	Eyak:
Listen (Directed at 3+)	<i>Niicugniluci!</i>	<i>Niicugniluci!</i>	
This smells good.	<i>Tepkegtut.</i>	<i>Cacat tepkegtut.</i>	
This smells bad.	<i>Teplugtuq.</i>	<i>Cacat teplugtuq.</i>	

### **Materials/Resources Needed:**

- Prepare Gravlax or ask student parents to provide an example
- Fermented Food Recipe Handouts (See recipes for ingredient lists)
  - Fermented Ketchup - FFS 35 Fermentation 3.1 Ketchup
  - Fermented Mayonnaise - FFS 35 Fermentation 3.2 Mayonnaise
  - Fermented Berries - FFS 35 Fermentation 3.3 Berries
  - Fermented Sauerkraut – Fermentation 3.4 Sauerkraut
- Recipe materials (See individual recipes for specifics) plus cutting boards and paper towels for group work stations

### **Web Resources:**

#### Fermented Food Recipes

<https://cfoodlab.org/blog/2015/6/4/gravlax-a-buried-salmon> Gravlax origins and recipe

<https://www.homemademommy.net/2011/12/fermented-ketchup.html> Fermented Ketchup Recipe

<https://homestead-honey.com/2016/07/11/how-to-make-sauerkraut/> Sauerkraut Recipe

<http://ohlardy.com/lactofermented-berries/> Fermented Berry Recipe

<https://traditionalcookingschool.com/food-preparation/recipes/lacto-fermented-mayonnaise/> Fermented Mayonnaise Recipe

#### Fermentation Process

<http://www.meatsandsausages.com/sausage-types/fermented-sausage> Fermented meat process explained

### **Teacher Preparation:**

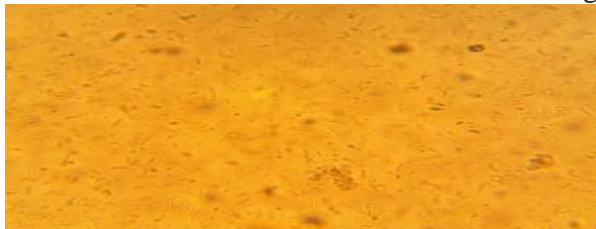
- Review Activity Plan and practice Sugt'stun or Eyak vocabulary.
- Contact your Local Education Coordinator or local Tribal Council for a list of Elders that have expertise in the lesson content.
- Invite an Elder or Recognized Expert to share information on using fermentation in subsistence food preparations and perhaps share a taste of some.
- Decide which fermentation recipes student groups will try and assign ingredients to bring to class accordingly. Students may all process the same recipe or a variety may be chosen.
- Three days prior to lesson prepare gravlax sample (website recipe site listed above) or ask student parent to prepare some.
- Set up a 'cache' of utensils, ingredients, paper towels, and cutting boards (enough for every group of 3-4 students to set up work stations to complete a fermentation recipe).
- Before the Elder or Recognized Expert arrives, review with students, how to interact respectfully with the Elder during his or her visit.

**Opening:** What happens when you leave food in the refrigerator for too long? (*It spoils.*) How do you avoid wasting food? (*You have to eat it sooner or you have to do something with it like cooking or freezing it so you can enjoy it longer.*) If you can't preserve/preserve food you can only eat what's fresh. Why is this a bad thing? (*Before grocery store fresh food isn't always*

available. Either the weather's too bad to allow any food harvesting or the hunt isn't successful or it's winter and there's not many fresh food sources. So, before refrigeration or canning people had to develop ways to preserve their food, to keep it from 'going bad' or risk starvation.)

### **Activities:**

1. Distribute gravlax samples. Have students speculate on how it was prepared. (*Allow general discussion but focus on whether the fish was cooked. How was it cured?*) This gravlax is a modern update of an old Scandinavian technique. The word itself can be translated as 'buried' or 'grave' salmon. Traditionally it solved the problem of what to do with huge amounts of salmon which were harvested in a short amount of time and salt was rare. People buried the clean and lightly salted fish in a shallow 'grave,' added some carbohydrates (like bark or malted barley) and some antioxidants (pine needles or berries) This created the conditions for the lacto-fermentation process that preserves the fish. Enzymes and bacteria from the fish flesh would break down protein and fat to produce a buttery texture with a strong cheesy smell just like the smell of fermented fish eggs.
2. Read Elder Quotation from Avis Kompoff above which describes the strong smell.
3. Explain how the Suqpiat created their own methods to preserve food through fermentation. They also used to bury fish and other meats in the gravel and allow them to ferment and be enjoyed at a later date. Fermentation is the production or preservation of food by the action of microorganisms, sometime known as 'lacto-fermentation.' Lactic acid is a naturally occurring bacteria in humans and animals. These bacteria grow when deprived of oxygen and act as natural preservatives which inhibit or slow down the growth of putrefying bacteria, the bacteria which spoils food. This helpful bacteria growth is called probiotic. Offer students examples of fermented food they're already familiar with: cheese, yogurt, sourdough bread, Korean kimchi, Hawaiian poi, salami, even chocolate (*fermentation removes the bitter tannins in cocoa beans*).
4. Introduce Elder/Expert and remind students of the Native tradition to listen carefully (*Niicugniluci!*)
5. Invite the Elder/Expert to describe traditional ways to preserve food (*drying, smoking, covering with seal oil, brining, fermentation*) and to share any memories of the preparation and consumption of traditional fermented foods. Does the Elder/Expert have a favorite recipe? Have some recipes gone 'out of fashion'? Did the Elder/Expert always enjoy the taste? What other ways did/does the Elder's household make use of fermented foods?
6. Explain that fermented foods often have a strong smell. Would the Elder say 'This smells good? /*Cacat tepkegtut?*' Or 'This smells bad? /*Cacat teplugtut?*'
7. Explain that in addition to preserving food fermentation provides us with helpful bacteria which promote the growth of healthy bacteria throughout our digestive systems. These *lactobacilli* help the foods' digestibility and increases vitamin levels. Numerous helpful enzymes are produced as well as antibiotic and anti-carcinogenic (anti-cancer) substances.



Lactobacillus

8. Announce that the students will now preserve food through fermentation. Divide students into groups of three or four, assign group work areas and have students wash their hands.
9. Explain that each group will be issued a Fermentation Recipe. Students are to retrieve the utensils and ingredients needed to complete the recipe from the class cache and set up their work stations. No ingredients should touch the desk top. Every group should use a cutting board for preparing ingredients.
10. Distribute the recipes and invite group representatives to retrieve the needed supplies.
11. Have students review and then make the recipes. Invite the Elder/Expert to offer advice or corrections. Ask students about the smells. ‘This smells good? /*Cacat tepkegtut?*’ Or ‘This smells bad? /*Cacat teplugtut?*’
12. Once students have completed the recipes initiate a discussion about the methods used. What steps did all the recipes use? (*If students have all used the same recipe handouts of different recipes may be distributed for students to compare techniques.*)
13. Distribute Fermented Fish Egg Recipe or project on screen. Identify fermentation steps in recipe. (*Isolation of food, closed container, time for good bacteria, lactobacilli, to grow*)
14. Review reasons to preserve food and preservation options. Determine when student recipes may be sampled OR keep them on hand to try at final Guest Chef lesson. When students sample the final products they can say whether ‘This smells good. /*Cacat tepkegtut.*’ Or ‘This smells bad. /*Cacat teplugtut.*’

**Assessment:**

- Students reviewed traditional Sugpiat and modern food preservation options.
- Students prepared a fermented food.
- Students identified and compared fermentation recipes.
- Students correctly pronounced Sugt’stun or Eyak vocabulary words.

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<sup>i</sup> Smelcer, John E. and Morgen A. Young. *We Are the Land We Are the Sea: Stories of Subsistence from the People of Chenega.*, Chenega Heritage, Inc., 2007. p. 43

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## **FFS Fermentation 3.1** **Fermented Ketchup**

**Materials:** Quart mason jar with lid, measuring cup, measuring spoons, knife, stirring spoon, can opener, garlic press, paper towel

### **Ingredients**

- Three 7-oz jars/cans of [tomato paste](#)
- 1/3 cup [raw honey](#)
- 3 Tb raw [apple cider vinegar](#)
- 3 small [garlic cloves](#), pressed
- 6 Tb [sauerkraut juice](#) (preferred) or whey (liquid whey from draining whole milk yogurt)
- 2 1/4 tsp [sea salt \(or any non-iodized salt\)](#)
- pinch [cayenne pepper](#)

### **Directions**

1. Combine all ingredients directly in the jar. Stir well to combine.
2. Ensure that the top of the ketchup is at least 1-inch below the top of the jar(s).
3. Using a clean cloth or paper towel, wipe the top of the jar above the ketchup clean.
4. Put lid on jar and leave at room temperature for 3 days; then transfer to the refrigerator.



<https://www.homemademommy.net/2011/12/fermented-ketchup.html> (12/16/2011 Lindsey Gremont)

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## **FFS Fermentation 3.2**

### **Lacto-Fermented Mayonnaise**

**Materials:** Food processor or blender, quart jar with lid, measuring cup, measuring spoon

#### **Ingredients**

3 egg yolks  
1 teaspoon Dijon mustard  
1 1/2 tablespoons raw apple cider vinegar  
1 tablespoon whey (liquid from draining whole milk yogurt)  
Sea salt (or any non-iodized salt), to taste (about 8 pinches)  
1 cup olive oil (or any combination of oils desired)

#### **Instructions with a food processor**

1. Combine egg yolks, mustard, vinegar, whey, and salt in a food processor bowl.
2. Blend well, about 30 seconds.
3. With the food processor running, add the olive oil in as slow a drizzle as possible. It will emulsify (*mix so thoroughly that the liquids which cannot be blended are held in suspension together*) into mayonnaise. This can take several minutes.
4. Adjust salt to taste.
5. To lacto-ferment and help the mayonnaise last longer, leave it out in an air-tight jar or container at room temperature for 7 hours.
6. Refrigerate.

#### **Instructions with a stick blender:**

1. Put all ingredients but oil in a quart jar.
2. Blend briefly with the stick blender.
3. Then run the stick blender while adding a little oil.
4. Stop adding oil and keep blending to make sure it emulsifies.
5. Repeat with more oil until all the oil is in and emulsified into mayonnaise.
6. Adjust salt to taste.
7. To lacto-ferment and help the mayonnaise last longer, leave it out in an air-tight jar or container at room temperature for 7 hours.
8. Refrigerate.



<https://traditionalcookingschool.com/food-preparation/recipes/lacto-fermented-mayonnaise/>

Author: Wardee Harmon.

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### **FFS Fermentation 3.3**

## **LACTO-FERMENTED BERRIES**



**Materials:** Pint mason jar with lid, measuring cup, measuring spoons, wooden spoon, small plastic bag, weights (dried beans, rice...)

**Ingredients:**

- 2 cups mixed berries: any berries except strawberries
- 2 Tbsps. honey
- 1/2 tsp culture starter mixed with a few Tbsps. water (or 2 Tbsps. whey – can use liquid whey from draining whole milk yogurt)
- 1/4 tsp sea salt (or any non-iodized salt)
- filtered water

**Method:**

1. Put the berries into a wide mouth pint size mason jar.
2. Squish them down a bit with a wooden spoon or your fist.
3. In a measuring cup, mix starter culture, a few Tbsps. water, the honey and a pinch of salt. Stir.
4. Add mixture to berries.
5. Fill jar with filtered water, leaving 1” head space.
6. Press down with fist or wooden spoon to be sure liquid has filled all the air spaces.
7. Fill small plastic bag with weights (rice or dried beans) and place in jar to keep berries underwater.
8. Cover tightly and leave at room temp for 1-2 days. Set on plate in case juices bubble out.
9. You know your berries are finished fermenting when you see bubbles and when they taste slightly sour with a bit of a carbonated feeling.
10. Store in the refrigerator. Use within 2 months.

<http://ohlardy.com/lactofermented-berries/>

Makes 1 pint. This recipe is based on one from Nourishing Traditions.

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## **FFS Fermentation 3.4**

### **Lacto-Fermented Sauerkraut**

**Materials:** Large bowl, quart mason jar with lid, chopping knife, stirring spoon, measuring spoons, zip-loc bag with weights (dried beans, rice...)

**Ingredients:** 1 head green, red, or Napa cabbage / salt

**Method:**

- 1) Slice or grate cabbage head. For chunky sauerkraut coarsely chop cabbage with knife.
- 2) For every 5 lbs of sliced cabbage, sprinkle 3 tbsp. of salt over the top.
- 3) Place cabbage/salt in large bowl, and massage the cabbage thoroughly (3-4 minutes). Let it sit 10-15 minutes so cabbage can release its natural juices.
- 4) Pack cabbage tightly in a mason jar, frequently pounding it down with your fist.
- 5) Loosely place a lid on jar and store on a counter, where you can check on it each day. Make sure the cabbage is always covered by its liquid. Use zip-loc bag filled with small weights (dried beans, rice...) on top of cabbage to keep it weighted down.
- 6) After a few days, you will notice some bubbling. This is a great sign of lacto-fermentation! When the kraut has fermented to your liking, transfer it to a cool place. I prefer to move it to cool storage on the earlier side, so my sauerkraut remains nice and crisp.



<https://homestead-honey.com/courses-books/>

## **FFS Fermentation 3.5**



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## **FERMENTED FISH EGGS/AGUDUK**

Nancy Yeaton, Nanwalek

### **Fermented Fish Eggs:**

1. Get fish that are getting ready to spawn, check to see if the eggs are ready by squeezing the belly of a female fish, kind of like milking a cow
2. If the eggs come out one by one, milk them out into a pillowcase, this method allows for cleaning out blood clots as well as other debris.
3. Once you are home, allow the eggs to soak in cold water for about a half an hour to hour
4. Drain in a colander, salt them with table salt and sample eggs as they sit to add more salt if needed.
5. Let them sit overnight in the colander
6. The next day and for a couple of days you can eat these as is or add to rice, or make sushi.
7. You can also place them in a glass jar and allow them to ferment for making Aguduk (*see below*).
8. I store mine in the refrigerator rather than the traditional smokehouse or porch where it's cold.

### **Aguduk;**

1. Have a nice bowl of plain mashed potatoes set aside.
2. Take about three to four big heaping tablespoons of eggs, put them in a glass bowl.
3. Start smooshing them as you stir them, adding oil (vegetable, olive - your choice) a little bit at a time. *Aguduk* (patience) is a virtue. You need to have some people around to tell stories, for this takes time.
4. Keep adding oil (at this point you can add seal oil) a little bit at a time until the mixture resembles the texture of mayonnaise.
5. Add cold water a little bit at a time. This will make the mixture turn white and fluffy.
6. If the mixture becomes too thin add more oil to thicken it up.
7. Finally, you can add the mashed potatoes until you cannot mix it in any more.
8. Add this to the bowl of mashed potatoes. Add some water until the mixture is fluffy.
9. You can add *pakik* (crowberries), *atsat* (blueberries), cooked bidarkies (chitons), or dip dry fish.