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## STeAM Girls Activities: Flandreau Indian School, Flandreau, SD, 2016

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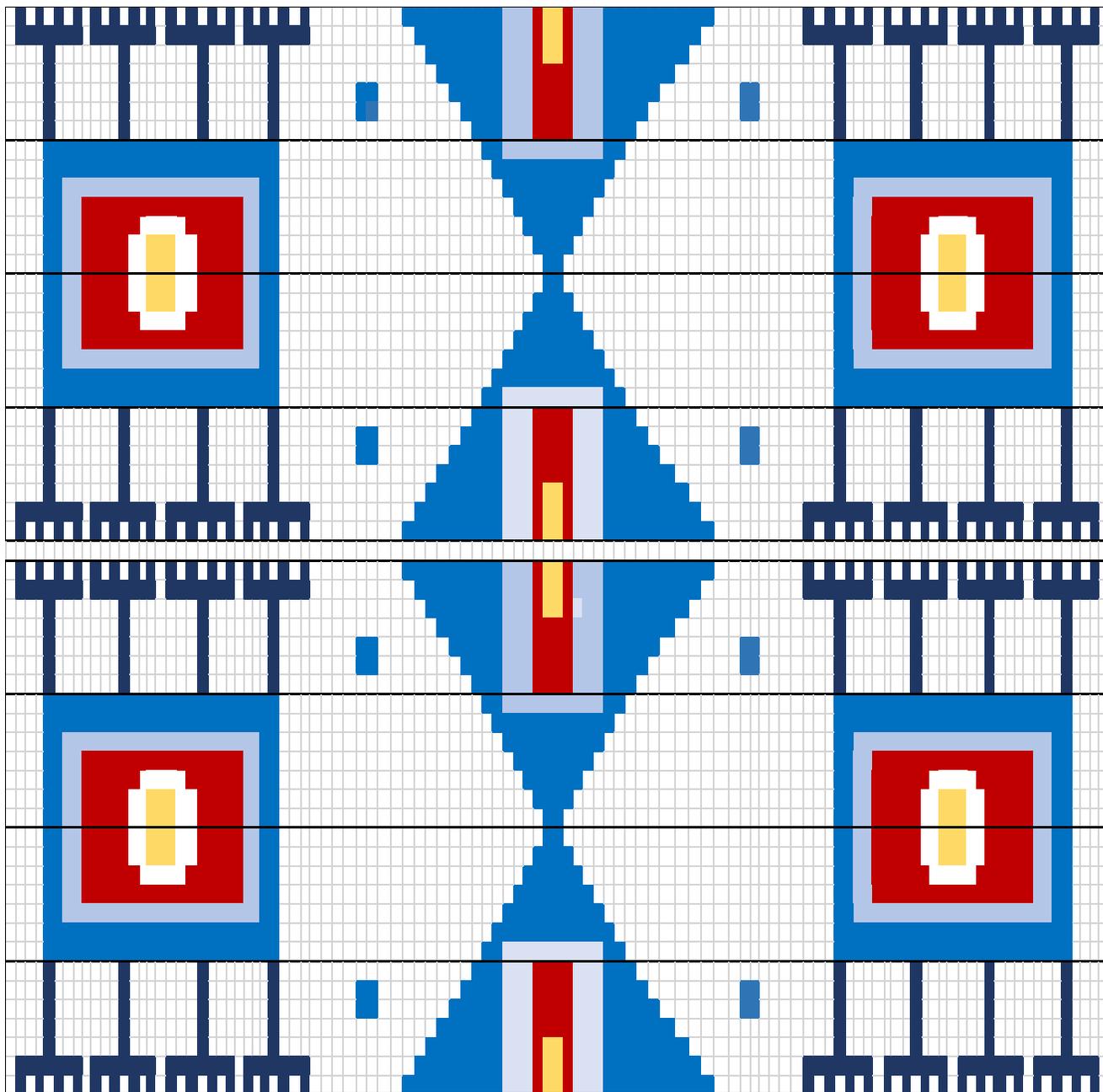
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# STeAM GIRLS ACTIVITIES

FLANDREAU INDIAN SCHOOL, FLANDREAU, SD

2016

Joanita M. Kant, Suzette R. Burckhard, and Richard T. Meyers, Eds.



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The STEaM Girls are 30 high school girls at Flandreau Indian School (FIS) who participated in culturally relevant science, technology, engineering, art, and math activities led by FIS science teacher Carl Fahrenwald and SDSU faculty, staff, and students in 2015-16, designed to increase interest in STEM studies and careers among Native American girls and women. SDSU Native American student mentors included Ashleigh Hare, Marisa Hare, Alyssa Cook, Wiyaka His Horse Is Thunder, and Alaina Hanks.



**Edited by Joanita M. Kant, Suzette R. Burckhard, and Richard T. Meyers**

Cover: Dakota/Lakota beadwork design done in Excel. This Dakota/Lakota beadwork design, popular about 1885 and inspired by Caucasus rugs brought to the locale by white settlers of that period. Common stylistic elements from those rugs included boxes, triangles and forks, often arranged in sets of 4. Here, the historical design was reinterpreted and plotted using Excel 2013 software with color highlighting where each cell is reduced to a small rectangle. Each rectangle represents one seed bead with 7 beads per row in lazy stitch throughout. Thus, math and technology can be applied to help save and reinterpret community traditions.

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## **STeAM GIRLS ACTIVITIES: USING TRADITIONAL MATERIALS**

*“I would like to bring back a woman’s society where we’d teach young girls to be women. They would go through a rite of passage. ‘If we do not harvest, our plants will go away.’ A medicine man told me that.”* Leana Long Pumpkin, Rosebud Reservation; in Joanita Kant PhD. Diss., “Heavy metals in traditionally used fruits among the Lakota,” SDSU, Brookings, SD, 2013, p. 166.

NOTE: Do not use stems, leaves, pits, seeds, or green fruit when making the traditional foods in this activity book because of the possibility of mild poisoning from cyanogenic glycosides. When canning, follow USDA advice in Complete Guide to Home Canning, [http://nchfp.uga.edu/publications/publications\\_usda.html](http://nchfp.uga.edu/publications/publications_usda.html).

### **Buffalo Meat with Chokecherries Wasna**

**3 pounds dried buffalo roast, pulverized and dry**  
**3 c. chokecherries**  
**3 T. buffalo kidney fat**

Mix dry buffalo meat with 3 cups of pitted and chopped chokecherries that were boiled in a saucepan until limp (put cooked chokecherries through a colander to remove pits). Add kidney fat and bake for 20 minutes at 350 degrees. Let dry and serve like a dry cereal with a crumbly texture. Discard chokecherry pits by planting where you want chokecherry bushes to grow.

### **Wasna**

**3 pounds dried buffalo roast, pulverized**  
**3 T. cooked buffalo kidney fat**  
**2 c. raisins**  
**2/3 c. sugar (to taste)**  
**1 c. dry corn meal**

Mix all ingredients with no other fruit. Serve dry with a dry cereal–like texture. Use a metal hammer to break up the dried meat to the consistency of sand.

### **Baked Meat Wasna**

**3 pound roast (beef, buffalo, elk, or venison)**  
**3 c. chokecherries (pitted) and simmered until soft**  
**1 c. dry cornmeal or 1 can sweet corn drained**  
**1 c. sugar (to taste)**

**3 T. dry milk (optional)**

**3 T. shortening**

Roast the meet until thoroughly done and dry. Pulverize (process with machine or hammer) the meat to the consistency of sand. Add cooked chokecherries (use colander to process) with pits removed, corn meal or corn, and sugar to taste. Add fat, lard, or shortening to moisten slightly. Serve as a moist side-dish. Or this mixture could then be baked at 350 degrees for 20 minutes after being drizzled with more chokecherry juice to further moisten it if needed. This is a wet wasna and is the consistency of crumbled hamburger.

### **Non-Meat Wasna**

**5 c. chokecherries**

**1 c. cornmeal**

**Sugar to taste**

**3 T. powdered milk**

**1 T. oil**

Pit and chop 5 cups chokecherries. Put in saucepan and simmer until soft. Add 1 c. cornmeal, sugar to taste, 3 T. powdered milk, and 1 T. of oil or shortening. Set aside. It's ready to eat when dry and grainy like crushed up cereal.

### **Roast Meat with Plums**

**3 lb. roast of buffalo, elk, or beef**

**1 c. pitted plums**

Add a cup of pitted plums to a meat roast (buffalo, beef, or pork). Roast in oven at 350 degrees until tender. Strain the gravy to remove lumps. Plant the pits where you want plum bushes to grow.

### **Wojapi**

**Pit and chop 5 c. fruit (black elderberry, buffaloberry, buffalo currant, chokecherry, wild grape, wild plum, or rosehip)**

**1 c. sugar to taste (or use 1 c. white corn syrup or honey)**

**2 T. corn starch in a little water**

**3 T. powdered milk**

Crush and pit fruit in saucepan. Add sugar and a little powdered milk to taste, and thicken with a mix of corn starch and water, or flour and water. Use the thickener like you would to thicken gravy. Cook over medium heat and stir until thick. Stir constantly to prevent scorching. Pour into small bowls to cool. Makes a fruit pudding.

## **Rosebud Tea**

Pick rose buds or rose petals. Wash thoroughly. Steep buds and petals in boiling water. The longer the soak, the stronger the tea. Good for vitamin C. Drink as tea.

## **Rosehip Tea**

Pick rosehips that are bright red and plump and juicy. Wash thoroughly. Remove achenes (seeds) to avoid the cyanogenic glycosides that could potentially release cyanide. Steep crushed rosehips in boiling water. The longer the soak, the stronger the tea. Good for vitamin C. Drink as tea.

## **Rose Leaf Tea**

Pick early fresh rose leaves. Wash thoroughly. Steep leaves in boiling water. The longer the soak, the stronger the tea. Drink as tea. Dry some leaves for future use.

## **Fruit Juice or Pancake Syrup**

**1 gal. fruit (black elderberry, buffaloberry, buffalo currant, chokecherry, wild grape, wild plum, or rosehip)**

Simmer 1 gallon fresh or frozen fruit with a little water in a saucepan. Strain the juice as soon as possible to extract the fruit without damaging the seeds or pits. Discard seeds or pits. Do not use stems, particularly for black elderberry since they are mildly poisonous due to cyanogenic glycosides and alkaloids (calcium oxalate crystals). Add sugar or corn syrup or honey (honey crystallizes if you keep it in the refrigerator) to taste. Use as fruit juice drink, or thicken with corn starch for pancake syrup. Do not can the produce if you add flour. Plant the seeds/pits where you want traditional plants to grow. Extreme heat during processing will reduce germination potential of seeds/pits.

## **Dry Chokecherry Patties (rehydrate for future use)**

**4 c. pitted chokecherries**

Cook 4 cups of chokecherries in a large saucepan on a stovetop until just soft. Run through a colander to extract pulp and skin. Make into patties about the size of hamburgers and place outdoors to dry on a screen. Cover with cloth or old curtains to keep flies off. After 3 days, these should be dry. Freeze or can any juice that is left over in this process. It is important for the patties to be completely dry before storing them in a cloth pillowcase-like container, or they will mold. These patties can be rehydrated for future use and can be stored in a cloth sack in a dry place until next year's crop is ready. Chokecherries are often prepared this way. Do not use the pits/seeds since they contain

cyanogenic glycosides and can result in mild poisoning, particularly when just freshly ground. Once they are ground and dried, some of the cyanide outgasses. The lethal dose of cyanide in humans is about 1 mg/kg of body weight (New Zealand Food Authority; [http://www.foodsafety.govt.nz/elibrary/industry/Cyanogenic\\_Glycosides-Toxin\\_Which.pdf](http://www.foodsafety.govt.nz/elibrary/industry/Cyanogenic_Glycosides-Toxin_Which.pdf)).

Plant the pits/seeds in a place where you want chokecherry bushes to grow. It is probably easier to simply freeze the chokecherries until you are ready to use them if you have the freezer space, but drying is more traditional.

### **Plum Jam (or other traditional fruit jams)**

**6 c. plum fruit puree**

**8 c. sugar**

**3.5 T. dry fruit pectin such as Sure-Jell**

**1 t. margarine or butter**

Plum jam includes the crushed fruit (without pits) with skin; whereas, jelly is made with only the clear juice. Either way, the recipes are similar, but they must be followed exactly. Be careful not to get burned by the sugary syrup or the boiling water. Keep everything very clean to avoid sealing bacteria into the canning jars. See the canning instructions, and comply with United States Department of Agriculture canning practices (USDA, National Institute of Food and Agriculture, “Complete Guide to Home Canning.” Agricultural Institute Bulletin No., 539, December 2009, [www.uga.edu/nchfp/publications/publications\\_usda.html](http://www.uga.edu/nchfp/publications/publications_usda.html)).

### **Ready the Fruit for Jams and Jelly**

Place about 3 or 4 gallons of frozen whole plums in a very large saucepan and boil, watching carefully so it does not scorch. Mash the fruit as it thaws with a potato masher. It will reduce in size as it thaws; so keep adding whole fruit as it does. When fruit is soft, place it in a colander in the same large saucepan and squeeze fruit through the holes to create a fruit puree. Discard the pits/seeds and avoid over-heating them for very long during processing. Plant the pits in a place where you want plum trees. The pits may take a long time to germinate, and if overheated may not germinate at all.

Measure 6 cups of fruit puree into a very large saucepan. Do not make a bigger batch because it may not set up correctly. Bring to a boil and simmer for 5 minutes, stirring so to avoid scorching; then add 8 cups of sugar that has been mixed with 3.5 T. dry fruit pectin (Sure-Jell or CERTO) or one liquid pouch of CERTO pectin. Stir constantly to avoid scorching. Add 1 t. margarine to prevent foaming. Bring to rolling boil over high heat for exactly one minute.

Refrigerate and use within 3 weeks or can the jam.

## **Jelly**

Make jelly by using only the clear fruit juice. For chokecherry, rosehip, black elderberry, wild grape, buffaloberry, buffalo currant, or serviceberry, prepare exactly 4 cups of fruit juice by simmering crushed and pitted fruit. Strain the fruit. Add 3.5 T. fruit pectin such as Sure Jell and bring to rapid boil. Add 5.5 cups sugar. Bring to rapid boil again for precisely one minute, stirring constantly so that it does not scorch.

As an alternative, use the recipes on the Sure Jell or CERTO package and follow the “Plum” directions for the above fruits. The recipe may fail if you use too little sugar or a sugar substitute. Get special recipes for those kinds of jams/jellies.

## **Canning Jam and Jelly**

Ladle the jam or jelly into pint or half pint sterilized jars. Leave 1/2 inch headroom under the rim for expansion. Wipe the rims with clean paper or cloth to get a good seal, and add the sterilized lids and rims. Hand-tighten. Process filled and capped jars in a water bath on a rack in a canner at low boil for 15 minutes. Remove jars with jar lifter and place on dry towel. They have sealed when the top pops down. If jars have not sealed when cool, refrigerate and use the product soon.

Be careful not to pick fruit from road ditches or shelterbelts that has been sprayed with agricultural chemicals because the fruit may not make healthy food. Always ask permission from landowners to pick fruit, and ask them about spraying history.

Be careful not to grind or can the pits or seeds into the fruit puree for all of these fruits, because they may contain cyanide. For the black elderberry, do not use the stems or green fruit because they are mildly poisonous. Pick or clip the purple fruits from elderberry stems and discard the stems before making jam, jelly, or other foods.

## **Wild Rose Petal Perfume Essence or Essential Oil**

Making perfume essence or essential oils from plant materials

Supplies:

- **Quart size canning jar with two lids (punch a hole in it for the copper tubing; the other should be solid)**
- **Metal or plastic sturdy spatula or spoon**
- **15 to 18 inches of ¼ inch copper tubing**
- **Modeling clay**
- **One pound of fresh lard or butter**

- **Fresh wild rose petals (or other flowers/materials that you want to extract scent from such as pine needles)**
- **Ethanol or rubbing alcohol**
- **Small bottle for collecting essence**

Place the lard into the canning jar and slowly heat it in a double boiler or in the sun to melt the lard. Fill the jar with rose petals and attach the jar lid securely. Shake the jar to thoroughly mix the petals and the lard and let this set for several hours. If the lard solidifies again, heat it gently to liquefy it. Carefully remove the petals while leaving the lard in the jar. You can use the spatula to press the petals against the side of the jar to force the melted lard out before removing the petals. You should notice a scent to the lard that is left in the jar. You can repeat adding petals and extracting the scent from the petals to increase the strength of the scent up to three times. The process of transferring the essential oil from the rose petals to the lard is called *enfleurage*. It is based on the fact that the essential oil has a different solubility in the lard compared to the rose petals. The oil will come out of the rose petals and into the lard because it is more soluble there. The next step uses alcohol to extract the oil from the lard since the essential oil is more soluble in the alcohol compared to the lard.

While you are waiting for the scent to transfer from the petals to the lard, make your distiller tube from the copper tubing. Bend the copper tubing gently so it has a short part to put into the lid of the canning jar followed by a coil that ends in a section that will allow scented alcohol to drip into your collection bottle. See Figure 1 for the general shape and set up.



Figure 1: Perfume distiller set-up for final extraction but not showing the lard. The arrangement shown was formerly available from Scientificsonline.com as part of a kit.

Once ready to extract the scent from the lard, remove the last set of petals and add approximately 1/8 of a cup of alcohol to the jar and cap tightly with the lid with a hole in it. Attach the copper tube and put clay around the opening where the tube is inserted in the lid to prevent vapor from escaping there when the mixture is heated. Heat the canning jar in a double boiler carefully until vapor starts to emerge from the copper tube. The vapor should enter the copper tube as the mixture is heated. The vapor will then cool and essence should drip into the collection bottle. If you smell the rose scent, there may be a leak; so check carefully to make sure all the connections are tight or covered. Tightly cap the collection bottle when all the alcohol has been extracted from the lard. The lard can be reused if you have fully extracted the scent from it.

The collected essence should be strongly scented. The collected essence can be mixed with coconut oil for a scented lotion or a light unscented oil. You can also mix the essence with more rubbing alcohol for a lighter scented perfume.

You might want to directly add the rose petals to rubbing alcohol or water to make a lightly scented perfume. This process does not take advantage of the varying solubility of the essential oil; so it results in a much weaker scent due to the limited extraction of essential oil from the plant material.