Cochineal: A Study in Scarlet

While walking in your neighborhood in Arizona or visiting the side canyons of the Colorado River in the Southwest, you may notice prickly pear cactus. This cactus provides edible fruit called tunas. But if you look even closer on the cactus pads you might see patches of white, matchhead-sized fuzz balls. Pull one off and smash it and you will get a scarlet red stain. It may be hard to believe, but these patches are cochineal insects and were once worth their weight in gold.

Cochineal, erroneously called bugs, are scale insects. Males have wings and legs. They search for females and live about one week. Females are wingless and legless parasites that live on cactus pads. As soon as they hatch, they start sucking on the cactus pad and will live, breed, and die under a white cottony, waxy mass. The adult female produces a type of acid while eating. This chemical, carminic acid, is offensive to many predators. Carminic acid is the "liquid gold" that is extracted from her body and used throughout the world to make food coloring, paints, clothing dye and cosmetics.

Why Red? How could a color be so valuable? Throughout history red and purple were the most desirable colors. They were the color of royalty around the world. Studies show that the color red quickens our pulse and breath. In many cultures it commands the eye—passion, vitality, rage, sacrifice. Red shows power. Of the substances that create reddish dyes, none were as bright or as colorfast as cochineal.

Cochineal insects are native to the Americas. For centuries Aztec, Mayan, and Incan cultures farmed cochineal insects to dye and paint a scarlet or blood red stain on textiles, pots, books, baskets, skin, and medicines. Breeders in Mexico began cultivating the insects, choosing quality and color over many insect generations. Roughly 70,000 dried females weigh one pound. Emperor Moctezuma demanded annual tribute in bags of cochineal from his subjects.

When Spanish Conquistadors arrived in Mexico, they were amazed at the abundance of red. Spanish merchants began shipping the dye to Spain. Spain reaped huge profits with its shipments to Europe, Africa, and Asia. Cochineal was second only to silver as one of its most valuable exports from Mexico. Spain jealously guarded its early monopoly, protecting the insect and the food source. For three centuries the English, French, and Dutch used piracy, bribery, thievery and spying to learn the secret.

Europeans used cochineal for dyeing fabrics. Power was expressed in the scarlet coats of British officers, court gowns, and religious robes. At Fort McHenry, Maryland, the "broad stripes," of the United States flag--dyed with cochineal, was inspiration for the national anthem. Colonial cookbooks included recipes with cochineal used whenever a red color was desired in food or beverages.

Eventually French and Dutch adventures succeeded in smuggling out live cactus pads covered with insects. Cochineal "ranches" were started in dozens of countries in North Africa, the Mediterranean and the Caribbean. By the 1880's cochineal production was declining rapidly. The invention of artificial dyes destroyed the market for cochineal. Any color on the color wheel could be made, and the world forgot the message that the intense red color once conveyed. Spain suffered a major crisis in its financial market when its 250 year-old industry failed within a few decades.

When Red Dye No. 2 was banned in the United States in 1976, a new market was created for cochineal. Today, cochineal is used in the food and drug industry in liquid or powdered forms. Cochineal is neither a toxin nor a

carcinogen. Sometimes listed as cochineal, E120, or carmine, it is the only natural food coloring authorized by the FDA. Check the food labels on cookies, yogurt, beverages, jams, as well as lipstick!

Here are a few gardening tips concerning the cochineal on the prickly pear you encountered in Arizona. Left unchecked the cactus could die. If you want to control the cochineal infestation, blast the pad with a garden hose. This will expose and weaken the insect. Treat it with dish soap. If the problem persists, cut off the worst pads, brush or scrap off the white mass, dry it, and use it to dye fabric.

Graphic Organizer for Four Door Book

Cochineal Animal

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3.

4.

Dyeing With Cochineal

1.

2.

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4.

The Americas

1.

2.

3.

4.

Europe, Asia, Africa

1.

2.

3.

4.

Tidbits

1.

2.

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4.

Research Report : Cochineal: The Red to Dye For

Teacher Name:

Student Name: _____

CATEGORY	4	3	2	1
Quality of Information	Information clearly relates to the main topic. It includes several supporting details and/or examples.	Information clearly relates to the main topic. It provides 1-2 supporting details and/or examples.	Information clearly relates to the main topic. No details and/or examples are given.	Information has little or nothing to do with the main topic.
Notes	Notes are recorded and organized in an extremely neat and orderly fashion.	Notes are recorded legibly and are somewhat organized.	Notes are recorded.	Notes are recorded only with peer/teacher assistance and reminders.
Mechanics	No grammatical, spelling or punctuation errors.	Almost no grammatical, spelling or punctuation errors	A few grammatical spelling, or punctuation errors.	Many grammatical, spelling, or punctuation errors.
Graphic Organizer	Graphic organizer or outline has been completed and shows clear, logical relationships between all topics and subtopics.	Graphic organizer or outline has been completed and shows clear, logical relationships between most topics and subtopics.	Graphic organizer or outline has been started and includes some topics and subtopics.	Graphic organizer or outline has not been attempted.