Lab 6
Teas, Coffees, Chocolates and Peppers
Selecting Plants for Taste, Color, Aroma and Heat

Humans have been selecting plants for millennia to achieve a variety of purposes. Grains and other food crops have been selected for increasing yield and nutritional content. Fiber producing plants have been selected for superior fibers for ropes, baskets, paper and cloth. In today's lab you will be evaluating the range of qualities in a number of plant products that are based on the secondary compounds produced by plants. In some cases there may be medicinal or therapeutic values associated with the products. In others, it may be mostly a matter of appealing to our senses of sight, smell, touch and sight. The plants responsible for these products have all been selected for their most desirable qualities (from the human perspective). Different grades and qualities exist for all plant products and characters such as color, aroma and texture are used as indicators of the product's quality. Today, in lab, you will be asked to study and evaluate different forms of black tea, coffee, chocolate, and chili peppers using techniques developed to assess their quality.

1. Tea Tasting and Evaluation

Strictly speaking, tea is made from the infusion of the leaves of *Camellia sinensis*, the tea plant. After tea leaves are harvested, they undergo different treatments to produce different kinds of tea. Black teas have been fully fermented creating their black appearance. Oolong teas are fermented only partially and are lighter in color. Green teas are not fermented at all and should have no dark color. Tea leaves are also graded for size, with the tree main grades of black tea being orange pekoe, pekoe and souchong (from largest to smallest). The best green teas will have dried buds of unopened leaves.

In today's lab you will be evaluating teas of different varieties and grades. You should start by first studying the terms used to evaluate tea leaves, aroma and taste. You will then prepare fresh pots of tea for the evaluation

Terms Describing the Leaf

Black- A black appearance is desirable.
Brown-A brown appearance normally indicates overly harsh treatment of leaf.
Chunky - A very large broken-leaf tea.
Clean - Leaf that is free from fiber, dirt and all extraneous matter.
Curly- Caused by too much abrasion during sorting.
Leafy - A tea in which the leaf tends to be on the large or longish size.
Musty - A suspicion of mould.
Powdery - Fine light dust as the tea people say meaning a very fine light leaf particle.
Uneven and Mixed - 'Uneven' pieces of leaf particles indicating poor sorting and resulting in a tea not true to a particular size grade.
Wiry - Leaf appearance of a well-twisted, thin, long leaf.

Terms Describing Infused Tea Leaf

Color

Aroma- Smell or scent denoting 'inherent character' usually in tea grown at high altitudes.
Bright - A lively bright appearance, which usually indicates that the tea will produce a bright liquor.
Coppery - Bright leaf that indicates a well manufactured or make of tea.
Dark - A dark or dull color that usually indicates poorer leaf quality.
Dull - Lacks brightness and usually denotes poor tea. Can be due to faulty making (manufacture) and firing or a high moisture content.
Green - When referring to black tea it means the leaf has been under fermented or alternatively it can be leaf plucked from immature bushes and will often , when liquored, result in a raw or light liquor. Can also be caused by poor rolling during making or manufacture.

Taste

Bitter - An unpleasant taste associated with raw teas.
Body - A liquor having both fullness and strength as opposed to being thin.
Brassy - Unpleasant metallic quality similar to brass. Usually associated with unwithered tea.
Bright - Denotes a lively fresh tea with good keeping quality.
Brisk - The most 'live' characteristic. Results from good manufacture.
Burned - Taint caused by extreme over drying during manufacture.
Earthy - Normally caused by damp storage of tea but can also describe a taste that is sometimes 'climatically inherent' in teas from certain regions.
Fruity - Can be due to over fermenting during manufacture and/or bacterial infection before firing or drying, which gives the tea an over ripe taste. Unlike wines this is not a desirable taste in tea.
Full - A good combination of strength and color.
Harsh - A taste generally due to the leaf being under withered during manufacture resulting in a very rough taste.
Metallic - A sharp coppery taste.
Muscatel - Desirable character in Darjeeling teas. A grapey taste.
Pungent - Astringent with a good combination of briskness, brightness and strength.
Thin - An insipid light liquor that lacks desirable characteristics.
Weedy - A grass or hay taste associated with teas that have been under withered during manufacture and sometimes referred to as 'woody'.

Tasting and evaluation Procedure.

1. Examine the loose leaf materials from the different tea varieties while you are bringing water for the infusion to a boil.
2. Measure out 1 level teaspoon per 8 ounces of hot water in a tea pot
3. Let tea seep for 3-5 minute if a black tea, 5-12 minutes for oolong teas and only 1-2 minutes for green teas.

4. Decant a small amount into a cup and evaluate color, aroma and taste. Record your results in the table below. Use the vocabulary above as a guide in evaluating the tea. It is OK to use your own descriptive terms when appropriate.

	Leaf color				
Variety/grade	green	grey	brown	black	other

	Leaf Aroma				
Variety/grade	Full Body	Strong	Burnt	Moldy	other

	Tea infusion Color				
Variety/grade	Coppery (best)			Dull (worst)	other

	Tea Taste				
Variety/grade	bright	full	thin	dull	other

2. Coffee Evaluation

Some terms in evaluating coffee:

Acidity: This can be described as the pleasing brightness or sharpness in the coffee. It is usually the most scrutinized characteristic of the coffee. Acidity can be intense or mild, and everything in between. Usually the acidity is best evaluated once the coffee has cooled slightly to a warm/lukewarm temperature.

Body: This is sometimes referred to as "mouthfeel". The body is the sense of weight or heaviness that the coffee exerts in the mouth, and can be very difficult to identify. It is useful to think about the viscosity or thickness of the coffee, and concentrate on degree to which the coffee has a physical presence.

Sweetness: One of the most important elements in coffee, sweetness often separates the

great from the good. Even the most intensely acidic coffees are lush and refreshing when there is enough sweetness to provide balance and ease the finish. Think of lemonade starting with just water and lemon juice, one can add sugar until the level of sweetness achieves balance with the tart citric flavor.

Finish: While first impressions are powerful, it is often the last impression that has the most impact. With coffee the finish (or aftertaste) is of great importance to the overall quality of the tasting experience, as it will linger long after the coffee has been swallowed. The ideal finish is one that is one that carries the flavor for 10-15 seconds after swallowing.

Tasting and evaluation Procedure.

The following procedure for evaluating coffee has been modified from the Coffee Geek review guide. It is a greatly simplified version of the procedure used by professional coffee "cuppers" (evaluators). The goal of this exercise is to compare coffees grown under different culture techniques and with different roasting procedures.

1. Measure the whole bean coffee into their cups or glasses, keeping track of which is which. Use two glasses per coffee being evaluated, and use 12 grams of coffee for 6.5oz of boiled water.
2. Pour the grinds into the tasting cup.
3. When the water is done boiling, remove it from heat (or after it shuts off), and wait 25 seconds before pouring. Pour slowly and methodically, making sure all the coffee grounds are saturated - try to avoid any dry clumps on the top of the coffee. When you start the pouring, mark the time, either by looking at the clock or by starting a timer. Wait 3 to 4 minutes and as the coffee grounds start to settle, then it's time to start evaluating the coffee.
4. In the four minutes the coffee and water have interacted, a thick "crust" of grounds will be sitting on the top of the sample cup. Get your face close to the cup, take your cupping spoon and puncture the ground crust to evaluate the aroma. Repeat this for each sample
5. Once you are finished evaluating the aroma, skim off the remaining top grounds. D this by taking two spoons, placing them into the cup near the back of the cup, then in a fluid, relaxed motion, drag them forward around the edges to meet again at the front of the cup, then scoop up just taking out grounds, leaving as much liquid behind as possible.
6. Begin tasting the coffees, taking a spoonful at a time and "slurping" it into your mouth while inhaling gently. The goal here is to have each liquid sample coat your entire tongue, but also the inhaling allows aromatic elements to exert their full effect. Use a new spoon between each cup and dispose of your used spoon in the recycling bin. The goal is to avoid cross-contamination of the samples.
7. Move around the table, sampling every cup. You may also want to go back and forth to each coffee several times as the coffees cool down to room temperature to see how the coffees fare at different stages in their cooling

8. It is perfectly acceptable to spit out your “slurps” of coffee as you go along, but you should also swallow some to evaluate the aftertaste and finish

Use the chart below to keep track of your evaluation and to score each coffee.

coffee	Aroma 0-5	Acidity 0-5	Body 0-5	Finish 0-5	Rating (Total)	comments

3. Chocolate

Chocolate Tasting Etiquette

Preparation: Before sampling the chocolate, clean the palate by taking several sips of water. The chocolate should be at room temperature (approx. 64-68 degrees Fahrenheit), in as little humidity as possible
Appearance: Examine the chocolate. The surface should be unblemished. The surface should be smooth with a silky sheen. The color can range from the ivory of white chocolate to the deep espresso-brown of dark chocolate.
Aroma: Grate a small amount of the chocolate sample and inhale the aroma. Identify the clean, milky fragrance of white and milk chocolate and the bittersweet aroma of dark chocolate.
Texture: Take a small bite and notice how the chocolate feels on the tongue. Quality chocolate should feel firm and have a "clean melt", with nothing sticky, waxy, or sandy to stick to the roof of the mouth or cling to the tongue, and then melt away like butter.
Taste: Eat the chocolate slowly and try to distinguish the different flavors of the chocolate and its fillings. Experience how the taste changes as the chocolate melts away. The second step is to roll the chocolate around the tongue to make contact with the four zones. The tip of the tongue senses sweet, the side senses salt and sour, and the back senses bitter.

Bitterness, acidity, sweetness, astringency and saltiness (depending on the filling) are the basic tastes inherent to chocolate. The cocoa should be slightly bitter, but without being acrid. A barely perceptible touch of acidity and slight sweetness help only to highlight other, more powerful flavors

Rating: Rate the chocolate based on your overall evaluation of its’ taste. You can rank the chocolates available today from most to least favorite or assign a bad-fair-good or excellent ranking for each chocolate.

Repeat with other brands or types: Take a sip or two of water to clean your palate.

Use the table below to help organize your evaluation of the different chocolates in lab today.

brand	type	% cocoa	aroma	taste	texture	rating

4. Chili Peppers

One of the most significant contributions of the western hemisphere to the world's spices is the chili pepper. Peppers are fruits from the genus Capsicum, which includes hundreds of varieties. Chili peppers have been artificially selected to produce a taste range that extends from sweet to mild to extremely hot. The hot taste is the result of a secondary compound (an alkaloid), called capsaicin. The level of capsaicin in a pepper is directly related to how hot a pepper is rated and can be evaluated using a simple taste test. The taste test is modified form a scale developed by Wilber Scoville. Scoville used a subjective tasting test to determine the level of capsaicin in a wide range of peppers. Now the level of capsaicin is determined with modern techniques in chemical extraction and purification, but the units are called Scoville units in honor of Wilbur Scoville**.**

In this exercise you will be using a modified taste test based on the Scoville technique to determine the level of heat in a range of peppers. Below is a list of some common peppers and their Scoville ratings.

Scoville Units	Pepper	Pepper	Pepper
100,000 to 300,000	Habanero		
50,000 to 100,000	Chile tepin	Thai	
30,000 to 50,000	Tabasco	Pequin	Cayenne
15,000 to 30,000	De Arbol		
5,000 to 15,000	Serrano		
2,500 to 5,000	Guajillo	Jalapeno	Mirasol
1,500 to 2,500	Rocotillo	Cascabel	
1,000 to 1,500	Negro	Ancho	Pasilla
500 to 1,000	New Mexico	Anaheim	Mulato
100 to 500	Cherry		
Zero	Bell	Pimento	

Procedure:

1) Work in small groups of 5 (needed for a consensus evaluation)
2) An extraction of capsaicin from a variety of fresh peppers will be prepared and diluted for the test.
3) Starting with the most dilute extraction from the dilution series (1:10, 1:100, 1:1,000, 1:10,000 and 1:100,000), a single drop of solution will be placed on your finger to be tested. Thoroughly wash hands before tasting.
4) Record whether you can taste the capsaicin or not. Increase the concentration until 3 out of 5 tasters can distinguish the capsaicin.
5) Record the level at which 3 out of five taste the capsaicin in the table below.
6) Take a small drink of water to clear your palate before moving to the next pepper.

Scoville Pepper Evaluation

pepper

	1:10	1:100	1:1,000	1:10,000	1:100,000	rating
Taster 1						
Taster 2						
Taster 3						
Taster 4						
Taster 5						

pepper

	1:10	1:100	1:1,000	1:10,000	1:100,000	rating
Taster 1						
Taster 2						
Taster 3						
Taster 4						
Taster 5						

pepper

	1:10	1:100	1:1,000	1:10,000	1:100,000	rating
Taster 1						
Taster 2						
Taster 3						
Taster 4						
Taster 5						

pepper

	1:10	1:100	1:1,000	1:10,000	1:100,000	rating
Taster 1						
Taster 2						
Taster 3						
Taster 4						
Taster 5						

pepper

	1:10	1:100	1:1,000	1:10,000	1:100,000	rating
Taster 1						
Taster 2						
Taster 3						
Taster 4						
Taster 5						

5. Plant Propagation Revisited.

You should have been checking your plants that you are vegetatively propagating since week 2. Today evaluate the progress for each cutting, root or stem that you are propagating. If there are roots on your cutting then they should be replanted in pots and place in the green house with your name and section number. Soil and pots will be made available in the greenhouse. Use larger pots for tubers, stems and root cuttings.

Use the table below to report on the progress of each cutting

Plant species	Propagation type	Date started	Presence of roots	Date transplanted