Food Science/ Healthy Living:

Project: Cream Puff Science

Supplies:

1 cup water
½ cup butter
1 cup all-purpose flour
4 large eggs
2 quart saucepan
Rubber spatula and/or hand mixer
Baking sheet

Time:
1 hour prep time, 2 hours 35 minutes total time
Makes 12 servings

What to Do:

1. Preheat oven to 400ºF
2. Combine water and butter in a 2-quart saucepan. Cook over medium heat for 4-7 minutes or until the mixture comes to a full boil. A full boil is one that cannot be stirred down.
3. *Reduce heat to low,* add flour all at once and stir vigorously until the mixture comes away from the sides of the pan and forms a ball. *Remove the pan from the heat and stir for several minutes so the dough can cool down slightly!* You don't want to scramble the eggs you are about to add.
4. Beat in 1 egg at a time until the mixture is smooth, shiny, glossy, and sticky. It might not look like it will come together, but it will! Just keep beating. You can use a hand mixer to beat in the eggs since the cooked dough doesn't easily accept them. Make sure each egg is thoroughly beaten into the dough and disappears before adding the next egg.
5. Drop dough by ¼ cupfuls, 3 inches apart, onto an ungreased baking sheet. Bake for 35-40 minutes or until the dough is puffed, golden brown and dry. DO NOT open the oven door until the puffs are risen and golden brown. The puffs will have a greasy, wet appearance if they are not completely baked.
6. Remove from the oven and pierce each puff gently with a fork or skewer to allow steam to escape. Cool completely before filling.
7. Fill with your favorite filling. Consider: custard, pudding, whipped cream, or chicken salad. What's your favorite cream puff filling?

Reflect:

1. Why is it important that the water and butter mixture come to a full boil before adding the flour?
2. Why is it important to add all the flour at once?
3. Why is it important to fully beat in one egg at a time?
4. Which ingredients provide structure to the cream puff?
5. Which ingredients provide tenderness to the cream puff?

Apply:

Why do cream puffs puff like they do? Steam forms as the puffs bake, and the strong gluten structure formed by beating the dough stretches to hold the steam, then sets into place as the heat coagulates (sets) the protein. The puffs will be dark golden brown, with a hollow center crisscrossed with soft filaments of dough.

Flour: provides the structure of the cream puff. The flour must be added all at once to the boiling water and butter mixture, so the starch swells and absorbs the liquid and the dough has structure.

Water and butter: fats provides tenderness to the cream puff. However, too much fat will interfere with gluten production making your cream puff collapse. It is important to bring the water and butter mixture to a full boil before adding the flour as heat is necessary to swell the starch granules in the flour. A full boil is reached when stirring does not reduce the strength of the boil.

Eggs: are the leavening (rising) agent. Yolks add fat for a tender and light texture and also act as an emulsifier for a smooth, even textured finished product. The proteins in the eggs add to the structure of the cream puff.

Background:

Cream puffs, made from choux (pronounced shoo) pastry, were first invented in 1540 by Catherine de Medici's head chef Panterelli. Choux pastry, also known as pâte à choux, is a twice-cooked hollow French pastry that is typically eaten cold. Sweet versions are generally filled with cream, pudding, or mousse while savory fillings include chicken salad, shellfish, or vegetables. Choux pastry dough can be used to make eclairs, buns, cream puffs, profiteroles, crullers, beignets, churros, funnel cakes and many other shapes.

Resources:

https://www.landolakes.com/expert-advice/conquering-cream-puffs/
https://www.thespruceeats.com/cream-puff-science-481231