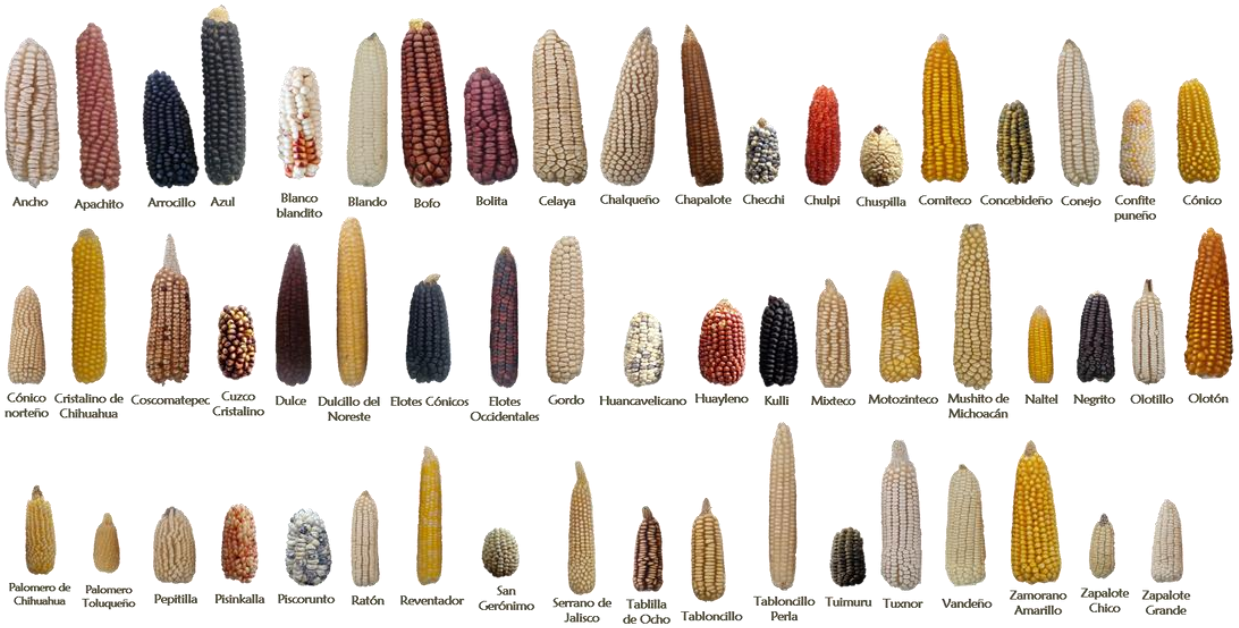
Why does popcorn pop?

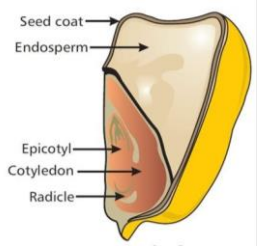
Introduction:

Corn was domesticated in central Mexico around 9,000 years ago. Ancient corn had only one cob per plant, and it was very thin and small. By slowly saving seeds from the best plants and cross-pollinating between varieties, corn slowly became larger, more productive and more diverse. Now there are hundreds of varieties, in all kinds of sizes, shapes, and colors.



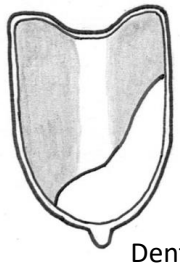
https://www.white-buffalo-trading.com/corn.html

But almost all of these different kinds of corn can be classified into five basic types: dent or field corn, flint corn, flour corn, sweet corn and popcorn.

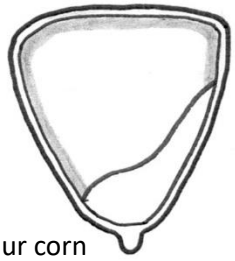


The main difference between these classifications are the compositions of their endosperms. Corn endosperm can be hard or soft. The hard endosperm is very rigid and strong. The soft endosperm shrinks more than the hard endosperm as it dries and retains more moisture. The ratio between these two types and the location of them in the kernel results in the differences between the varieties.

Dent corn makes up the majority of commercially grown corn in the US, because it can be used for animal feed, processed foods, and ethanol. It is called dent corn because there is a dent in the top of the dried kernel. When it dries, the hard endosperm on the sides retain their shape but the soft endosperm down the center shrinks slightly, causing the top of the kernel to collapse inwards.



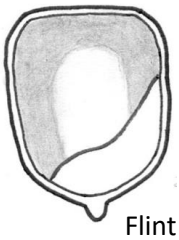
Dent corn



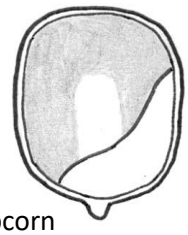
Flour corn

When ground, flour corn is used to make fine cornmeal and masa for tortillas and tamales. Whole, it is eaten as posole or elote. There is only a thin layer of hard endosperm around the outside; the rest is soft endosperm.

Flint corn has a thick hard endosperm layer that surrounds the soft endosperm. It is ground to make coarse grits and polenta.



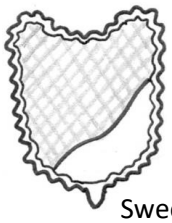
Flint corn



Popcorn

Popcorn also has a thick hard endosperm layer that surrounds the soft endosperm. But popcorn is generally smaller than flint corn and has a greater proportion of the hard endosperm.

Sweet corn is eaten when it is immature. Because of a genetic mutation, the sugars in sweet corn are prevented from combining into the more complex starches. The kernels, therefore, stay sweet. But the sugars shrink a lot more than the starchy soft or hard endosperm. Without the structure provided by the hard endosperm, the kernel dries wrinkly.



Sweet corn

Heat is the movement of molecules; as a substance gets warmer its molecules move faster and faster. Recall from the previous page that the soft endosperm contains more moisture and is weaker than the hard endosperm. As a corn kernel gets warmer, the molecules of water in the endosperm start moving faster and faster. Eventually the pressure from this movement is more than the seed can contain and the kernel pops.

Purpose:
To explore the popping properties of different varieties of corn.

Materials:

10-20 flint or dent corn kernels
10-20 sweet corn kernels (dried seeds, not fresh or frozen)
10-20 popcorn kernels
Popcorn popper
Optional: kitchen scale

Procedure:

1. Looking at the pictures in the introduction of the inside of the different types of corn, describe what you think will happen when the flint or dent corn is heated, when the sweet corn is heated, and when the popcorn is heated.

2. Place the flint or dent corn in the popper and heat until they have popped. Describe or draw what happened.

3. Place the sweet corn in the popper and heat until they have popped. Describe or draw what happened.

4. Place the popcorn in the popper and heat until they have popped. Describe or draw what happened.

5. Optional: If you're curious about how much water is inside each popcorn kernel, weigh 10 kernels before popping and then again after popping. The difference, divided by 10, is the average amount of water in each individual kernel.

Weight of 10 kernels pre-popping _____

Weight of 10 kernels post-popping _____

Weight of 10 kernels pre-popping – weight of 10 kernels post-popping _____

÷ 10

Average weight of water in kernel _____

Conclusion:
How did the popcorn pop differently than the sweet corn and dent or flint corn? *Why* did it pop differently?

Sources:
https://www.nativeseeds.org/blogs/blog-news/types-of-corn