

Chocolate: A Little Big History

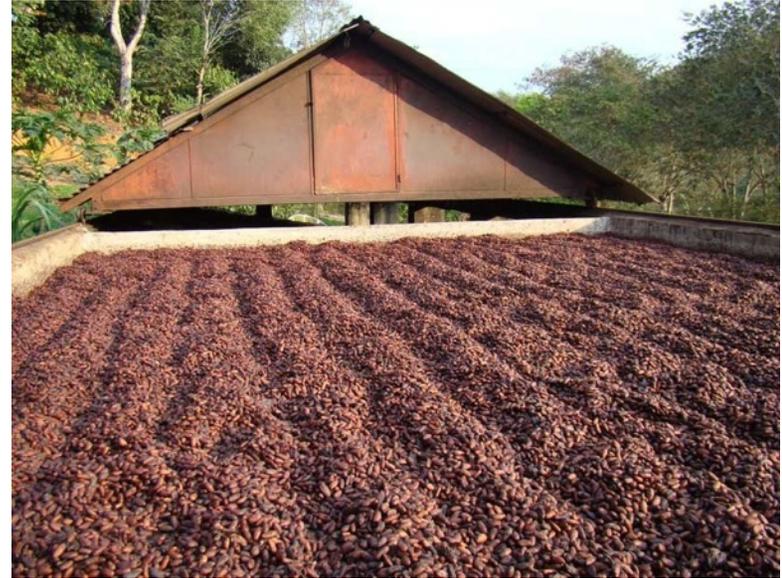
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“There is nothing better than a friend, unless it is a friend with chocolate.”

--Linda Grayson

There is an intimate connection between humans and the wonderfully sweet dessert called chocolate. It has an amazing journey through time, from its evolution to a bitter drink, to a sweet hard substance that has whole stores and factories and holidays dedicated to it. Chocolate actually has a complex emotional connection to humans. This connection started with magic and deities. It is thought that there is more lore on chocolate than on any other food. The goddess, Ixcacao, was worshipped by the Mayan in 1000 BCE for her connection to both love and chocolate. The meaning behind chocolate transitioned from magic to affection over the years. When chocolate is given from person to person it indicates love and caring. In most cultures around the world, chocolate symbolizes love. We used it as a currency at one point. It is even said to reduce heart disease and normalize blood pressure. Chocolate has a complex and unusual story, following humans throughout their evolution.

Over several hundred years and through collective learning, humans have been able to create a process that we use today to produce great tasting chocolate from cacao pods from the Theobroma Cacao tree. First, the beans are harvested from an orange or yellow ripe pod. You activate the yeast in the beans and keep it at high heat for six days in a place where the moisture will not evaporate, or until the fermentation is complete. They are ready for the next step if the insides are dark brown and juicy. You then lay them out on drying racks in extreme heat. Next, you gently break the shell of the beans off of the “nibs”. The nibs are then ground into a paste with heat and pressure and separated from the cocoa butter; what you are left with is called cocoa liquor. You then add the cocoa butter back to the cocoa liquor in proportions that give you milk chocolate, dark chocolate or a variation. Sugar, milk and other flavors are added and the conching (further grinding, smoothing of the mixture) begins. Emulsifiers such as soy lecithin are added to maintain the smooth texture. Tempering is the final process. The mixture is reheated and then carefully cooled to a temperature that produces a uniform crystal structure. This gives the chocolate an even smoother, clean look and feel and taste. Fortunately evolution produced the cacao pod for us humans to cultivate!



Chocolate indirectly came from the Big Bang. Most of the compounds in chocolate were formed in supernovae, where the heat and pressure is enough to fuse the elements that are more complex than iron. Earth and our solar system formed by the debris that was expelled in a supernova. The heavier elements formed in the supernova that created the solar system were “pulled” closer to the sun by centrifugal force. That is how chocolate has such a rich combination of elements. Four-hundred and fifty million years ago (MYA), in the Silurian Period, plants appeared on land. Archaeopteris, an extinct tree that made up most of the forests across the earth's surface in the late Devonian period, is considered by scientists to be the first modern tree. It developed around 350 MYA. This tree had spores, not seeds. 300 MYA, the first trees with seeds evolved. And, finally two-hundred MYA, a plant emerged that had

flowers. It's called *Amborella trichopoda* and is thought to be the last common ancestor of flowering plants. Charles Darwin called the transition of plants to start flowering the "abominable mystery" of evolution. This all led up to the development of *Theobroma cacao*, the tree that gives us the makings of chocolate. This tree is native to Central and South America and now is also grown in West Africa and Asia.



It is debated as to where and when humans first made chocolate. Final evidence leading to the place of origin is eagerly awaited. "[It would be] exciting, no doubt. ... Archaeologists have been looking for Mesoamerican [chocolate] connections to the Southwest for 100 years," says Robert Hard of the University of Texas, San Antonio, who specializes in the archaeology of the Southwest. One place of interest in this controversy is the Maya Lowlands. Evidence that the Mokaya people of the Pacific coast were processing and consuming liquid chocolate as early as 1900-1500 BCE has been found in excavated bowls and baskets. Also in Mesoamerica, traces of chocolate have been found in the Gulf Coast area, causing archaeologists to think that the pre-Olmec people were consuming liquid chocolate by 1750 BCE, and the Olmec people the same. Some early evidence of cacao consumption even points to Utah, where traces of a

chocolate like substance have been discovered. We not only share an evolutionary ancestry with chocolate, as all living things do, but a cultural connection is certainly present. Chocolate has been in our societies for so long that it is ingrained in our life style.

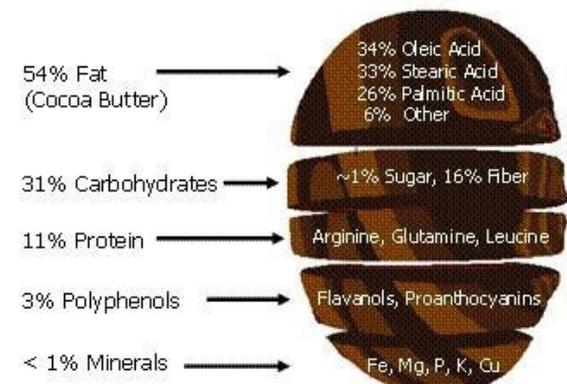
Cacao was incorporated in early human history as a divine food and as common currency. In the original place where chocolate was made, it wasn't a sweet and meltable bar, like today, in fact, when it was first consumed, it wasn't even a solid! Chocolate was a bitter drink, created from fermented cacao beans and the fermentable sugars of the white pulp around the beans of the fruit. In addition to drinking this during their everyday life, the Mayans believed the cacao bean had divine properties, and used them in rituals of birth, marriage and death. In the 1600's, the Aztecs gained control of a large part of Mesoamerica and adopted cacao into their diet. They associated it with "Quetzalcoatl" one of their deities who, by legend, was banished by the other gods for sharing chocolate with humans. That is where the cacao tree's scientific name, *Theobroma cacao*, which means "food of the gods" originated. Cacao was traded for turquoise by early Mesoamericans. They bartered with visitors from the southwest for gems and precious stones. In pre-modern Latin America, cacao beans were considered currency. As written in *Beyond the Codices: The Nahuatl View of Colonial Mexico*, "One bean could be traded for a tamale, while 100 beans could purchase a good turkey hen, according to a 16th-century Aztec document." Cacao influenced early human culture from multiple perspectives.



Until the 16th century, Europeans had not heard of chocolate. Christopher Columbus and his son, Ferdinand, found the bean and brought it to Europe. However, they were not the first European to come across it. Spanish conquistador Hernán Cortés wrote in 1521 of Chocolate, “Loathsome to such as are not acquainted with it, having a scum or froth that is very unpleasant taste. Yet it is a drink very much esteemed among the Indians, where with they feast noble men who pass through their country.” Even when in Europe, it remained a privilege of the rich until the invention of the steam engine which made mass production possible in the late 1700s. A Dutch family named Van Houten brought about this change with inventions that could mass produce the shiny, tasty chocolate bars. Mechanical mills were designed to squeeze out the cocoa butter which helped create hard, durable chocolate. In 1828, a Dutch chemist found a way to make powdered chocolate, "Dutch cocoa," by taking out half of the natural fat from chocolate liquor, grinding what remains, and treating the mixture with alkaline salts to cut the bitter taste. This led to the first modern chocolate bar being made by Joseph Fry, who in 1847 discovered that he could make a chocolate paste by adding melted cocoa butter back into Dutch cocoa. A company called Cadbury was marketing boxes of chocolate in England by 1868 mostly to provide boxed chocolates for Valentine’s Day. Chocolate’s connotation moved from the magical, mystical worship that started in Mayan days to celebrating Saint Valentinus, acknowledging affection and love. Milk chocolate became huge years later by Nestle. In America, chocolate was even included in soldiers' rations and used in lieu of wages during the Revolutionary War. Chocolate was seamlessly incorporated into the post-revolution world.

The post-revolution world allowed humans to analyze chocolate’s many different parts. Part of what makes cacao so special is how you can taste the differences between cacao from different locations. Cacao is chemically made up of carbon, oxygen, hydrogen, and nitrogen (CHON), the most common elements in living organisms. It also contains minerals such as calcium, copper, magnesium, phosphorus, potassium, sodium and zinc, which make up 3% of the average cacao bean. Cacao contains 12% amino acids and proteins, the essential building blocks of life and cacao butter makes up 54% (where most of the calories come from). Water is about 5%, starch 6%, fiber 11%, phenolic compounds 6%, theobromine 1.2% (where the tree name comes from) and caffeine 0.2%. Phenylethylamine one of the phenolic compounds is known to elevate mood and relieve stress. This molecule is likely the reason that chocolate has been associated with love and affection. Cacao’s large number of compounds (300-400) make eating it a complex sensory experience.

What’s in the cocoa bean?

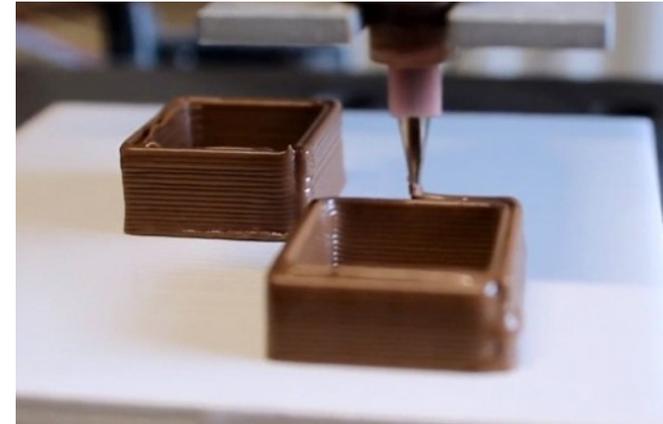


People like chocolate so much that they even try to find ways to make it “good for you.” Chocolate is rich in flavonoids, antioxidants, and flavonols. Flavonoids are vitamins that help plants recover from environmental toxins and repair damage. They are commonly found in fruits and vegetables. Foods rich in flavonoids make it appear that we also benefit from this "antioxidant" power. Antioxidants counter damage inflicted by free radicals. Free radicals are uncharged molecules that cause cell and DNA damage. If

your body doesn't have antioxidants to combat oxidation that occurs, it can be damaged by free radicals. An increase in oxidation can cause low-density lipoprotein (LDL), also known as "bad" cholesterol, to form plaque on the artery walls. Flavonols are a type of flavonoid found in chocolate. They have antioxidant qualities and potential influences on vascular health, such as improving blood flow to the brain and heart, lowering blood pressure, and making blood platelets less sticky and less likely to clot. Dark chocolate likely has more flavonoids than milk chocolate, although it has more to do with the amount of processing it has gone through than the recipe.

People have concerns about fat in their diet, and chocolate is no exception. The fat in chocolate is cocoa butter, which is made of oleic acid, monounsaturated fat, stearic and palmitic acids (stearic and palmitic acids are forms saturated fat). It is said that saturated fat has a negative effect on cholesterol, however research shows that stearic acid has a neutral effect. Scientists at the Harvard University School of Public Health examined 136 studies on cocoa. They found it does seem to boost heart health, according to an article in the European journal Nutrition and Metabolism. Also, preliminary research at West Virginia's Wheeling Jesuit University suggests chocolate may boost your memory, attention span, reaction time, and problem-solving skills by increasing blood flow to the brain. Using data from 114,000 patients, researchers found that people who consumed the most chocolate had a 37% lower risk of developing heart disease. They also had a 29% lower risk of suffering a stroke than those who consumed less chocolate. Dr. Oscar Franco, from the Department of Public Health and Primary Care, said: "Chocolate may be beneficial, but it should be eaten in a moderate way, not in large quantities and not in binges," he said. "If it is consumed in large quantities, any beneficial effect is going to disappear." Chocolate's fat could actually be good for you! Next time you bite into your piece of chocolate, perhaps you can feel less guilty.

So, if we keep our chocolate consuming to a healthy amount, the future is sure to be tasty with chocolate in it. Now, with new technology emerging daily and a huge personalized food movement, there is going to be many new projects with chocolate. There are 3D printers that can print in chocolate to create personalized desserts. Food artists and enthusiasts are going to create amazing chocolate sculptures, recipes, and flavors. Just imagine intricate designs of chocolate swirls, fresh from your 3D printer. Chocolate will taste better than ever in the future. Chocolate's whole journey came from humans fermenting some strange bean from a pod, and making a bitter drink. Then, it traveled around the world getting additions like sugar along the way. In a way, chocolate's journey marks human's path through history. As humans went through stages of development, chocolate changed with them. When the industrial revolution occurred, chocolate became mass produced. Now, we can thank all the people who made chocolate what it is today, as we bite into our chocolate a sweet flavor fills our mouth with a silky warmth. (EM, 6/2014)



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