



From Dyeing to Dying: A Chronicle of Carmine

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The white dots on the cactus are bugs and there is a good chance you have eaten them before. Raised on cactuses, they are called cochineals and the acid in their guts makes a vibrant red dye. It ends up in a ton of products from strawberry yoghurt to M & Ms to lipstick. Indigenous people across Latin America traded it for thousands of years and in the 17th century it was Mexico's second most valuable export behind silver. It can be found on the walls of archaeological sites in pretty priceless paintings and the ropes of kings. Synthetic dyes and pressure from animal rights activists have pushed some Mexican farmers to abandon production altogether and cultivation of cochineal has been disappearing. It is the most powerful brilliant red dye in existence and this might be the last time a few of the last cochineal growers farm cochineals in their land.

Cochineal bugs are tiny parasites that live on cactuses and the stuff that become the powerful red dye makes up almost a quarter of their weight. It is a naturally occurring compound called carminic acid that is a repellent against predators like ants. Cochineals eat prickly pear cactus or nopals as they are known in Mexico. They have all the moisture and nutrients the bug needs to survive.

Catalina is one of the last cochineal producers in all of Mexico, running a farm in Oaxaca. It all starts in her field of young nopals. These baby cactuses are cuttings of older ones of which we can take segments and multiply them. From the bottom it develops two. Farmers have to wear gloves to protect against the cactus' needles as they cut off the paddles. Next Catalina washes the cactuses with soap and water only then she can place the cochineals on the paddles. For nesting the mother cochineal, they put it into the palm "nests". These nests look like finger traps but they're tiny houses for the bugs which no one makes anymore so they have to be careful not to break them. In around 12 to 10 hours, the baby cochineal appears walking through the holes of the palm and once they have spread across the paddle she hooks in a wire and hangs it up in a place they call the nopal library where instead of books they have prickly pears. Here it is protected from wind, rain, cold, and heat. Now the cochineals can get to munching. They have to constantly check for predators in the nopal library. Predators like telegony worm which eats cochineals when it is in the larval stage.

Every white dot seen in the cactus is a cochineal and it has dust around it like talc or flour which acts as a glue to help the insects stick to the paddle also protecting them against the sun too. The cochineal sticks its probe into the cactus skin and sucks out the water and nutrients. Then the body starts working like a lab, transforming sugar into carminic acid. Only females produce carmine. The male is tiny, has wings, and flies away. Caretakers of the cochineals have to constantly move babies to new nopal paddles and after two to four months, the female insect are ready to harvest. Catalina uses a sieve to separate the bugs from their clothes that is the period and silk they make. And only the cochineal remains. As the dead cochineal dry out, their squishy pod solidifies. Three Kg of wet cochineal gives 1 kg of

dry cochineal. Catalina and her daughter, Claudia uses a traditional metate to grind them into a brilliant red as it is better to do it by hand to grind slower so the colour is more concentrated. Either way, it is very tedious work. It takes 70,000 bugs to make just one pound of dye. The powder has to be dunked in an alcohol solution and filtered to remove the insect parts.

Catalina sells a kilogram of her dried cochineal for about \$150 a dollar but with all the work it takes, it should have a price of around \$500 per Kg. Large food brands use carminic acid and everything in the UK. But customers will never taste it as the flavour doesn't change and cochineal only gives colour. It appears on the nutritional label as Carmine, Natural Red 4, Crimson Lake, or E120. Carmine is also frequently used in the cosmetic industry and that use is anything but new. Cochineal dates back thousands of years in Mexico. It was used in lipstick, textiles, royal headdresses, and wall art. After Hernan Cortes conquered the Actecs, he bought cochineal back to Europe and it quickly replaced European dyes, because cochineal fixed into wool and silk better, lasted longer, and created a more vibrant red. As it was about 15 times more powerful than anything that had been seen before, it came to represent power showing up in the highest of fashion. The Catholic Church used it in its red cardinal robes, and the British Army used it in their red coats and soon artists like Van gogh, Renoir, and Rembrandt were painting cochineals into their masterpieces.

In the 1800s, women in the US started using it to colour food, from cakes and candies to jellies and pickled red cabbage. But then in 1856 synthetic dyes were invented. First with mauve, made from the by-product of coal, and then in 1878, with Red No.2 made from petroleum. It was very difficult to compete because they had lower prices, larger volumes, and similar qualities. And these synthetics just about wiped out cochineal production in Mexico. Then in 1976, the FDA banned Red No. 2 under suspicion that it could cause cancer.

So, a renewed interest in natural dyes began but at that point, there were almost no cochineal growers left in the country. Catalina's family were one of just three still working with the insects so she made it her life mission to preserve this bug and teach others about cochineal. She started selling the dye to local artisans and chefs and turned her farm into a museum to lead workshops for people interested in the bug but much of Catalina's work has been reversed in the last two decades. Brands like Liqueur Campari and Starbucks stopped using Carmine due to pressure from vegetarian customers. The pandemic was another blow. Orders stopped completely and that's when she decided to stop cochineal production. Last year she produces 400 kg of the bug this year she expects just 50 kg as she needs something that makes her money and hence, she switched her entire greenhouse to tomatoes.

In Peru, the government started investing in cochineal farming in the 1990s to help boost employment in a rural part of the country and now Peru dominates more than 80% of the market. American-based liquer brand has started using it again in place of synthetic dyes. It was even the inspiration for Pantone's colour of the year, 2023 and there's growing demand across the globe but Peru has some advantages. The country produces a wild kind of cochineal that grows outdoors without much farmer involvement so it is cheaper and even though Mexican domesticated cochineal have more carminic acid, they also need to be grown indoors to protect from parasites. To be able to deliver large-scale orders from international buyers, farmers like Catalina would have to build more greenhouses and hire labours but that's too expensive and hence Catalina had to turn down two letters of interest from English buyers because she simply couldn't produce the amount of dye they needed. Experts say investments from the Mexican government could help farmers to provide basically seed money to Oaxaca peasant women.

In the meantime, Catalina hopes to keep educating every visitor who stops by her farm and thinks there is an opportunity to make this culture reborn. But until investments and customers come some cochineals will be lost and Catalina will be here caring for her bunny cactuses and tiny little bugs to keep alive this business they consider the cultural legacy of ancient Mexico.