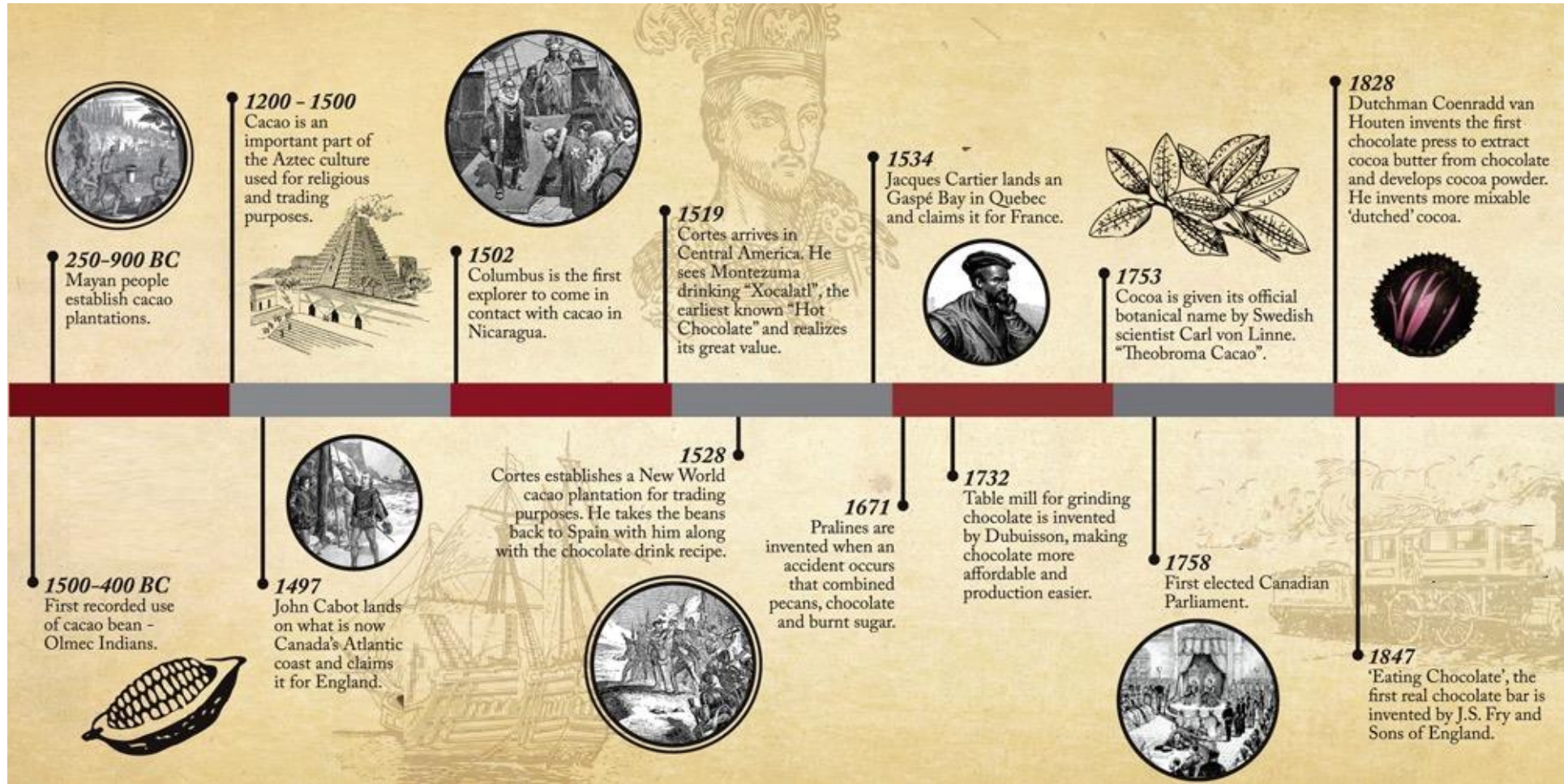




# How to Become a True Chocolate Geek

Nate Saal  
Founder & CEO, CocoTerra Company

# “Chocolate” has a long and complex history



Adapted from [madefromchocolate.com](http://madefromchocolate.com)



# Theobroma Cacao

Food of the Gods

# Chocolate grows on trees!

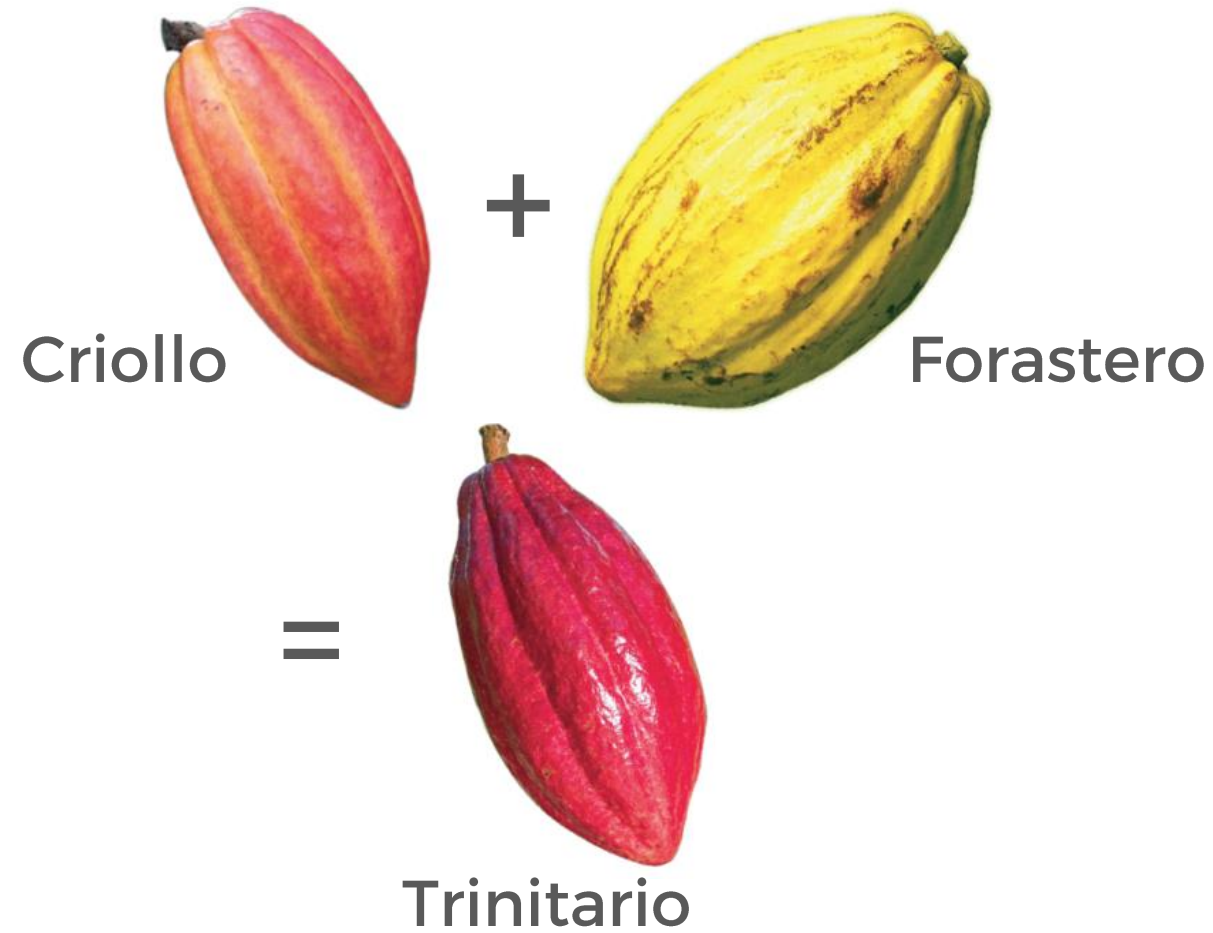


**Chocolate is made from the seeds of the Theobroma Cacao tree**

# Pods grow in a variety of shapes, sizes & colors



# Three traditional varieties are now 11 genetic “clusters”



# Cacao has flavor variety, like coffee and wine



Copyright Storey Publishing Megan Giller Illustrated by Amber Day

# Cacao pods are hand-harvested





# Pods are broken open to remove seeds



Seeds are coated in a sweet, white mucilage or pulp (AKA baba)

# Chocolate is a fermented food!



**Fermentation by yeast and bacteria is a key step in flavor development**



# Chocolate Making

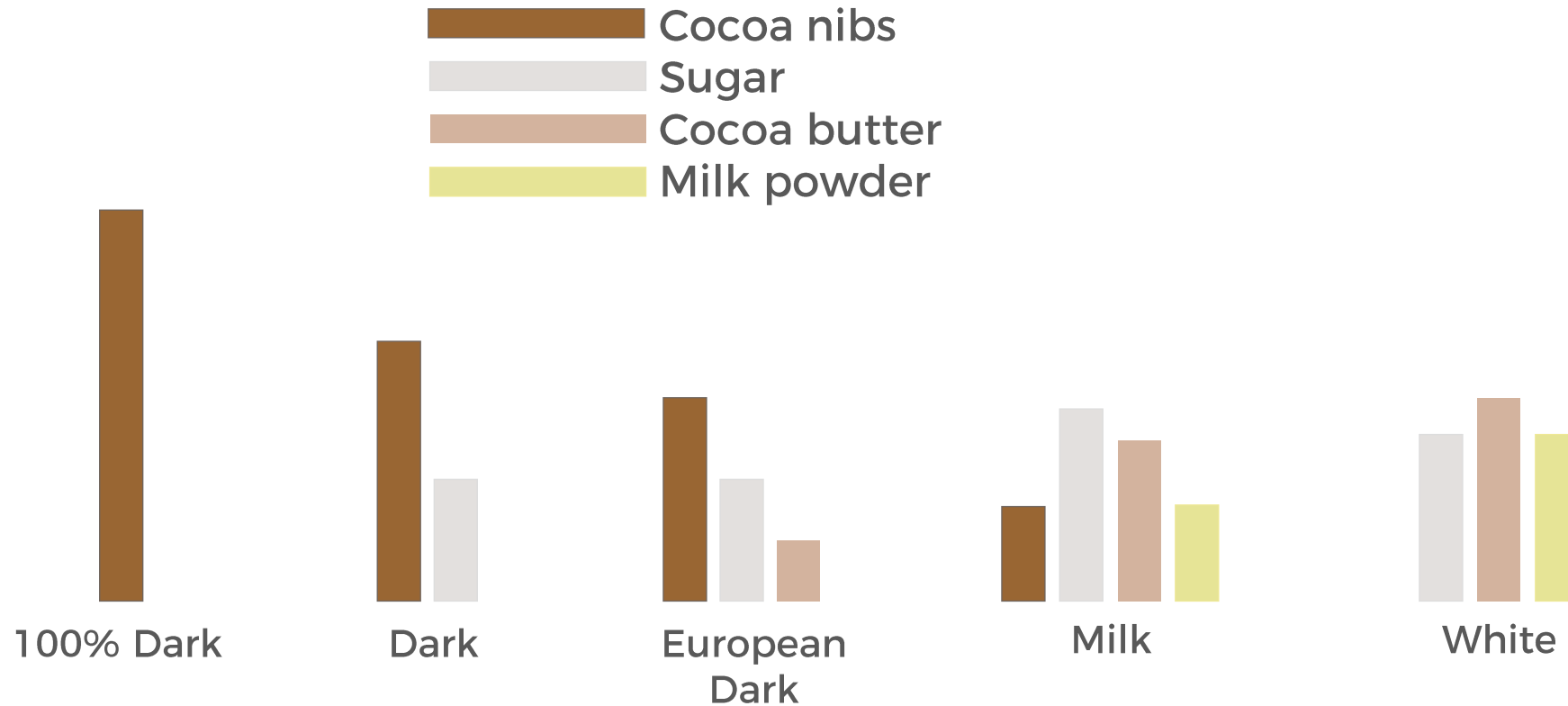
Ingredients and processing steps

# Four ingredients make all chocolate

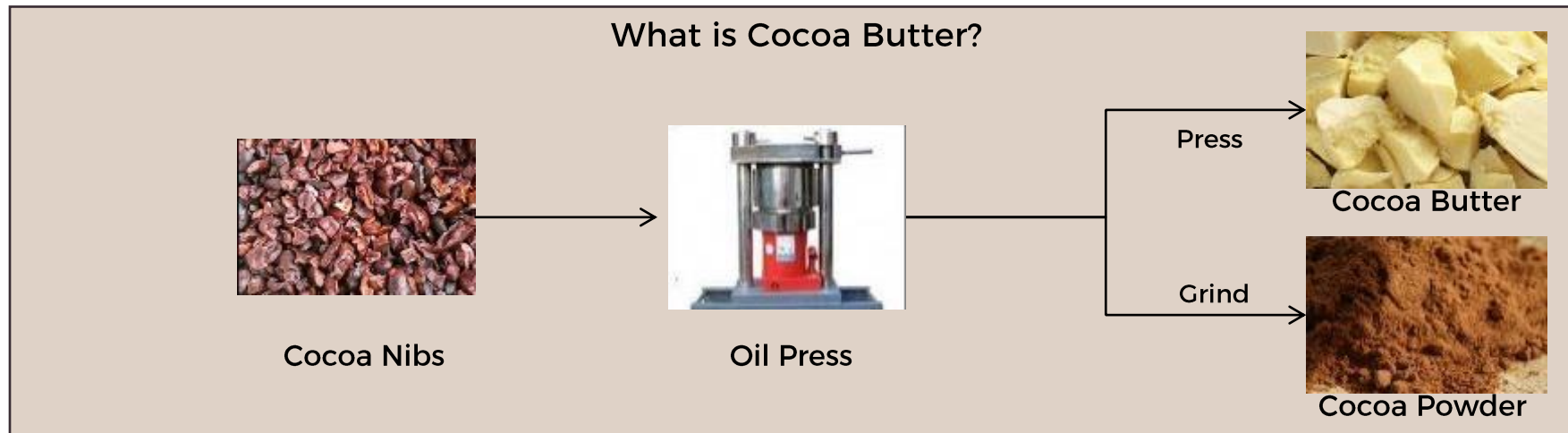
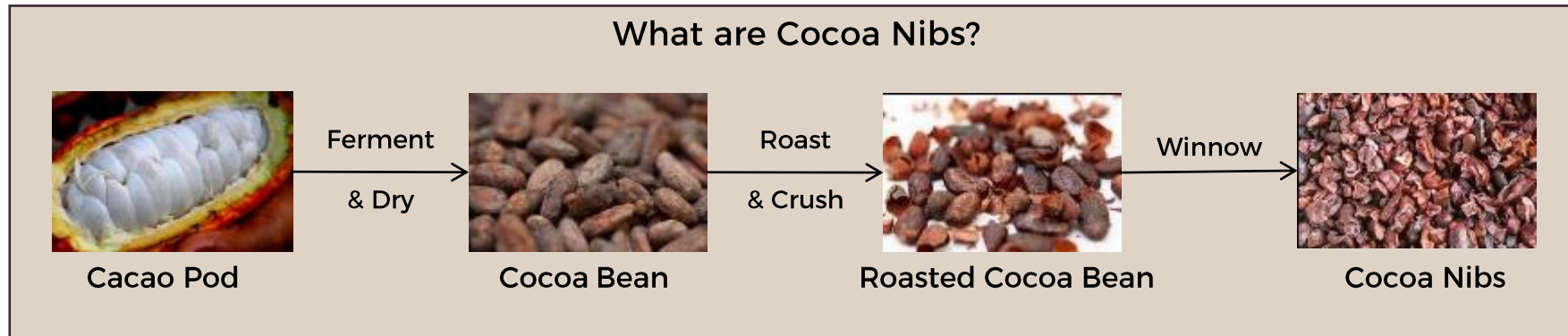


# Chocolate ingredients by type

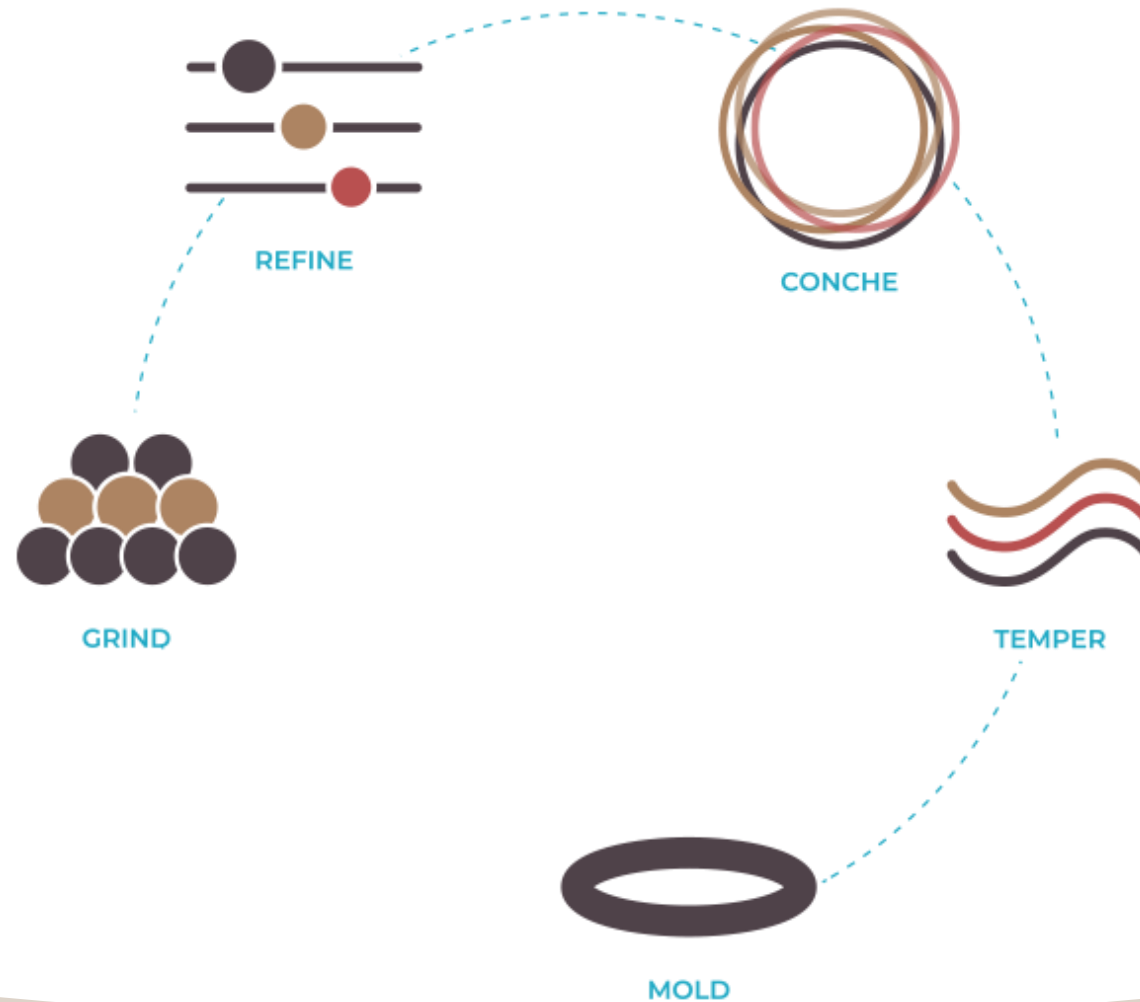
Four basic ingredients are the building blocks of all chocolate types :



# Cacao provides the basic ingredients for chocolate

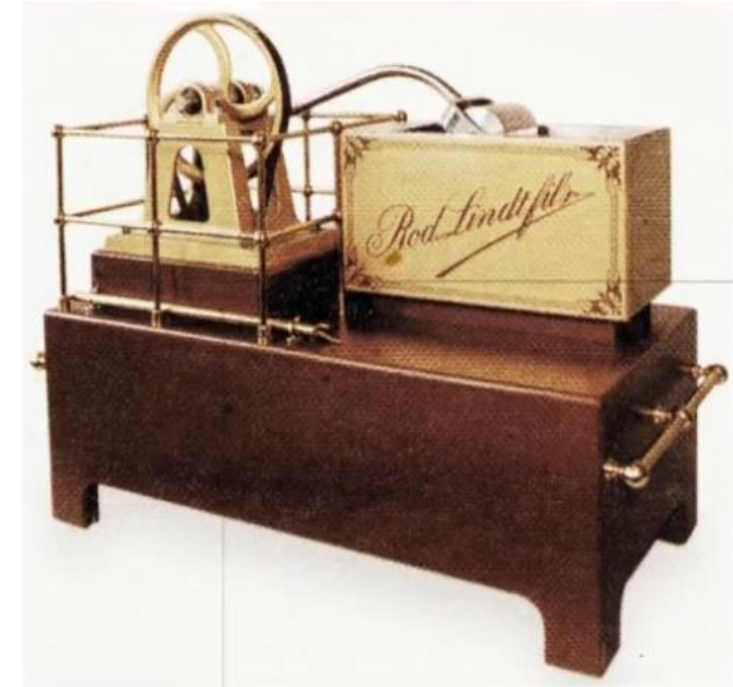


# The chocolate-making process



# What is conching?

In 1879, Rodolphe Lindt invented the conche machine. It slowly manipulates the molten chocolate at elevated temperatures. To this day, there is still debate over how the processes affects flavor and mouth feel.



Reorganization?

Aeration?

Dehydration?

Oxidation?

Volatilization?

Smoothing?



# What is tempering?

## Table Tempering



## Tempering Machine

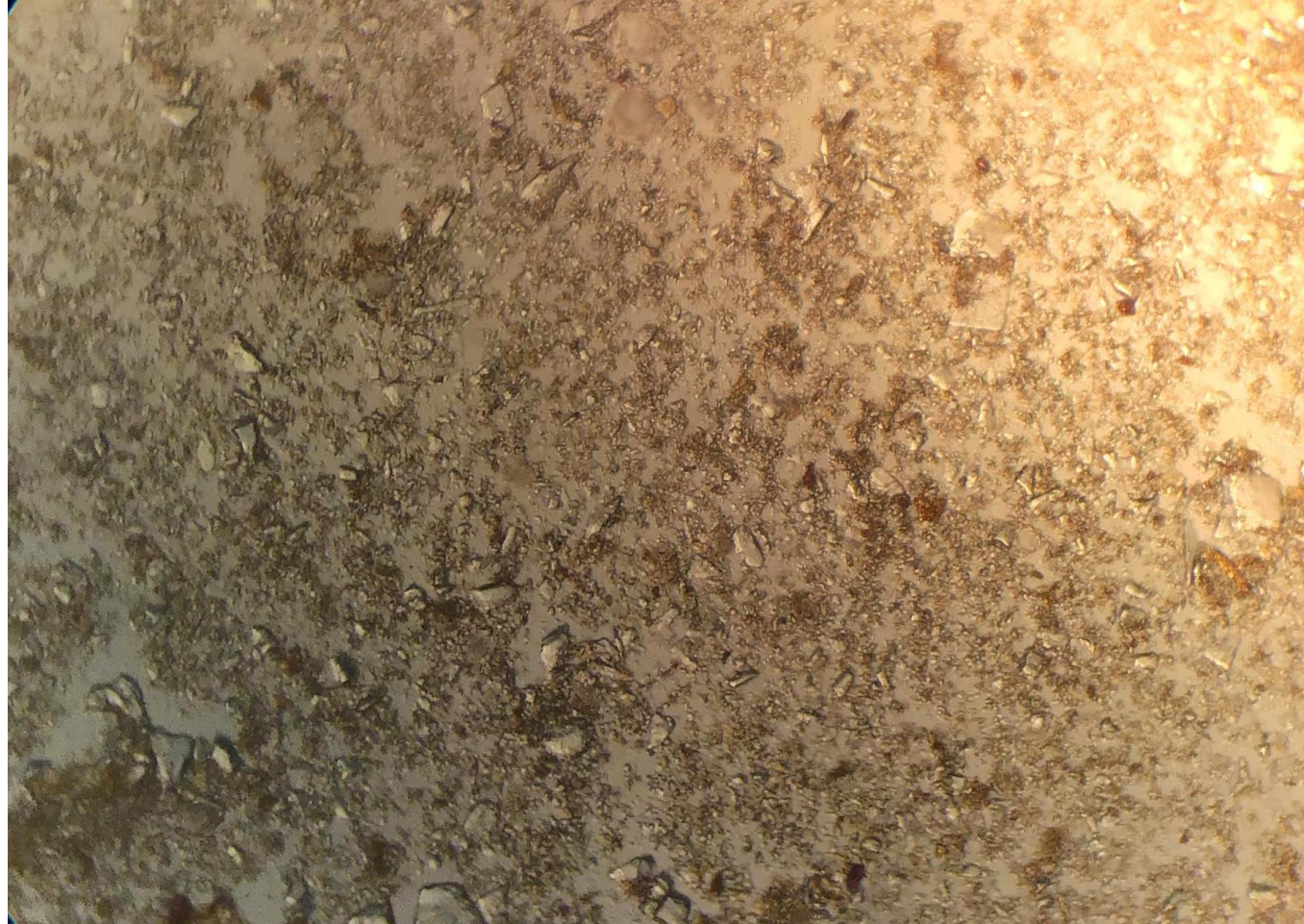


## Seeding



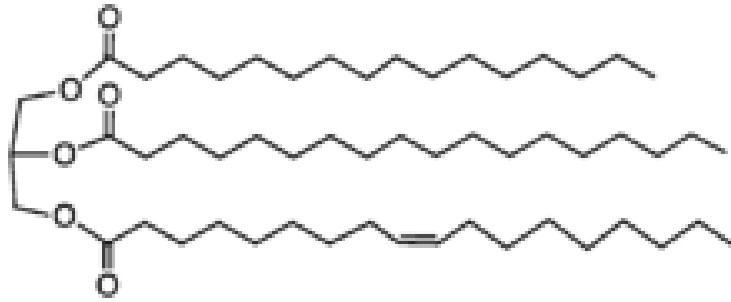
Photo Copyright 2018 - [Orson H. Gygi](#)

# Chocolate is a suspension of particles in fat



Chocolate as seen through a microscope

# Cocoa butter is a triglyceride (fat)



Cocoa butter molecule

The predominant triglycerides forms are POS, SOS, POP.

P = palmitic, O = oleic, and S = stearic



# Cocoa butter is a polymorph

Cocoa butter can crystallize in six different structures. Each has a unique melting temperature.

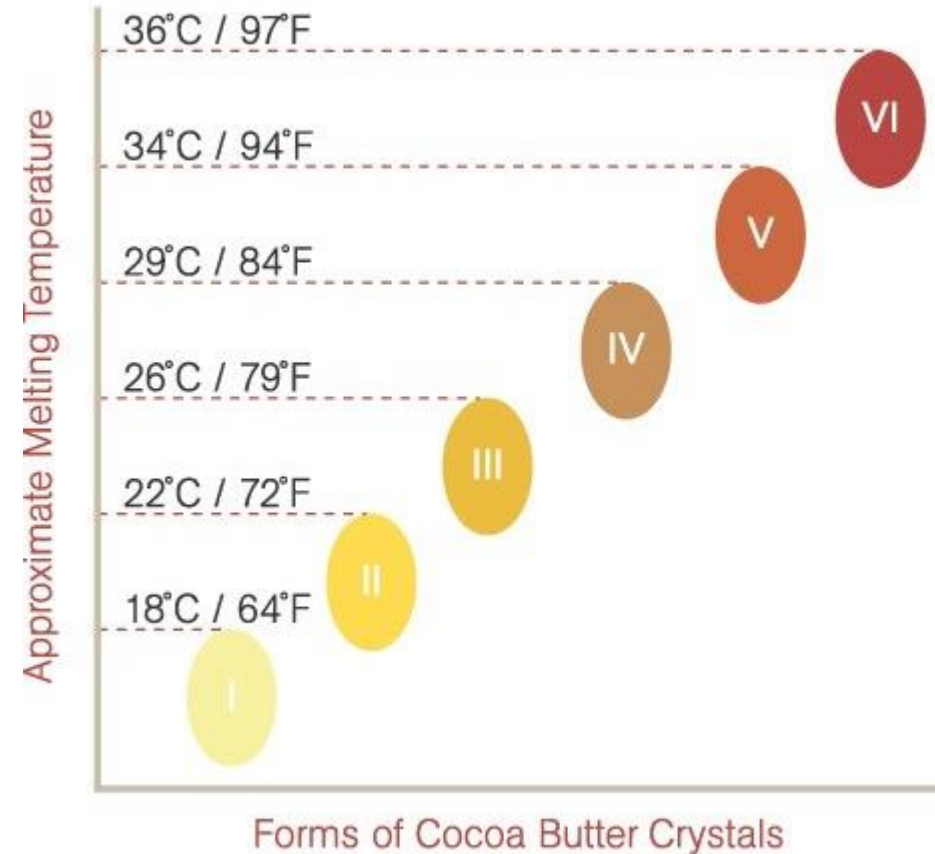
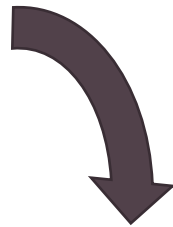


Image by CKBK

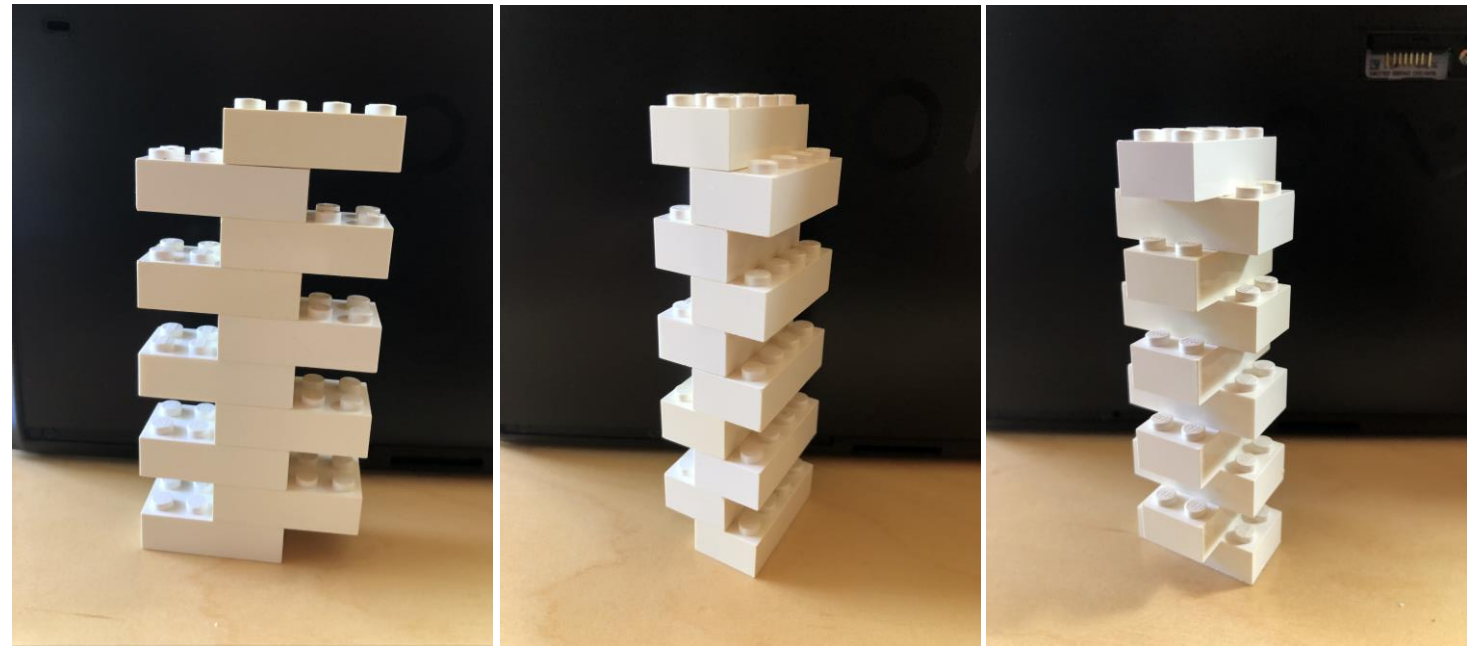
# Cocoa butter molecules are flexible connectors



“Untempered”

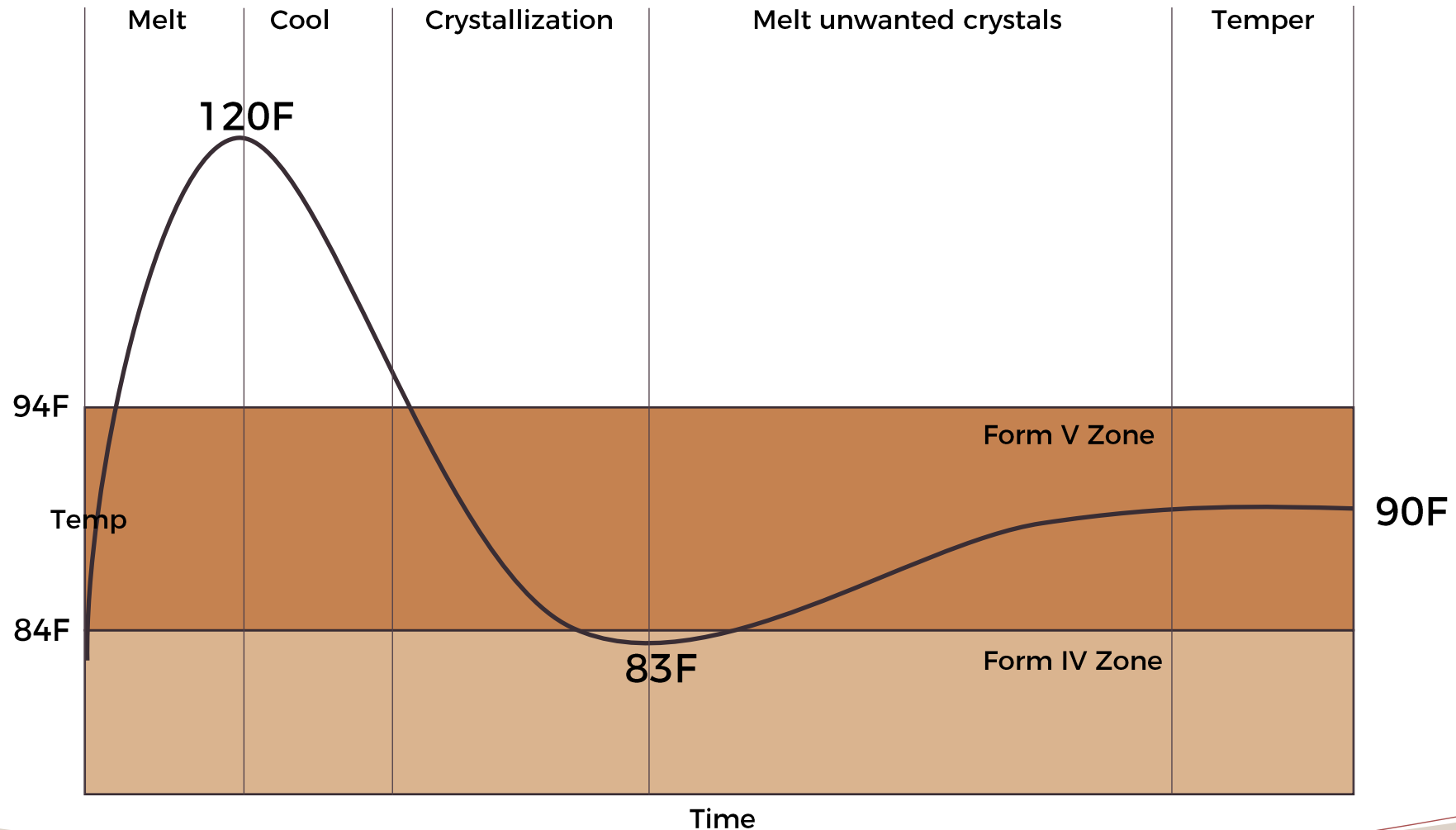


“Tempered”



Like Lego, the same unit can connect in different, repeating ways

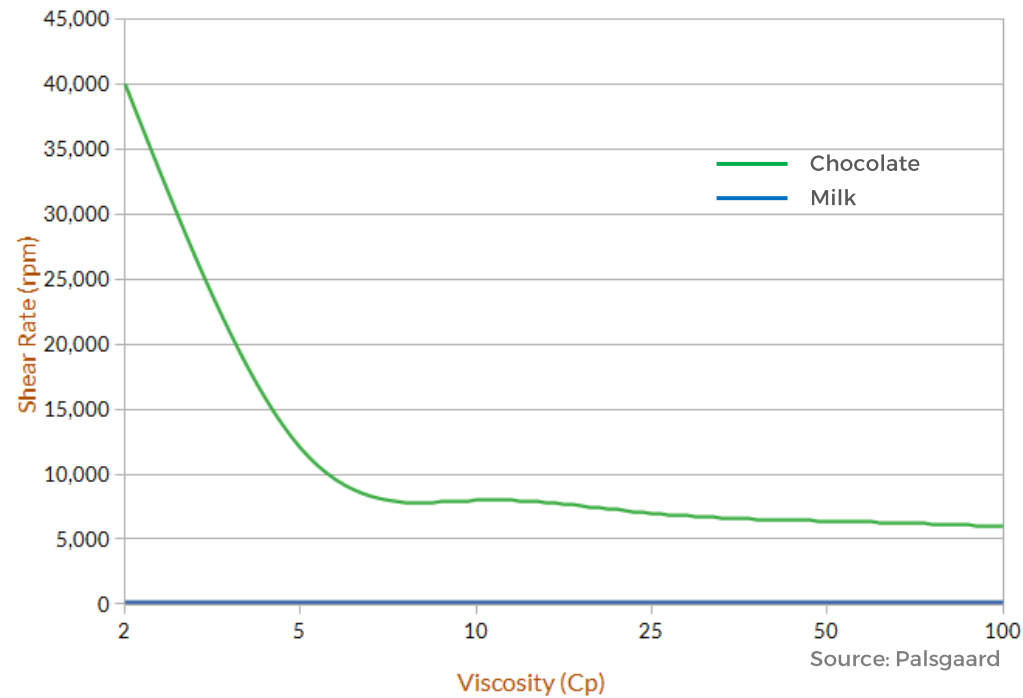
# Tempering is a controlled crystallization process



Dark chocolate tempering curve

# Molten chocolate is a non-Newtonian fluid

The viscosity (the resistance to flow) of liquid chocolate decreases with increased stress over time





# Chocolate Facts

Things you should know to be a true chocolate geek



# “Cacao” or “Cocoa”?



“Cacao”



“Cocoa”

# Infusions vs. inclusions



Dark chocolate with almonds and raisins



White chocolate with candy cane bits



Milk chocolate with coffee flavoring

# Determinates of chocolate quality



# Is white “chocolate” really chocolate?

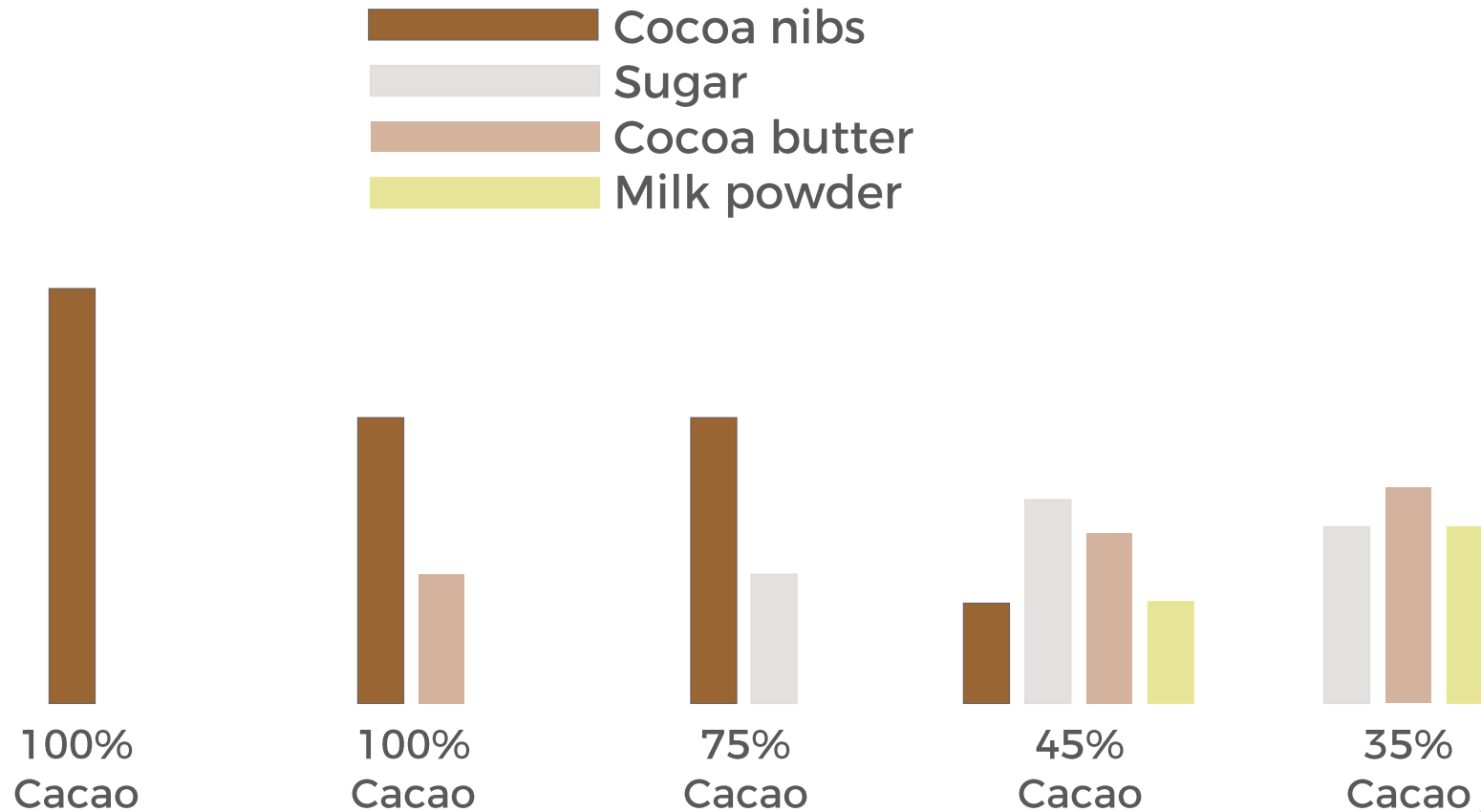


-  Cocoa nibs
-  Sugar
-  Cocoa butter
-  Milk powder



# How is cacao % calculated?

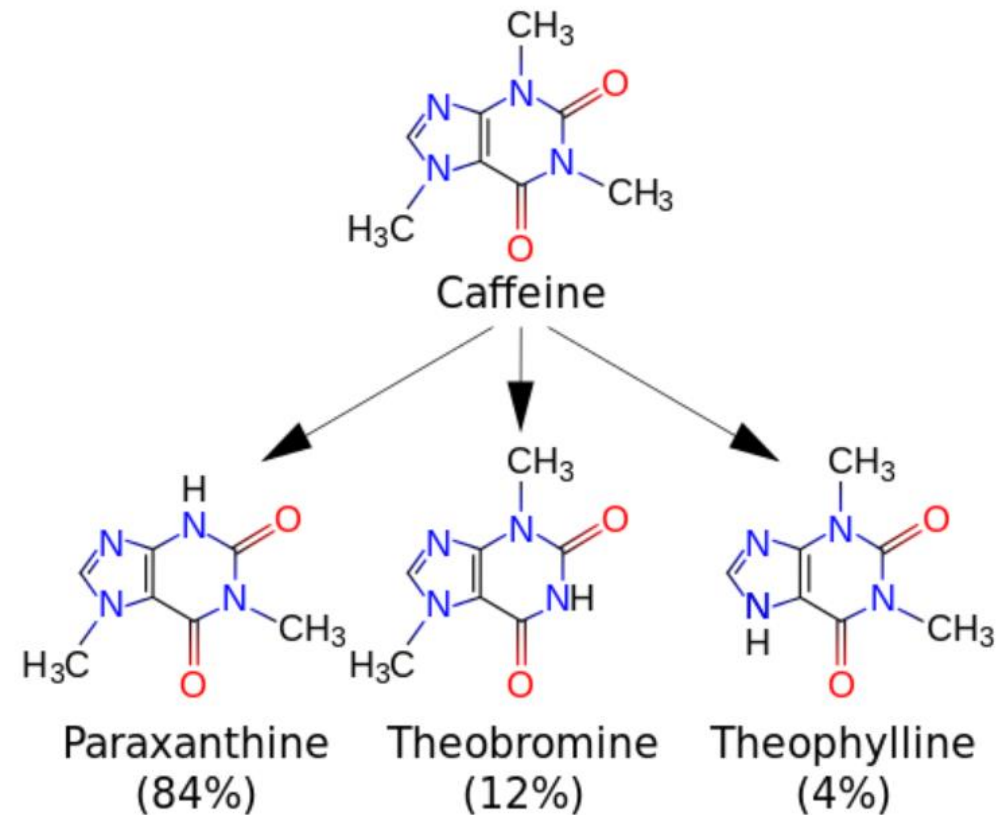
Cacao % is the sum of cocoa nibs and cocoa butter



# Chocolate contains theobromine

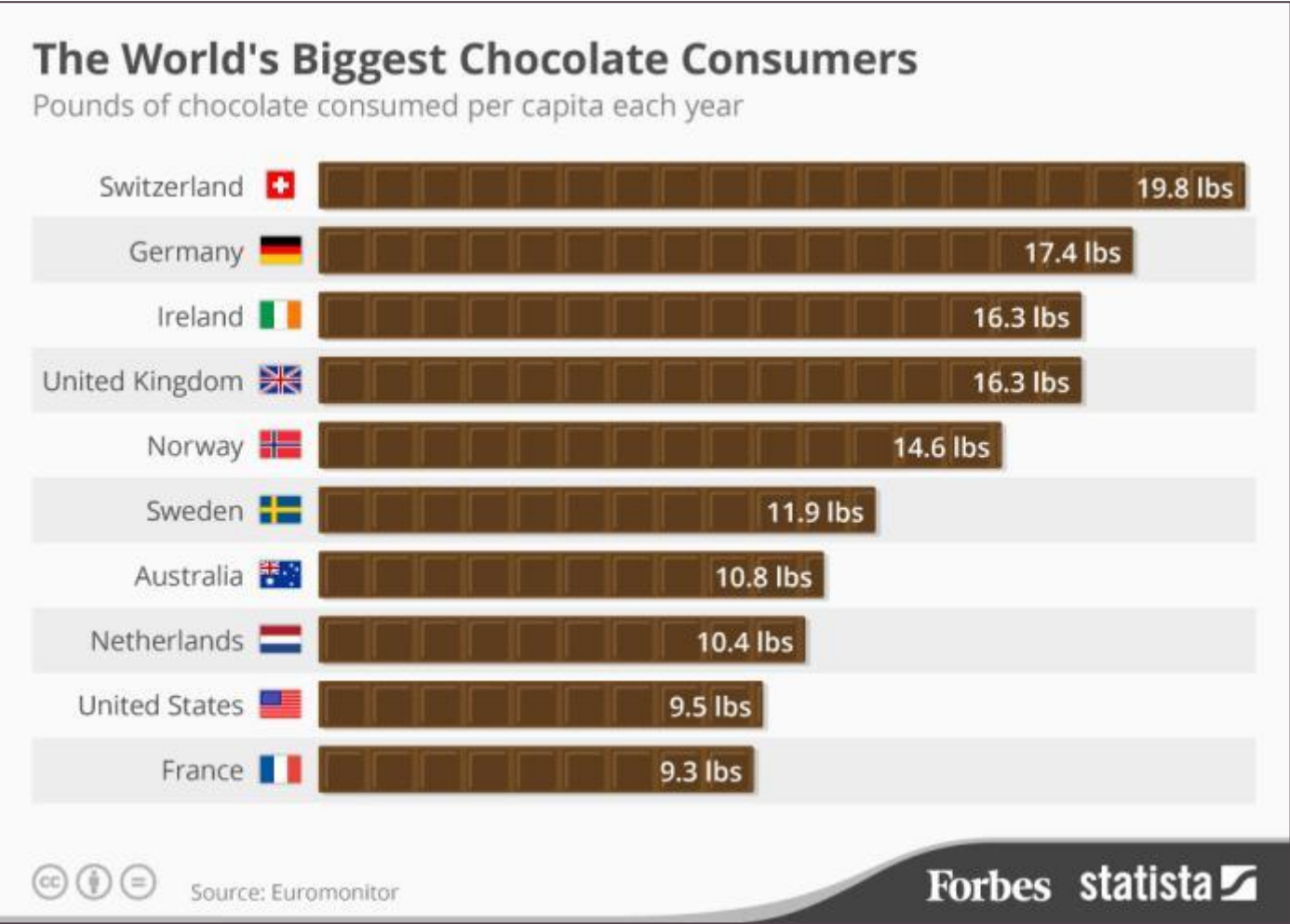
- Theobromine is a stimulant
- Theobromine and caffeine are related
- Chocolate contains ~2% theobromine
- Dogs cannot metabolize theobromine

Chemical structure of caffeine and the three primary metabolites generated inside the liver

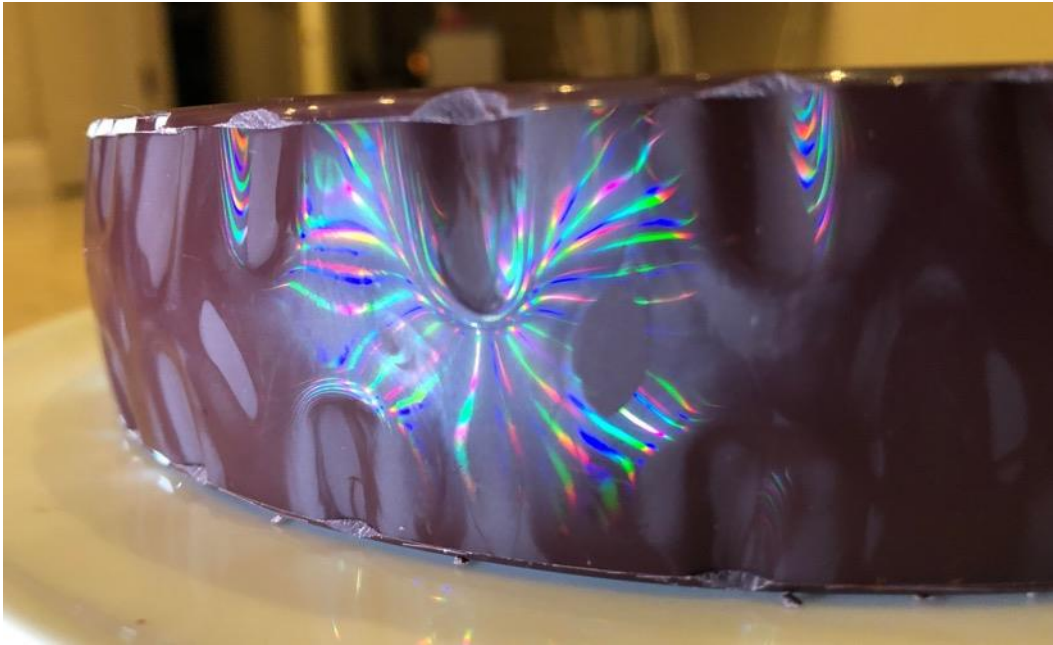


[Icey](#) - Own work, created in [Inkscape](#)

# The US is NOT the biggest consumer of chocolate



# Experimenting with chocolate



**Rainbow Chocolate**

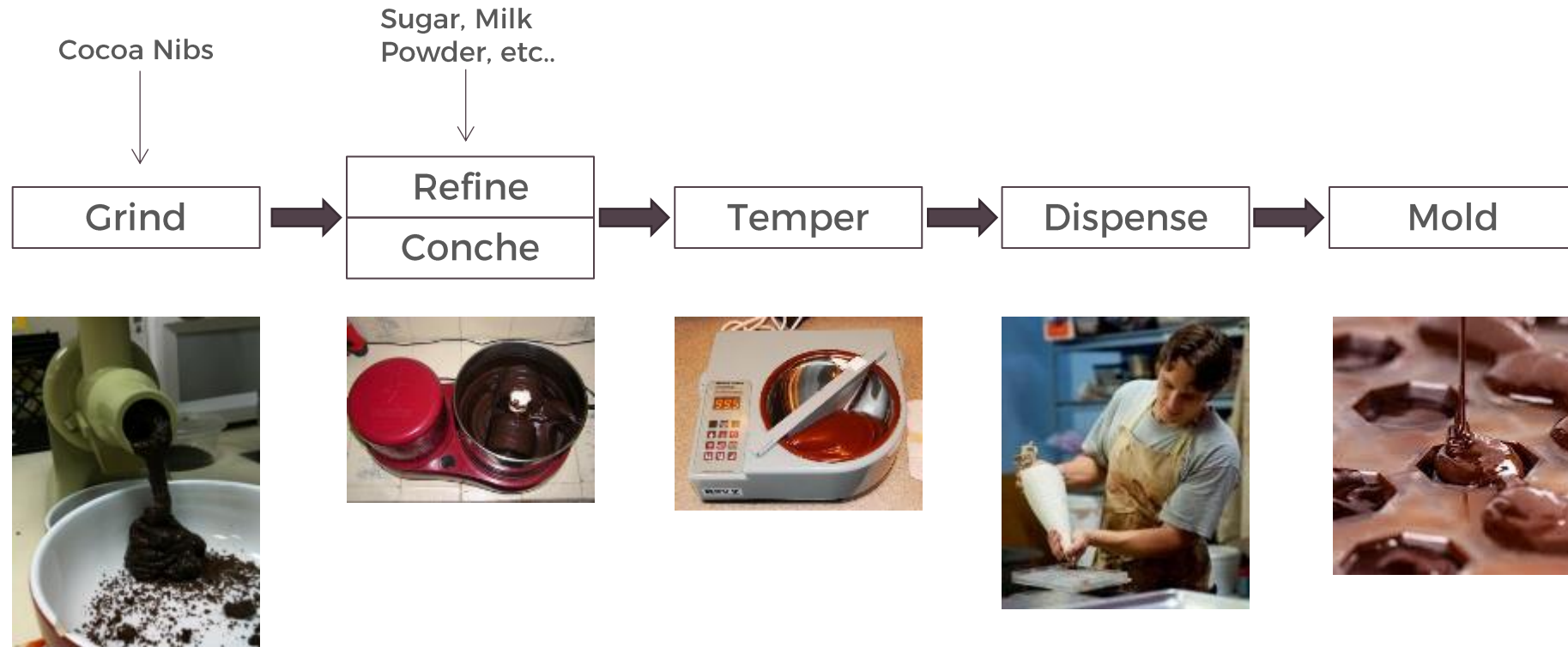


**Ruby Chocolate**



# DIY home chocolate-making

Can be messy, complex and time-consuming



# CocoTerra - The first table-top chocolate maker

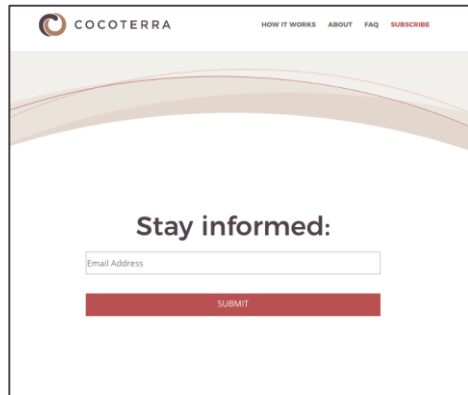


**Bean-to-bar chocolate in 2 hours!**

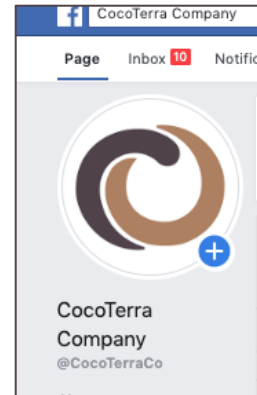
# Output: a ring of chocolate?



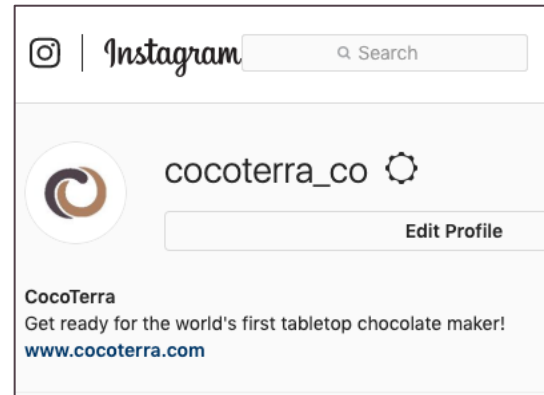
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## Questions?



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