

Plants that Changed History



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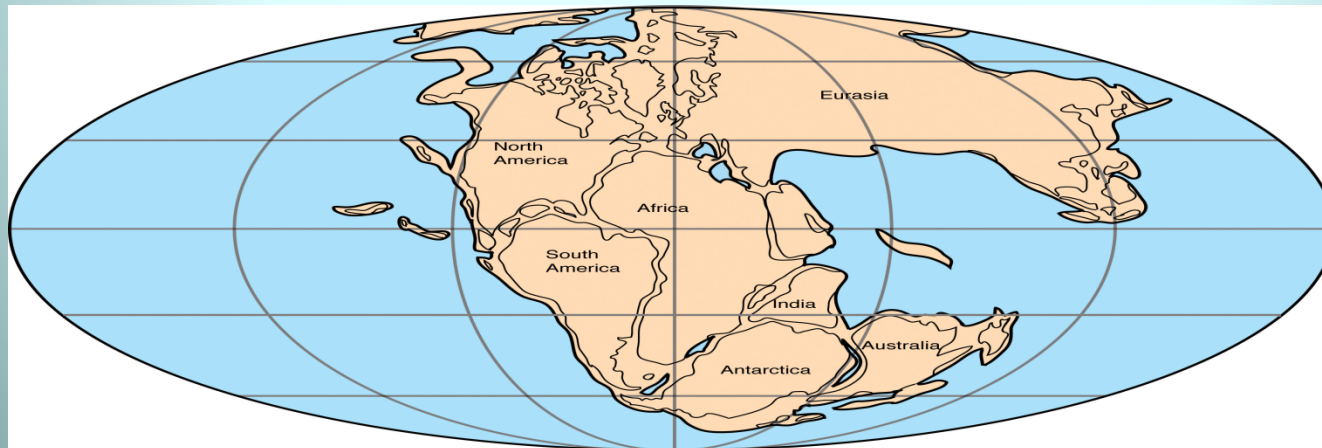
Perspectives

Current perspectives- wonderful recent gains for humanity by every measure

- 19th century Life expectancy -30 yr., now 71 worldwide and 81 in developed world
- 19th century- 1/3 children died before age 5, now at 6% in poor areas
- Substantial advances in medicine, and health care
- 30 years ago-37% lived in extreme poverty, now 9.6%
- Poverty slashed by education, markets, global trade, cheaper food and clothing and social programs
- Catastrophic famine vanished except for war ravaged areas
- Famine stanchd by crop rotation, synthetic fertilizer, hybrid crops
- 19th century- 12% could read or write, now 85%

Historical Perspectives

- 250 million years ago single land mass- Pangaea
- Discovery of America changed history- Columbian Exchange- Long separated ecosystems joined creating biological upheaval.
- History of humanity changed by exploiting plant life
- A number of plants have changed the course of history with far reaching impact- health, customs and society
- Long history of genetically modifying plants



Columbian Exchange

- After Columbus ecosystems separated for eons suddenly met and mixed and exchanged
- None of the interaction understood by the participants
- Plants like corn to Africa, potatoes to Europe, horses and apples to the Americas
- A host of other organism-insects, grasses, bacteria and viruses exchanged
- Interactions of differing cultures
- European exploitation
- Columbus's voyage marked not the discovery but the creation of a new world



Coffee

Coffee is the only plant talked about that is outside the Columbian Exchange

Two main species grown

- Arabica coffee (from *C. arabica*)
three-quarters of coffee cultivated
- Robusta coffee (from *C. canephora*);
Robusta strains also contain about 40–50% more caffeine than Arabica
- Caffeine is natural stimulant.
- Caffeine is an inborn plant pesticide, protecting the coffee fruit from insects.



Coffee



- Native of Ethiopia
- Legends- 10th century- Kaldi the goat herder
- Early on, the fruit were mixed with animal fat to create a rich survival energy bar.
- In the 13th century people began to roast coffee beans.
- Extremely popular with the Muslim community for its stimulant powers, which proved useful during long prayer sessions and pilgrimages.
- Turks were the first people to make a drink out of coffee beans.
- The world's first coffee shop, Kiva Han in Constantinople opened in 1473.
- At the same time, Turkish law made it legal to divorce a man if he fails to provide his wife with enough coffee to last her the day. Coffee is widely held as an aphrodisiac.

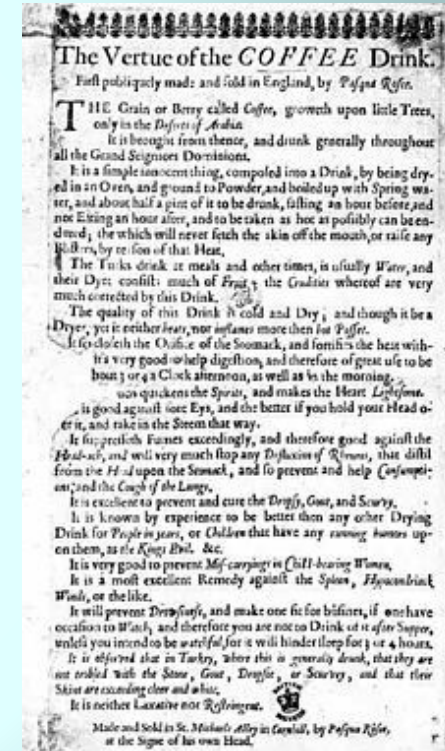
Coffee

- The word "coffee" entered the English language in 1582 via the Dutch *koffie*, borrowed from the Ottoman Turkish *kahve*.
- Coffee was first introduced to Europe on Malta in the 16th century. It was introduced there through Turkish Muslim slaves. "Turks, most skillful makers of this concoction."
- Coffee came to Venice in 1615. "Drink of the Devil" controversy, Pope Clement VIII was asked to decide. After tasting he found it so satisfying that he gave it papal approval.
- Coffee houses quickly became centers of social activity and communication in the major cities of Europe. Replaced alcohol as a breakfast drink.



Coffee Houses in London

- First Coffee House- Queen's Lane Coffee House- 1654 still in business today
- 30 years later 3,000 coffee houses in England
- Outrageous claims:
- "Tis extolled for drying up the Crudities of the Stomack, and for expelling Fumes out of the Head. Excellent Berry! which can cleanse the Englishman's Stomak of Flegm, and expel Giddinesse out of his Head."
- Coffee houses called the penny university
- These "penny universities" are filled with lively discussions among a mix of social classes, from students to tradesmen to the elite.



Coffee

- In 1773, Americans threw not only tea but coffee as well overboard to protest English taxes
- When the our government banned alcohol in 1920. Coffee sales skyrocketed.
- American soldiers are issued instant Maxwell House coffee in their ration kits as they fight World War II.
- in the 1940's Italian Achilles Gaggia invented the espresso machine. He named the Cappuccino for its resemblance to the color of the robes of the monks of the Capuchin order.
- n 1971, Starbucks opened its first store in Seattle's Pike Place public market.
- Second only to oil, coffee is the most valuable legally traded commodity in the world. We love it, we rely on it, and we drink it in massive quantities.
- Coffee is a daily ritual in the lives of millions of humans around the globe.
- Coffee has helped shape our history and continues to shape our culture.



Tobacco

- Native to North and South America
- Tobacco –*Nicotiana Solanaceae*- the nightshade family
- Used as medicine and as hallucinogenic by Native Americans



- In England, it was introduced to the country by Sir Walter Raleigh. He was a shameless promoter of tobacco as a necessary recreation for all gentlemen. Soon, smoking was seen as the height of fashion.

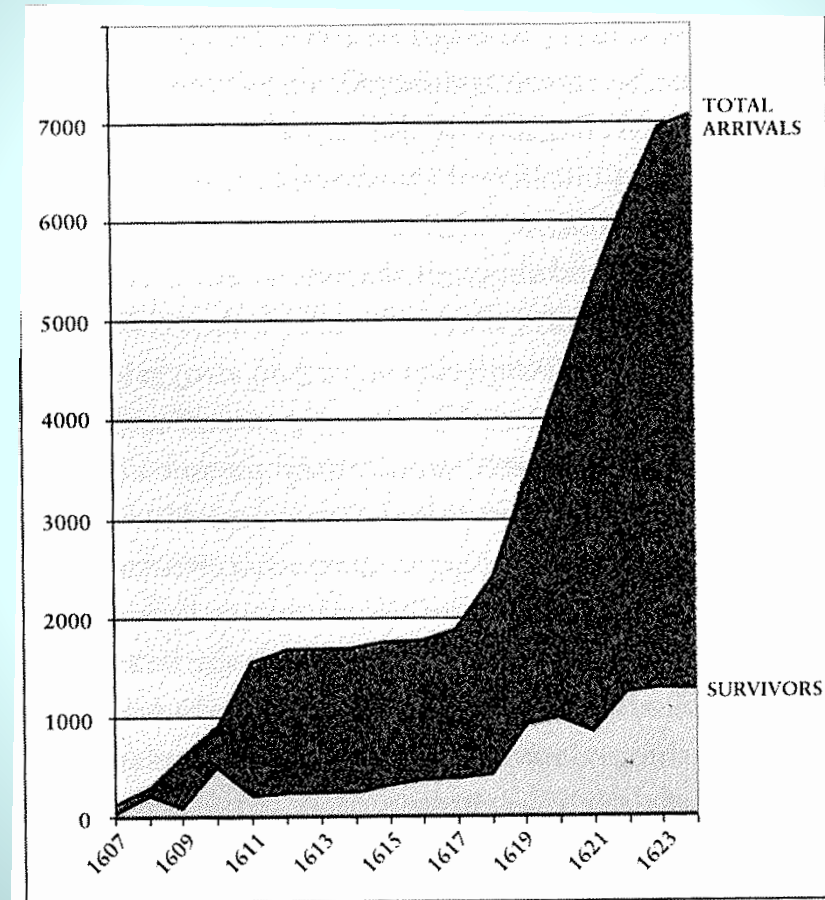


Jamestown

Tobacco unleashed a permanent change to the American landscape

- Local tobacco *Nicotiana rustica* harsh
- John Rolf got Spanish strain grown in Trinidad and South America
- Tobacco brought the colony from wretched failure to great success
- Became rage by 1619 Jamestown exported 10 tons
- By 1639 750 tons exported
- Tobacco was the magnet that brought malaria to the New World with devastating impact
- Slavery introduced- efficient due to colonists introduction of malaria
- Start of plantation style of farming
- Imported bees for honey- no thought about pollination
- Tobacco pulls all nitrogen and potassium out of the soil

Jamestown



Tobacco



Ships from England used soil for ballast.

The soil contained worms.

- The introduction of worms triggered a big change.
- Over time the worms cleared much of the litter in hardwood forests
- In 1881 Charles Darwin wrote: "It may be doubted whether there are many other animals which have played so important a part in the history of the world, as have these lowly organized creatures."
- Earthworms play a major role in the conversion of large pieces of organic matter
- into rich humus, thus improving soil fertility.
- Earthworms accelerate nutrient cycling in the soil-plant system through fragmentation & mixing of plant debris

Tomato

- The tomato is a fruit/berry of the plant *Solanum lycopersicum*.
- The plant belongs to the nightshade family.
- The species originated in Peru.
- Wild versions were small, like cherry tomatoes, most likely yellow
- By 500 BC, it was being cultivated in southern Mexico areas.
- The Nahuatl (Aztec language) word *tomatl* gave rise to the Spanish word "tomate", from which the English word tomato derived.
- Its use as a cultivated food may have originated with the indigenous peoples of Mexico.
- Hernán Cortés may have been the first to transfer the small yellow tomato to Europe in 1521. Although Christopher Columbus may have taken them back as early as 1493.
- Tomatoes were erroneously thought to be poisonous by Europeans who were suspicious. This was exacerbated by the interaction of the tomato's acidic juice with pewter plates.
- The tomato's ability to mutate and create new and different varieties helped contribute to its success and spread throughout Italy.



Tomato

- The earliest discovered cookbook with tomato recipes was published in Naples in 1692, though the author had apparently obtained these recipes from Spanish sources.
- Unique varieties were developed over the next several hundred years
- Today there are around 7,500 tomato varieties grown.
- To facilitate transportation and storage, tomatoes are often picked unripe (green) and ripened in storage with ethylene.
- A machine-harvestable variety of tomato ("square tomato") was developed in the 1950s.
- The first commercially available genetically modified food was a variety of tomato named the Flavr Savr, engineered to have a longer shelf life.



Pepper

- Unusual that two completely different plants are called the same.
- **Black pepper** (*Piper nigrum*) is a flowering vine in the family Piperaceae, cultivated for its fruit, which is usually dried and used as a spice and seasoning, known as a peppercorn.
- Native of India.
- Peppercorns could be used as currency and was more valuable than gold.
- Columbus was to find the Spice Islands but discovered the New World.



Pepper

- The bell pepper and hot peppers have been cultivated for more than 9000 years, with the earliest cultivation having taken place in South and Central American civilizations. Native to Central South America- Peru and Bolivia
- The misleading name "pepper" was given by Europeans when Christopher Columbus brought the plant back to Europe. Pepper was at that time applied to all known spices with a hot and pungent taste and was therefore naturally extended to the newly discovered genus *Capsicum*.
- Cultivars of the plant produce fruits in different colors, including red, yellow, orange, green, white, and purple. Bell peppers are sometimes grouped with less pungent pepper varieties as "sweet peppers".



Corn

- Maize is an annual grass in the family Gramineae.
- Maize was domesticated in Mexico by the Aztecs. They modified 5 genes.
- All maize arose from a single domestication in southern Mexico about 9,000 years ago.
- Many centuries of artificial selection by the indigenous people of the Americas resulted in the development of maize plants capable of growing several cobs per plant.
- Later changes in the evolution of modern maize involved many genes with small effects.



Corn



- Maize was because it was nutritious, easy to store and carry, provided food and fuel, maize became a staple food for most American cultures.
- Maize spread to the rest of the world because of its ability to grow in diverse climates.
- Spanish settlers consumed maize and explorers and traders carried it back to Europe.
- Some Spaniards worried that by eating indigenous foods and risk turning into Indians.
- It was cultivated in Spain just a few decades after Columbus's voyages then spread to Italy, West Africa and elsewhere.

Corn

- Many industrial varieties of corn are genetically modified for resistance to herbicides.
- Some strains genetically engineered for greater drought tolerance.
- Maize has become a staple food in many parts of the world.
- Total production of maize surpasses wheat or rice.
- Most is used for corn ethanol, animal feed and other products- corn starch and corn syrup.
- Major types of maize are dent corn, flint corn, pod corn, popcorn, flour corn, and sweet corn.



Potato

- Cultivation of potatoes in South America goes back 10,000 years
- Potato is a native of Peru
- It is a member of the nightshade family as tobacco, tomatoes and sweet pepper
- Cash crop of the Andean people was chuño: created by letting potatoes freeze and thaw repeatedly. Can be stored for years without refrigeration-helpful during years of famine or bad harvests. The Spanish fed chuño to the silver miners who produced vast wealth in the 16th century for the Spanish government.



1,000 varieties grown in Peru
5,000 varieties preserved

Potato



- Introduction to Europe was key historical event
- Wide spread consumption lead to the end of famine cycle
- Feeding growing populations, it permitted a few European nations to assert domination over most of the world (1750-1950)
- To solve famine in 1744 Fredrick the Great ordered eating potatoes
- In 1775 Louis XV1 and Marie Antoinette wore the blossoms
- Ending hunger gave political stability
- It set the template for modern agriculture
- First large scale production- monoculture
- High productivity of potato doubled Europe's food supply
- First use of fertilizer- Peruvian guano
- Fertilizer increased yields by 2 to 3X



Potato

- Unlike any other major crop, potatoes contain most of the vitamins needed for sustenance.
- One of the prime factors of population explosion in the early 1800s.
- In 1854 *Phytophthora infestans* struck
- 1 million Irish died of starvation
- Over 2 million emigrated from Ireland
- Ireland has less people than it had over 150 years ago
- First potatoes grown in US- 1719 Londonderry, NH from seeds and tubers from Ireland
- Today, the potato is so common and plentiful in the Western diet that it is taken for granted.



Organic and Non-GMO

Organic Issues

- Non-organic substances approved by FDA
 - Ethylene
 - Metals including copper, magnesium sulfate, oxides, sulfates, or silicates of zinc, copper, iron, manganese, molybdenum, selenium and cobalt
 - Chlorine, paracetic acid, sodium carbonate peroxide hydrate
- Over use of manure
- Lower yields resulting in higher cost

Non-GMO Issues

Just about all crops have been genetically modified

Current technology is precise in obtaining the desired result

No nutritional value or health issue- over 200 medical studies

Perspectives-The Future

- Current population- 2.9 billion- 1960 half of today's
- 2030- 5 billion predicted
- 2050-9 billion predicted
- Sustainable discipline
- Alternative food sources are being developed
- Clean meat under development
- Rise of Africa
- Abundance beyond imagination
- Many open issues that cloud any forecast



Concluding Remarks

- My hope- you found this talk interesting
- When you have a cup of coffee you may think of Kaldi the goat herder
- This talk was an abbreviated thumbnail of a rich history



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Concluding Remarks

