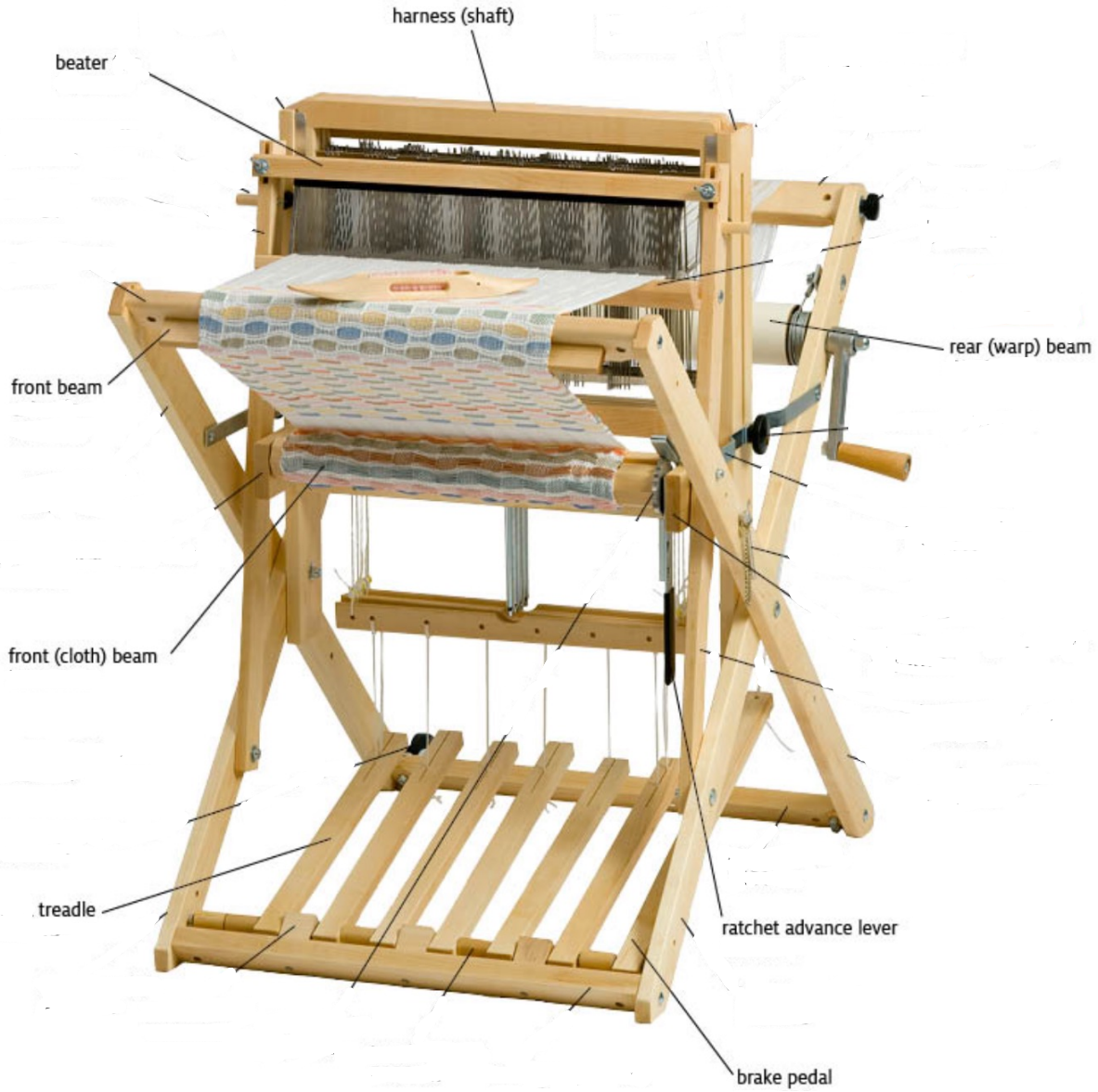

Human History
Through Fiber
How Fiber Changed the World
Howard Seltman and Kathy McIntyre-Seltman

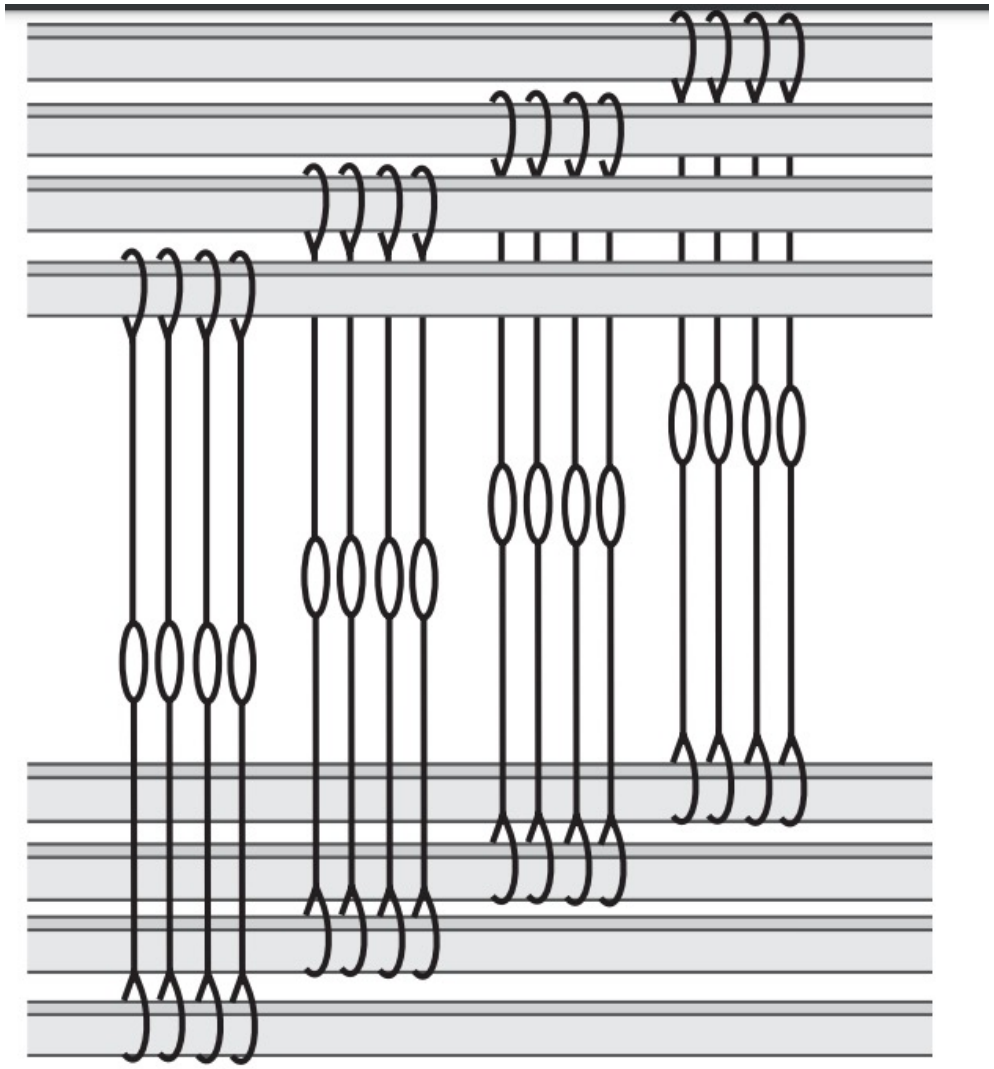
Course Overview

- Week 1
  - Prehistory and history
  - Process overviews of spinning and weaving
- **Week 2**
  - **Hemp, flax and other bast fibers**
  - **Cotton**
- Week 3: Silk
- Week 4: Wooly mammals
- Week 5
  - Dyeing
  - Synthetics
  - Fiber hobbies

Review of Weaving

4-shaft horizontal loom



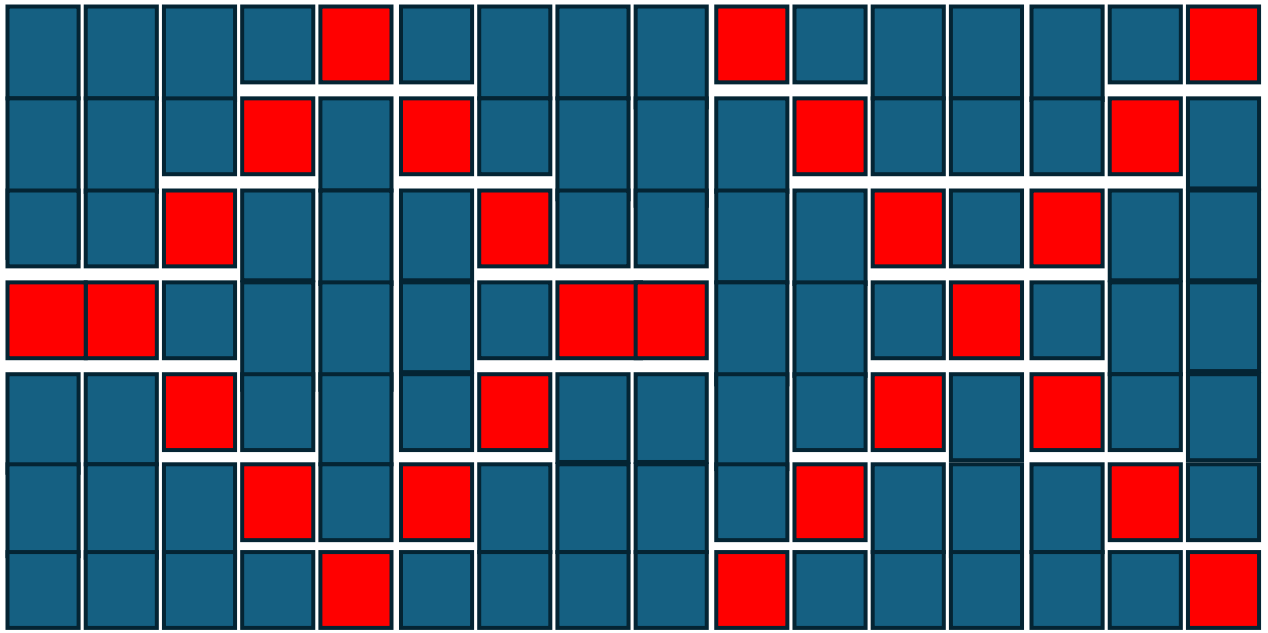


Weaving Patterns

Shaft number 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Shaft number 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Shaft number 3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Shaft number 4	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Warp thread number: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Blue warp
Red weft



Shaft **lowered**

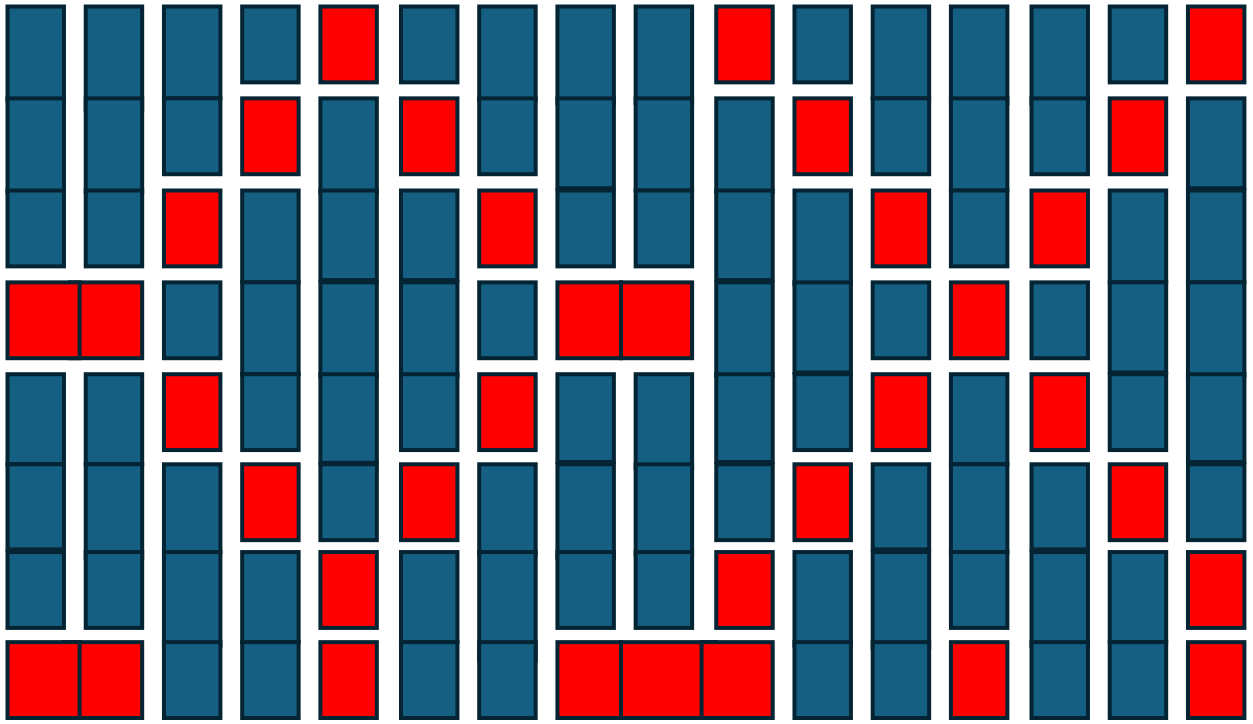
1
2
3
4
3
2
1

Weaving Patterns

Shaft number 4	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Shaft number 3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Shaft number 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Shaft number 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Warp thread number: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Blue warp
Red weft



Shaft(s) **raised**

2, 3, 4

1, 3, 4

1, 2, 4

1, 2, 3

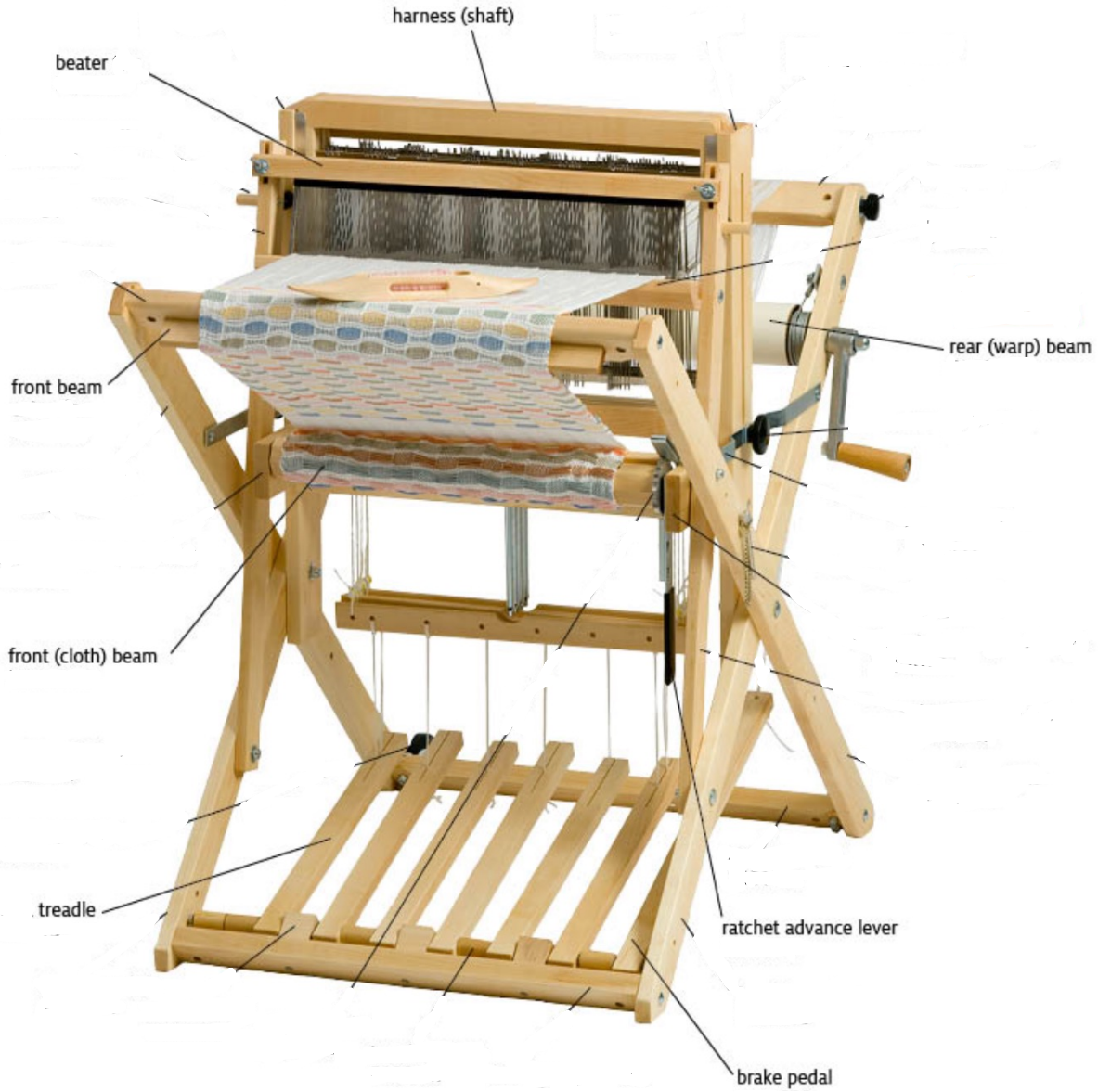
1, 2, 4

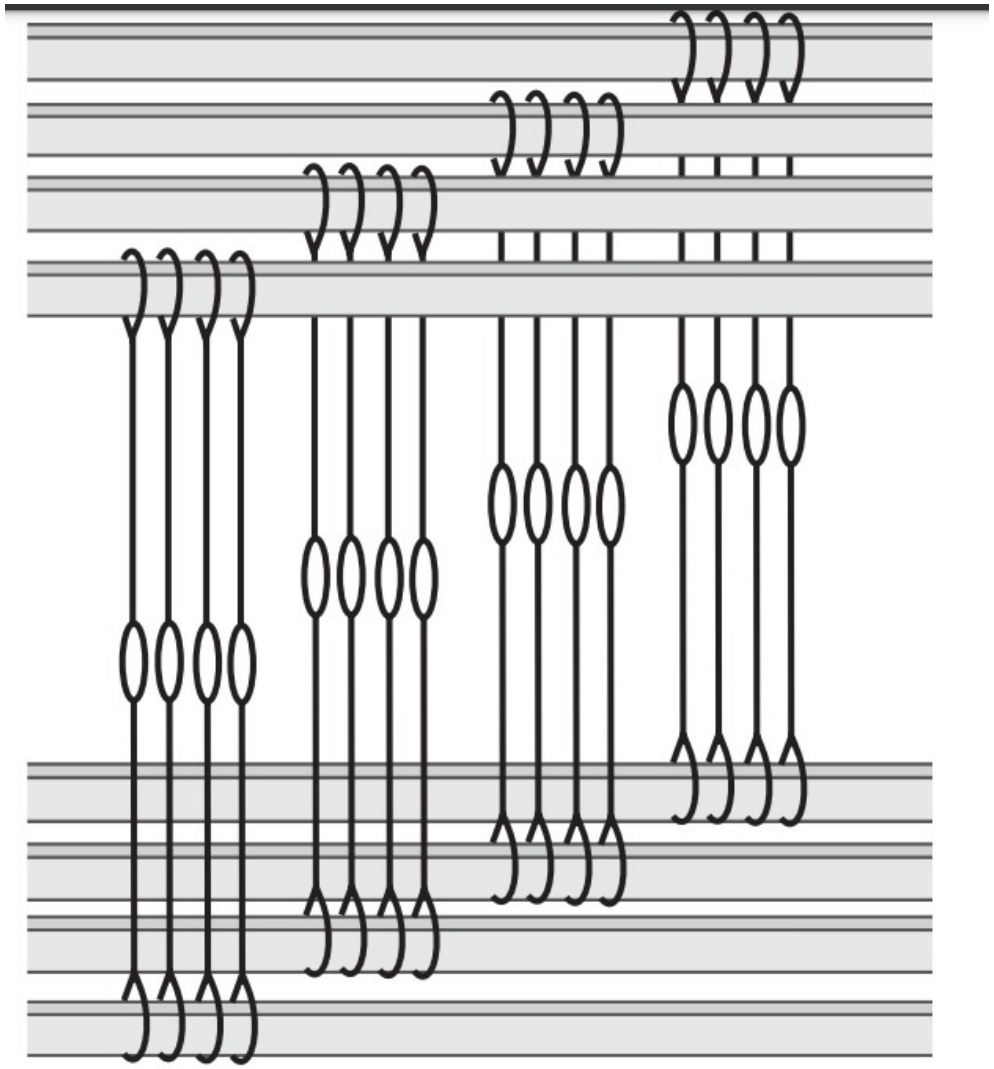
1, 3, 4

2, 3, 4

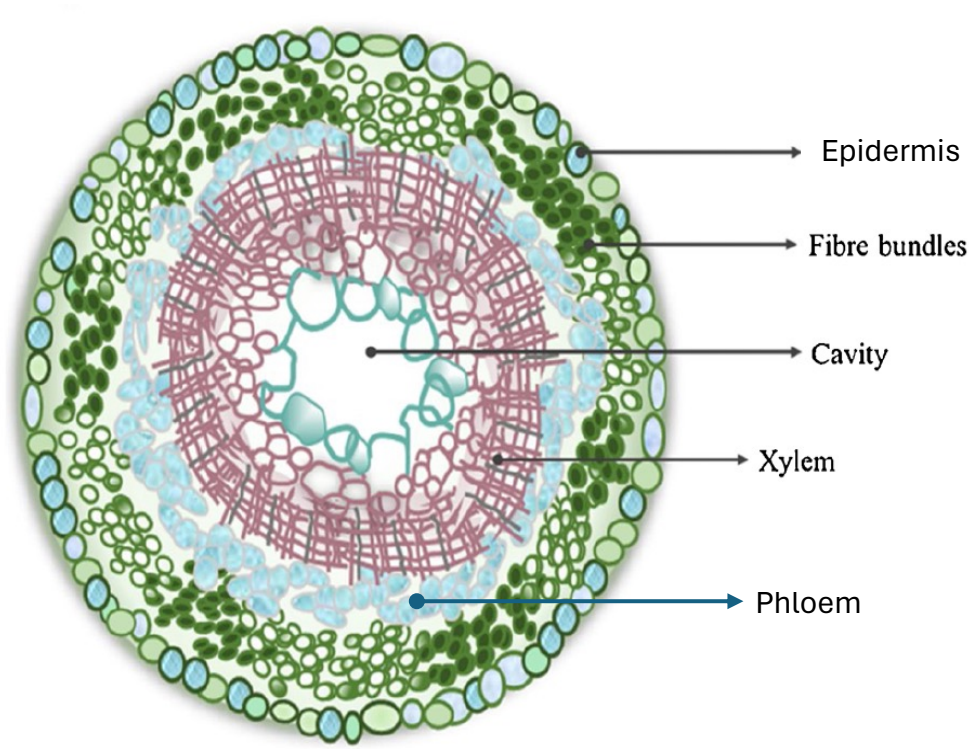
2, 3

4-shaft horizontal loom





Bast fibers



The cross-section model of a bast fiber stalk

- Play a structural role in ***stems*** and trunks
- Chiefly cellulose, and biodegradable
- Includes hemp, flax, nettle, ramie, jute, and kenaf as well as trees such as linden, willow, yew, birch, elm and cedar
- Less water and pesticides than cotton
- Extensive processing required to separate from non-cellulose plant components
- Probably the first fibers used to make cloth
- Dye less well than wool, silk or cotton

Jute

- A mallow from the Indian subcontinent spread around the world
- Goes back 4500 years in the Indus valley (Harappa and Mohenjo-Daro)
- More than a billion jute sandbags were sent from Bengal to the trenches in WWI
- Almost wiped out by synthetics in the 1970s
- Now used for burlap, carpet backing, cordage, paper pulp, and scrim
- 2.5 million tons per year, esp. India and Bangladesh (vs. 27 for cotton)

Stinging Nettle

- From the nettle (Urticaceae) family
- Originally native to Europe, temperate Asia and North Africa
- Woven into cloth in Bronze and Iron Age Europe, Nepal and East Africa
- Never cultivated
- Ancient competitors include cultivated hemp and flax

Ramie

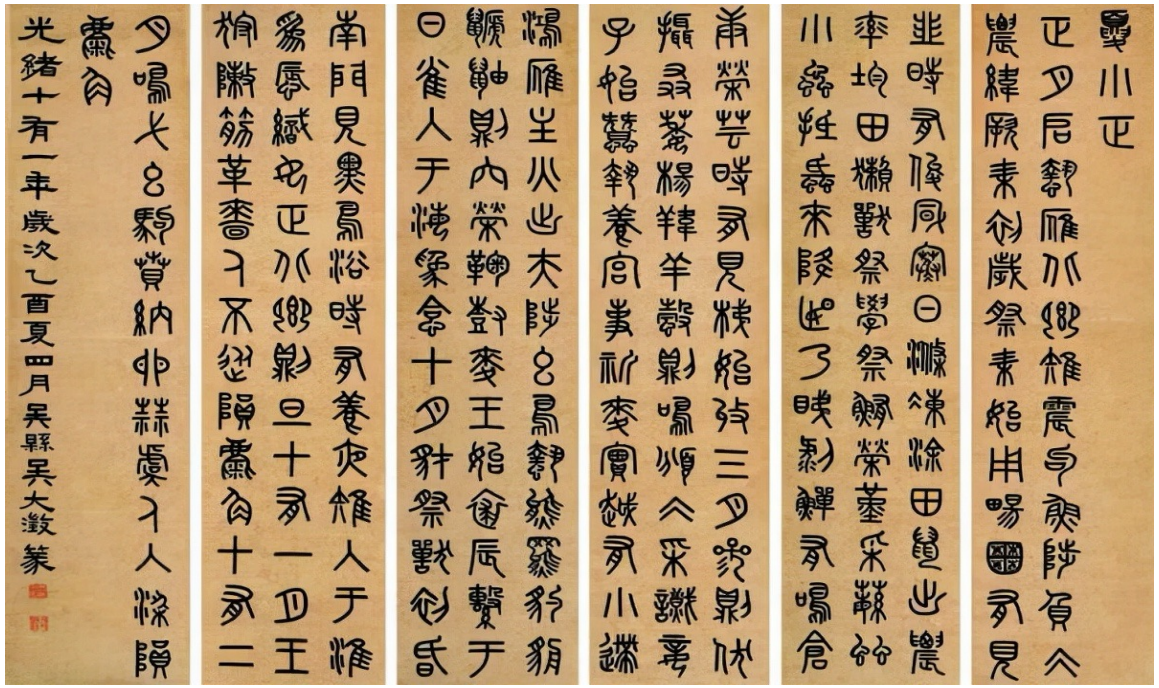
- From the nettle (Urticaceae) family
- Also called China grass or Chinese nettle
- Used for 6000 years in China and for Egyptian mummy cloths
- Can be harvested 3 to 6 times per year
- Strong, resists wrinkling, silky luster
- Now just 0.01 million tons per year (vs. 27 million for cotton)

Manila

- *Musa textilis, (Abacá)* related to banana and plantain
- Also known as Manila hemp
- Native to the Philippines
- Stronger than hemp, salt resistant, fiber 3 to 12 feet long
- Scraped without retting
- Knotted instead of spun
- Spanish colonists called it medriñaque cloth
- Along with tobacco and sugar, the main export in the 18th century
- Suppressed under American colonization
- From 1843 to the end of the 20th century, the source of Manila folders
- Still in use today for traditional costumes, rope, and tea bags

Hemp (Cannabis sativa)

- A dioecious plant in the small hemp family (order Rosales)
- Mesopotamian hemp cloth 10,000 years ago
- Cultivated in China for 6000 years for paper and textile
- In ancient China, commoners mostly wore hemp or wool clothing until the introduction of cotton in the Sòng Dynasty (~1000 CE)

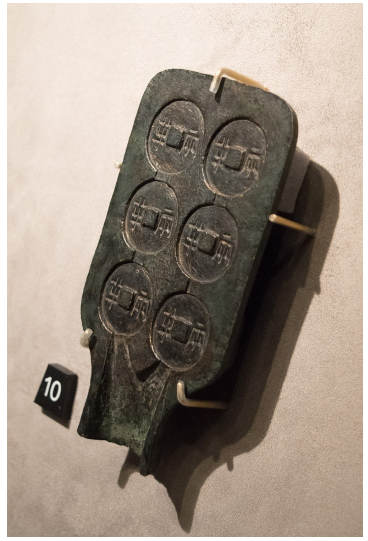


3500 years ago, the Xià dynasty's *Xiao Zheng* names hemp as one of the major cultivated crops in China, along with millet, beans, wheat and rice

Many later texts contain details of cultivation including timing, soil fertilization, crop rotation and identification of male vs. female plants 1500 years before Western botanists

Hemp cloth as money

- “Excavated documents recording the laws of the Qín state that by the mid-third century BCE hemp cloth for tax payment was being produced to a standard measurement of 8 feet in length by 2 feet 5 inches in width, which was equivalent in value to 11 *bànliǎng* 半兩 coins. This confirms that hemp cloth was used in payment and was a medium of exchange that was regulated by the state, which standardised its dimensions and determined its value.” --Sheng, J Royal Asiatic Soc, 23:2 (2013)
- The Táng dynasty (618-907 CE) tax system required each adult male to pay a portion of grain plus 20 days corvée labor, but these could be replaced by hemp or silk textiles. Textiles were also used as imperial salary.



Hemp and the British Empire

- Hemp spread to Europe about 3200 years ago
- *Canvas* is from the Dutch pronunciation of Cannabis
- “By the late 1700s a major ship-of-the-line in the British navy required 80 tons of Hemp in sail and rope, this equated with 350 acres of hemp production. The sails and rigging had to be completely replaced every 3-4 years.” -- https://athertontablelandnetguide.com/history/hemp/
- Laws required English and American farmers to plant a portion of their land with hemp in colonial times
- One goal of colonization of Australia was to replace American hemp imports after America won its freedom

Hemp in the US after Independence

1st. There is one establishment, of a national character, for the manufacture of hemp, (into cordage only;) it is located at Charlestown, Massachusetts; was erected between the years 1834 and 1838, and costs annually to keep it in operation, in labor and materials—such as fuel, tar, oil, soap, &c.—about thirty-five thousand dollars.

2d. The quantity of foreign and domestic hemp consumed in the process of manufacturing cordage, from the commencement of the year 1839 to the close of the past year, has been as follows, viz:

Of Russia hemp	5,133,976 lbs.
Of American hemp	66,074 "
Of Manilla hemp	370,341 "
Total in five years	5,570,391 lbs.

The manufacture of cordage from the several kinds of hemp, as above stated, is as follows, viz:

Cordage from Russia hemp	4,664,057 lbs.
Cordage from American hemp	29,678 "
Cordage from Manilla hemp	348,286 "
Total of cordage in five years	5,042,021 lbs.

3d. Russia, American, and Manilla hemp are used in the national ropewalk. The former of these costs, with the duty on, two hundred and forty dollars; without the duty, two hundred dollars. The American costs two hundred and eighty dollars; and the Manilla, one hundred and fifty dollars per ton.

4th. Experiments, to a considerable extent, have, at different times, been made to test the relative value of American and foreign hemp; the results of which prove the former to be fully equal to the latter, provided the same care is taken in cleaning and preparing it for manufacturing.

5th. The annual quantity of cordage manufactured for the navy, within the last five years, has been about one million one hundred thousand pounds; and by referring to answer to quere two, the relative proportions of foreign and domestic will at once be seen.

About twelve thousand bolts of American manufactured canvass have been used in the navy during the last five years.

Part of an 1844 letter from the Secretary of the Navy to the 28th Congress

Hemp and the Law

- In the US, the Marijuana Tax Act of 1937 imposed strict regulations and taxes on growing hemp
- During WWII, the 1937 act was suspended for the “Hemp for Victory” campaign, due to the need for rope and canvas
- The 1970 Controlled Substance Act labeled hemp as a Class I drug
- With the 2018 Farm Bill, hemp (and derivatives) with less than 0.3% THC became legal
- Other countries around the world restrict hemp altogether or above a certain THC level

Hemp today

- Biodegradable
- Far less resource intensive than cotton
- Cloth is a bit rough – often combined with other fibers
- 0.1 million tons, mostly from China, France, Canada, US

Flax

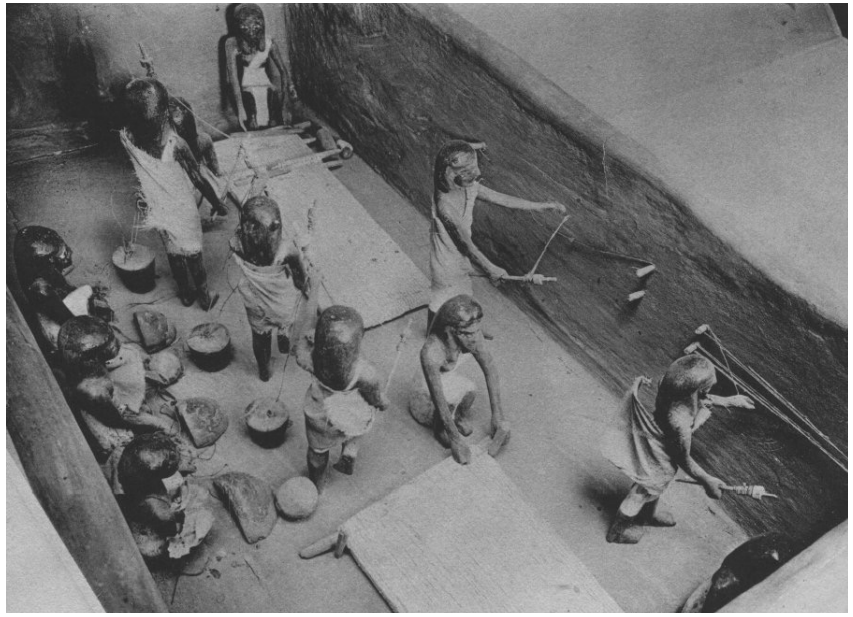
- A flowering plant whose bast fibers make ***linen***
- Also called “linseed” and a source of linseed oil
- First cultivated 9000 years ago in the Fertile Crescent, reaching Europe, Egypt, China, and India by 5000 years ago
- Egyptian priests wore only bleached linen, a symbol of purity
- The fleets of the Phoenicians, Egyptians, Greeks, and Romans were mostly powered by linen sails
- Linen and hemp were the major peasant fabrics in China until the Song dynasty
- Flanders was the major linen center of the Middle Ages in Europe
- Flax was a major crop of North American colonists
- It was eventually mostly supplanted by cotton

Making Linen from Flax (2:33) [Mount Vernon]

Review of Flax Preparation

Flax and Linen in Egypt

- Natural ecru or light green or bleached white, but poorly dyed
- The poor wore simple coarse loincloths, while the rich wore fine-textured rectangular pieces draped over or wrapped around the body and often tied in front, as well as tunics, gowns and shirts both with and without sleeves
- Both men and women were weavers
- Many mummy wraps are linen soaked in resins and preservatives
- Also used as bedding, sails, sacks, bird nets, fish nets, and rope



Model of a linen production workshop from the tomb of royal chief steward Meketre (~1950 BCE)

First Dynasty linen shirt ~3000 BCE

Tutankhamun's Tomb (1324 BCE)

Boxes in the antechamber contained most of the clothing in the tomb: 145 loincloths, 12 tunics, 28 gloves, 24 shawls, 15 sashes, 25 head coverings and 4 socks

Flax and Linen in Europe

- In the Middle Ages, the lower Rhine (now Belgium, the Netherlands, and Germany) had a rural flax economy with local spinning and weaving
- In the end of the 14th century, it began to be traded in local towns, then exported to France, England, Spain, Germany and Italy to be worn under woolens
- Latin (*linum*) → French, German → English *lining* and *lingerie*
- This continued until at least the 18th century, when Bremen and Hamburg exported 20-30 million thalers of linen products (roughly $500,000,000 today)
- Technology improved with immigrating Mennonites and Huguenots
- Eventually lost out to cheaper Irish linen

Flax and Linen in America

- The Irish linen industry focused on finer linen from younger flax, so needed to import seed from America and the Baltic
- Flax started with Jamestown and the Puritans in Massachusetts
- Mennonites and Quakers in Germantown, Moravians in Lititz, PA, and Rappites in Harmony, PA were among those organized enough for a full linen economy
- Virginia produced flax for canvas sails and rope in the Revolutionary and Civil wars
- In 1810, 20 of the 4700 people in Pittsburgh worked in the linen factory
- By the mid 19th century, flax was mostly grown for seeds and oil due to high labor costs

Ulster Folk and Transport Museum

Women were traditionally the spinners and weavers of cloth, but the labor-intensive nature of the flax crop required some cultures, particularly the German, to send women into the fields as harvesters and dressers.

Summary of Bast Fiber

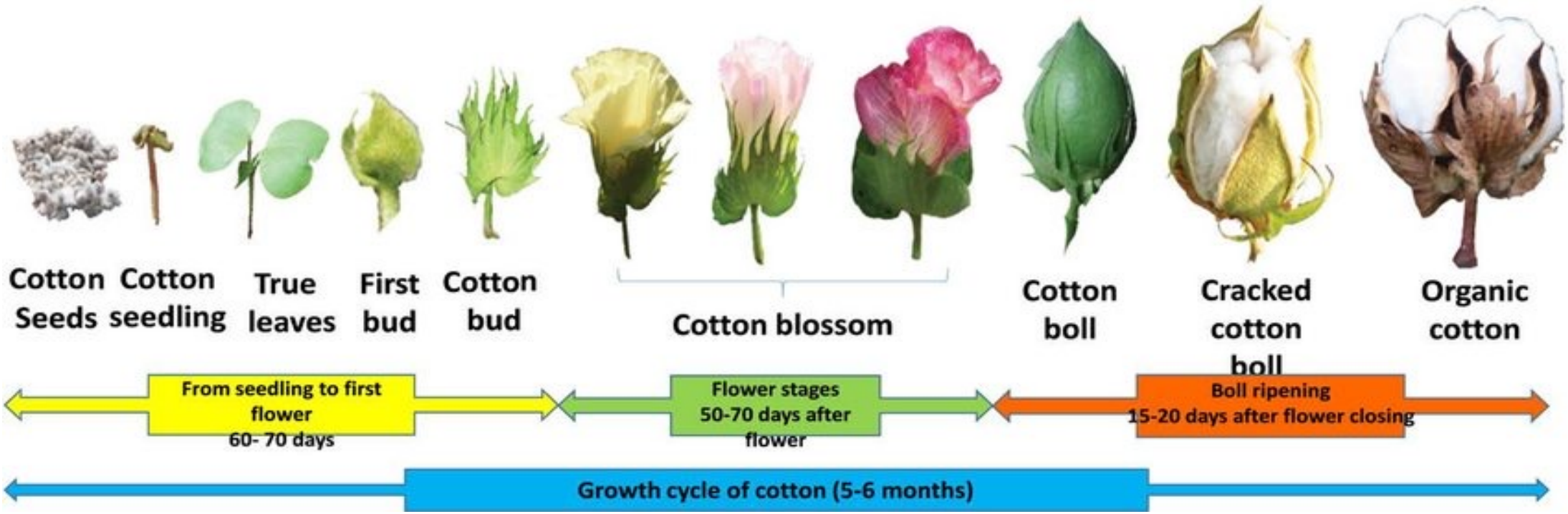
- Various bast fibers have been exploited for millennia
- This includes linen cloth, ropes, sails, canvas, and burlap
- Economics, climate, and skilled workers caused centers of production to move around the globe
- Cotton and synthetics have largely replaced bast products
- Niche markets still exist, including fiber-reinforced composites, burlap, natural cordage, and luxury/eco-clothing

Questions and Comments?

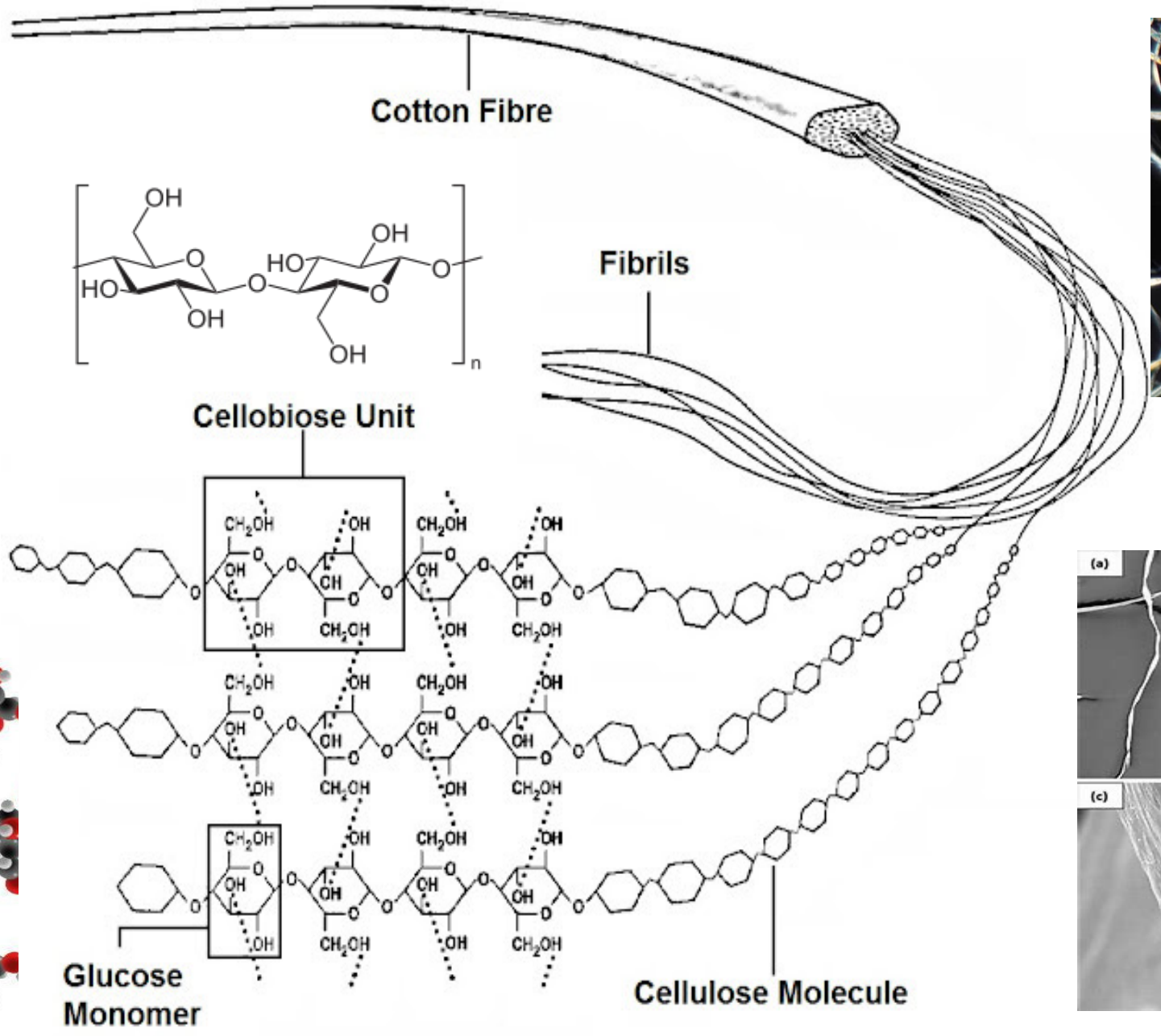

Cotton

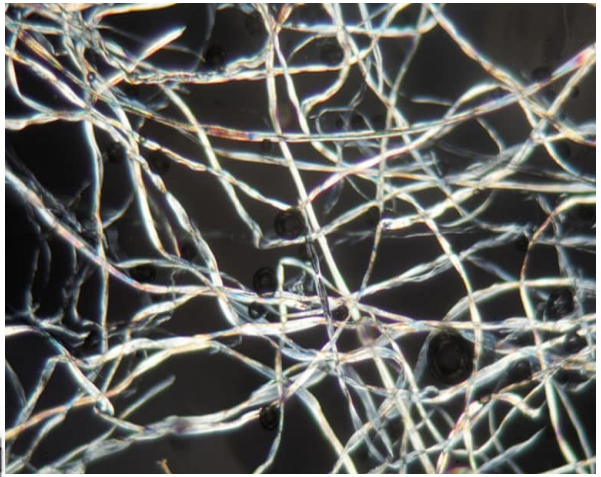
Gossypium *sp,* mallow family

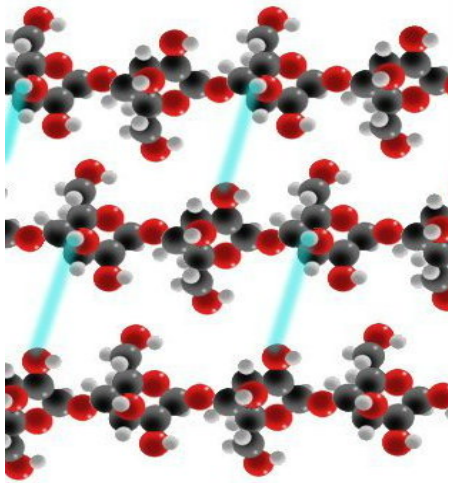
4 species cultivated but now >90% is G. *hirsutum*

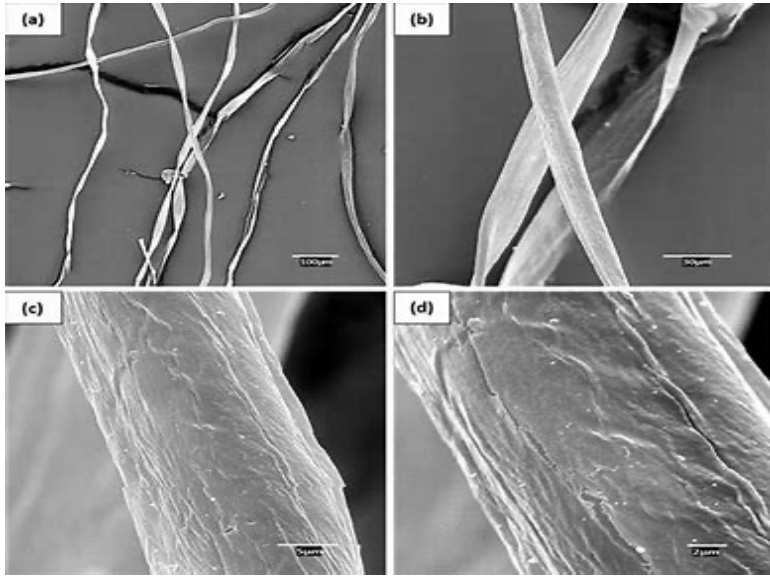


- Each boll contains 3-5 cells
- Each cell contains 7-10 seeds
- Each seed is attached to 10,000 – 20,000 fibers, each of which is a single cell


Cotton Fibre
Fibrils
Cellobiose Unit
Glucose Monomer
Cellulose Molecule

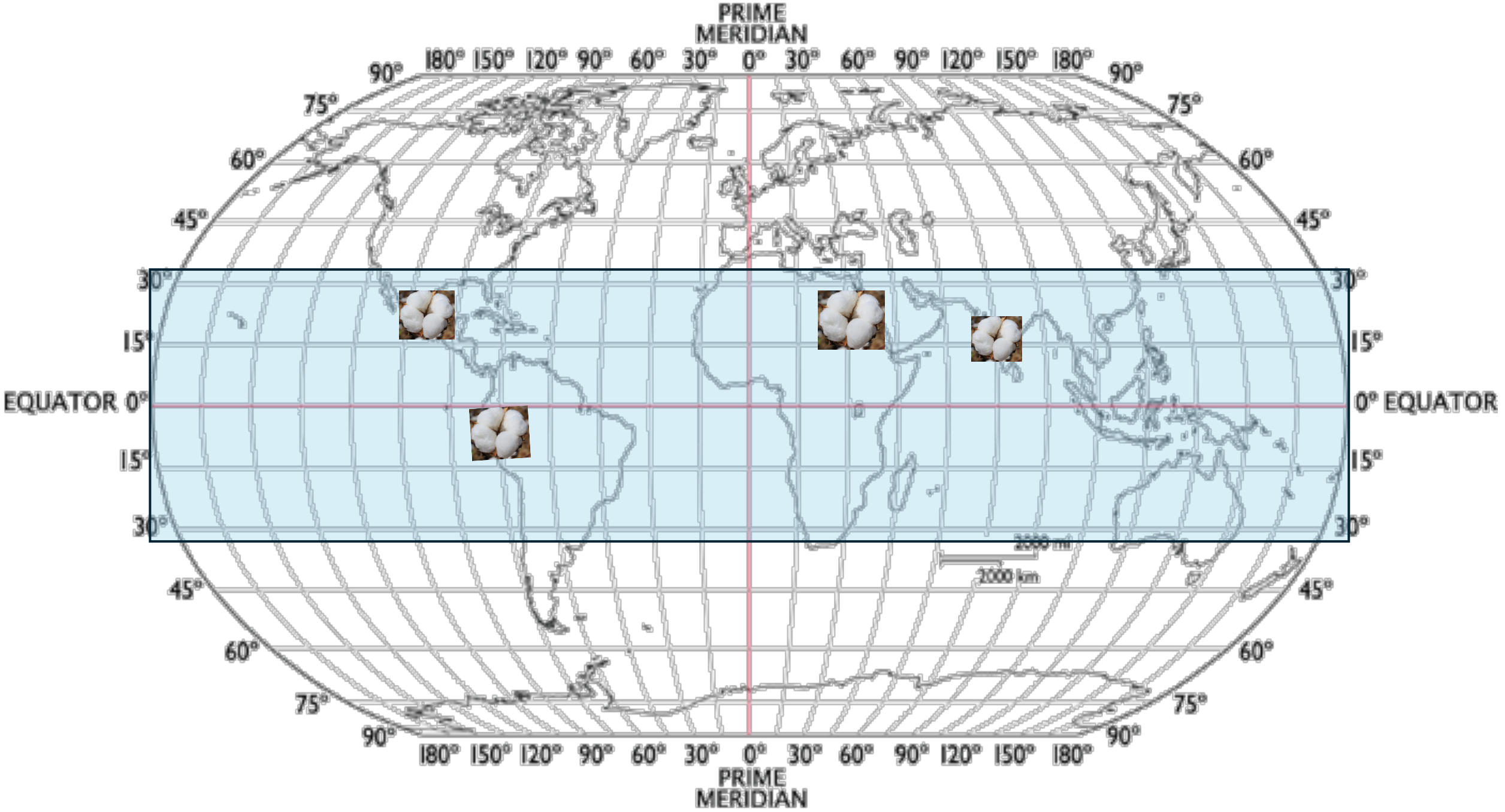





(a)
(b)
(c)
(d)

Growth Requirements

- Hot and sunny climate
- Soil temp at least 60° for at least 200 days/year for growing season, no deep freeze
- Rain 20 -25 inches/year
- High nitrogen requirement


PRIME MERIDIAN
180° 150° 120° 90° 60° 30° 0° 30° 60° 90° 120° 150° 180°
90°
75°
60°
45°
30°
15°
EQUATOR 0°
0° EQUATOR
2000 mi
2000 km
PRIME MERIDIAN

Cotton cultivation

Wild cotton evolved 10 – 20 million yrs ago **Cultivation – 6000 yrs**

- **Indus valley** – *G. arboretum*, 6 ft shrubs, seed dated to 5000 BCE, textiles found from 3200 BCE but descriptions from 4000 BCE

  Herodotus – 445 BCE described cotton in India

  "wild trees bear fleeces for their fruit, surpassing those of sheep in beauty and excellence, and the natives clothe themselves in cloths made therefrom"

- **E Africa** – Nubia (now Sudan) – *G. herbaceum*, textiles from approx. 4000 BCE
- **Egypt** – carried by trade with Nubia; used seeds for cattle fodder 2600 BCE but did not make cotton textiles until 300 BCE

  Pliny the Elder – 70 CE – described Egyptian cotton as "nuts with a beard"

- **S America** – *G. barbadense*, bushy tree, seeds and bolls found from 6000 BCE, fishing nets from coastal Peru from 2400 BCE, textiles from 1600 BCE
- **Central America** – *G. hirsutum*, seeds dated 3400 BCE, Mayan thread and textiles 1500 BCE

Cotton cultivation

- Like most agriculture, cotton domestication began as family based subsistence crop
- Was often grown together with food crops – legumes replenished nitrogen
- Spinning (women's work) and weaving (men's work) done at home to meet family needs
- 200 CE first evidence of collectivization in cultivation and processing – rise of professional weavers in SE Asia

Cotton trade

- 4000 BCE - cotton textiles exported from India to Middle East and steppes of the Caucasus
- 300 BCE – 300 CE cotton was a luxury fiber in Mediterranean cultures
- 200 BCE – first evidence of cotton in China, imported from India Chinese word for cotton derives from Sanskrit
- 800 CE – raw cotton and textiles widely spread east and north with the spread of Islam (along Silk Road)
  - Quran forbids men wearing silk garments, any fabric worn by men must be <50% silk so cotton / silk blends created
  - Persian cotton so fine it was transparent at 1200 threads/inch

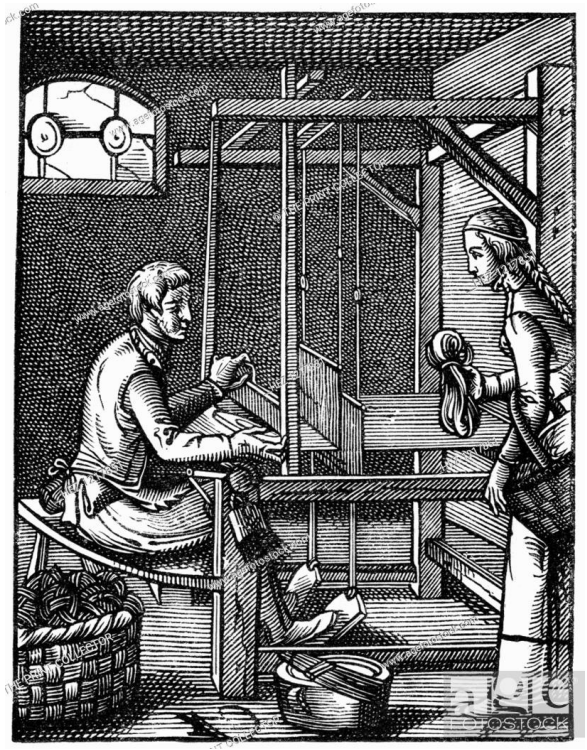
Cotton exemplified global capitalism – world's most important industry 1000 - 1900

1000 – 1200

- India was biggest world producer of raw cotton – exported to China, Japan, Caucasus, Africa
- Middle East cotton raw and fabric brought to Britain and Europe with return from the Crusades
- Rapid growth of textile industry in Italy, Germany, and Low countries
  - Importation of raw cotton from Egypt, East Africa, some from India
  - women spun at home, men wove at home and in proto-guilds
- Attempts at cultivation of cotton in Italy, West Africa, Caucasus – failed due to climate, lack of water, cost of labor unless people were enslaved or indentured

Medieval times

- Formation of weaving guilds – master weavers and apprentices
- Spinning was still home-based women's work, but began to supply more than just family needs, spinning flax cotton and wool for guilds



1400 -1700

- 1400's – Flemish, German textile production from imported cotton
  - Improvements to spinning wheels and looms
- 1600 – British textile production
  - Flemish workers sent to England to spin cotton
  - Cotton replaced wool production
  - By 1620 England was **exporting** cotton cloth to India, Africa, Americas
  - Indian cotton block printed textiles became fashionable
  - British merchants protesting the import of Indian cloth → steep tariffs on Indian textiles, laws that only British made cotton could be worn
  - Rapid growth of industrial cities with centralized textile production, especially Manchester and Lancastershire, and ports, especially Liverpool

Cotton in Britain –

- By 1700 Britain controlled world market for cotton manufacture, replacing India
- Manufacture → wealth distinct from land ownership

First manufacturing industry where raw materials were imported

How did the Brits do it?

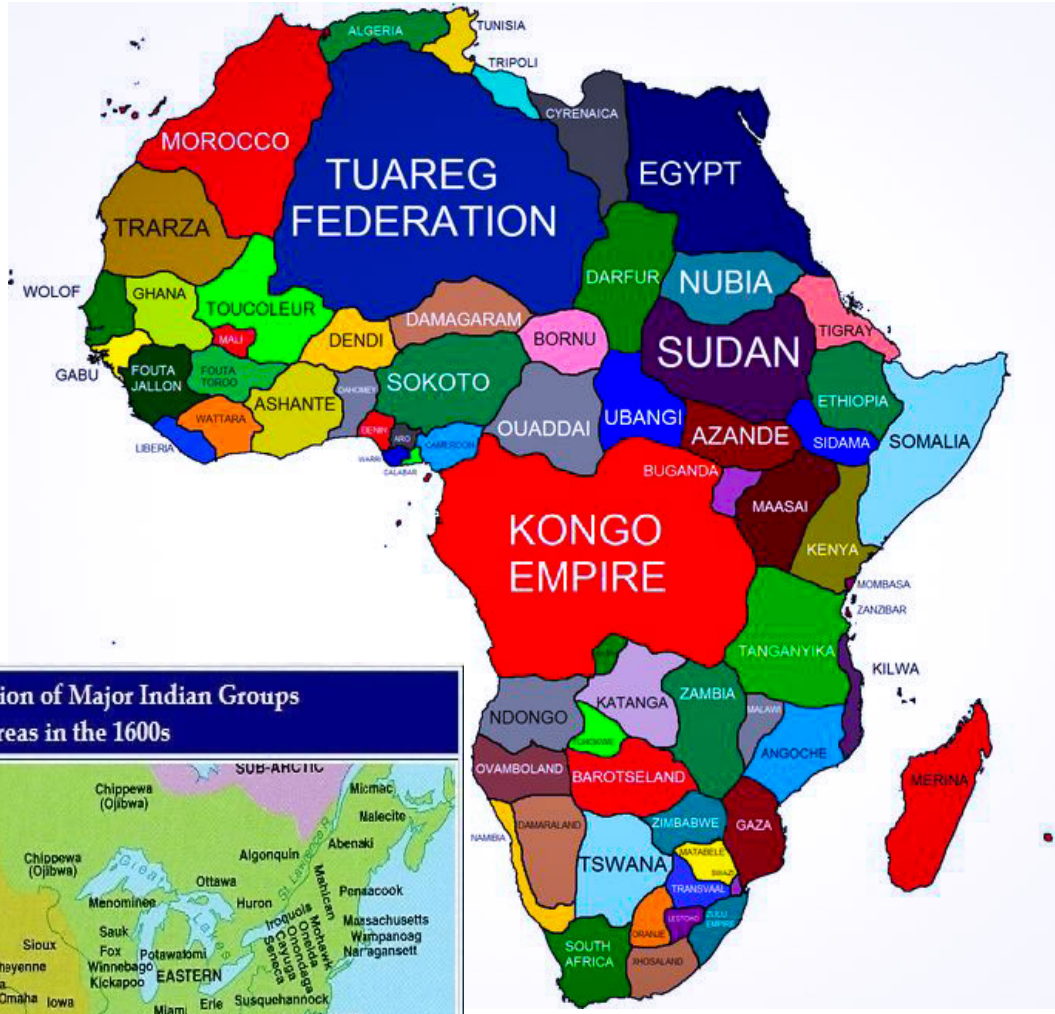
1. ***Imperial expansion***
2. ***Expropriation of land – displacement of indigenous peoples***
3. ***slavery***

1. Imperial expansion

- Colonization throughout the world - Britain and other European countries
- Attempts to change cultures, build infrastructure to suit British needs
- British East India Trade Company – expansion to resource rich parts of the world
  - Founded by London merchants 1600 under royal charter from Queen Elizabeth 1
  - Return of Drake to England 1580 with gold, silver and cotton → sea routes for trade
  - Defeat of Spanish Armada 1588 → captured ships

2. Expropriation

- All over the world indigenous peoples were killed, rounded up, forcibly moved so that colonizers could take over land
- Land “liberated” used to support British industries, especially cotton



3. Slavery

Cotton agriculture is very labor intensive

- Planting, irrigating, pests
- Picking - backbreaking work
  - Short harvest time
  - Harvesting each boll by hand
  - Separation of seeds from fibers
  - Package for transport

No country succeeded in cotton without enslaved workers

Other countries used these strategies, but none as extensively as Britain

Portugal – colonized Brazil, south western Caribbean for cotton, and northwest India - Vasco da Gama and sea route to India

Spain – colonized South and Central America – Peruvian and Mexican cottons

France - West Africa and Caribbean – Haiti slave rebellion 1799 - 1803

Netherlands – Southern Africa and Caribbean

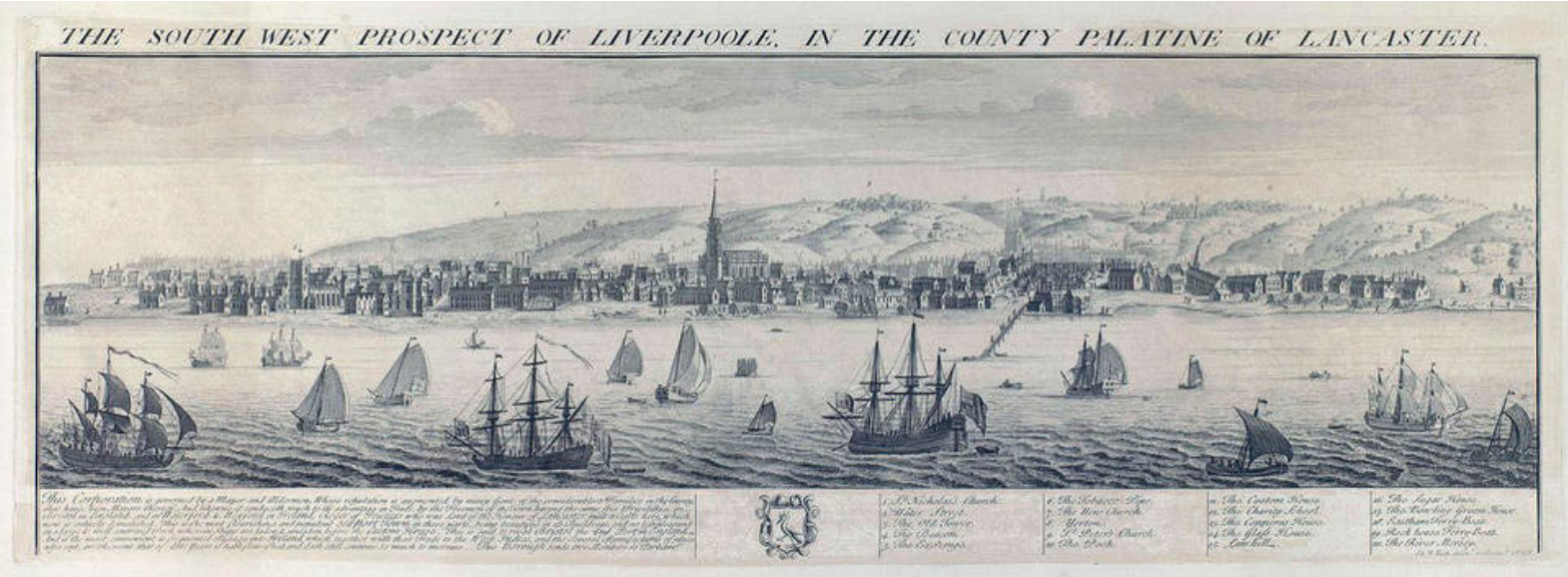
Denmark – colonized Caribbean for cotton

Germany attempted to colonize West African regions for cotton

Cotton in Britain 1700's

- Import of raw cotton → manufacture and export of textiles with centralized weaving mills but home based spinning
- Growth of huge middlemen infrastructure:

  shipping, customs, brokers
- Development of credit, brokers trading in futures
- World colonization and British East India Company – trade in cotton, sugar, spices and slaves



Limitations in hand labor

- Production of cloth:
  - combing cotton
  - spinning yarn or thread
  - weaving cloth
  - making goods
- Bottleneck = spinning

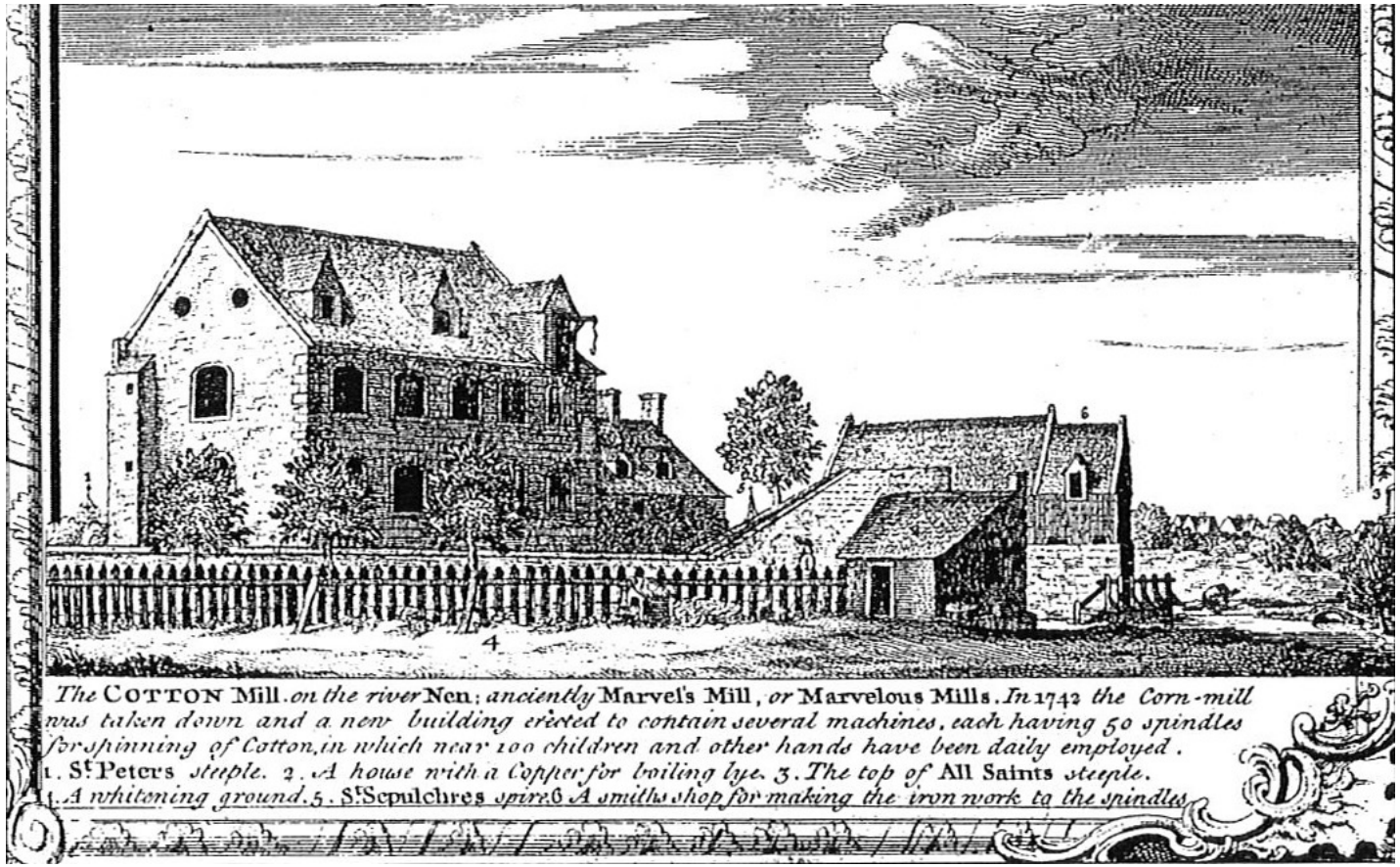
  It took 100 spinners of fine cotton thread to supply 1 loom
- Search for increased efficiency of spinning spurred the Industrial Revolution in America and Britain

450.—The Jersey-wheel, formerly used for spinning Cotton and Wool.

Industrial Revolution

1733 – John Kay invented flying shuttle → doubled weavers' speed

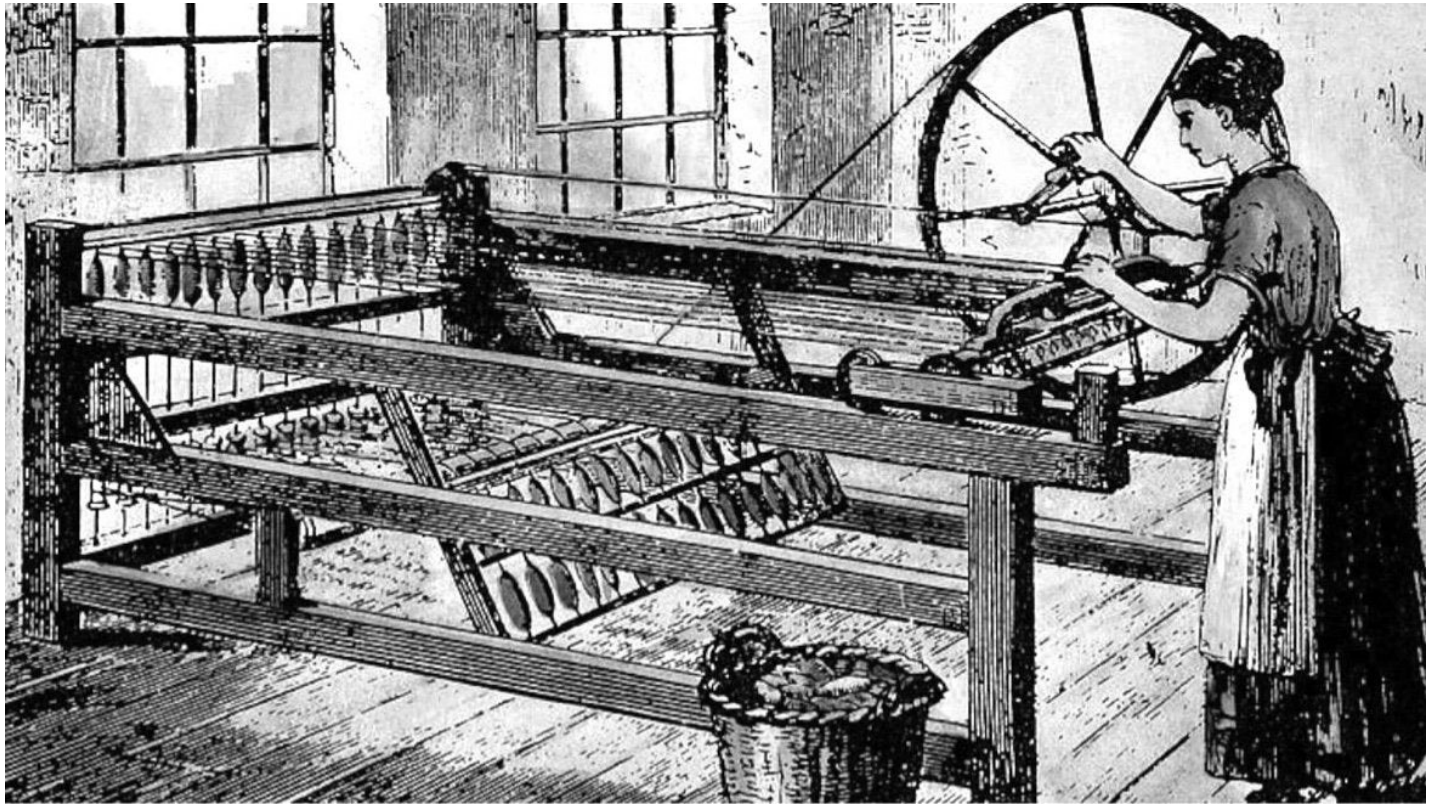
1741 – Partially mechanized water wheel roller spinning mills first used for cotton in England

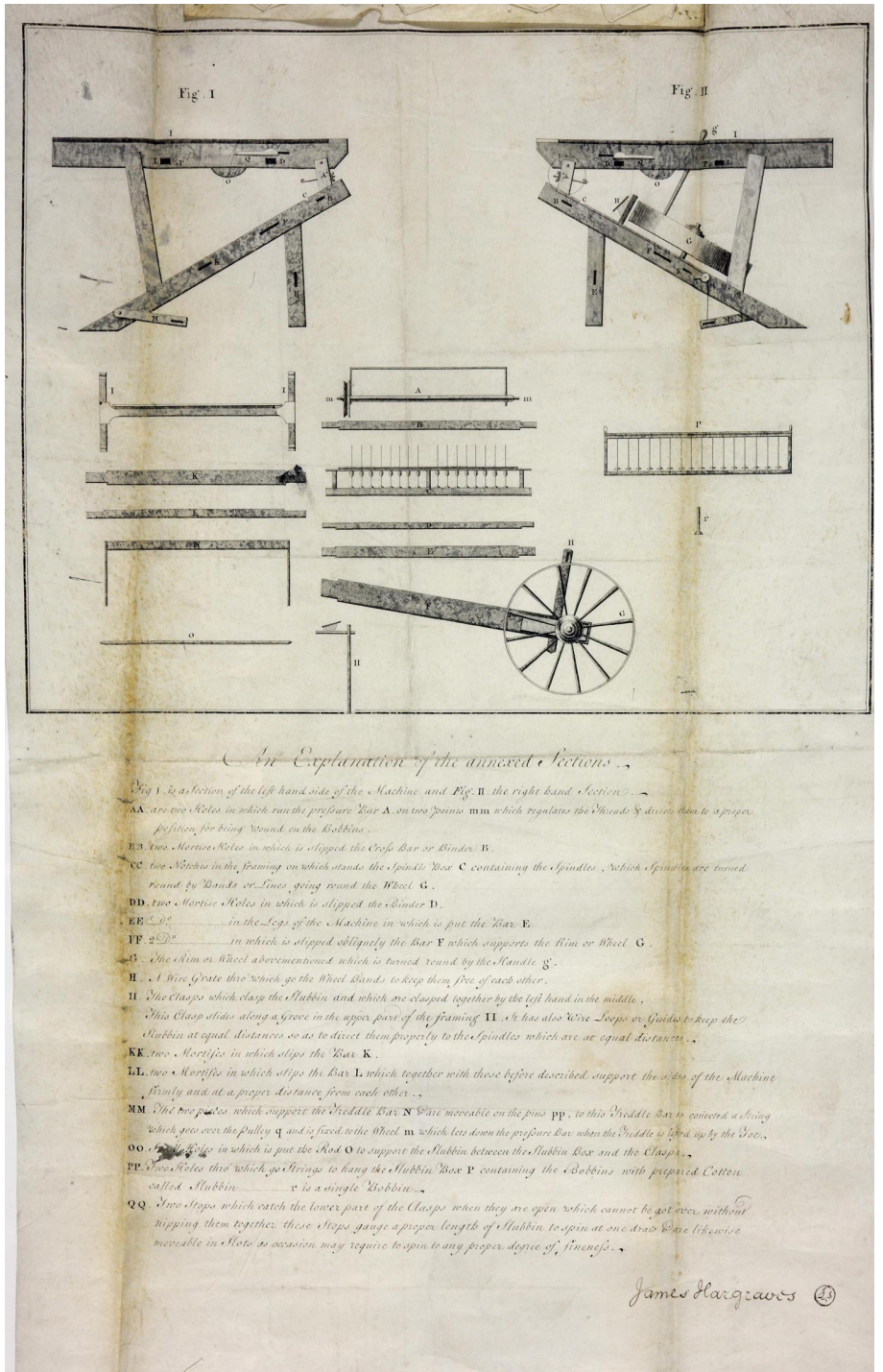


Industrial Revolution

1764 – Hargreaves patented **spinning jenny**

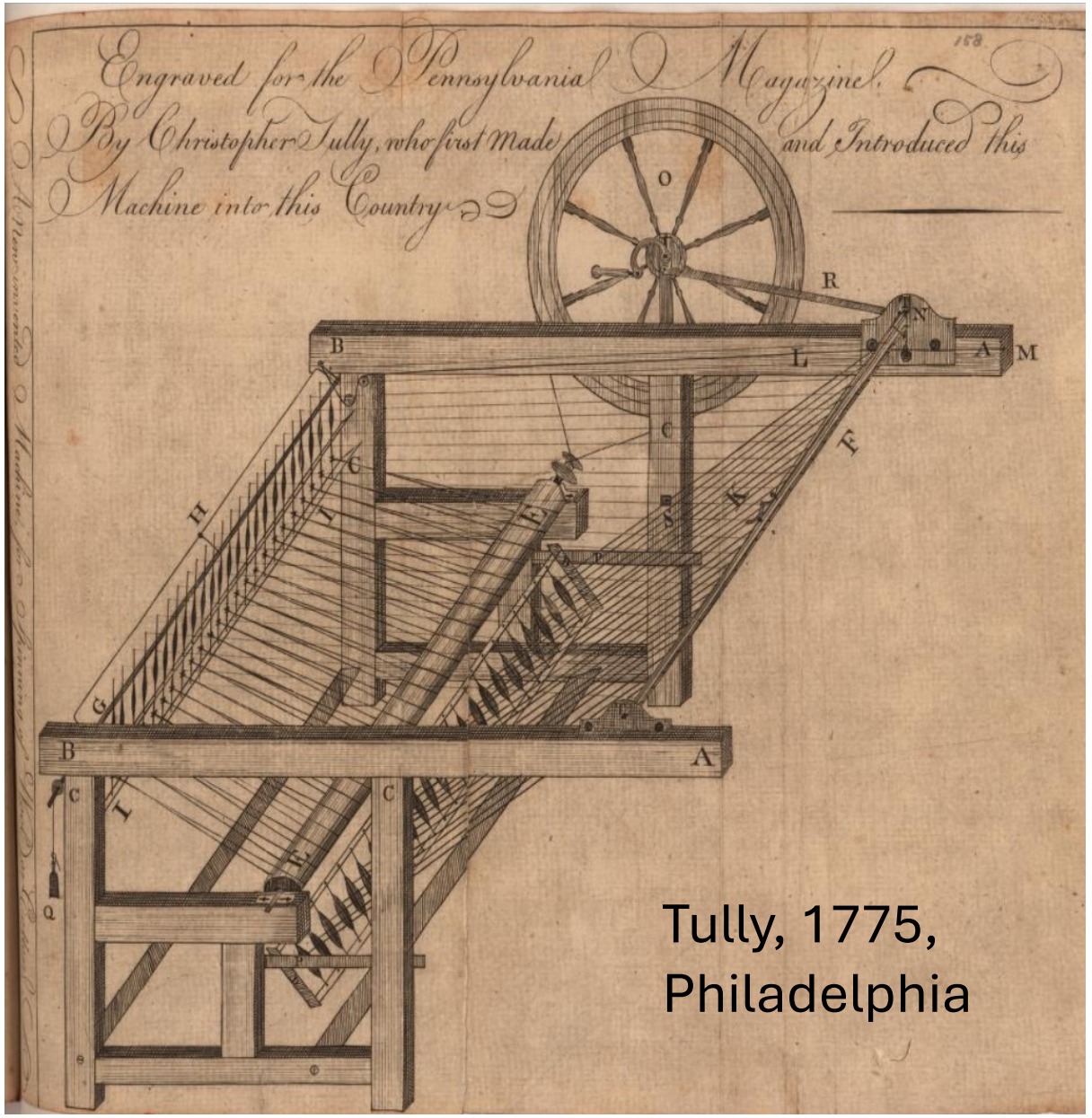
- Handcranked device turned multiple spindles
- Tripled spinners' production





Industrial Revolution

The first spinning jenny seen in America was exhibited in Philadelphia and was constructed by Tully after the plan of James Hargreaves. Hargreaves, a carpenter and weaver, invented a machine which spun thread. He did not apply for a patent for his machine until 1770; before that time others freely copied his machine. The Pennsylvania Magazine was only published from January 1775 through July 1776. The July 1776 issue included the first magazine printing of the Declaration of Independence.

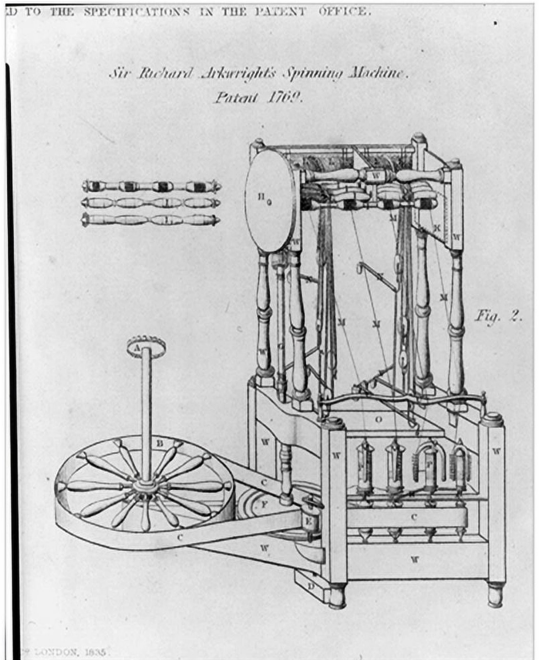


Tully, 1775, Philadelphia

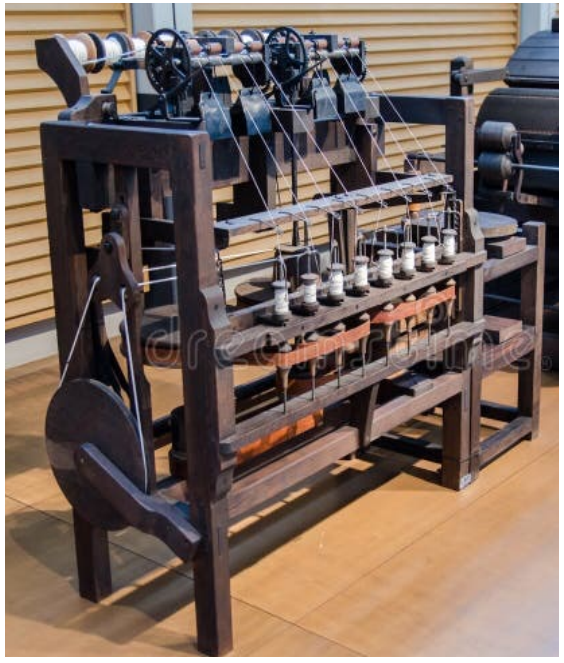
Industrial Revolution

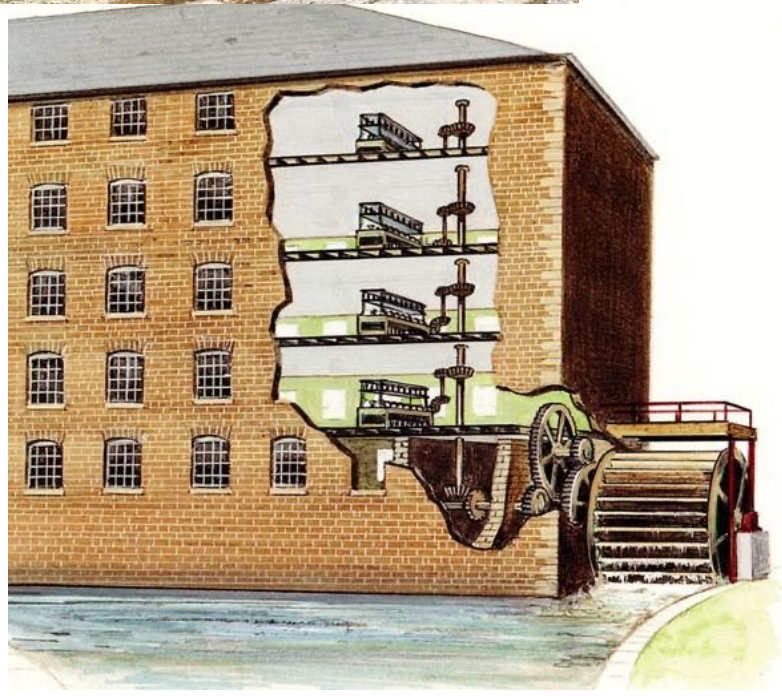
1765 – Arkwright invented **water frame**, patented in 1769 – water powered jenny

- Spun 96 threads at a time
- First factory using it 1771
- Technology stolen by German spy → spread through Europe and US



1775

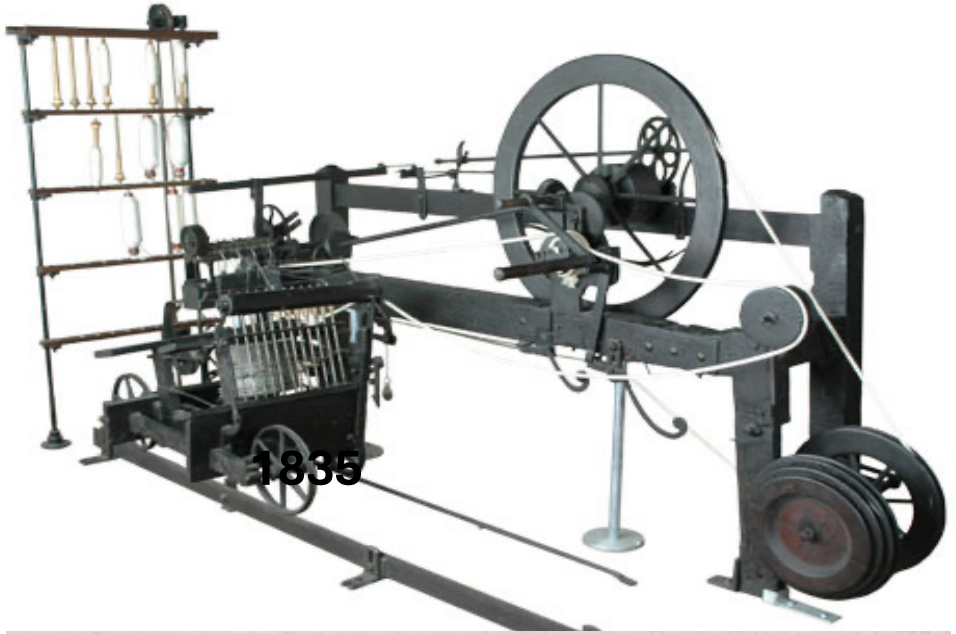




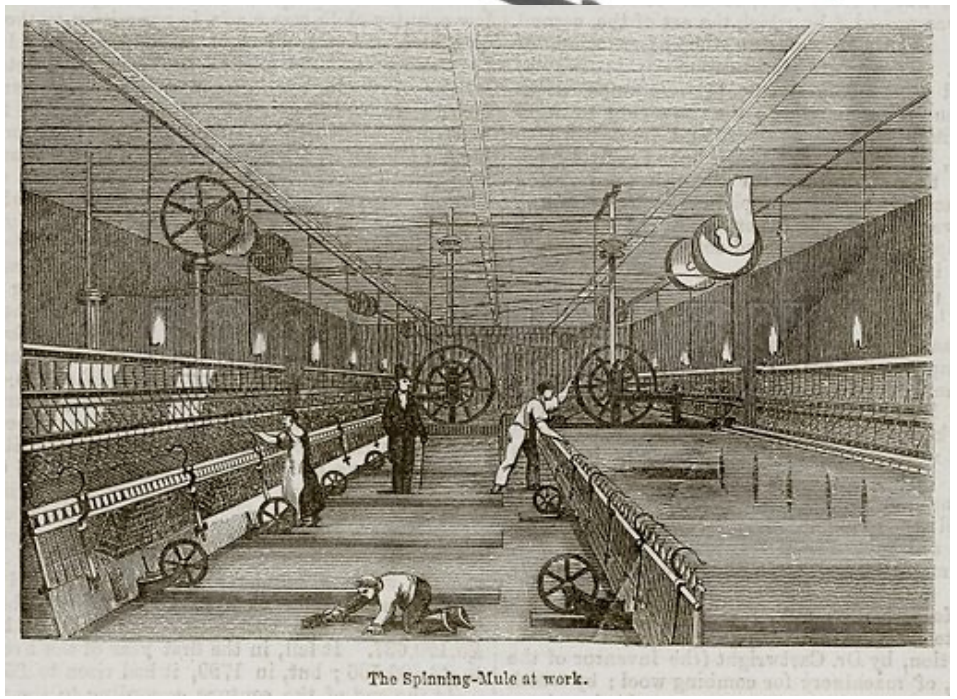
Industrial Revolution

1779 – Crompton patented **spinning mule**

- Combined jenny and water frame
- Pulled (drafted) combed cotton from multiple spindles using water power
- 1st had 48 spindles, up to 1300 by 1800
- Could spin 1 lb 60 s cotton thread per day



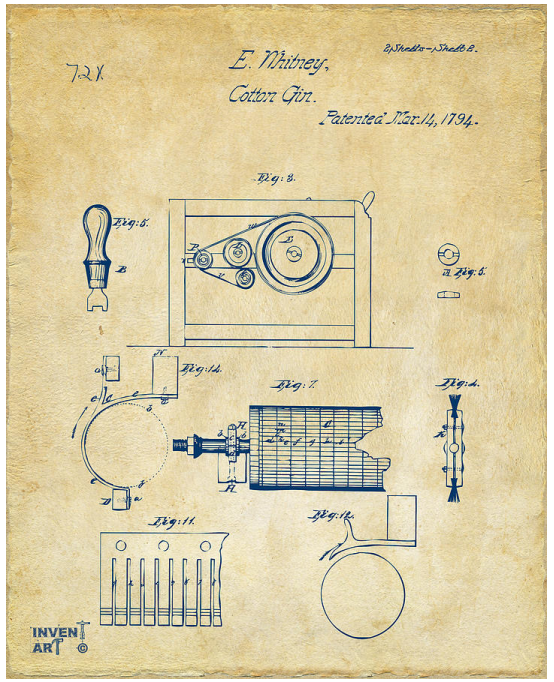
The spinning mule has a fixed frame with a creel of cylindrical bobbins to hold the roving, connected through the headstock to a parallel carriage with the spindles. On the outward motion, the rovings are paid out through attenuating rollers and twisted. On the return, the roving is clamped and the spindles are reversed to take up the newly spun thread

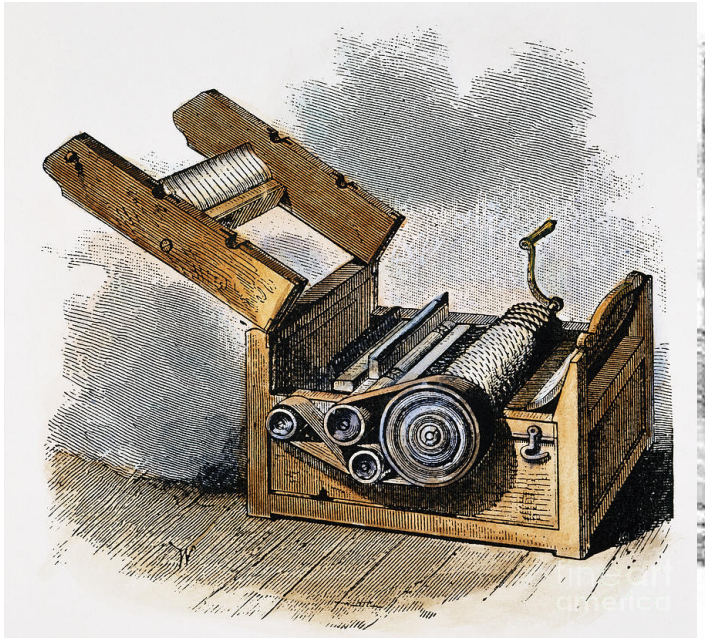

The Spinning-Mule at work.

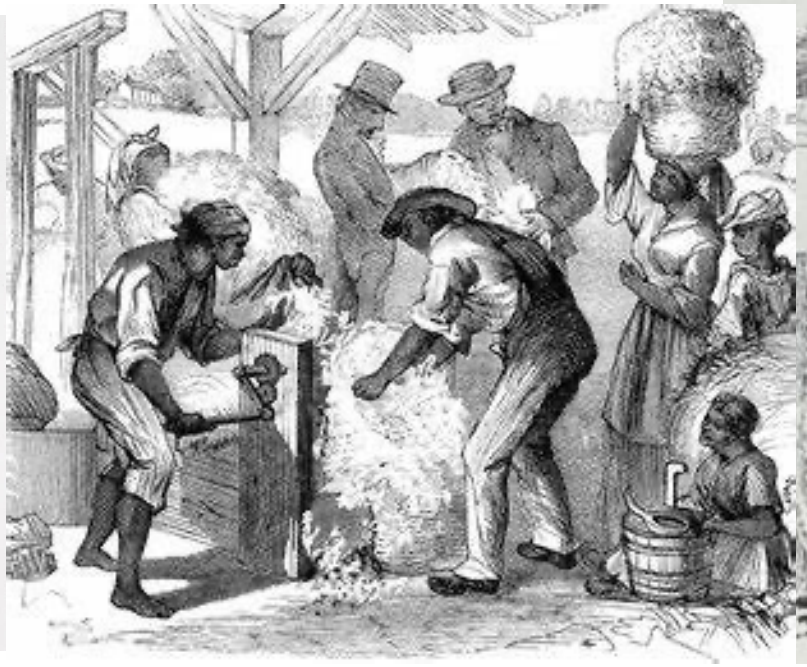
Industrial Revolution

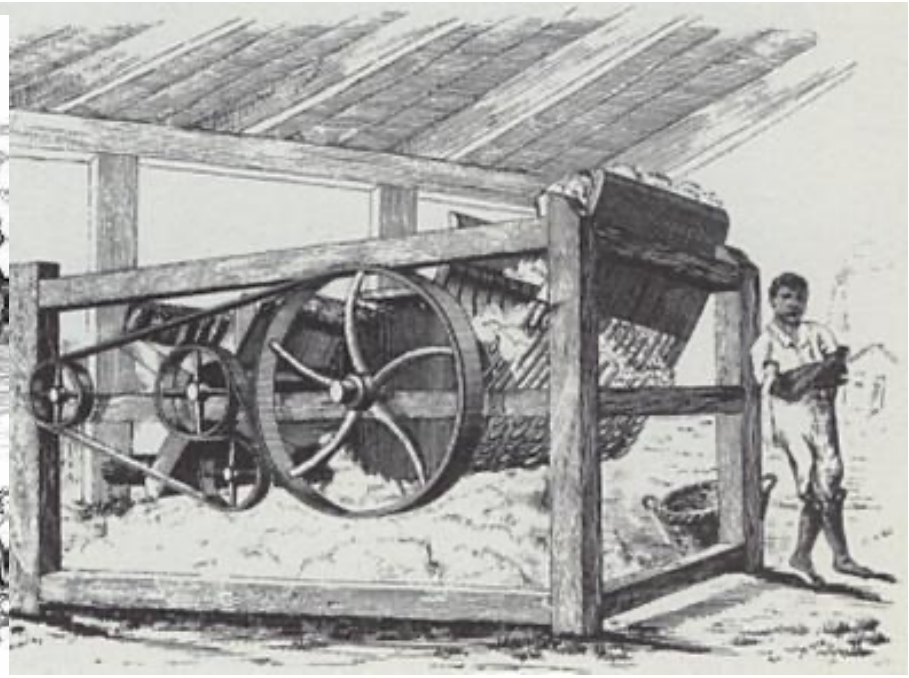
1794 - Eli Whitney patented **cotton gin**

- Separated seeds from bolls
- By hand, it took 12 hrs to remove seeds from 1 lb
- Gin handled 50 lbs per day
- Made cotton export economically feasible

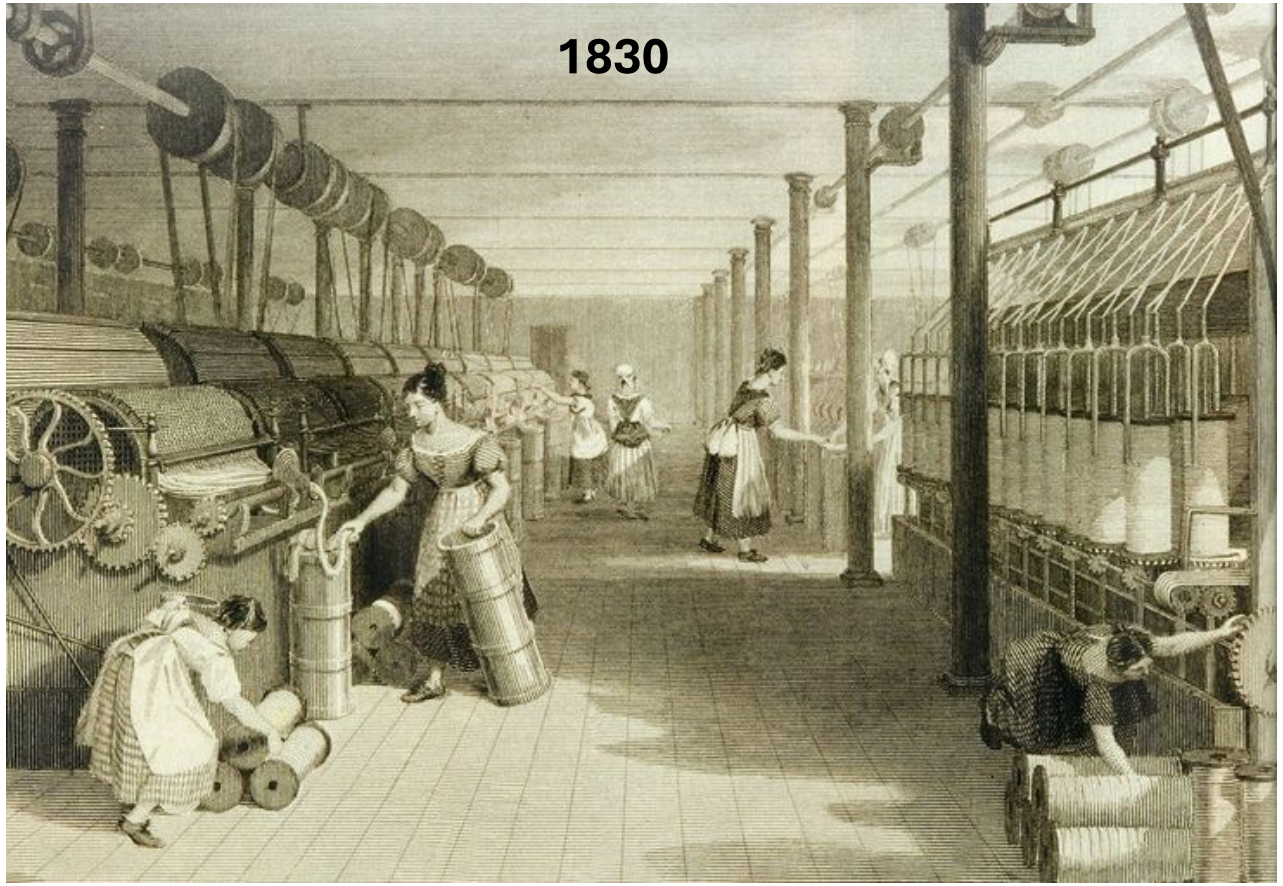






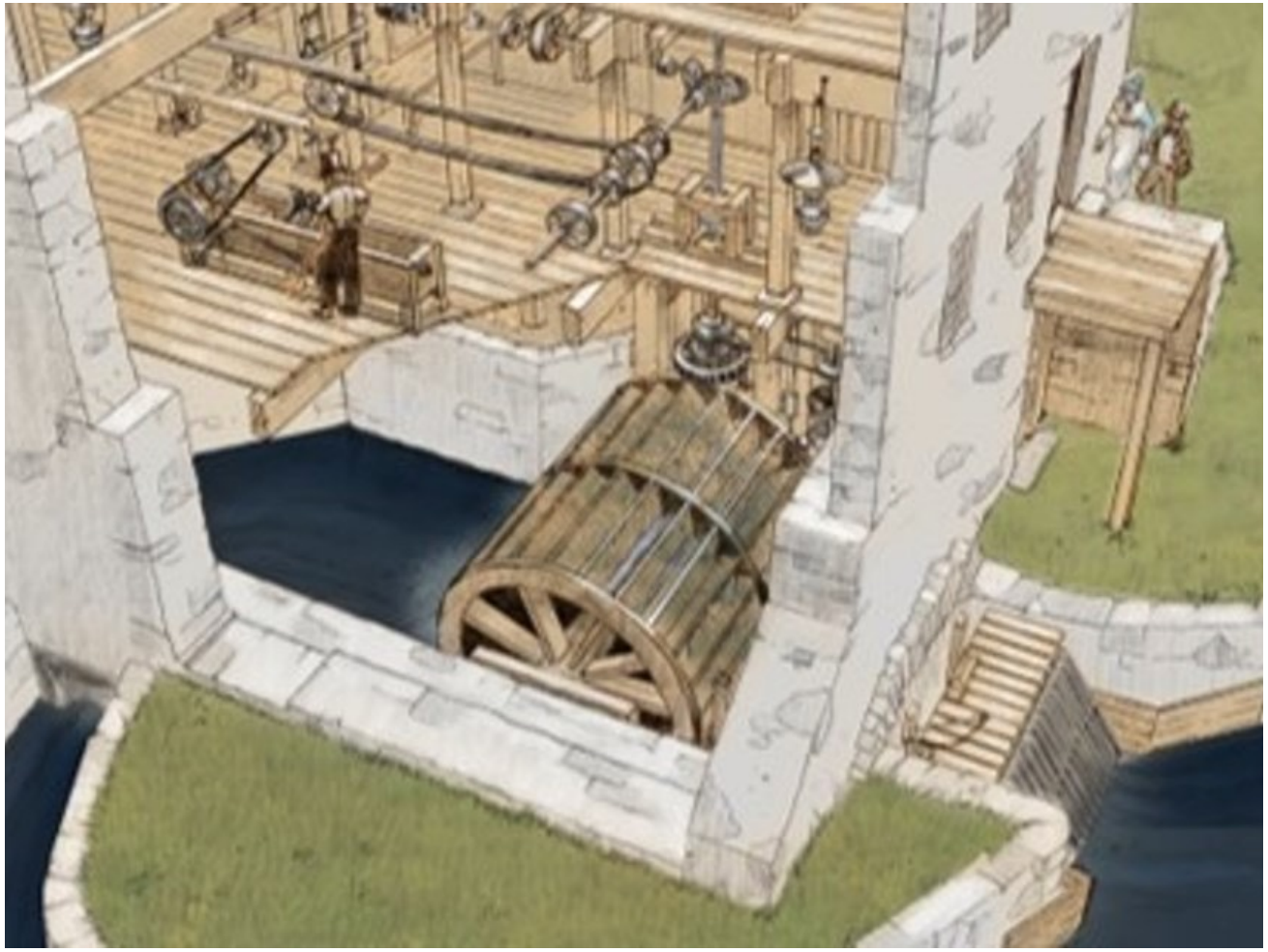


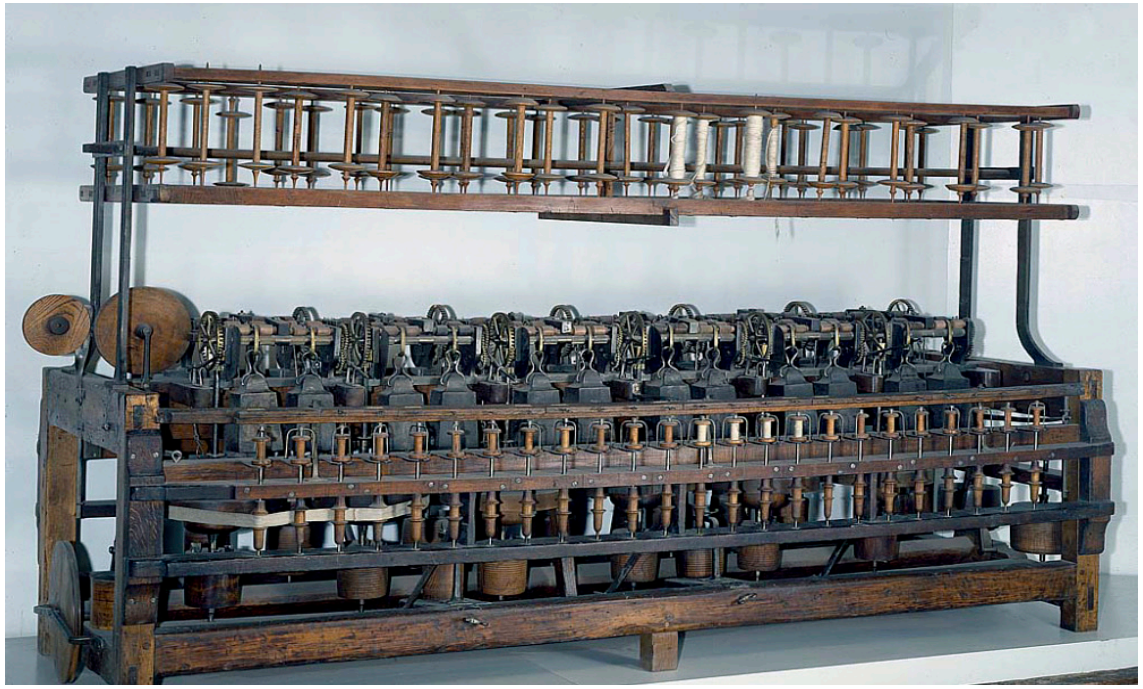
Together, these inventions from **1764 to 1794** transformed textile production from a croft to a factory industry



Slater Mill, Pawtucket, RI

First US Cotton Mill **1793**

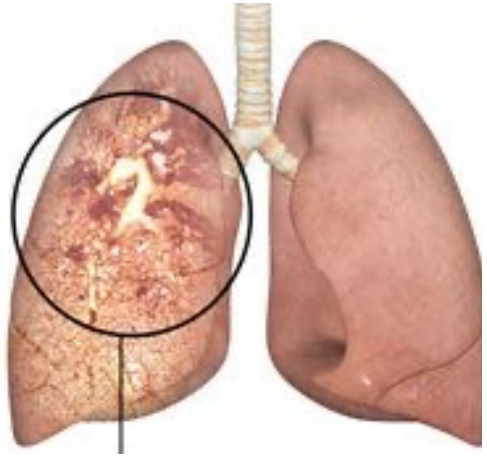


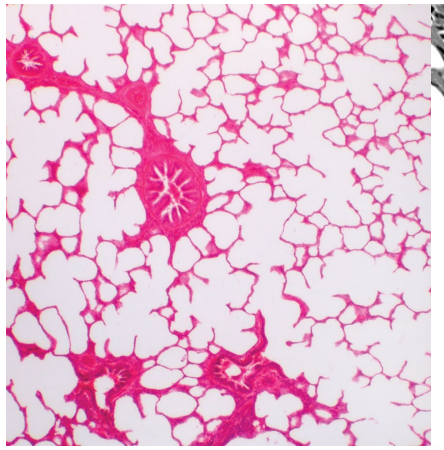


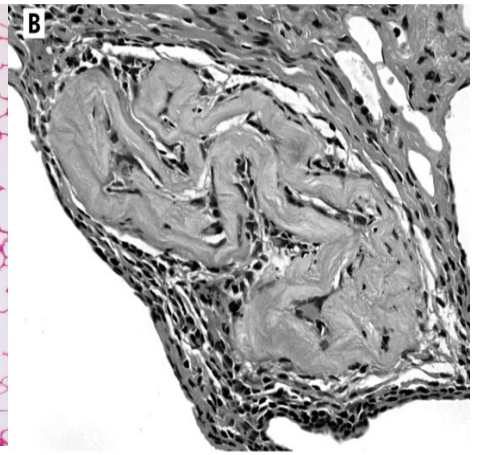
Industrial Revolution: Cotton Industry and Health

- Brown Lung Disease

Little bits as fly off fro' the cotton, when they're carding it, and fill the air till it looks all fine white dust. They say it winds round the lungs, and tightens them up' - 1855 novel







- Deafness due to loudness of machinery
- Mule spinners cancer – cancer of the mouth and scrotum from lubricants of spinning mules
- Industrial fires and accidents – airborne cotton lint highly flammable

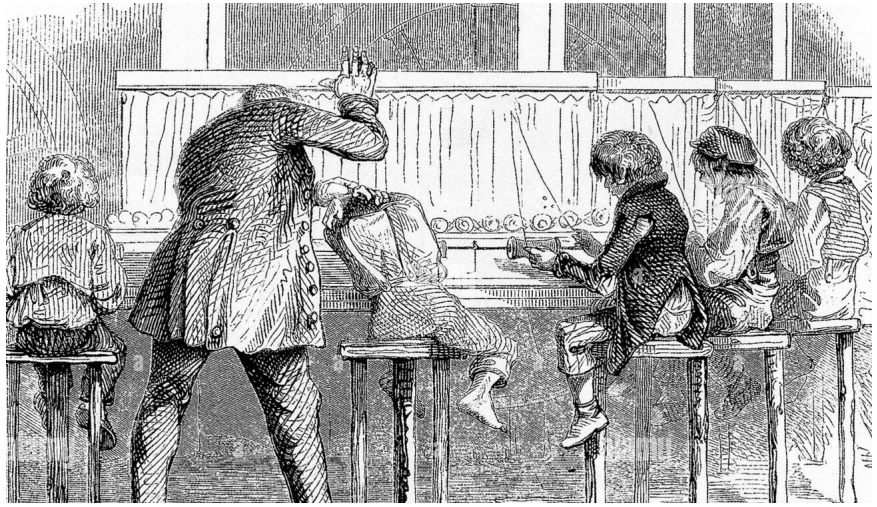
Industrial Revolution
Rebellions and worker actions

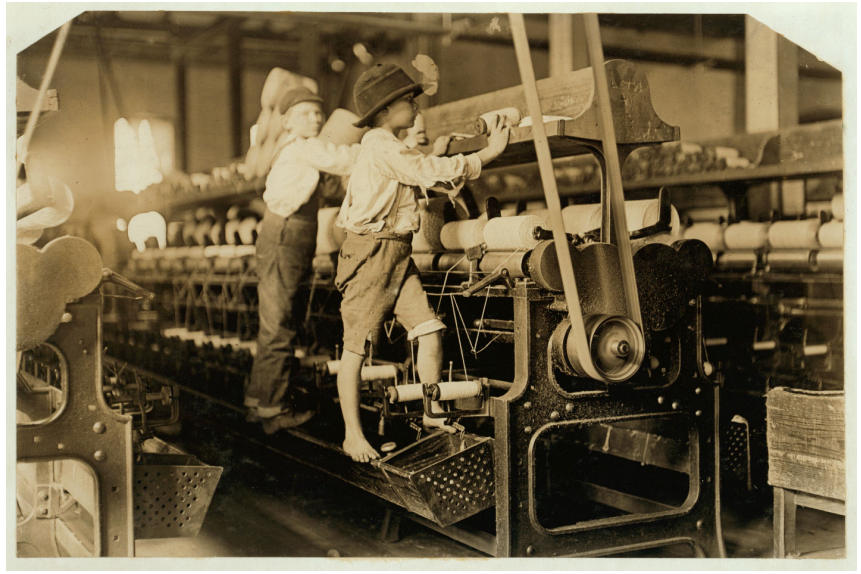
- Luddites 1811-16 – opposed cotton textile machinery because it decreased croft workers income, smashed machines at night
- 1824 Slater mill strike RI, 1st women's strike
- 1834 "Lowell girls" failed strike
- Manchester mill workers labor actions in 1862 in support of abolition
- Many labor solidarity movements in late 19th,early 20th C in textile mills

I have refrained from exposing the worst parts of the system, for they are so gross that I dare not publish them. The demoralising effects of the system are as bad, I know it, as the demoralising effects of slavery in the West Indies. I know that there are instances and scenes of the grossest prostitution among the poor creatures who are the victims of the system, and in some cases are the objects of the cruelty and rapacity and sensuality of their master. These things I never dared to publish, but the cruelties which are inflicted personally upon the little children not to mention the immensely long hours which they are subject to work, are such as I am very sure would disgrace a West Indian plantation.

Richard Oastler

Cotton and Child labor





Health and Morals of Apprentices Act 1802

- Hours of work limited to twelve a day
- Boys and girls to sleep in separate dormitories with no more than two to each bed
- Compulsory education to be provided in the arts of reading writing and arithmetic
- Each apprentice to be provided with two suits of clothes
- On Sunday children to be instructed in Christian worship
- Sanitation to be improved

Regulation of Child Labor 1833

- No workers under 9 years old
- Hours of work limited to 9 hrs for children <13
- 2 hours compulsory education

Cotton in Britain 1800’s

Cotton Industry

% of British Economy

1770	2.6%
1801	17%
1831	22.5%

Sourced from India, Ottoman Empire, Caribbean

Cotton in Britain 1800's

Cotton Industry

% of British Economy

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1831	22.5%

Sourced from India, Ottoman Empire, Caribbean

Cotton imports to Britain

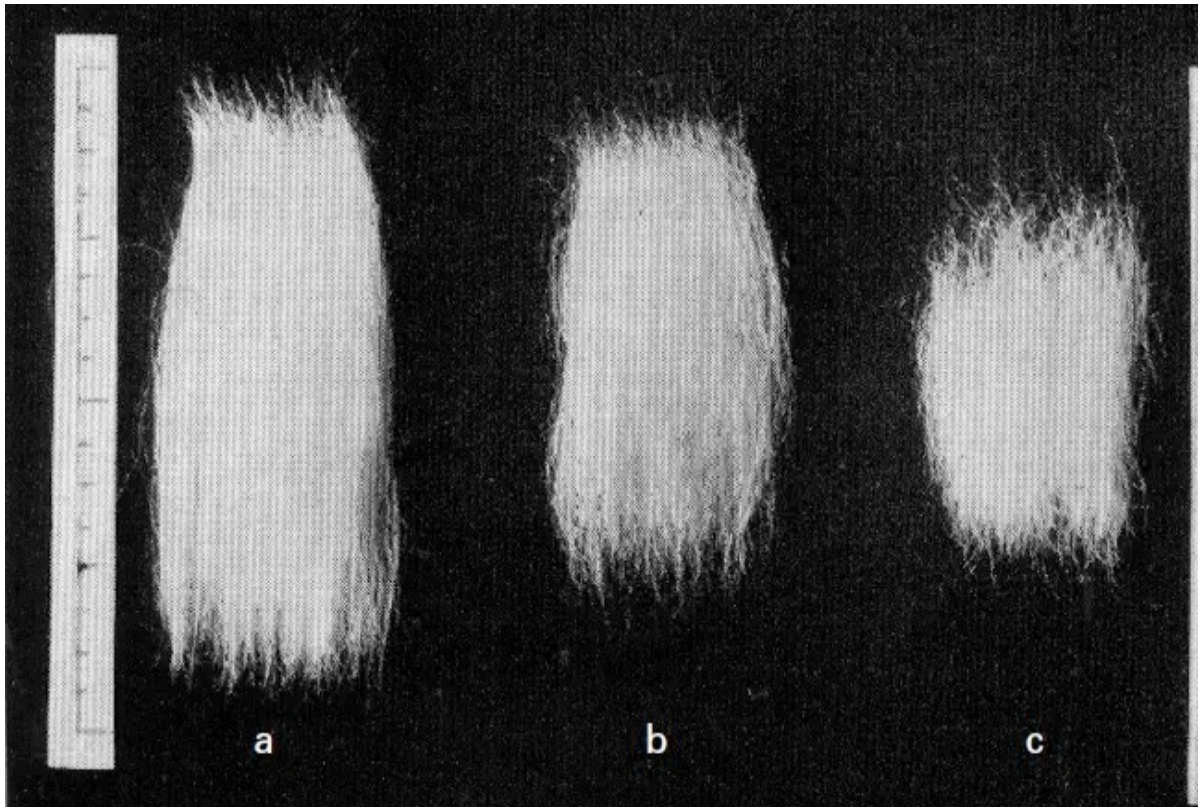
% from America

1796	2%
1820	32%
1859	60%

First American import to Britain was Georgia Sea Isle Cotton **1785**

Cotton in America

- First cultivated 1621
- Sea Isle cotton – Georgia coast – long smooth fiber, would not grow inland
- Upland cotton – shorter fiber, stuck more to seeds but grew away from coast – *G. hirsutum* seed imported from Central America



Cotton in America

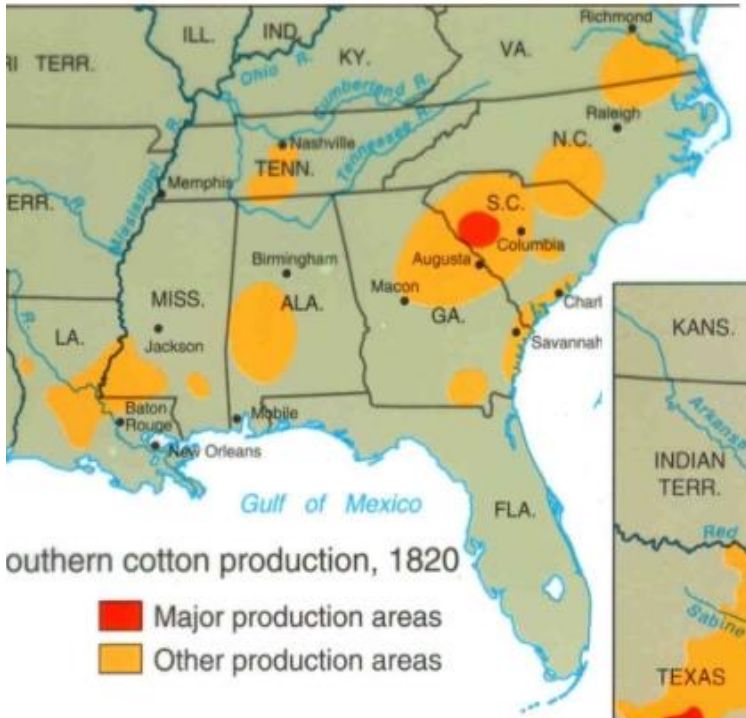
- America exported raw cotton grown in Southern states
- Northern factories – coarse cheap cotton mostly worn by enslaved people in the South
- Why were factories in the North not the South?
  - Land use for agriculture more profitable
  - Enslaved workers thought to be ill suited for factory work
  - Need for water power to run factories

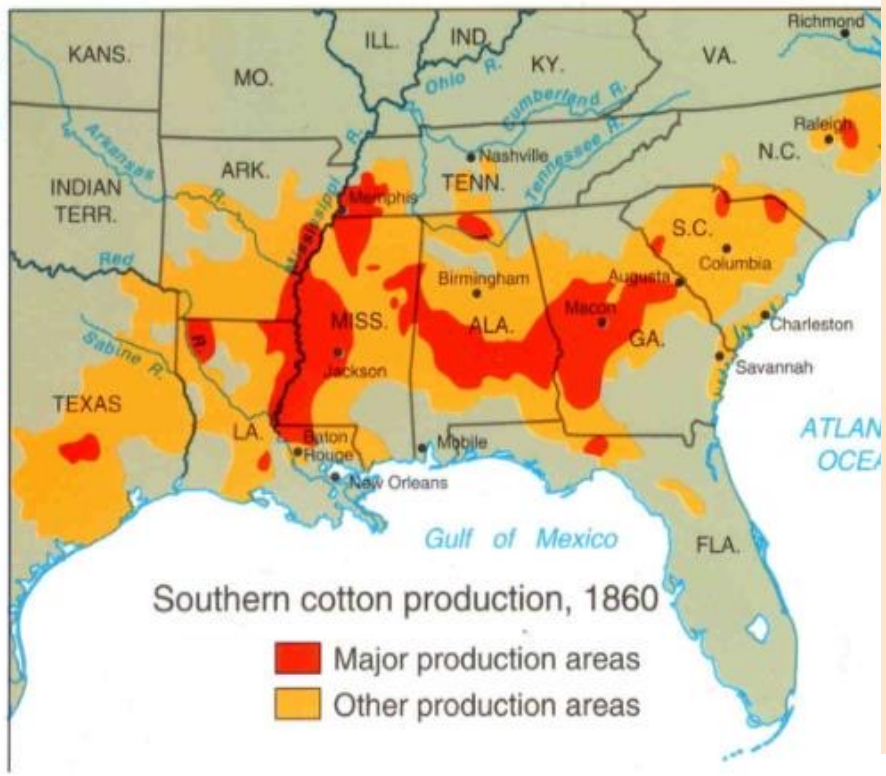
Cotton in America

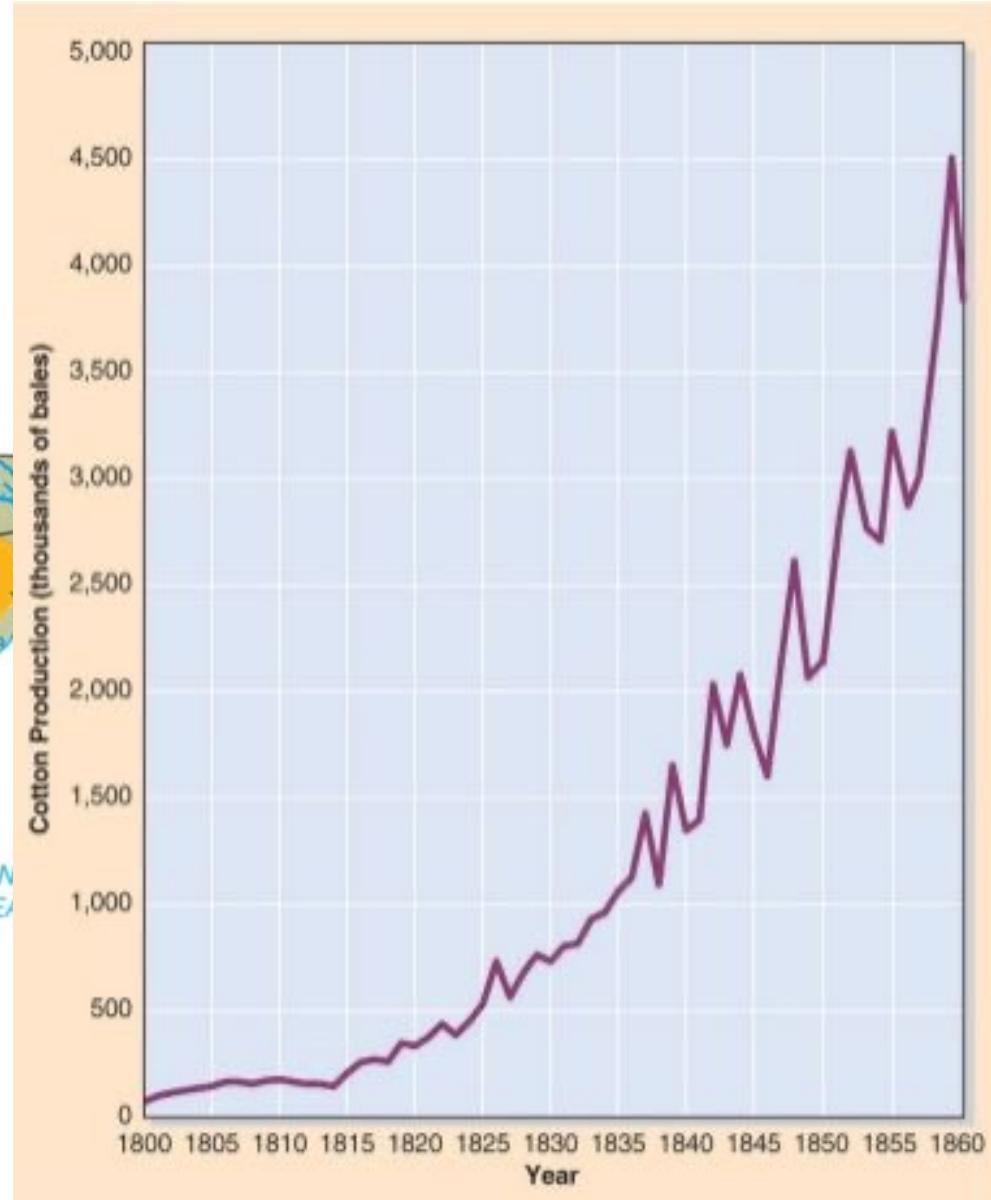
- Territorial expansion driven by demand for cotton
  - Louisiana Purchase 1803, Florida 1819, Texas 1845
- ↑↑ production – far outpaced tobacco

  S. Carolina exported <10,000 lbs 1790 → 6.4 MILLION lbs in 1800
- ↑↑ importation of enslaved persons
- Separation of industrial North states and agricultural South
- Development of export customs and shipping industry in South – New Orleans, Charleston, Savannah

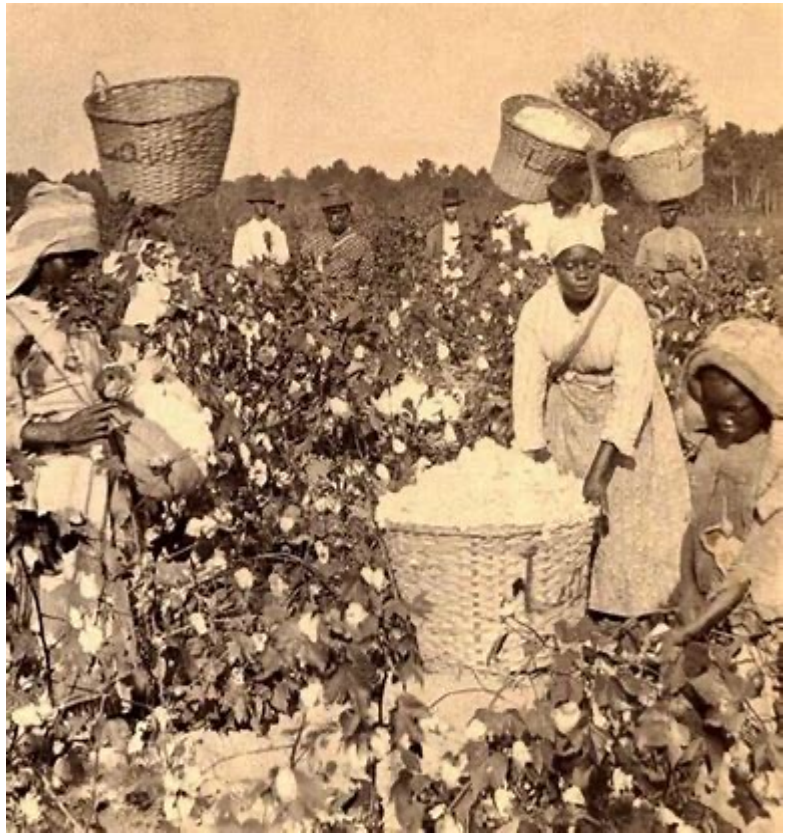
Southern Cotton Production 1820 and 1860

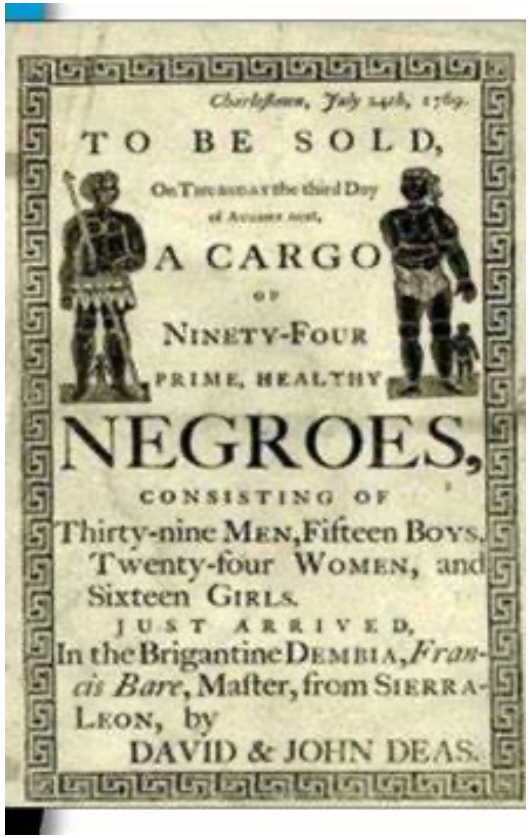


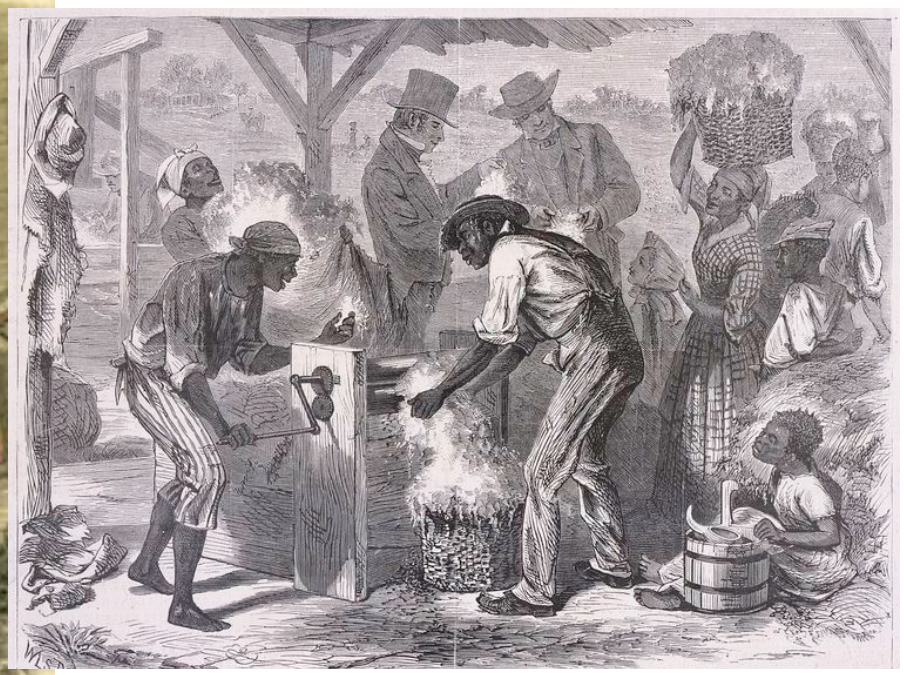




Cotton in America was dependent on enslaved peoples' labor







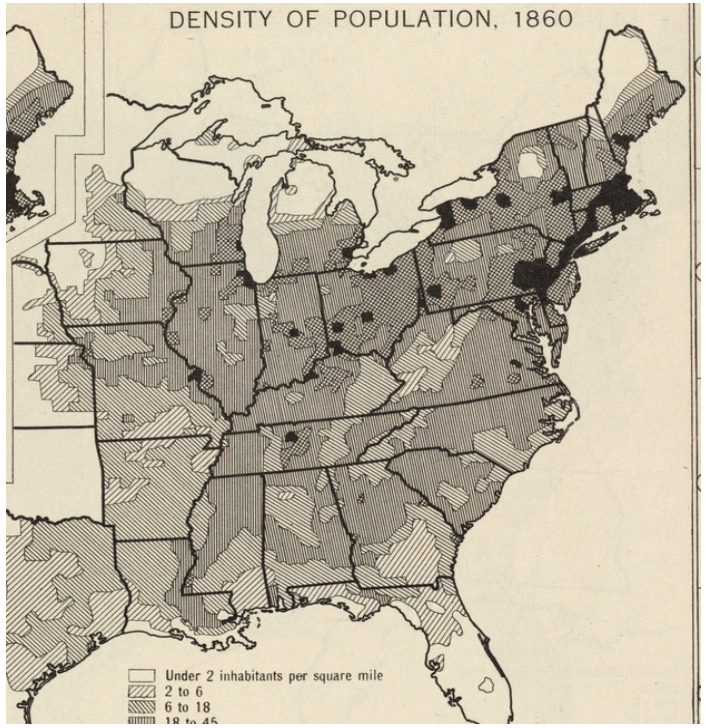
SKETCHES IN THE LAND OF COTTON.—THE COTTON-PRESS.

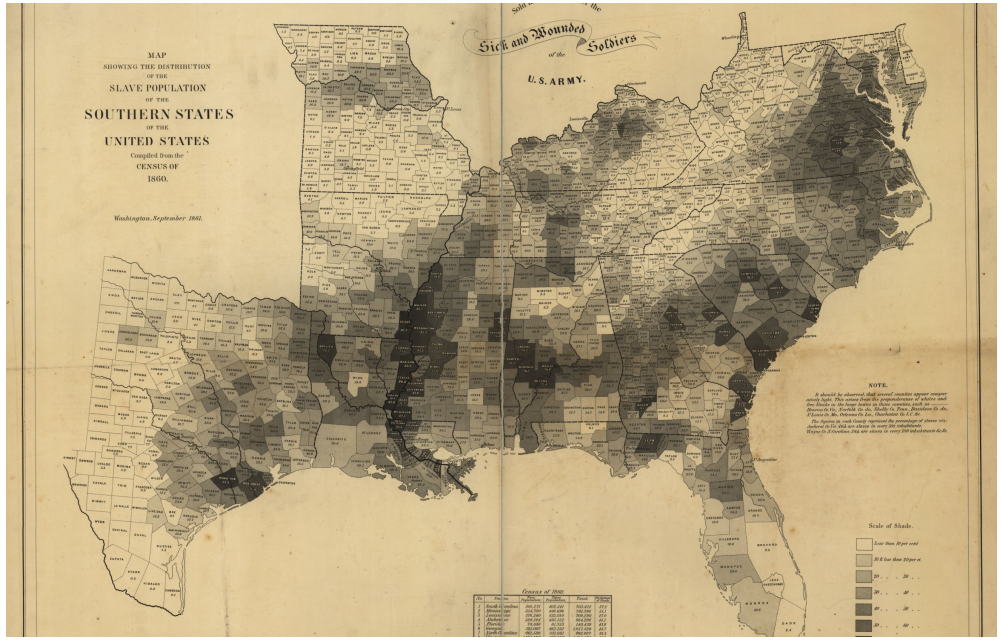
Cotton in America

- England outlawed slavery 1837, foresaw issues with stability of slavery in America
- British East India Co tried to create cotton agriculture elsewhere
  - India – failed due to lack of coerced labor, resistance of local weavers to machinery and transport infrastructure
  - Egypt – temporary success but failed in 1850's due to lack of coerced labor
- Still dependent on America

Cotton in 1860

- 20 million people worldwide engaged in cotton industry (1 of 65 humans on earth)
- 10% all British capital, with ¼ British population dependent on cotton industry
- America supplied 80% world's cotton
  - **3.8 billion bales exported** (1 bale = 400 lb)
  - **$190 million in exports**





Cotton in 1862

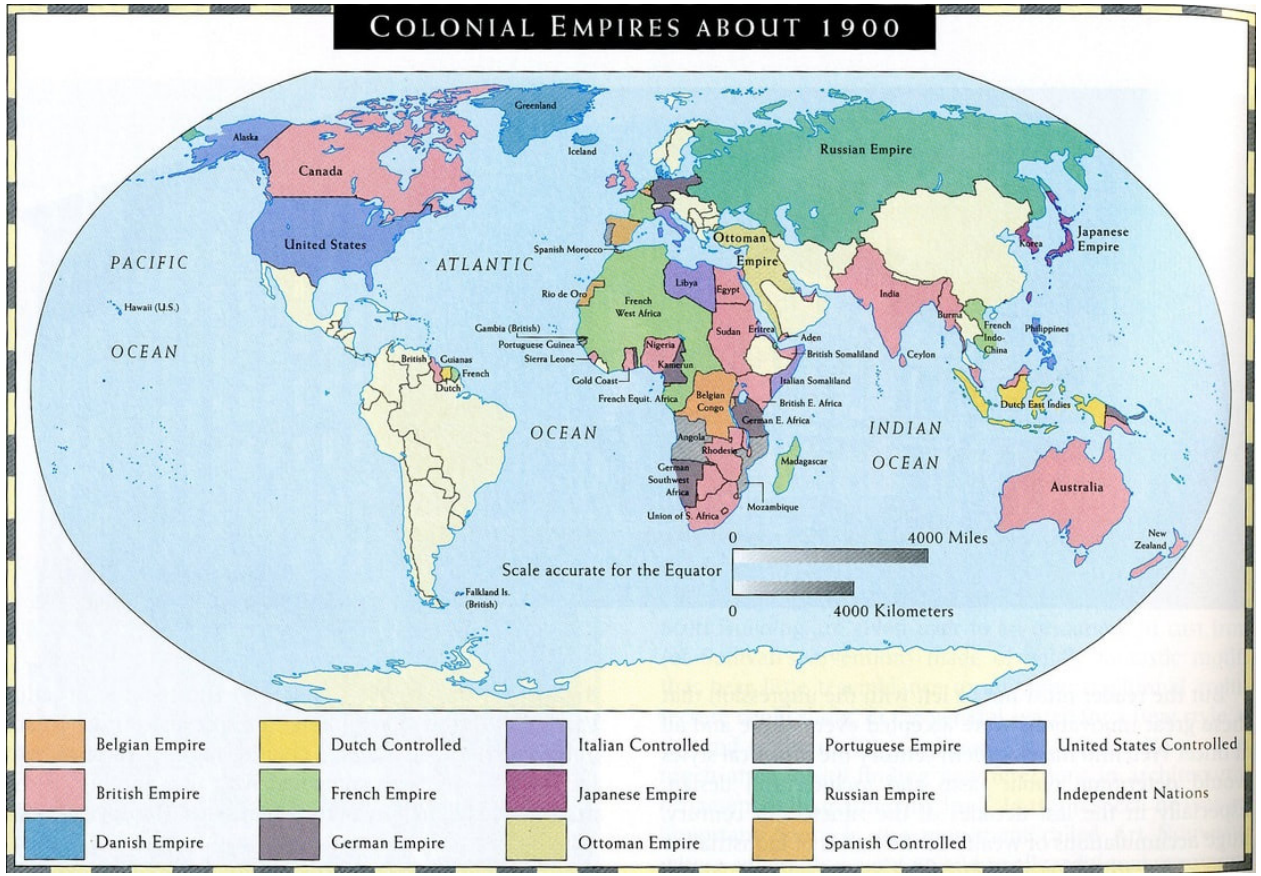
- Civil war → “cotton famine” in Britain,
  global recession, ↑↑ in cotton prices
  1st global raw material crisis
- Split in British Parliament
  - Some wanted to recognize Confederacy to maintain cotton supply
- Britain sourced cotton from:
  - India – British East India Trade Co ↑production 70%, problems with infrastructure, labor markets
  - China – problems with infrastructure
  - Egypt - Britain returned to rebuild after 1850’s collapse
  - Brazil – controlled by Portugal

Cotton after the Civil War

- Cotton consumption worldwide ↑
- Egypt, India production ↓ due to failed coerced labor
- Formerly enslaved persons did not go back to growing cotton other than subsistence crops → development of sharecropping
  - By 1900 75% black farmers were sharecroppers
  - Permanent indebtedness – company stores, wages in crops, coercive landlords, suppression of black collective actions
  - Northward urban migration
- Carpetbag South → consolidation of power with landowners → unwillingness to let demand drive price → collapse of cotton agriculture

"The culture of cotton is the most important element in the success of colonization" – 1870

- British, French, Portuguese, Dutch colonization of Africa and SE Asia
  - Contracting of Tuskegee grads to establish cotton in West Africa
- Japanese colonization of Korea
- Russian colonization of central Asia
- American westward expansion



Worldwide Cotton Production 20th Century

- Imperialism and vertically integrated conglomerates
- Demise of brokers and middlemen
- Futures trading → globalization of prices
- Increased production in India, Egypt, China, Brazil, Africa, Caucasus → massive food shortages

"Cotton and food insecurity go hand in hand" early 1900's newspaper

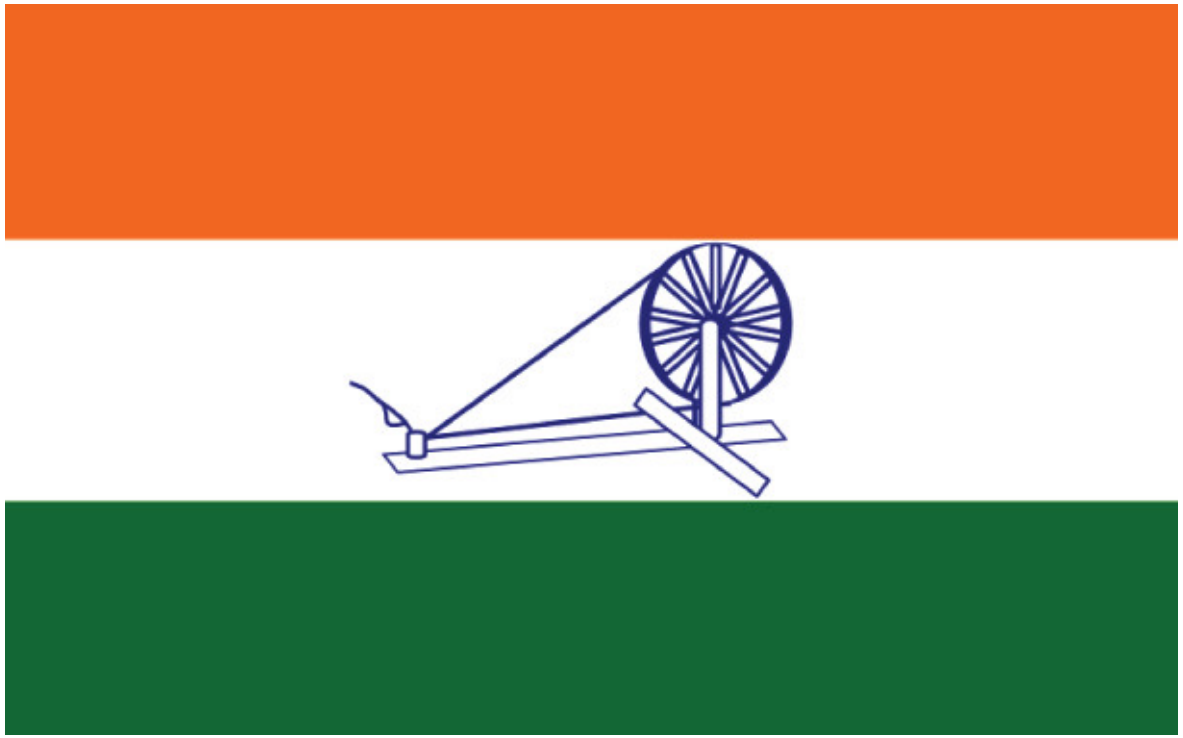
Worldwide Cotton 20th Century: India

India grew cotton but imported 75% of its cotton cloth from Britain

Gandhi saw non-cooperation as the road to independence

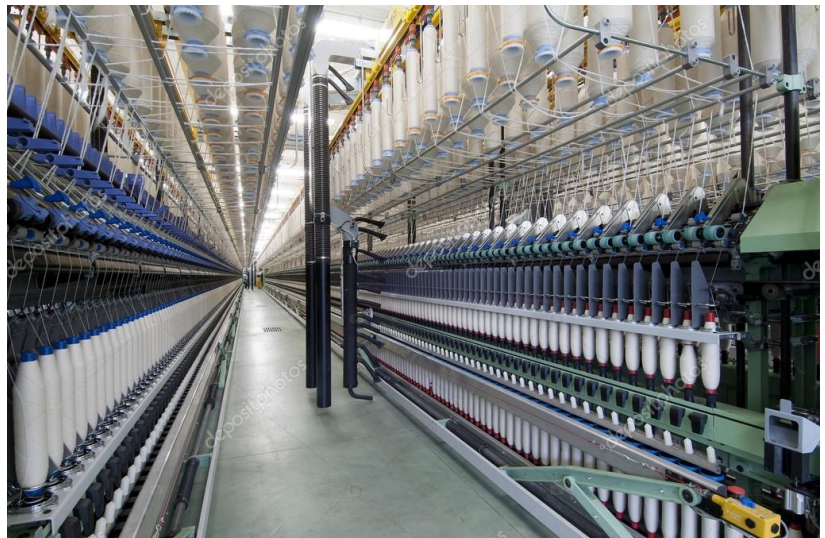
- Called on Indian people to boycott British goods, most famously cotton and salt
- Advocated home grown homespun cotton goods
- Required spinning at schools and government meetings
- Famously spent Independence Day 15 August 1947 spinning and fasting

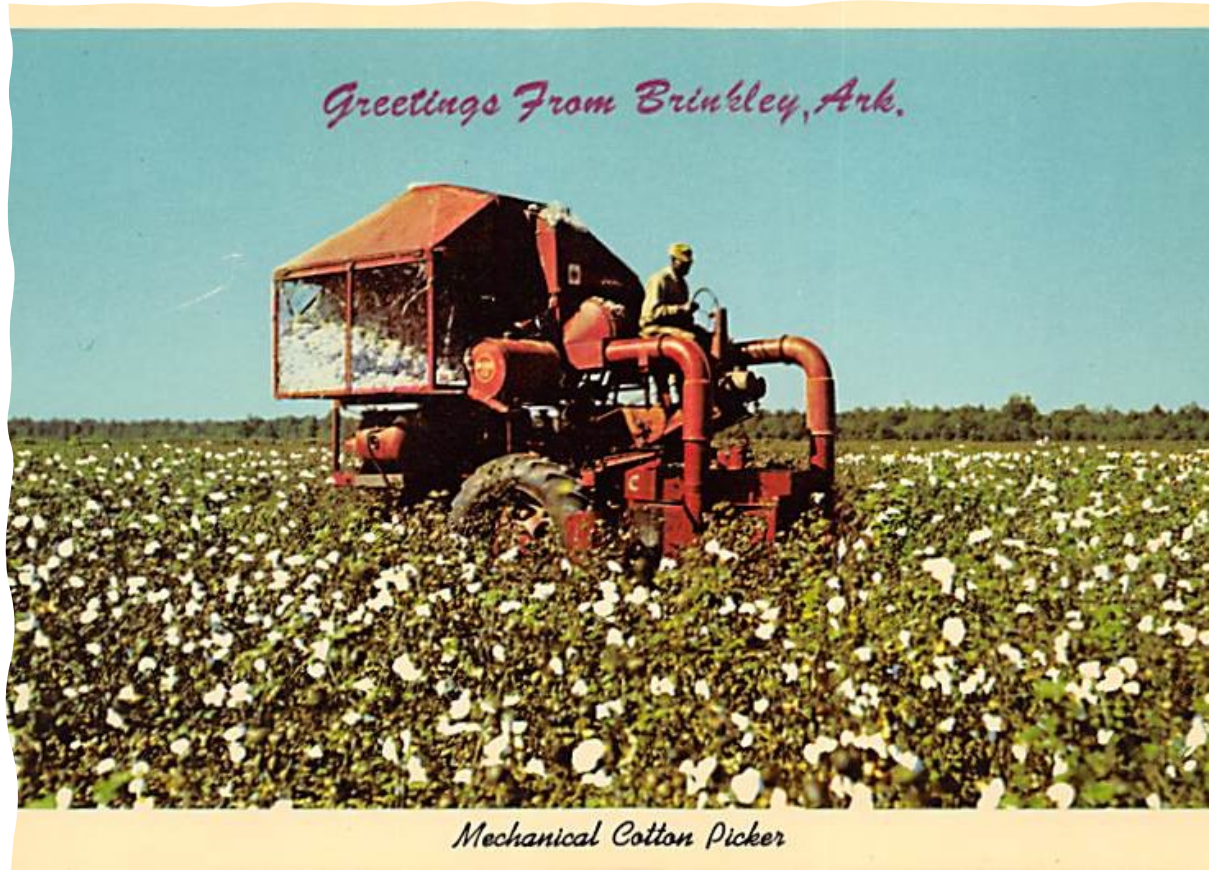
Flag of India
1931



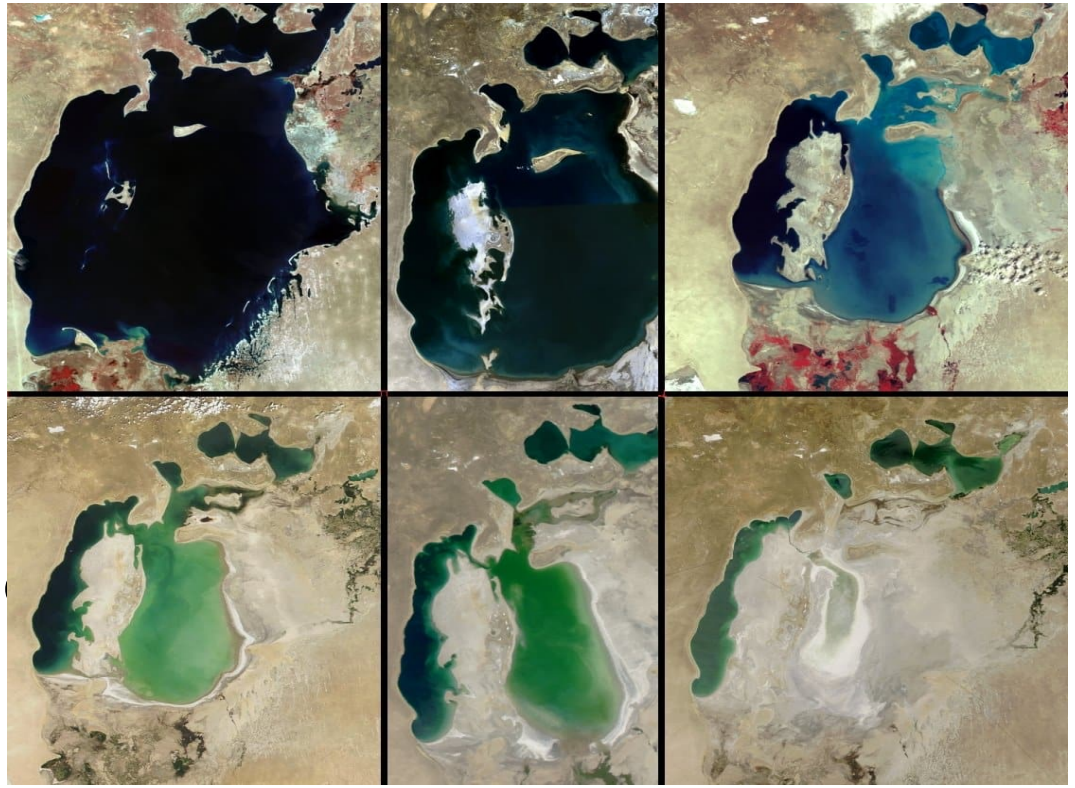
Cotton in 20th century

- Factories still staffed by children and women
- Child work and welfare reforms
- Hand picked until 1940's
- Exploitation and sharecropping into 21st c





Worldwide Cotton 20th Century: Central Asia



- Russian control of Central Asia → rapid expansion state-sponsored cotton agriculture
- Near complete destruction of Aral Sea

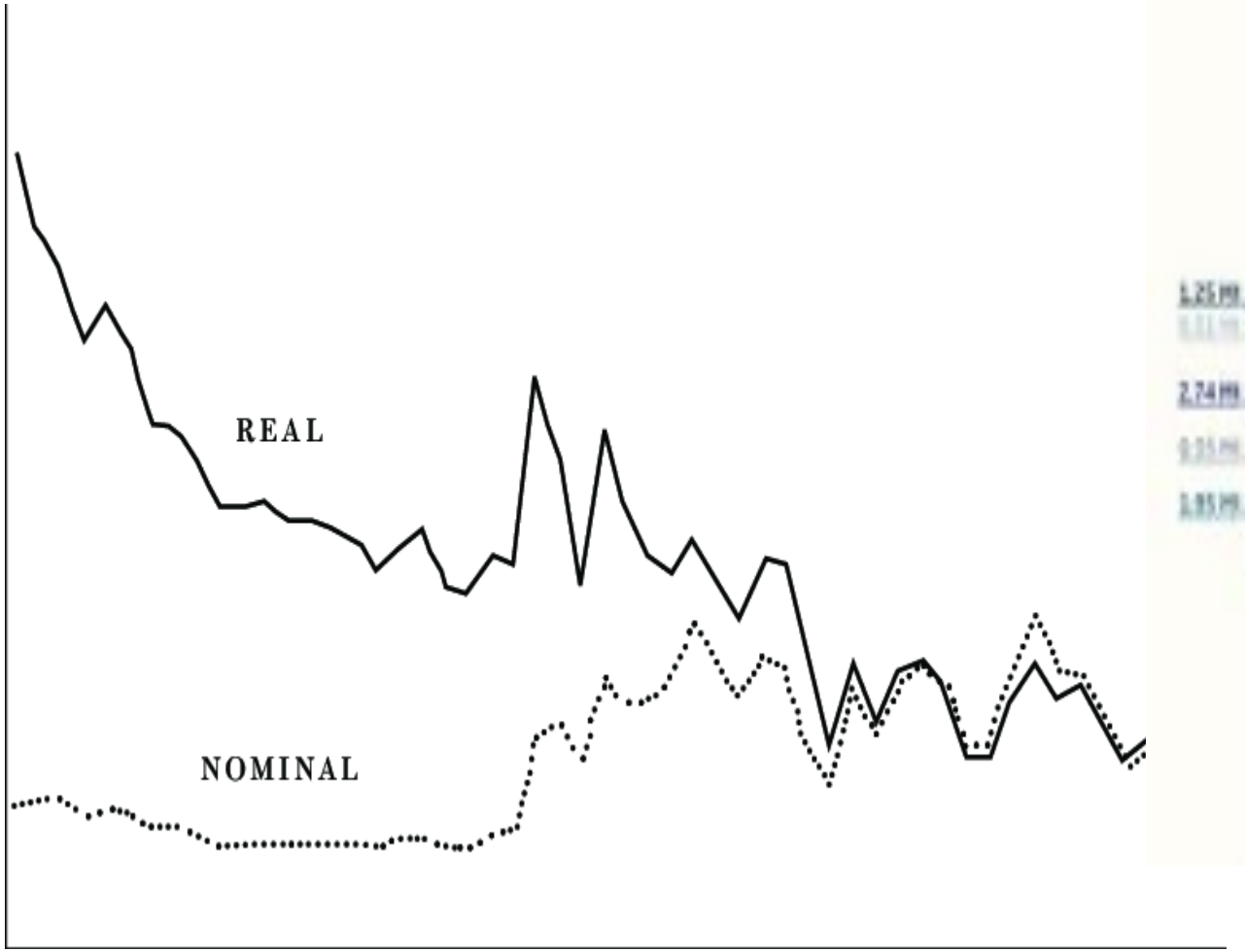
Cotton in 21st century

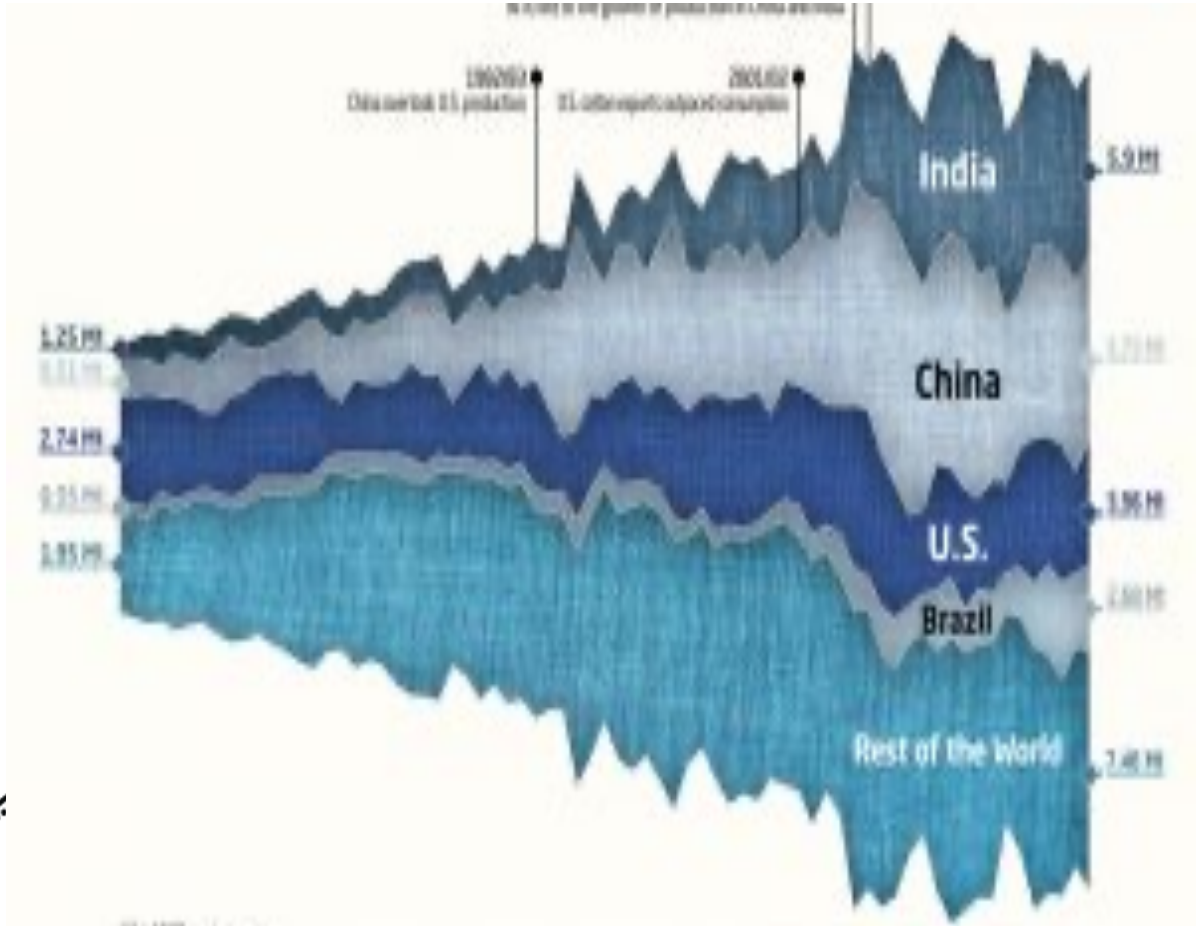
Environmental impact

- Water consumption
- Pesticides – cotton responsible for 50% worldwide pesticide use
- 20% water pollution worldwide
- GMO

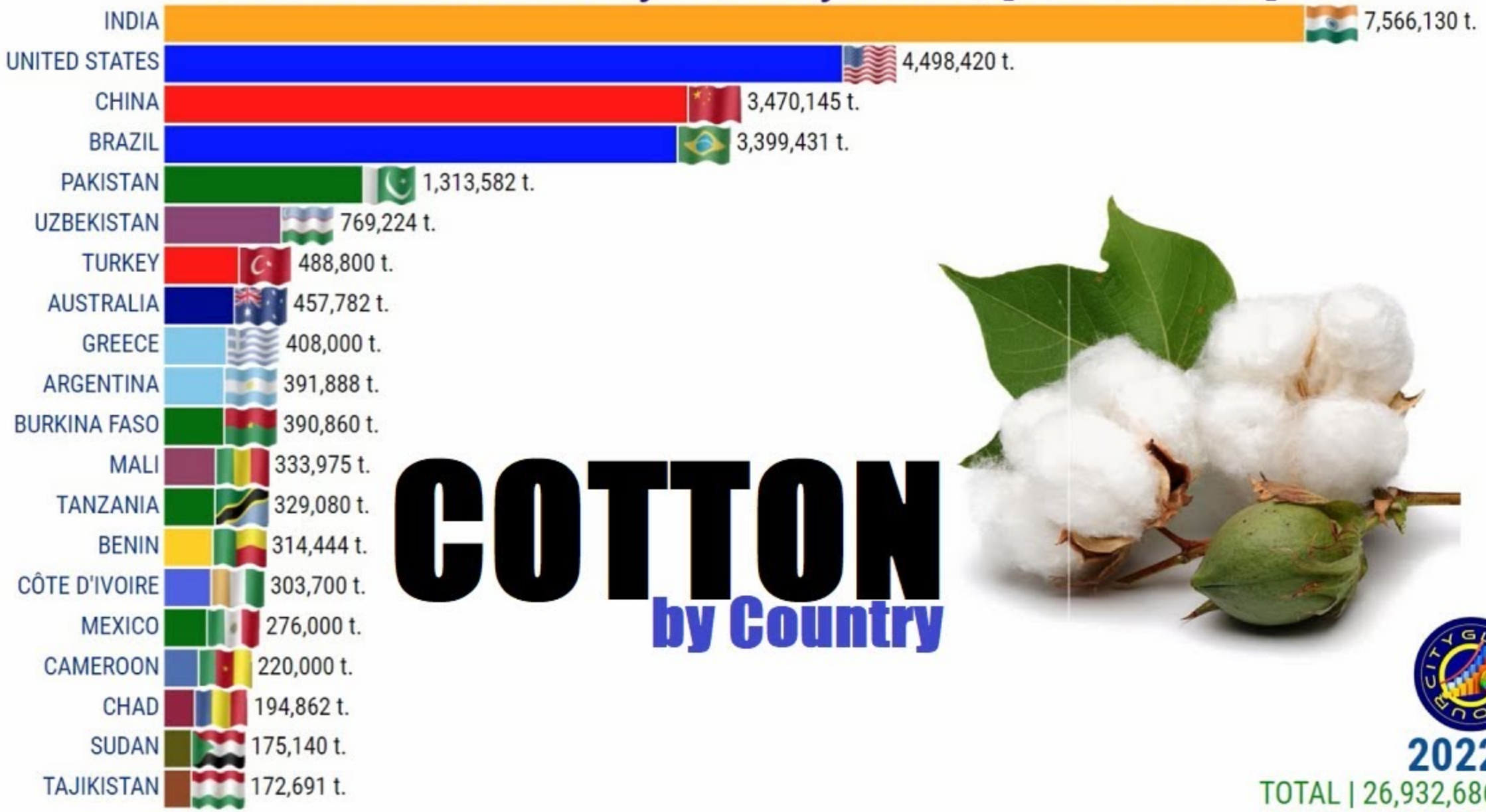
- Russian coerced cotton workers in Uzbekistan and Tajikistan → boycott of cotton from this region
- Increased in recycling of cotton textiles
- Increased interest in green and organic cottons

Cotton Production Since WW II





Cotton Production by Country 2022 | [Metric Tons]



Questions and Comments?

Extra Slides

Sisal

- A leaf fiber (not a bast fiber)
- An agave from Mexico spread around the world
- Chiefly used for cordage and carpet backing
- 0.2 million tons per year, esp. China, Tanzania, Kenya, and Madagascar

Homegrown Flax and Cotton by Cindy Conner

- Pulled up from the root
- Rippling removes seed heads from stalks
- Retting releases inner flax fibers from outer epidermis (pectin)
- Retting: water (2-5 days), dew (6-21 days), snow (months)
- Breaking separates boon from flax fibers
- Scutching removes the rest of the boon
- Hackling separates rougher and shorter tow from “line flax”
- 80 sq foot garden, 5.6 lbs retted flax, 6 oz line flax + 19 oz tow (12 oz from coarse hackle, 4 oz from medium hackle, 3 from fine
- Best spun wet