

Chapter 20 – Industrial Revolution

AP European History

1851: The Great Exhibition



- Crystal Palace
 - 100,000 exhibits
 - Significance of tree in-side?
 - Britain: “workshop, banker, trader to the world”





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Industrial Revolution: The Basics

- What was it?
- When did it begin?
- Where did it begin?

It is still happening/evolving...

What was the Industrial Revolution?

<u>Traditional Economy</u>	<u>Industrial Economy</u>
Power: human/animal, wind, water	Power: coal/steam
Labor intensive	Capital intensive
Skilled labor	Unskilled/specialized labor
Rural & Decentralized / Intimate / Unregimented time	Urban & Centralized / Impersonal / time-work discipline
Artisans own means of production	Factory owners own means of production (Capital)

Leads to:

Greater Productivity (Prices decline)

Greater Demand/Consumption

Greater Demand for Raw Materials

Wealth Creation/Shift in Societal Order

Urbanization/Population Growth

Fundamental Overhaul of Society

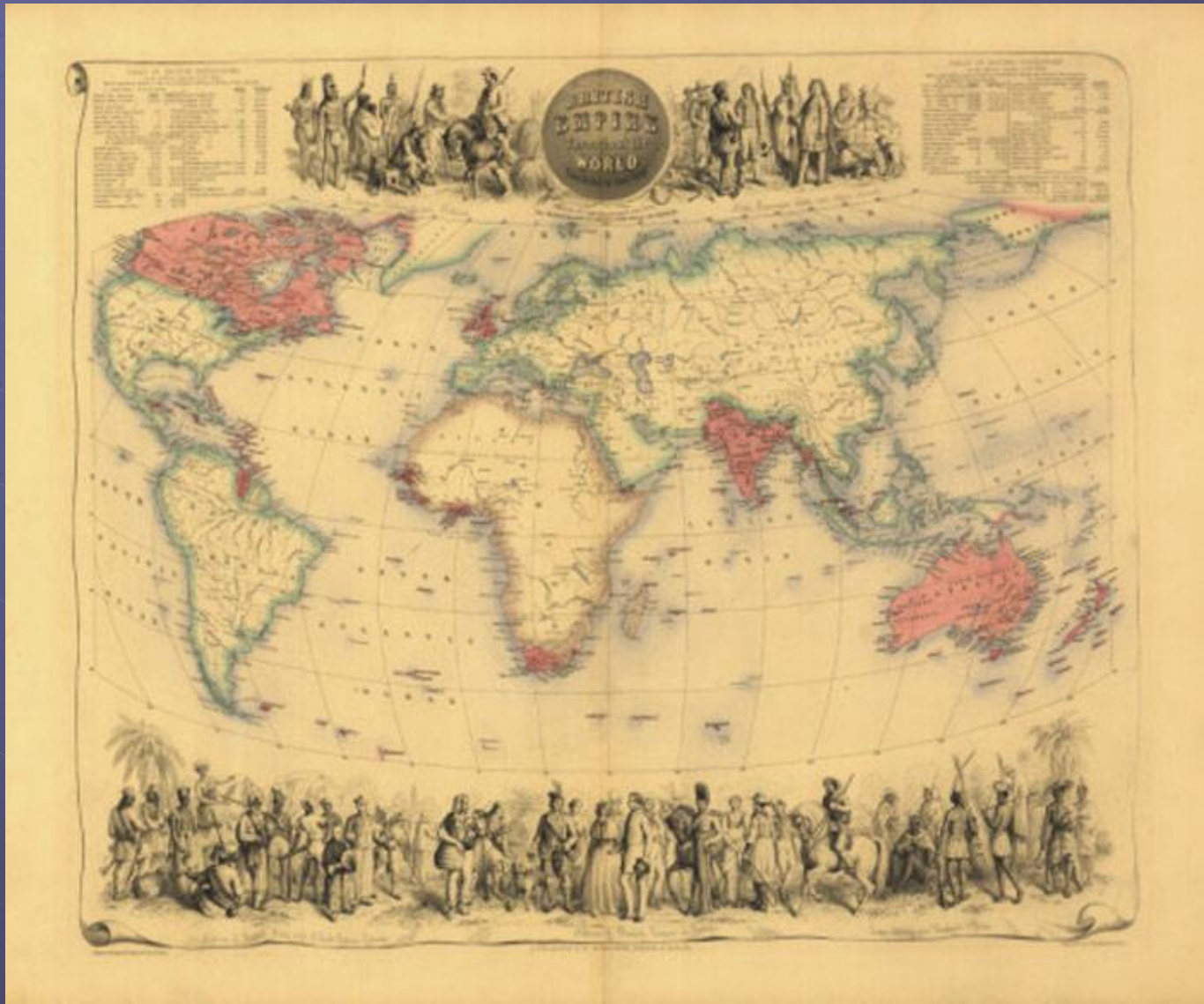
(Erosion of family security, development of economic based classes)

Why did it begin in Britain?

- Agricultural Revolution of 1700s
 - Lower food prices – greater ability to purchase mfd. Goods
 - Rapid population growth and surplus pool of labor
- Capital/Access to Credit
 - Presence of national bank
 - Liquidity – bank notes/paper money
- Entrepreneurial tradition: Capitalist tradition grows out of and destroys cottage industry (“putting out”/“domestic” system)
- Mineral resources, rivers, lack of internal barriers, navy/merchant marine (access to markets)
- Government protection of private property (accumulation of capital) and lack of gov’t restraint on businesses

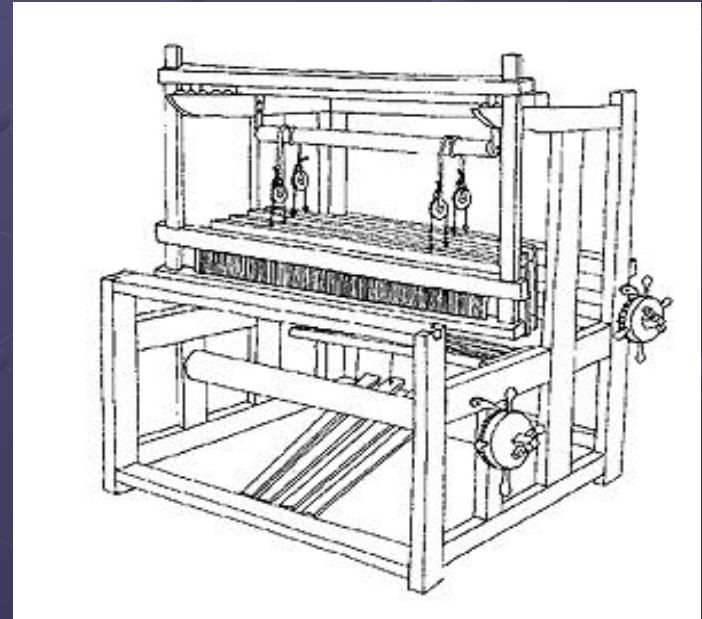
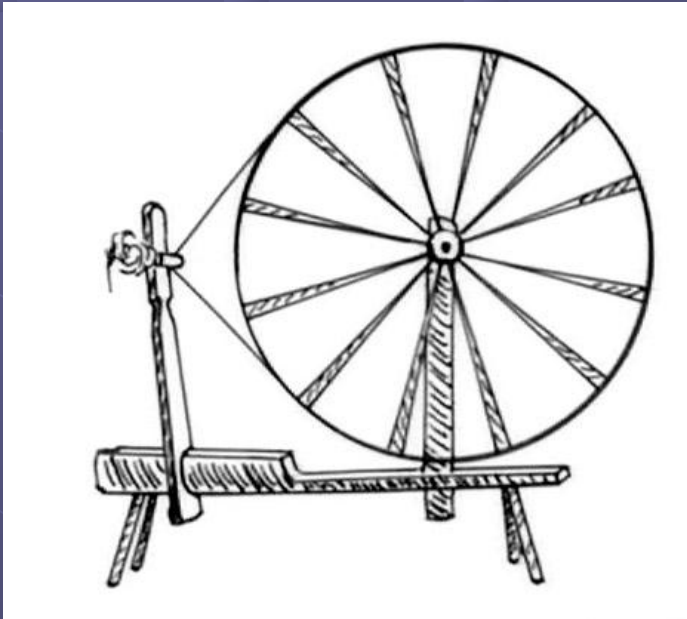
- **Existence of foreign (unprotected) markets**
 - **Role of mercantilist protectionism BUT Britain's possession of many colonies**

British
Empire



Cotton Textiles: The First Mechanized Industry (1770s-1780s)

- Demand for cotton cloth
- Failure of cottage industry to meet demand
- Process of creating cloth
 - Raw material spun into thread (or yarn) on spinning wheel; thread woven into cloth on loom

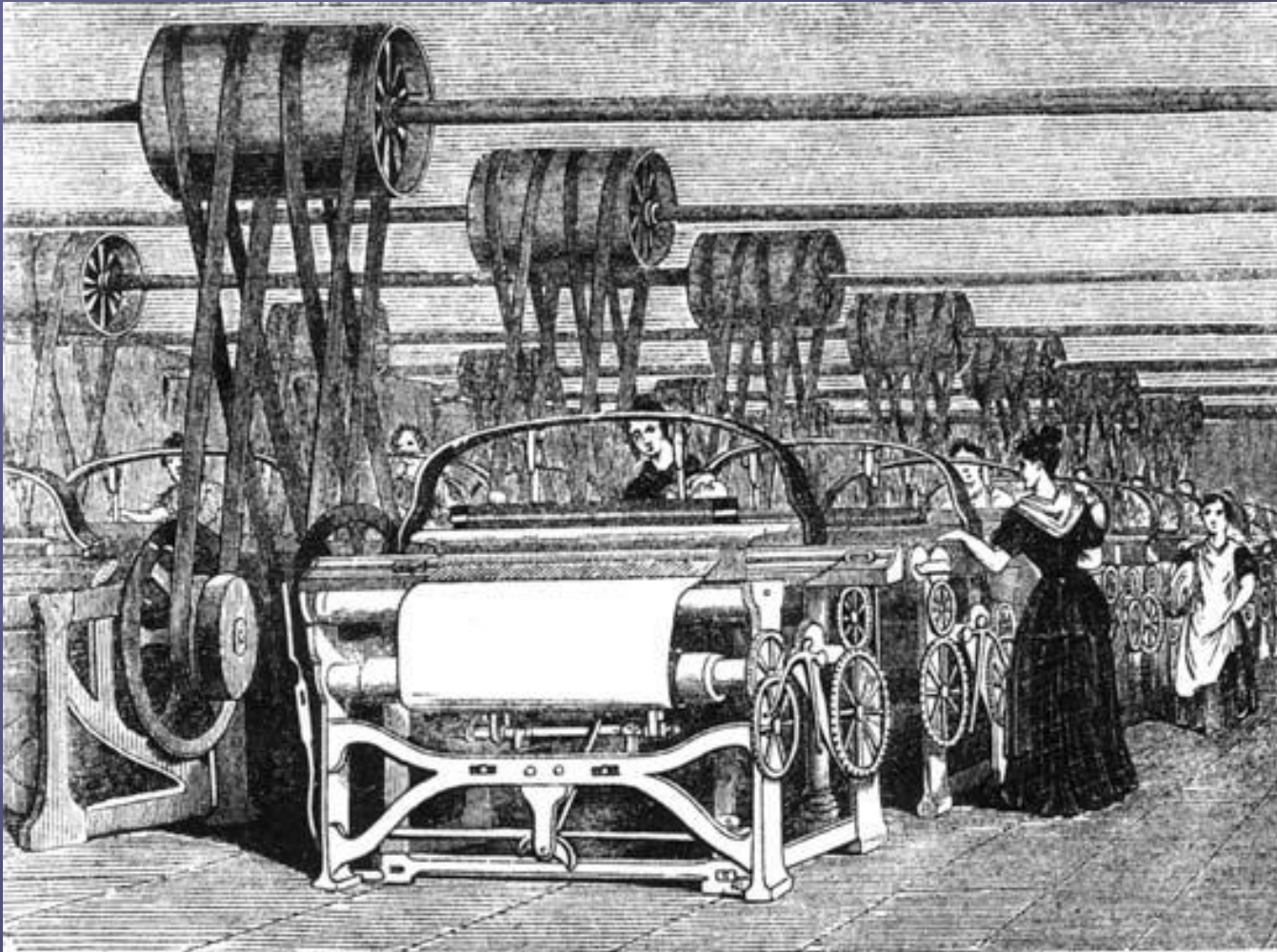


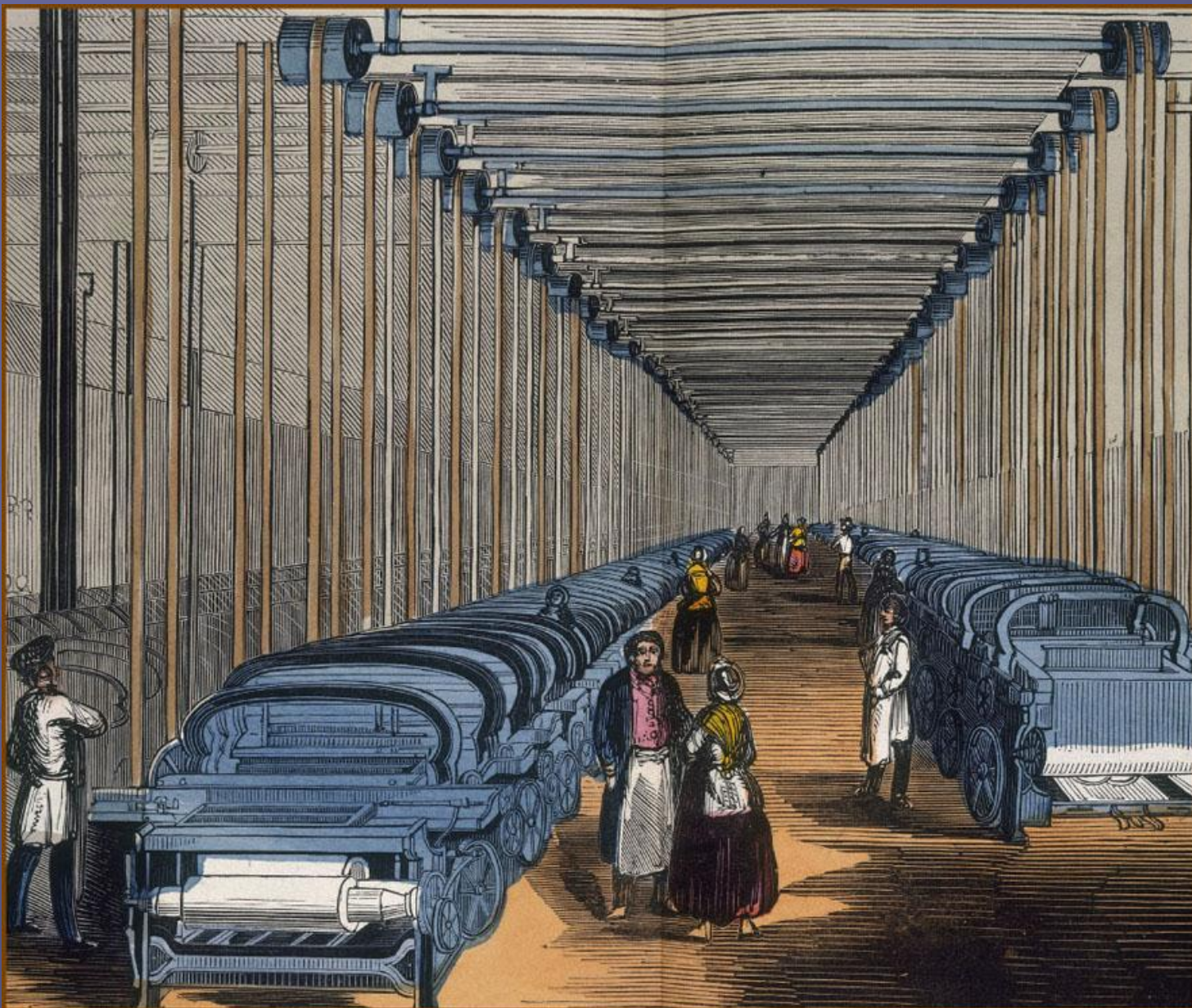
Yarn Production

- Increased demand leads to new inventions
 - James Hargreaves – spinning jenny (1768)
 - Richard Arkwright – water frame/ “mule”



- Cloth Manufacturing: Edmund Cartwright – power loom (1787)

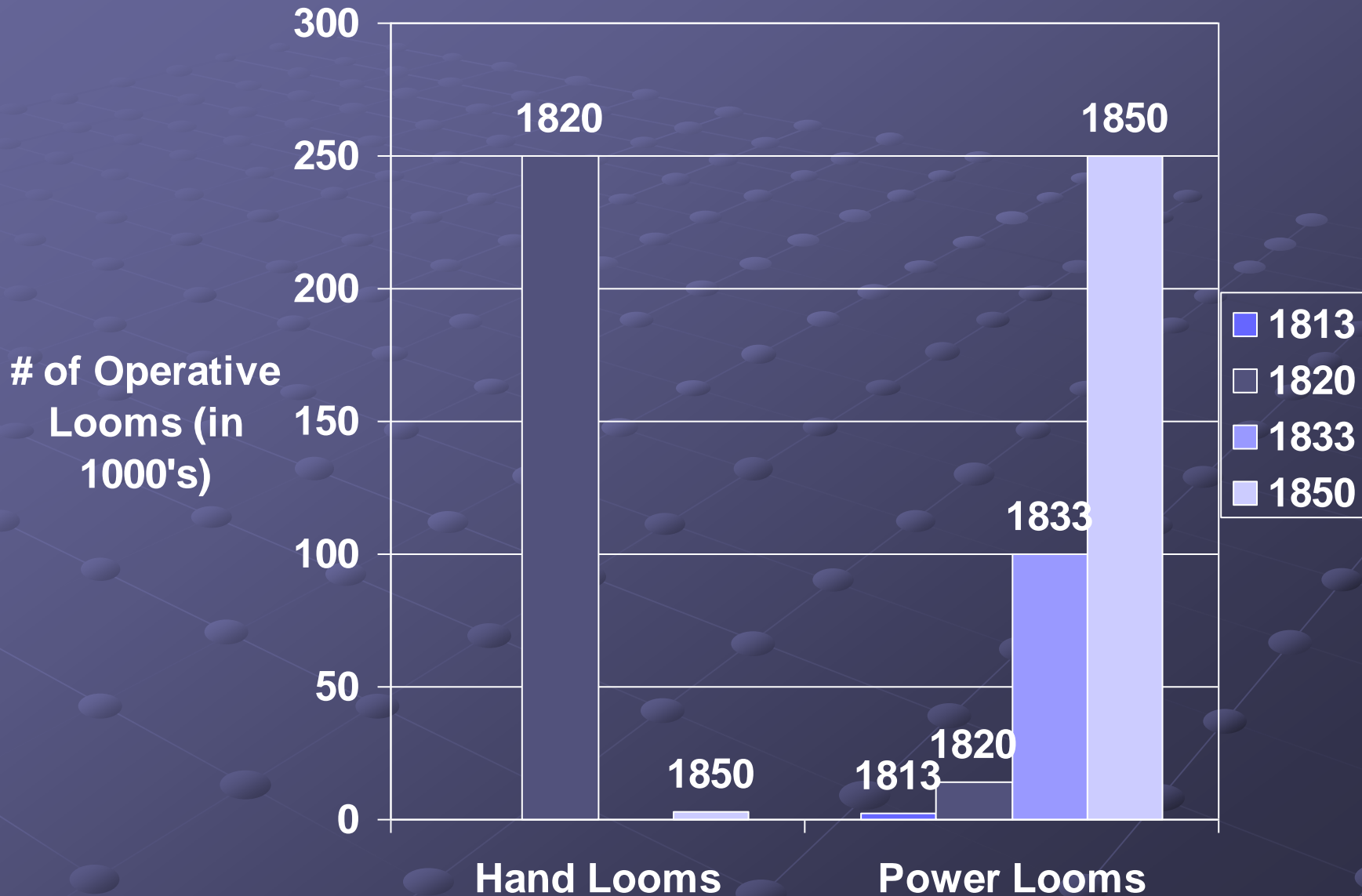




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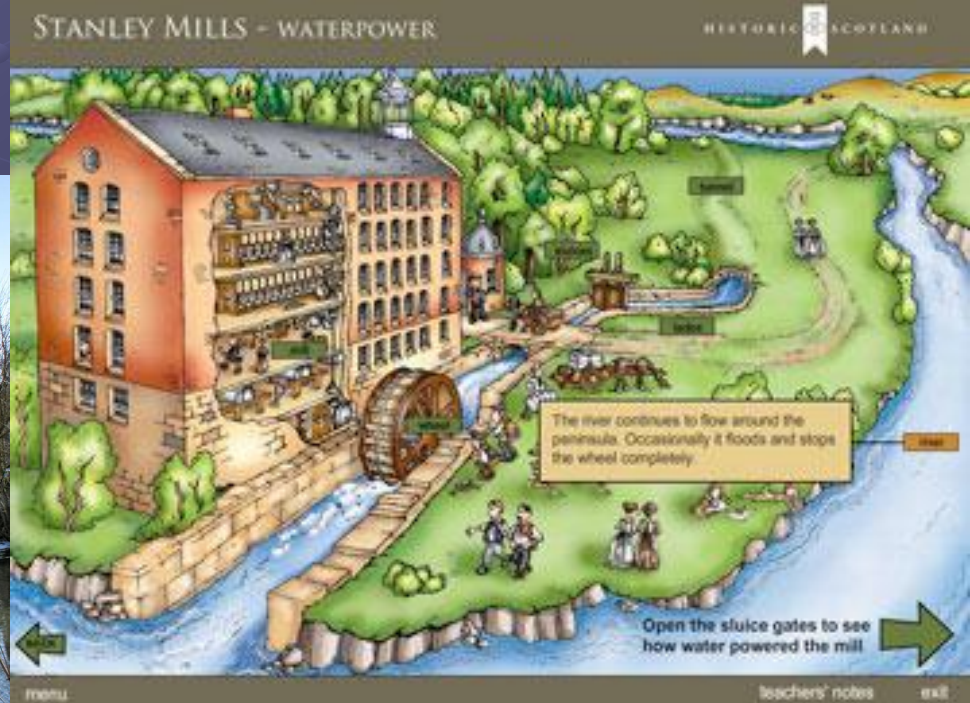
● Powerlooms in an English textile factory

Hand Looms vs. Power Looms in Great Britain



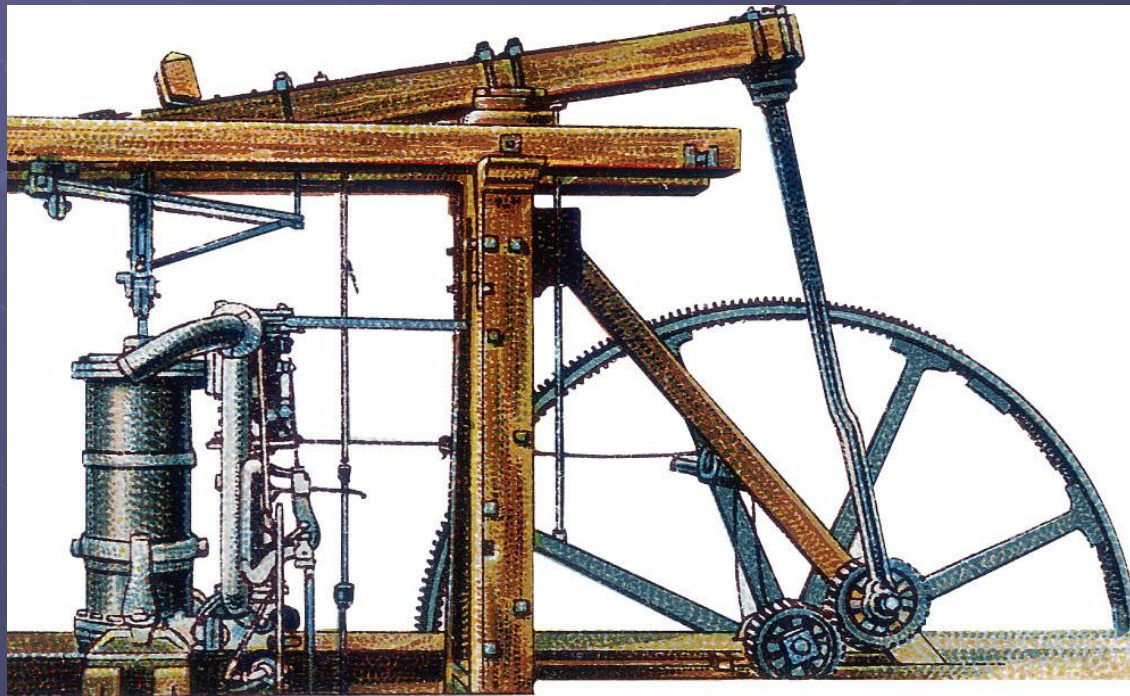
Effects of New Means of Production

- Factories – water sources
- Factory labor = concentrated (centralized)
- Vs. Cottage Industry labor = decentralized)
- Urbanization



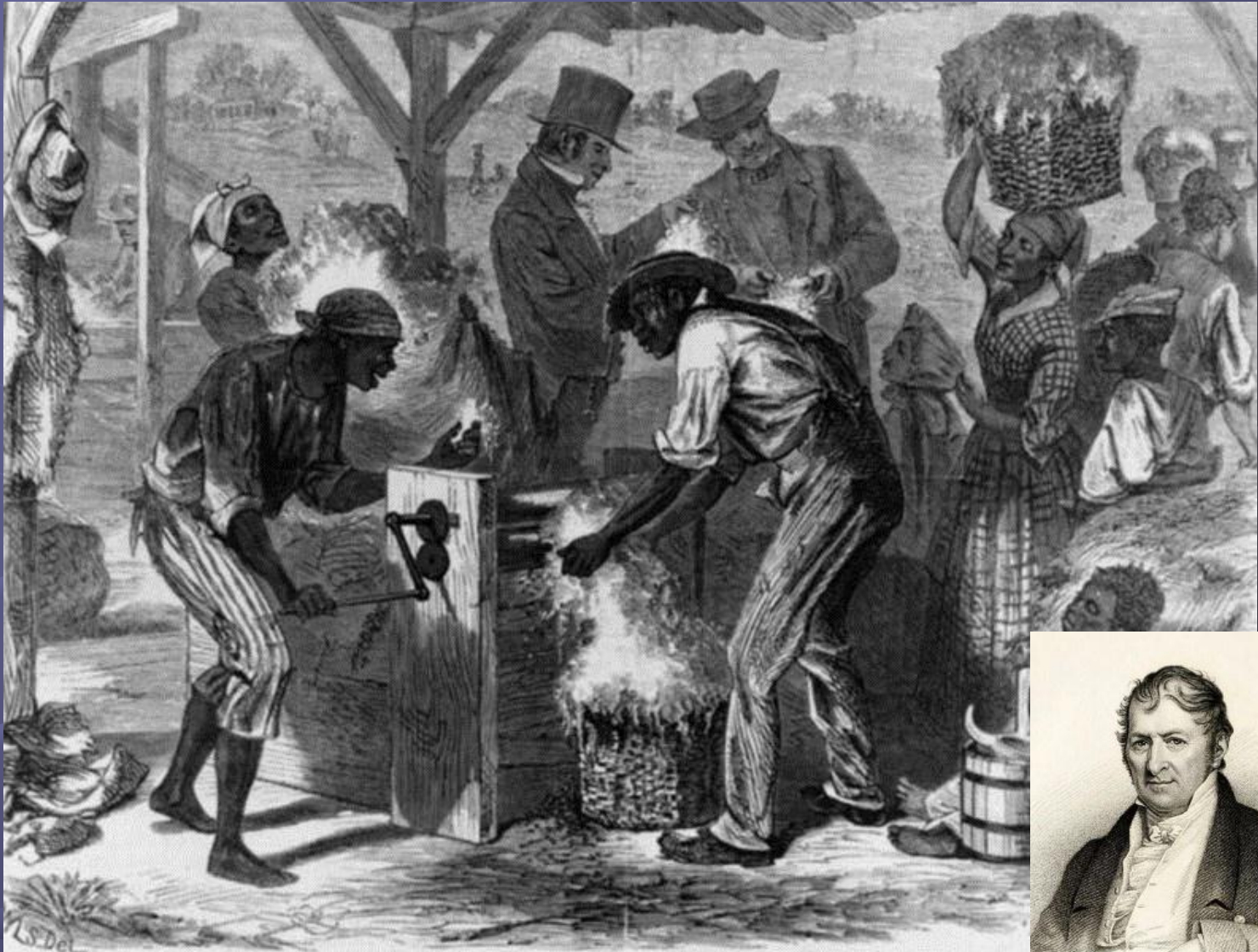
New Sources of Energy

- The need for more energy
 - Inefficiency of traditional sources of energy (rivers-location), (horses-care)
 - Coal and the shortage of wood
- Replacement of wood with coal (1815-1850 – 4 X coal output)
- Use of steam engine (Thomas Newcomen) to remove water from mines
- Improvement of steam engine by James Watt (1782)
 - Rotary engine – shaft – drive machinery



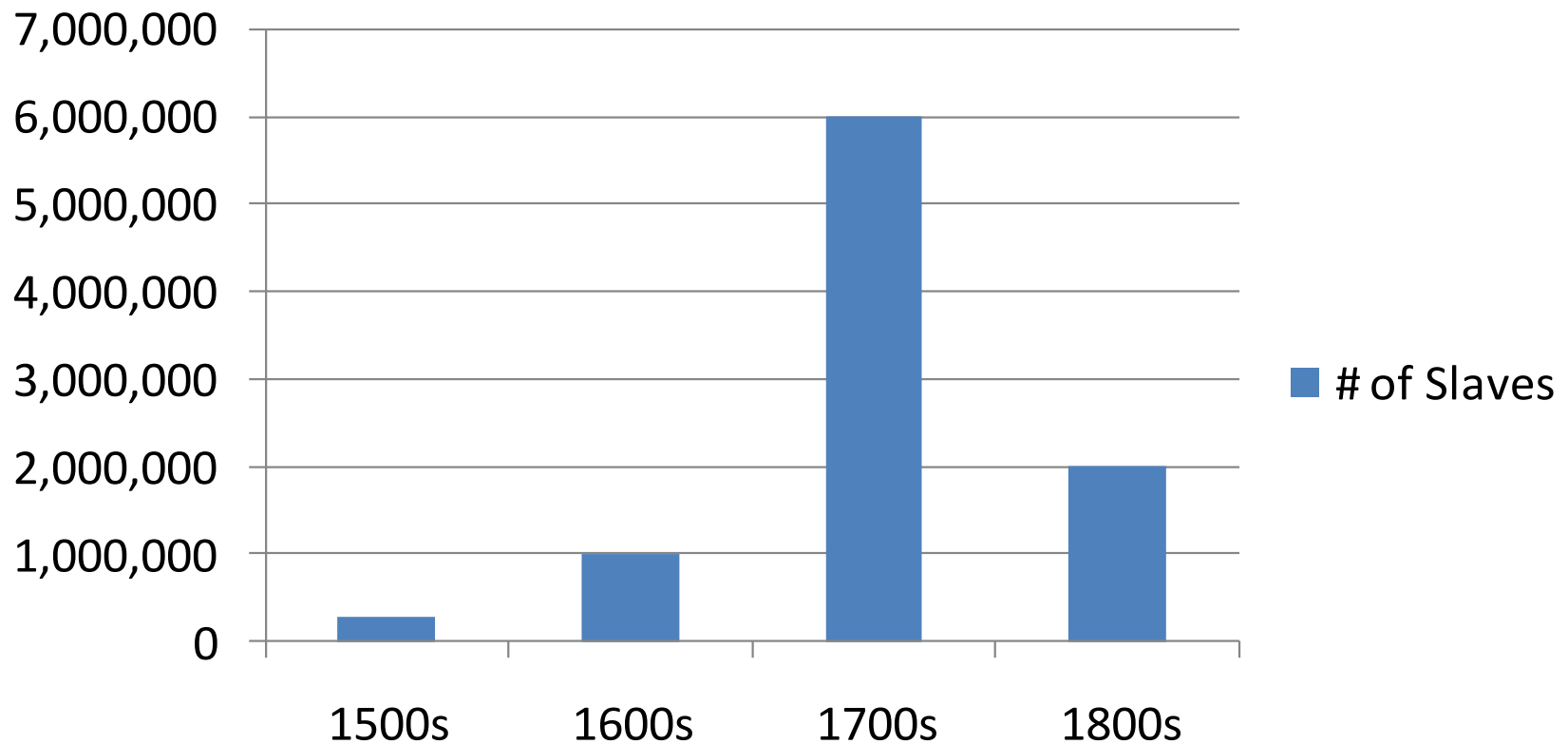
Cotton Growing: Eli Whitney – Cotton Gin (1793)

- Impact on cotton growing regions?

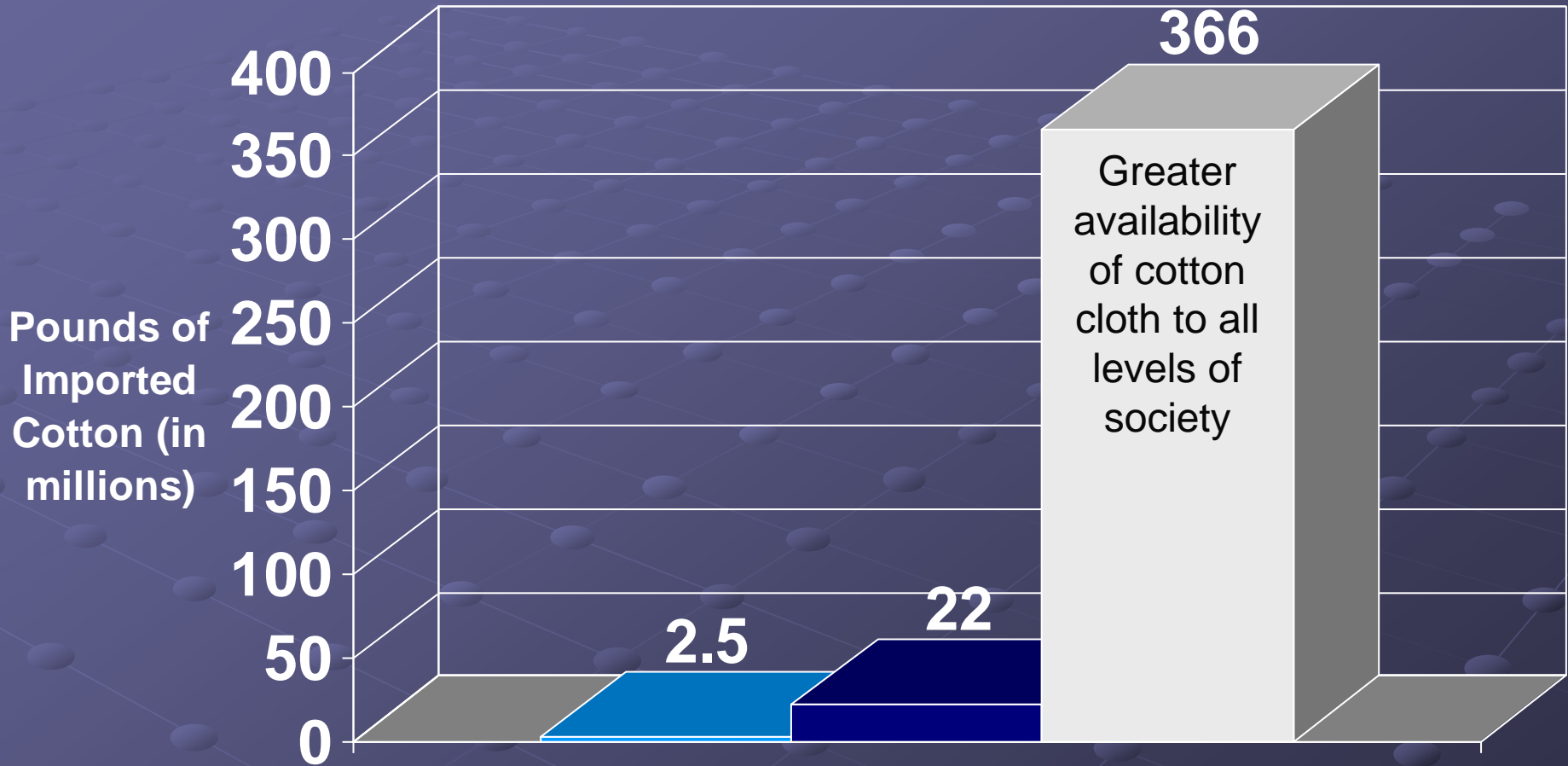


Exportation of Slaves from Africa

of Slaves



British Imports of Raw Cotton



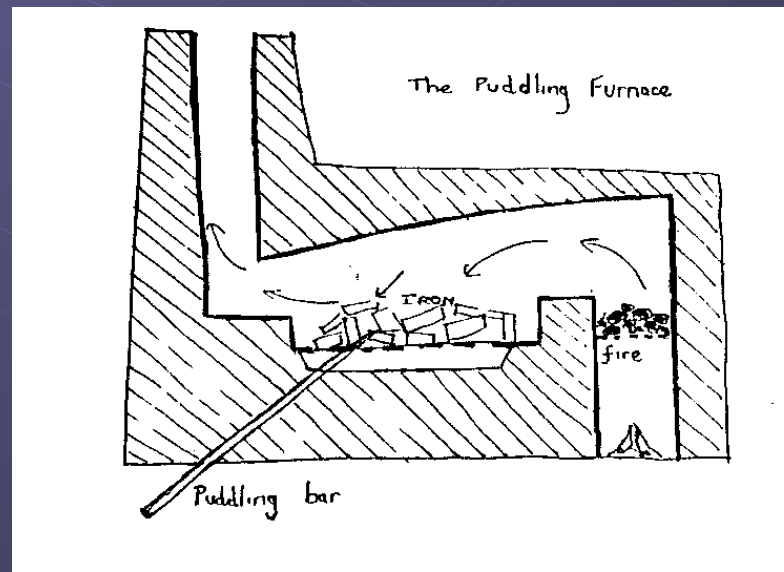
Inexpensive slave labor in India/Americas – raw cotton

■ 1760 □ 1787 ■ 1840

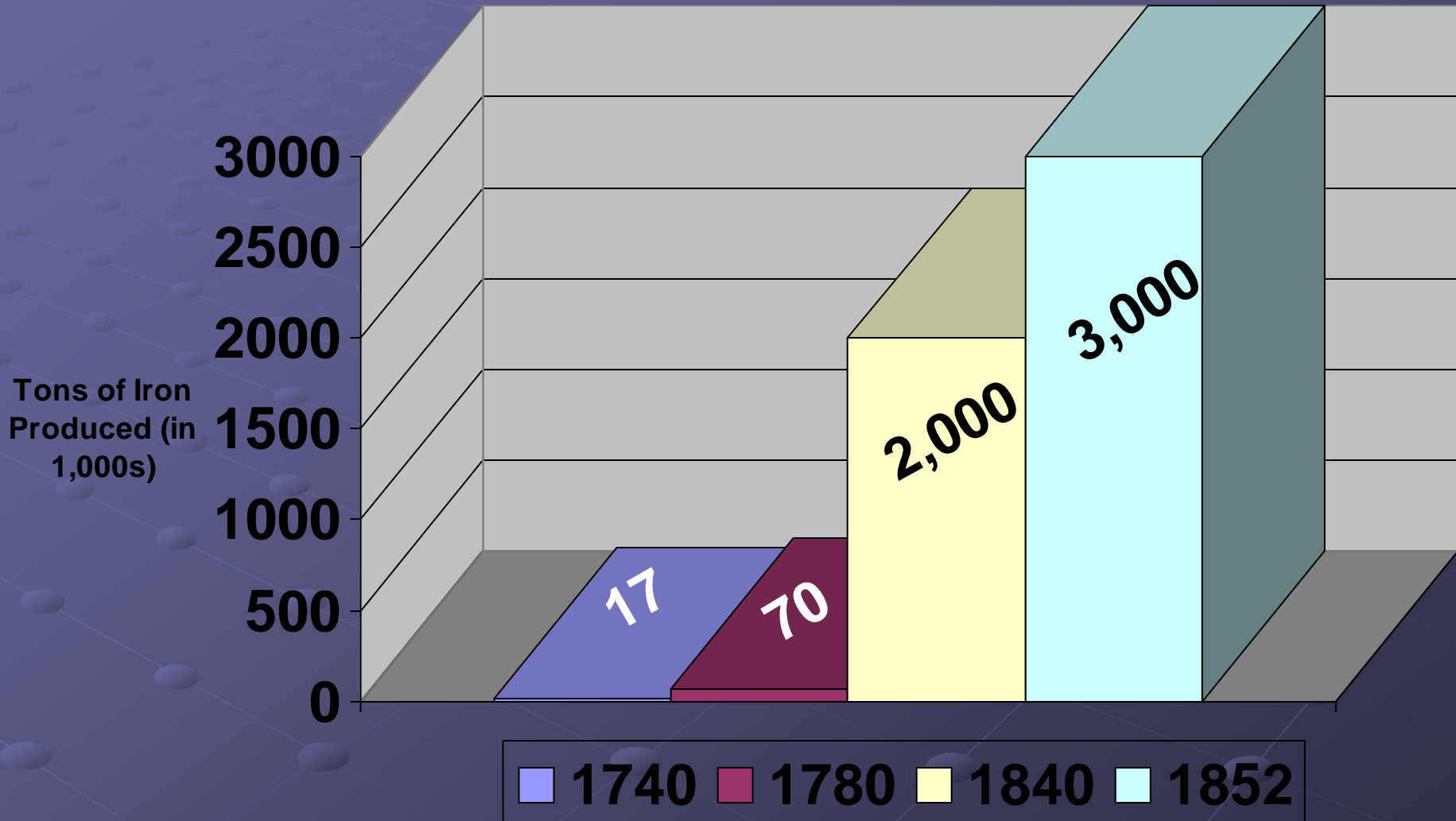
Factory-based cotton
production's impact on poor
urban workers?

Iron Industry

- Uses of new steam engine
 - Powered factory machinery
 - Helped power blast furnaces that used coke
- Traditional process of producing pig iron (use of charcoal to burn impurities from iron ore)
- Early 18th C. smelting iron into cast iron – use of coke derived from coal
- 1780s – Henry Cort – Puddling – using coke to burn impurities out of iron (no direct contact with carbon of fire...)

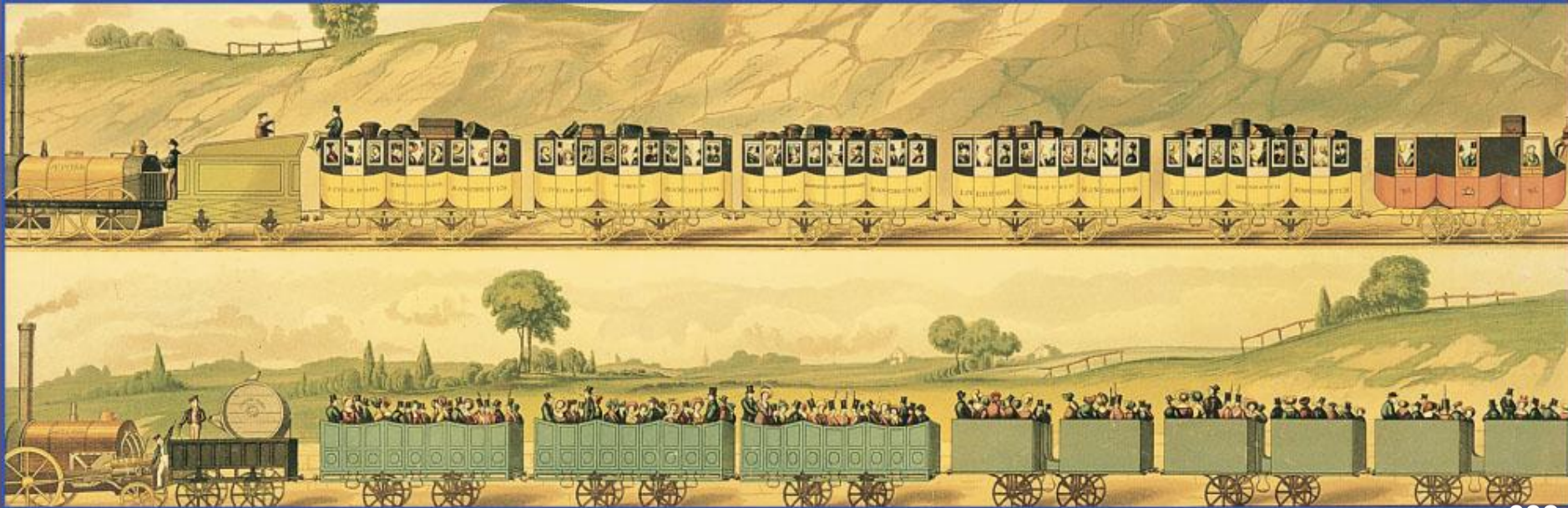


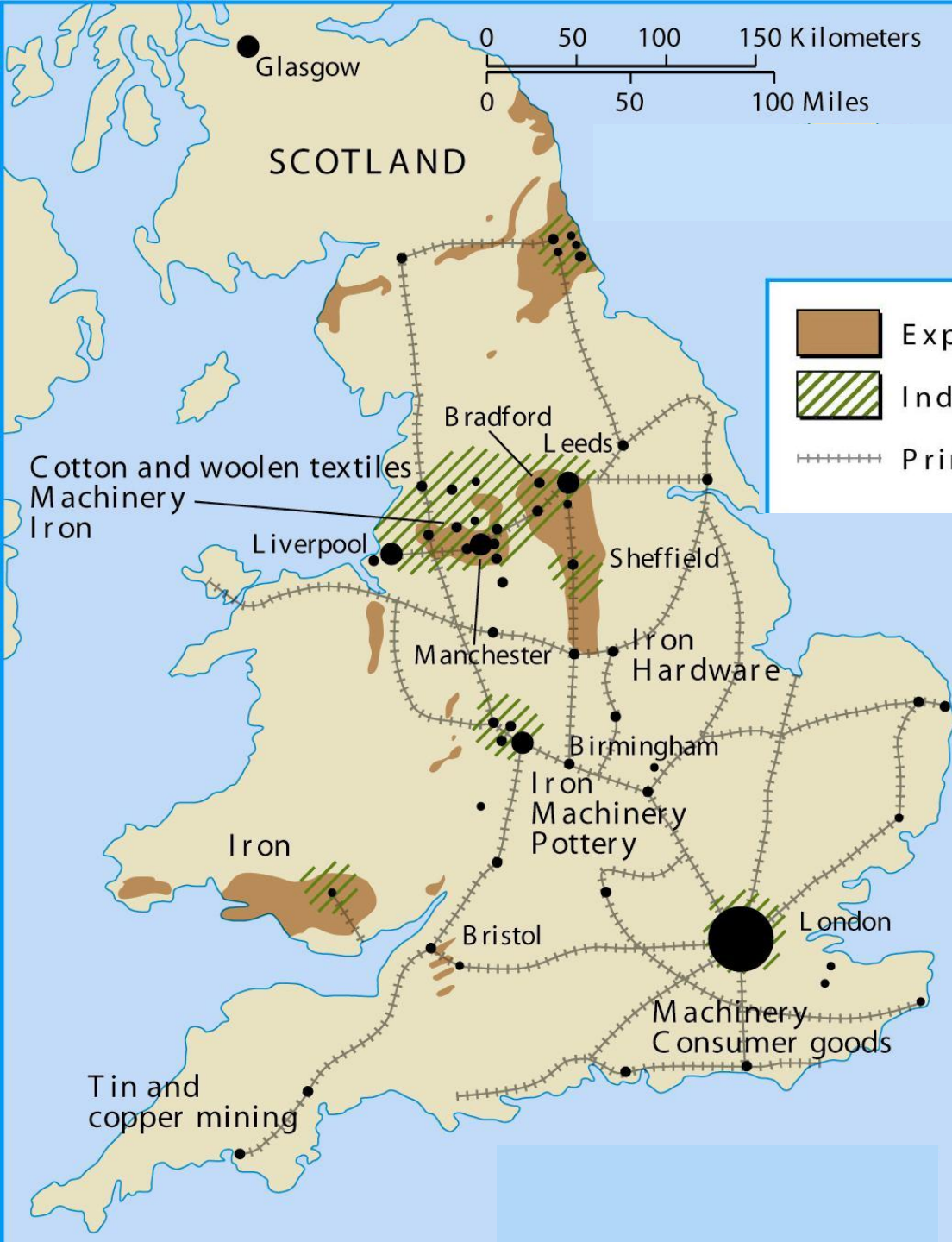
British Iron Production



Transportation

- Turnpike trusts – new roads
- 1760-1830 - canals
- Steamboat
- Steam locomotives
 - Use in mines (Germany in 1500 – Britain in 1600)
 - Richard Trevithic (1804) – 5 mph
 - 1830: *The Rocket* – Manchester-Liverpool George Stephenson – 16 mph
 - Joint-stock companies – Capital RR lines





0 50 100 150 Kilometers
 0 50 100 Miles

SCOTLAND

Glasgow

Cotton and woolen textiles
 Machinery
 Iron

Liverpool

Bradford

Leeds

Sheffield

Manchester

Iron
 Hardware

Birmingham

Iron
 Machinery
 Pottery




Iron

Bristol

London




Machinery
 Consumer goods

Tin and
 copper mining

-  Exposed coalfields
-  Industrial areas
-  Principal railroads

Cities with over 100,000 people are labeled.

Towns with over 20,000 people are shown:

-  50,000
-  400,000
-  2,400,000

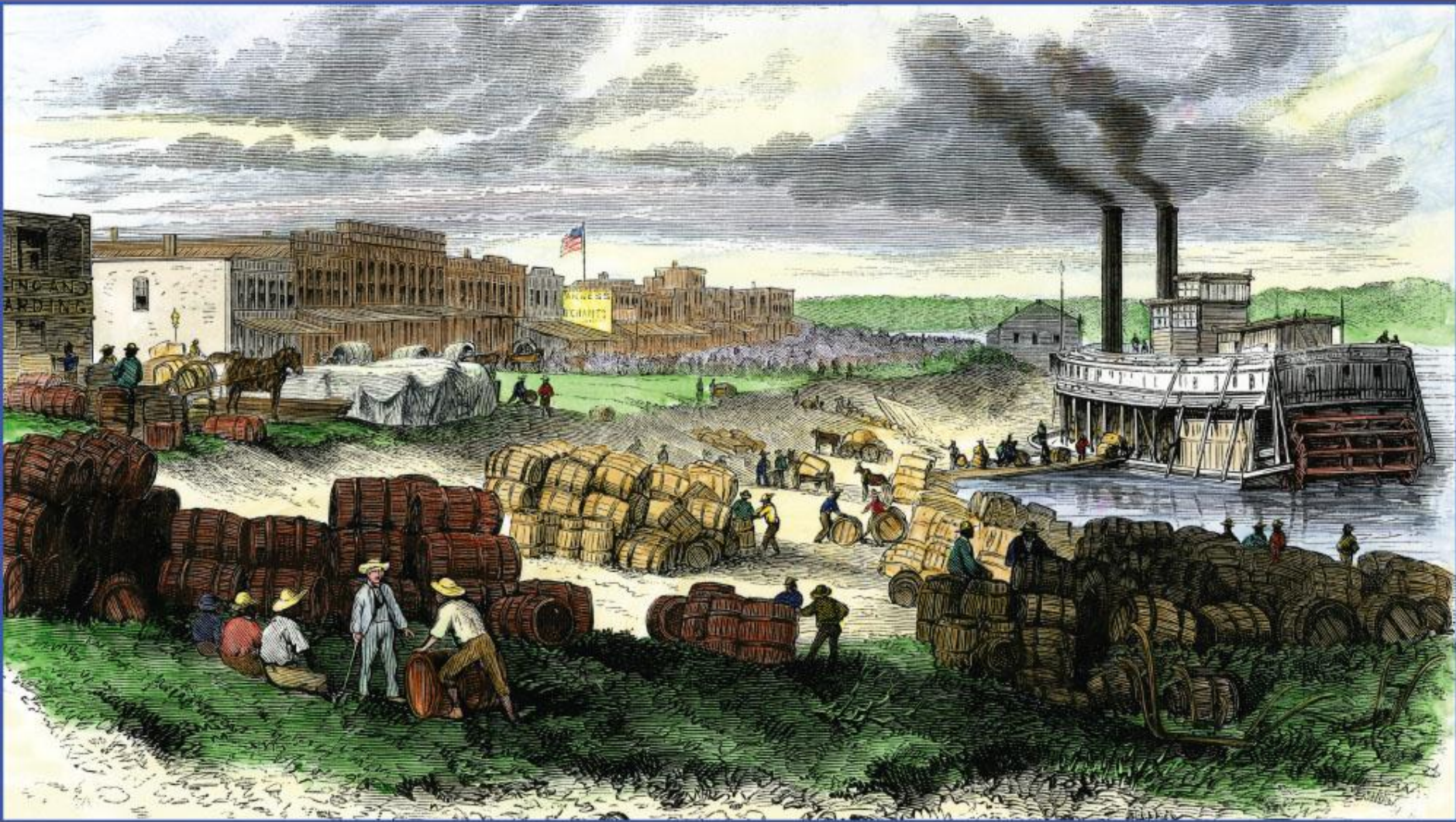
Map of Britain - 1850

Rough sketch of the British Canal Network

- Navigable rivers
- Broad or barge canal
- Narrow canal



- 1 Leeds
- 2 Manchester
- 3 Hull
- 4 Liverpool
- 5 Birmingham
- 6 Leicester
- 7 Gloucester
- 8 Avonmouth
- 9 Oxford
- 10 Cambridge



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Impact of a Cheaper/Faster Means of Production/ Transportation

- Price of goods – reduced
- Larger markets (more people)
- Increased sales/profits
- Accumulation of capital → Reinvestment
- More factories/more machinery
- Cheaper goods
- REPEAT!!!
- Efficient transportation as the lubricant

The Industrial Factory

- Culture shock of skilled artisan labor to unskilled/specialized factory labor
 - Diverging interests of factory owners (capitalists) and labors (proletariat)
 - Development of inhumanity *“to make such machines of the men as cannot err”*

- Time-work discipline – need for regularity, efficiency, acceptance of monotony
 - Regulations (p. 611)
 - Punishments (fines, dismissal, beatings)
 - Dominion of nature, personal success=divine will (Calvinism)
- Ties between industrial/ bourgeoisie ethic and religious ethic (Methodism/Evangelicalism) – disciplined hardship for divine reward
- Middle Class values projected on working class – generational acceptance



- work/institutional discipline
- capitalist interests
- creation of modern political, social, economic world

Spread of Industrialization

- Four phases of industrial revolution
 - Great Britain (1770s)
 - France, Belgium, German states, US (after 1815)
 - Rest of Western world (1850)
 - Non-Western world (1920s)

● Why did industrialization occur later on the continent?

- Poor transportation
- Customs barriers
- Stricter guild restrictions
- Less willingness to take risks
- Upheaval of Napoleonic Wars
- Infusion of inexpensive British goods
- Lingering aristocratic disdain for bourgeois ambition/entrepreneurial spirit (vs. Britain)
 - Less willingness to invest in new technology
- British protective of trade secrets (artisans/importation of machinery)
 - Mr. Bayer = John Cockerill

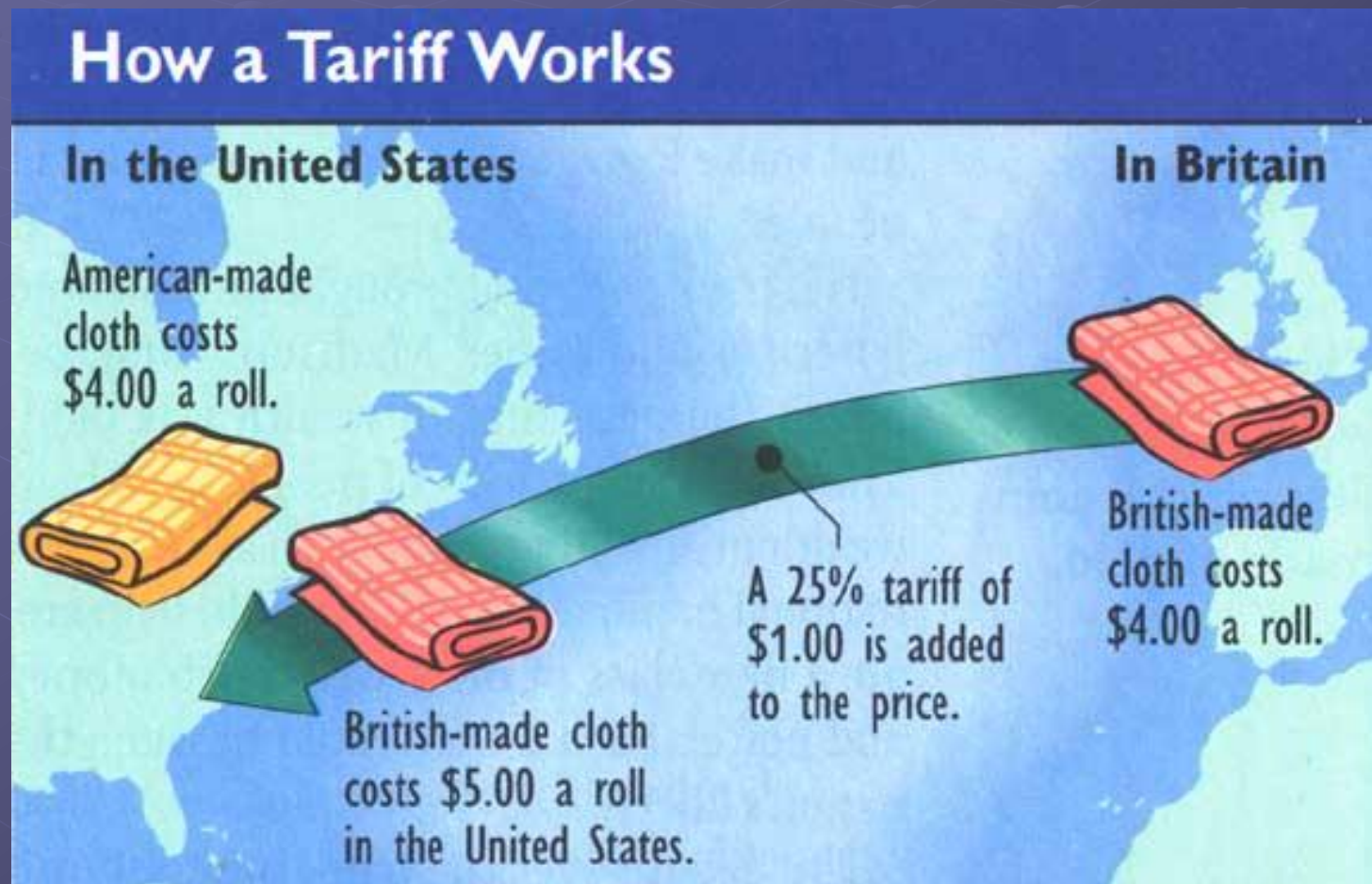
● How did gov'ts play a greater role in continental industrialization?

- Provided grant capital
- Paid for technical education
- Exempted foreign industrial equipment from import duties
- Paid for roads, canals, railroads



Govt. Use of protective tariffs

- Friedrich List – *National System of Political Economy* (1844)
- Industrialization requires protective tariffs



- Why were joint-stock investment banks necessary for continental industrialization?
 - How they worked?
 - Thousands of small and large investors with limited liability
 - RR, mining, heavy industry
 - Examples
 - Société Générale / Banque de Belgique
 - Crédit Mobilier (France)
 - Kreditanstalt (Austria)
 - Why they were needed? Need for credit
 - Too expensive and risky for one or few investors
- Industrialized regions on Continent more dispersed than in Britain (NW England)

Industrialization in the US

- 1800-1860
 - Population explosion – 5M to 30M
 - Cities over 100,000 – 0 to 9
 - % farmers = 86% to 50%
- Interchangeable parts = “American System”
 - Harper’s Ferry - muskets
- Homestead Act/Pacific Railway Act 1862-
- America – more unskilled labor (rural and immigrant workers)
(Capital intensive)
- Myth of social mobility/equal economic opportunity
(richest 10% held 75% of wealth)
(2011 – richest 400 individuals hold more wealth than the bottom 155 million people)



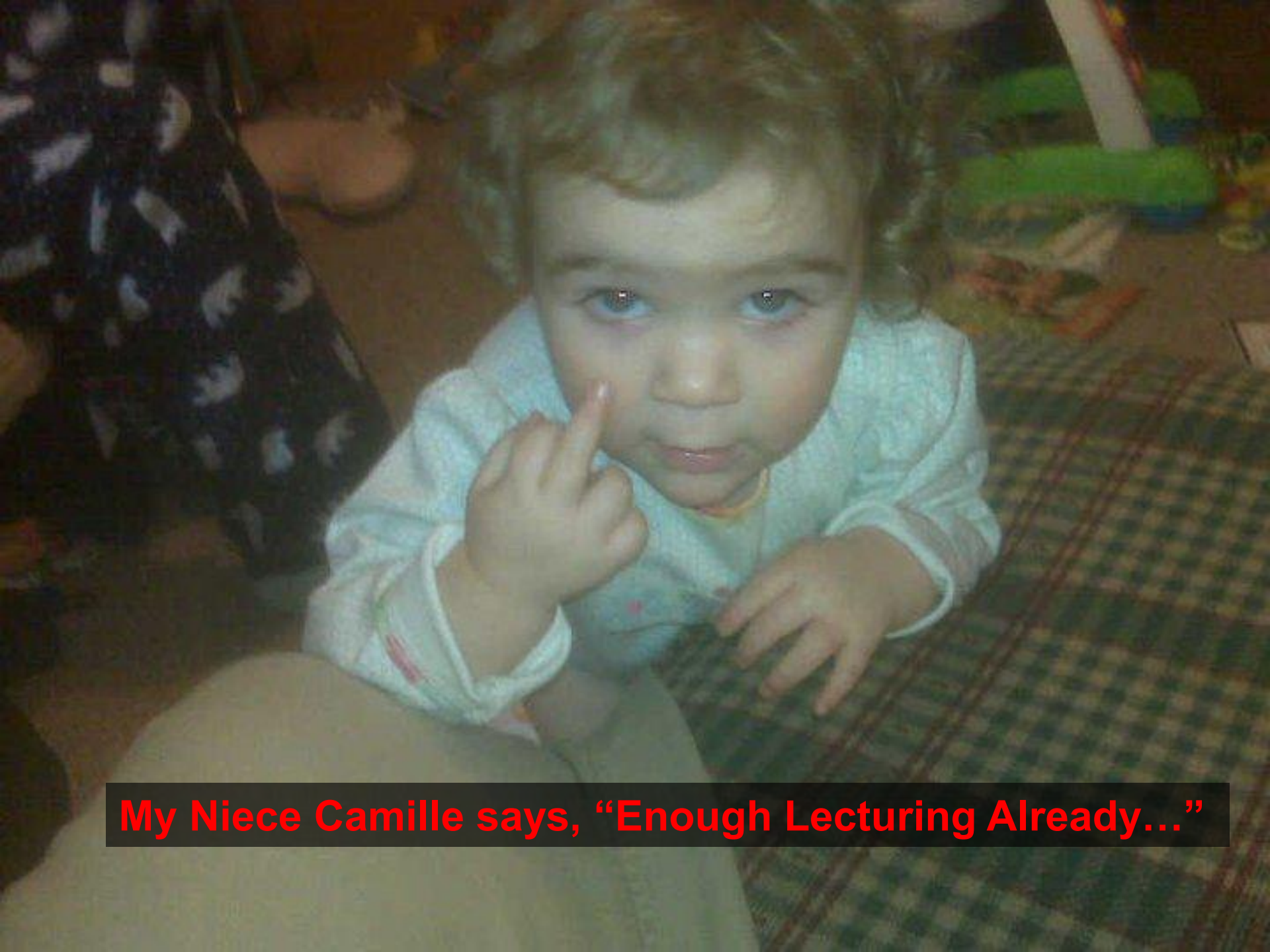
Harpers Ferry





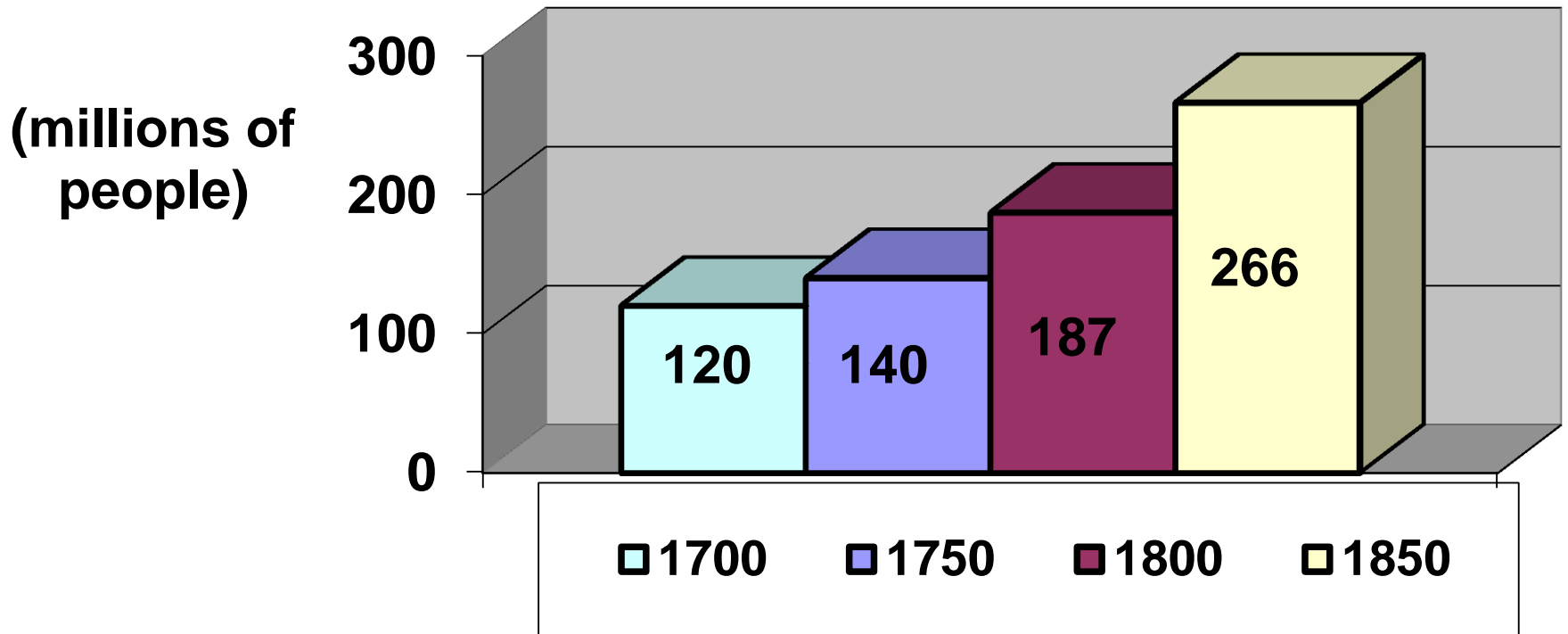
The Rest of the World...

- Eastern Europe/Russia imported industrial goods
- India/Southern US – exporter of raw materials to Britain
 - Impact on Indian spinners and hand-loom weavers
 - Colonial dependency



My Niece Camille says, “Enough Lecturing Already...”

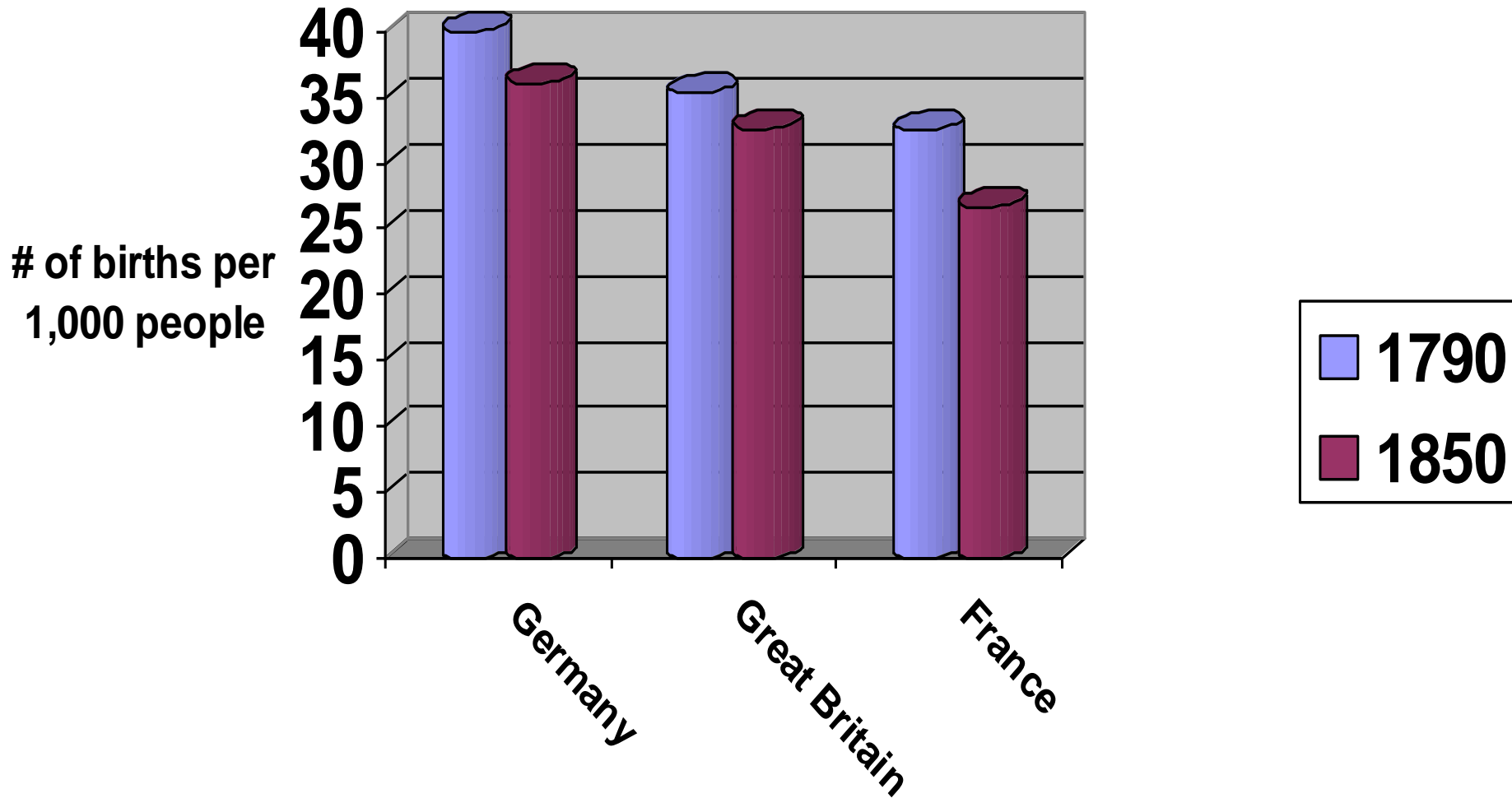
Europe's Population



- Declining birthrates, **BUT**
- Decline of death rates (less famine/epidemics/war & increase in food supply)

(Europe's Population Today: about 750 million)

Birthrates in Europe



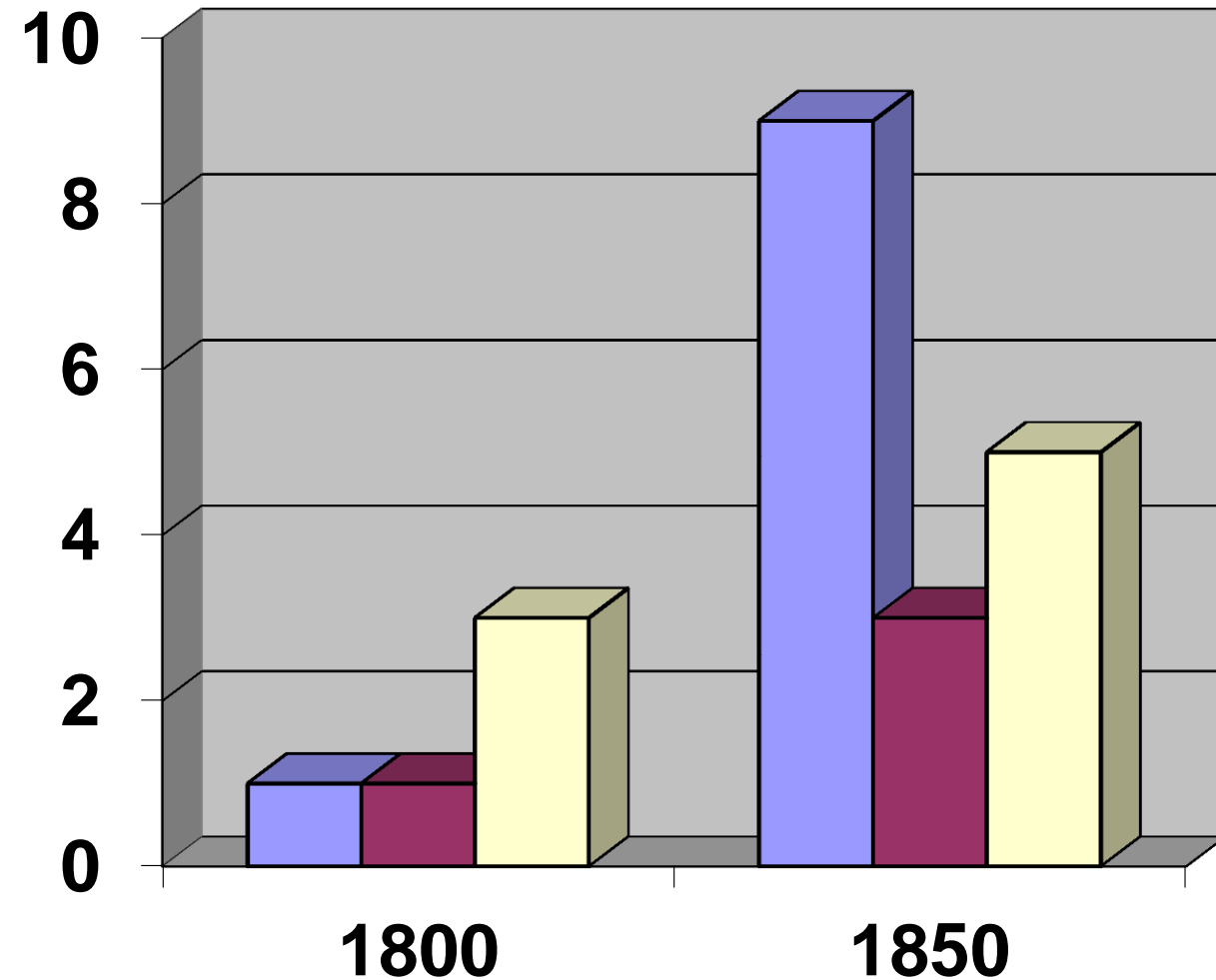
of Cities Over 100,000

- Great Britain
- France
- German States

Industrialized cities:
“Islands in an agricultural sea”

Effects:

- Severe congestion in the countryside
- Overpopulation, landless peasants & rural poverty



Irish Potato Famine (1845-1849)

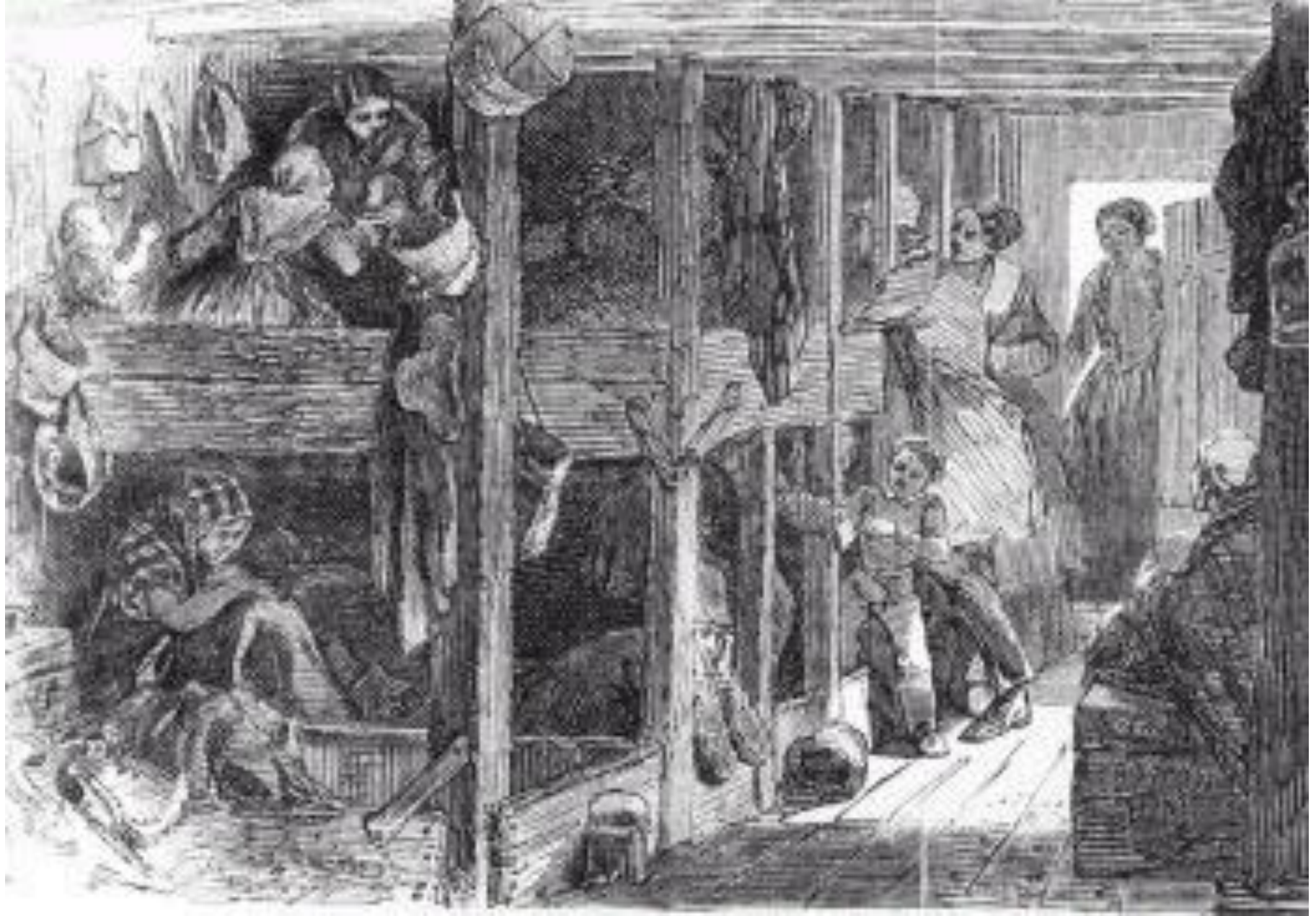
- Population explosion – 1845 (over 8 mil.)
 - Less than 4 mil. 1781
 - Farmers crowded into tiny subdivided plots
- British Protestant Absentee Landlords
- Reliance on potato (peasants)
 - Sole source of food for the 1/3-1/2 of Irish (1845)
- 1845, 1846, ~1847 – crop failure – fungus
 - No gov't aid (Ireland, Britain) *society's morality*
 - Diversion of food provisions by Britain
 - Higher taxes – landlords had to evict tenant peasants
 - Wandering poor – starvation/disease
 - 1,000,000 Irish died
 - Nearly 2,000,000 fled overseas (Britain/US/Canada)



The monument in Doolough valley has an inscription from Mahatma Gandhi:

“How can men feel themselves honoured by the humiliation of their fellow beings?”

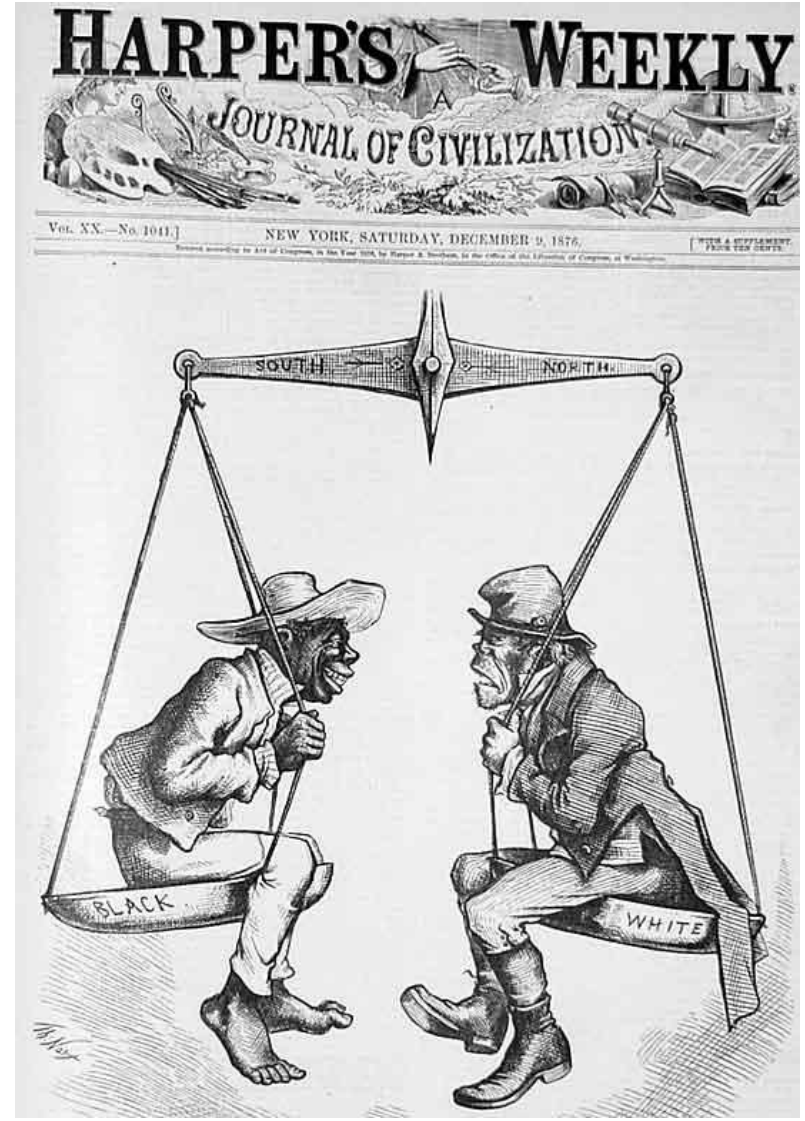




- *Harper's Weekly* image of the "coffin ships" showing the cramped, unhealthy accommodations for the Irish immigrants.

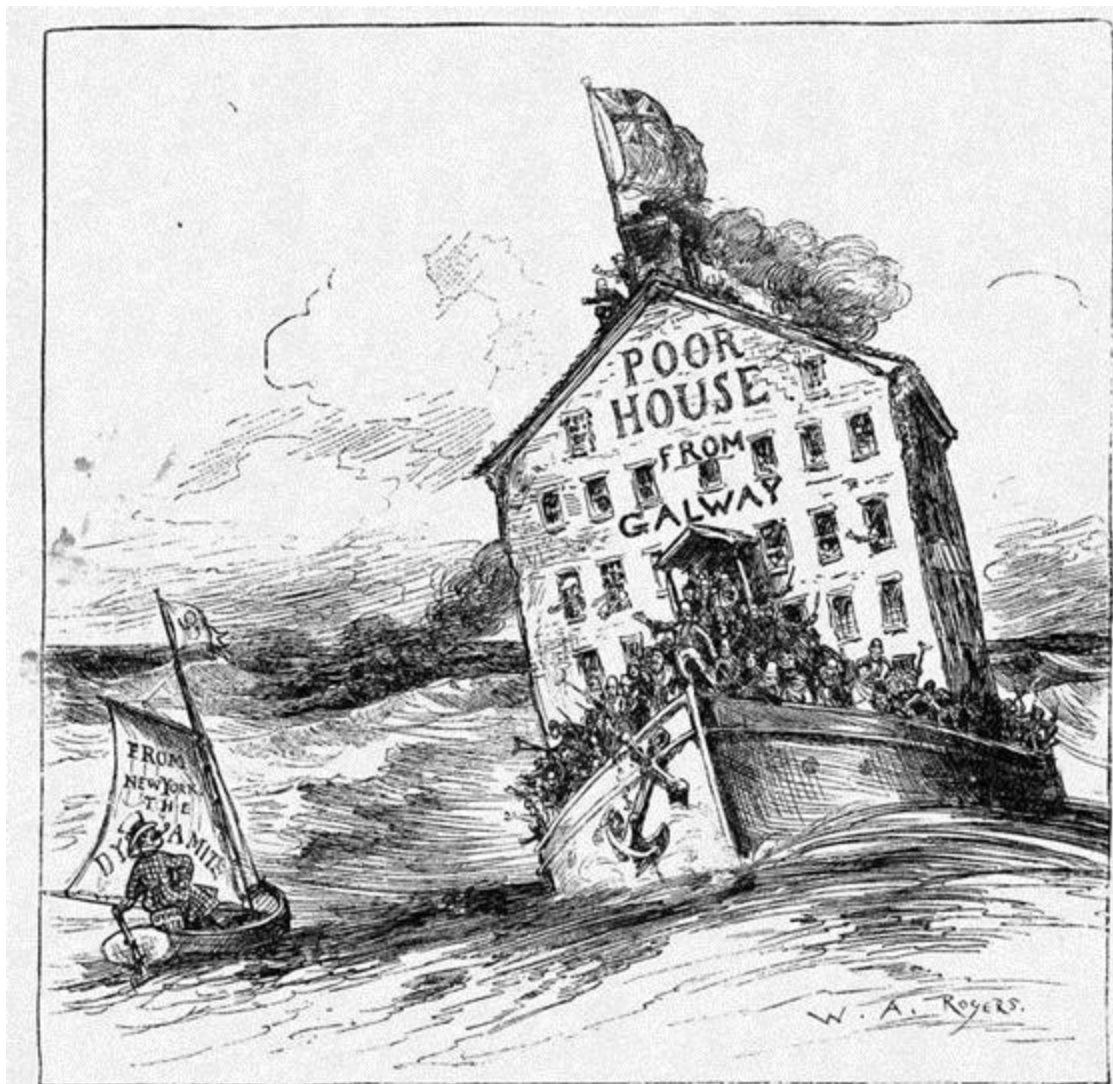


Nativist Movement in America – Then and Now





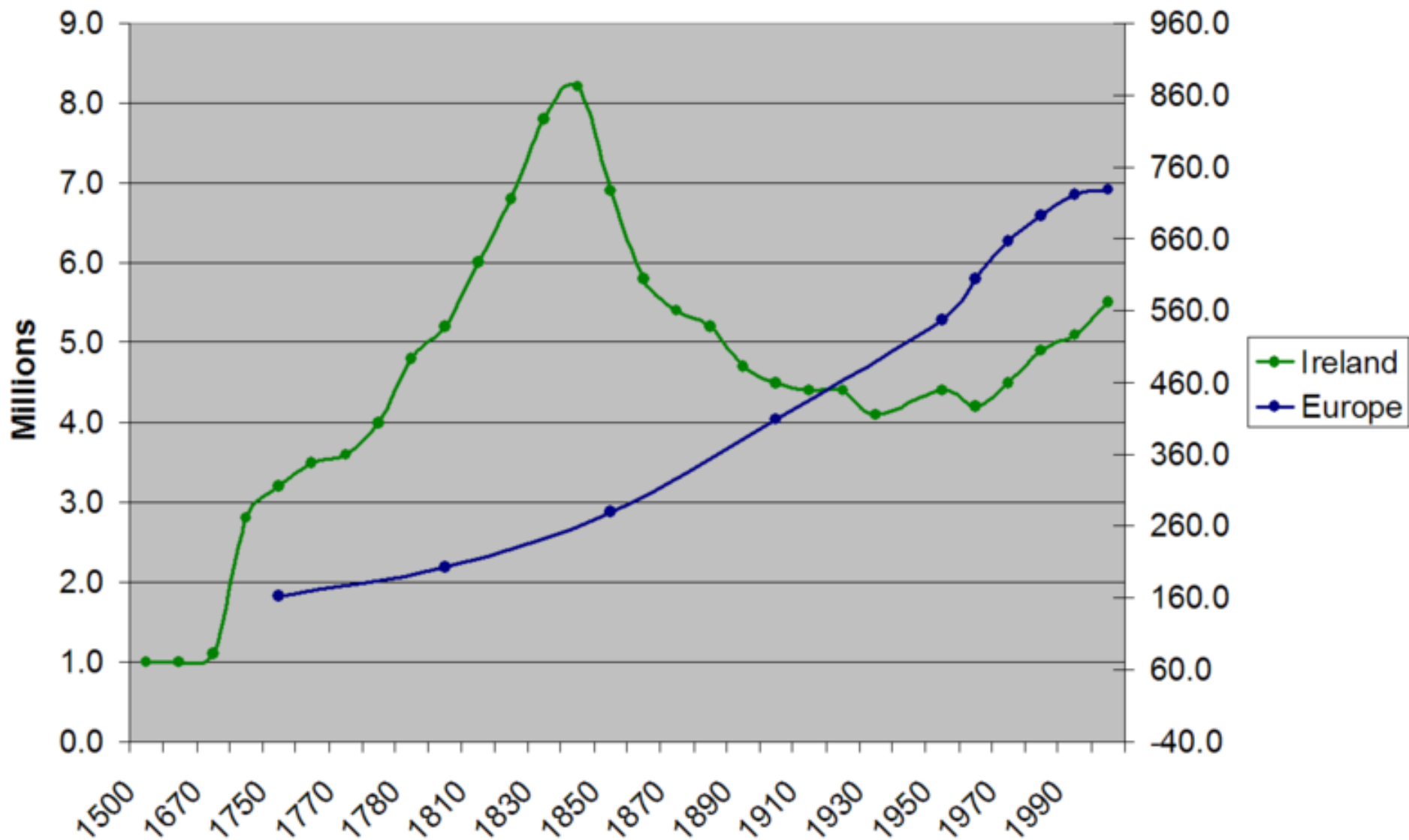
Thomas Nast cartoon from 1870 expressing the worry that the Irish Catholics threatened the American freedom.



THE BALANCE OF TRADE WITH GREAT BRITAIN SEEMS TO BE STILL AGAINST US.

650 Paupers arrived at Boston in the Steamship *Nestoria*, April 15th, from Galway, Ireland, shipped by the British Government.

Population of Ireland and Europe



- Describe urban conditions in 19th C.
 - Living conditions
 - Sanitary conditions (Birmingham 1843 – p. 620)
 - Health conditions (p. 621)
 - Consumer protections (p. 621)
 - Moral conditions
 - Social Investigations France (1820s) /Britain – Poor Law Commission



Industrial Staffordshire



Problems of Pollution



The Silent Highwayman - 1858

"Your money or your life."

The 1858 print from Punch magazine is usually captioned - "*The silent highwayman* : Death rows on the Thames, claiming the lives of victims who have not paid to have the river cleaned up, during the great Stink."

The New Industrial City



Early-19c London

by Gustave Dore



Worker Housing in Manchester



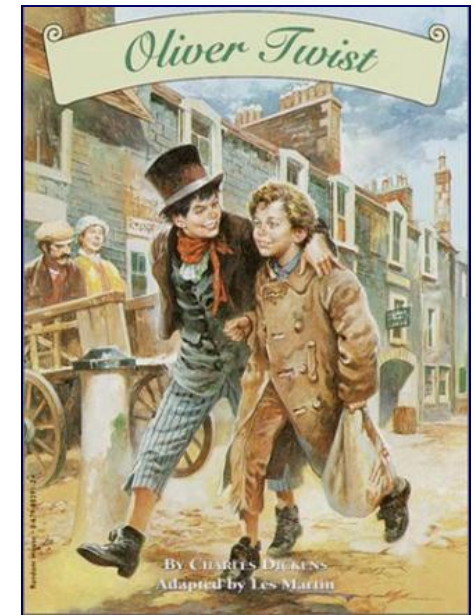
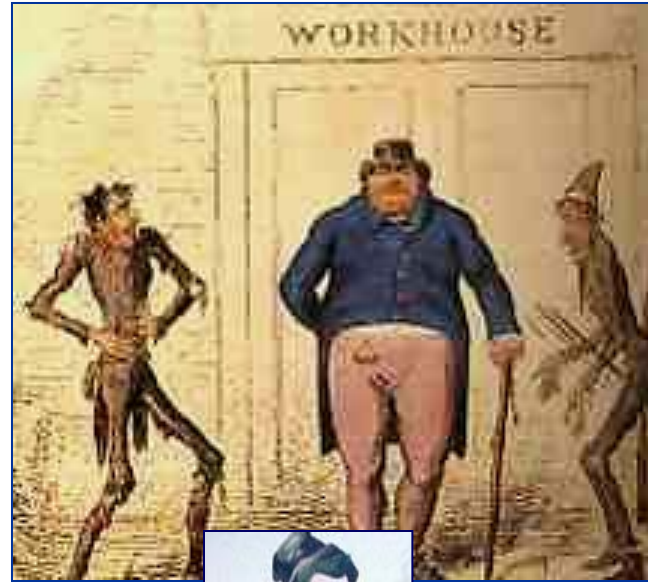
Factory Workers at Home



Workers Housing in Newcastle Today



The Life of the New Urban Poor: A Dickensian Nightmare!



Private Charities: Soup Kitchens



Urban Reformers

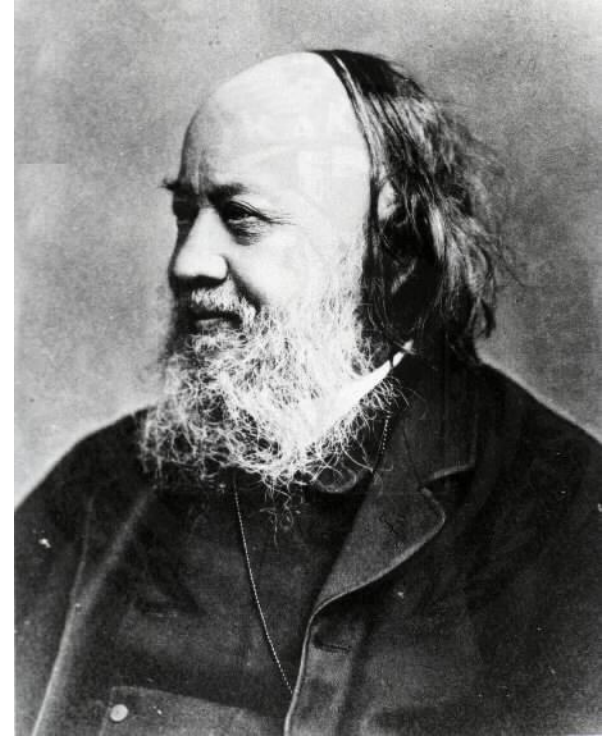
Response to poor as actions of self preservation (What did the bourgeoisie and upper classes fear?)

“volcanic elements, by whose explosive violence the structure of society may be destroyed” (James Kay-Shuttleworth)

“...They eat, drink, breed, work and die; and...the richer and more intelligent classes are obliged to guard them with police.”

Urban Reformers

- Edwin Chadwick (1800-1890)
 - Poor Law Commission (DBQ)
 - *Report on the Condition of the Labouring Population of Great Britain* (1842)
 - Unsanitary conditions to be addressed by public administration
 - Public Health Act 1848/National Board of Health
 - Modern sanitary reforms
- Q: Why does the health of the urban poor become a concern to a government that serves the interests of the wealthy/middle classes?**

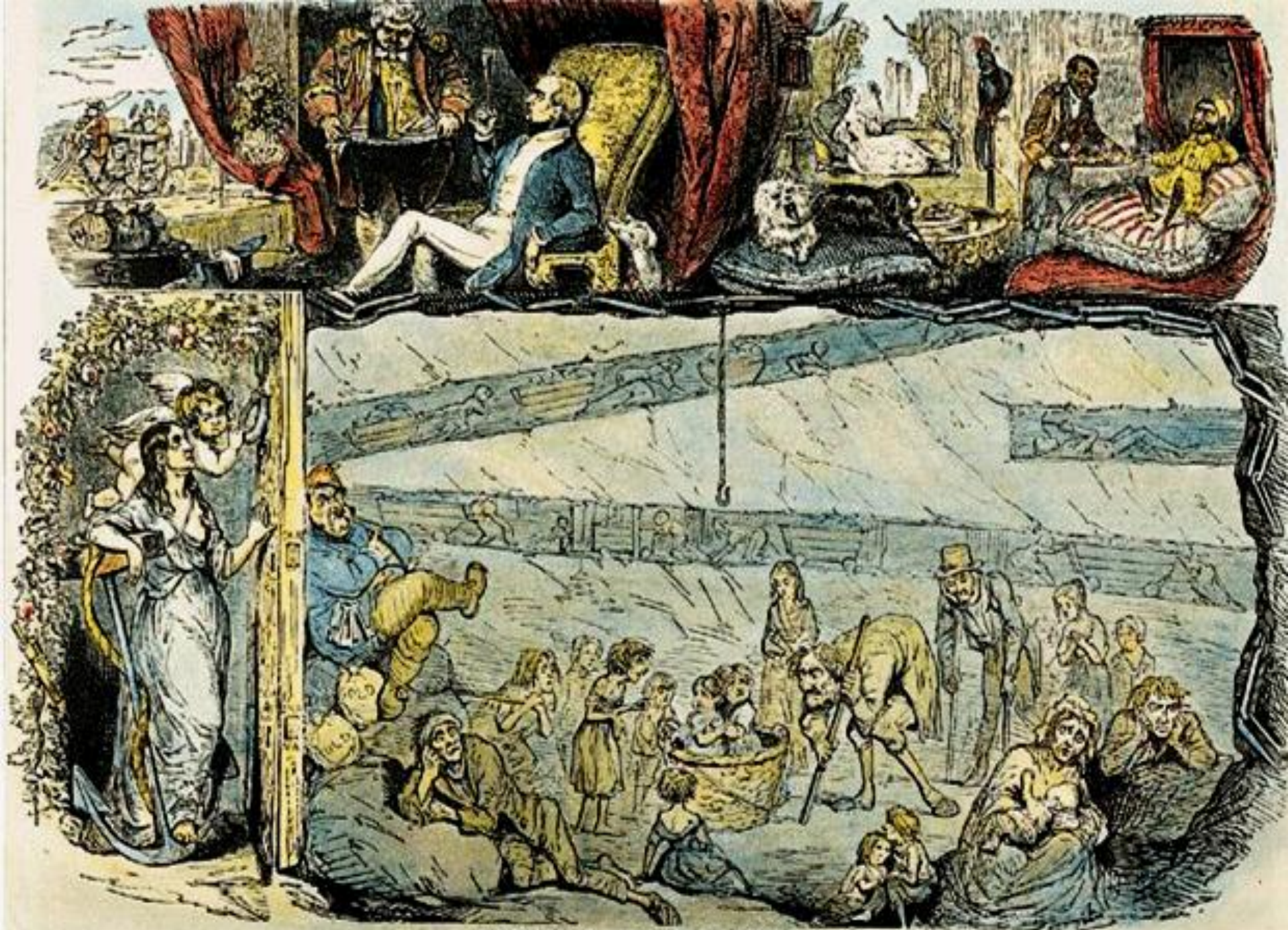


Expansion of the Bourgeoisie – the Industrial Middle Class

- Industrial Entrepreneurs
 - Greed ethos “*getting of money...is the main business of the life of men.*” Jedediah Strutt
 - Race for profits (reinvestment)
 - High risk (tasks of industrial entrepreneurs) high reward
 - Smaller enterprises
 - Bankruptcy/cannibalization
- Backgrounds
 - Merchants, Successful Peasants (cottage industry)
 - Religious minorities (Quakers)
 - Landed Aristocracy – industrial pursuits
- Evolution of the Business Aristocracy (wealth – generational)
 - Not modern corporate Capitalism of later 1890s
 - **Industrial middle class merged with old elites



*Gordon Gekko
Wall Street*



CAPITAL AND LABOUR.

Workers

- 1st Half of 19th C.
 - Artisans (top of the working class hierarchy)
(a group that would see eventual decline –
SEE p. 623)

Then...

- Agricultural Laborers
- Domestic Servants
- Industrial workers
(some involved in cottage industries)

Working conditions?

- Workday?
- Worker security?
- Working conditions?
- Health effects?
- Children's roles? Pay? % of workforce?
 - Pauper apprentices

Responses...

- 1830s/1840s – Child labor standards in textile industry/mines (exempt industries: workshops, non-factory trades, pottery)
 - 1830 - women and children – 2/3 cotton industrial labor force
 - (p. 626 – Mr. Bayer’s solution to teaching freshmen...?)
 - Factory Act of 1833 (women to replace @ ½ the pay of men)
- Women/Children in factories following a kinship pattern?
- Factory Acts → separation of work and home?

Responses...

- Poor Law Act 1834 - - workhouses for jobless poor,

“to make the workhouses as like prisons as possible...to establish therein a discipline so severe and repulsive as to make them a terror to the poor.”

Based on what premise?



Built in Southwell, Nottinghamshire, in 1824, this was considered to be "the model of a well-regulated workhouse".

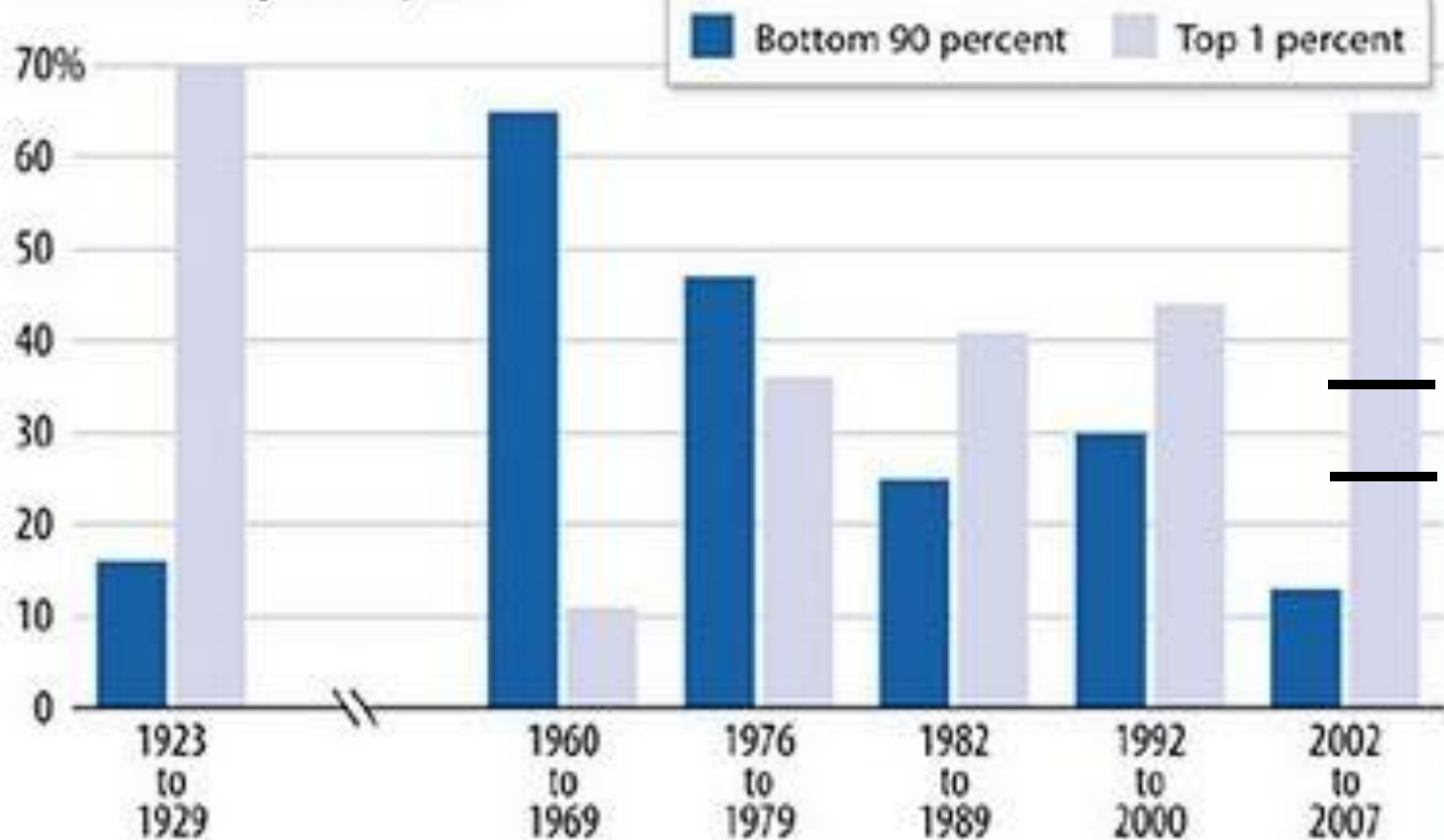
"It is beyond the omnipotence of Parliament to meet the conflicting claims of justice to the community; severity to the idle and vicious and mercy to those stricken down into penury by the vicissitudes of God ... There is grinding want among the honest poor; there is starvation, squalor, misery beyond description, children lack food and mothers work their eyes dim and their bodies to emaciation in the vain attempt to find the bare necessities of life, but the Poor Law authorities have no record of these struggles."

Philanthropist William Rathbone (1850)

- Did the Industrial Revolution bring about higher standards of living (higher per capita incomes, greater consumer choices)
 - Not right away...not without collective/government action...
 - Reinvestment of profits in capital expenditures
 - Wages kept low
 - Widening wealth gap: 1801: 1% of pop. w/ 25% of nat'l product – 35% in 1848
 - Tea, sugar, coffee – semi-luxuries for middle/upper classes
 - Meat consumption less in 1840 than 1780
 - Goods like cotton – more affordable
 - Cyclical depressions (overproduction)

Share of Nation's Income Gains Going to Top 1 Percent at Highest Level Since 1920s

Share of income growth captured




(Center on Budget and Policy Priorities)

Source: CBPP calculations based on data from Piketty and Saez

Responses to the Industrial Revolution

- **Recall:** working class movements in French Revolution (Sans Coulottes, Gracchus Babeuf – Conspiracy of Equals)
- **Recall:** unfair system of representation in British political system
- Fear of working class movements and passage of Combination Acts (1799 & 1800)
 - The **Combination Act of 1799**, titled *An Act to prevent Unlawful Combinations of Workmen* (short title 39 Geo. III, c. 81), prohibited trade unions and collective bargaining by British workers. An additional act was passed in 1800 (39 & 40 Geo III c. 106).
 - Following their repeal in 1824, the *Combination Act of 1825* was passed. Collectively these acts were known as the **Combination Laws**. The 1799 and 1800 acts were passed under the government of William Pitt the Younger as a response to Jacobin activity and the fear that workers would strike during a conflict to force the government to accede to their demands.

Dear Multi-National Corporations,
"There will be a time
when our silence will
be more powerful than
the voices you are
throttling
today."

August Spies
(From the gallows in the shadow of the
Haymarket Tragedy - 1887)

citibank

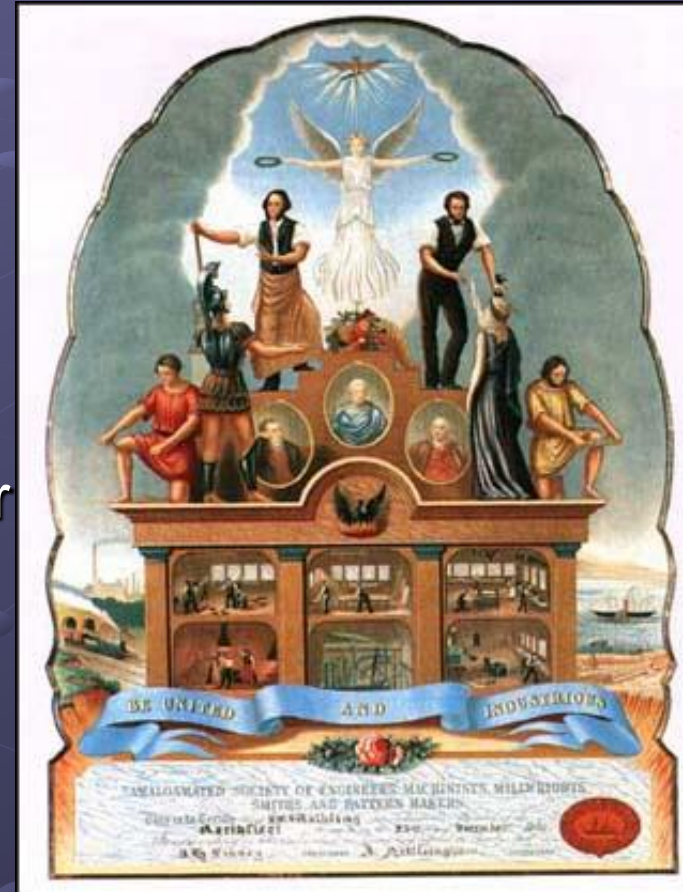
GEORGE V. DUNNE COOK CO



Responses to the Industrial Revolution:

Trade Unions

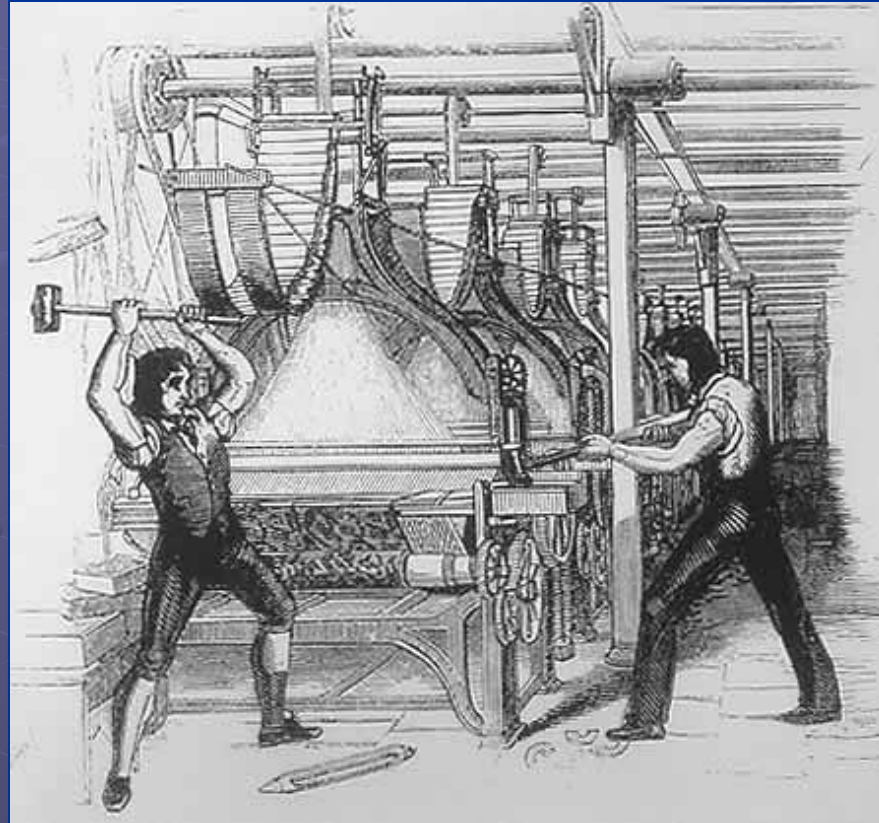
- Unions formed in spite of Combination Acts – led to strikes
 - Repealed in 1824
- Similarity to craft guilds
- Limited early goals
 - Limit entry
 - Concessions from employers
 - Limited to their own trade
- Failure of national unions - Lack of popular support...
 - Robert Owen and the Grand National Consolidated Trades Union (1834)
 - General strike for 8-hr day (collective)
- The return to individual trade unions
 - Amalgamated Society of Engineers - unemployment benefits



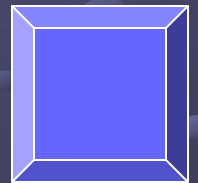
Protests / Reformers

The Luddites: 1811-1816

- Attacking of machinery (power looms)
- Failure to stop industrialization
- Reflection of intense feelings against Industrialization



Ned Ludd [a mythical figure supposed to live in Sherwood Forest]



The Luddite Triangle



The
Luddites

WHEREAS,

Several **EVIL-MINDED PERSONS** have assembled together in a
notorious Manner, and **DESTROYED** a NUMBER of

FRAMES,

In different Parts of the Country :

THIS IS

TO GIVE NOTICE,

That any Person who will give Information of any Person or Persons
thus wickedly

BREAKING THE FRAMES,

Shall, upon **CONVICTION,** receive

50 GUINEAS

REWARD.

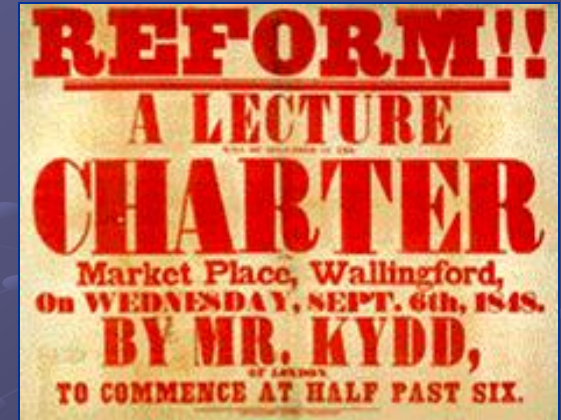
And any Person who was actively engaged in **RIOTING,** who will
impeach his Accomplices, shall, upon **CONVICTION,** receive the
same Reward, and every Effort made to procure his Pardon.

Information to be given to Messrs. **COLDHAM** and **ENFIELD.**

Nottingham, March 25, 1811.

W. P. & Co., Printers, Nottingham.

The Chartists



Key	
	Chartist settlements
	Centres of Chartism
	Area of plug riots, 1842

The “Peoples’ Charter”

- v Drafted in 1838 by William Lovett.
- v Radical campaign for Parliamentary reform of the inequalities created by the Reform Bill of 1832.



- Votes for all men.
- Equal electoral districts.
- Abolition of the requirement that Members of Parliament [MPs] be property owners.
- Payment for Members of Parliament.
- Annual general elections.
- The secret ballot.

The Chartists



*A physical force—
Chartists arming for
the fight.*

A female Chartist



Peterloo Massacre, 1819

St. Peter's Field,
Manchester: popular
demonstration
protesting Corn Laws
- kept prices
artificially high
British Soldiers
Fire on British
Workers:

*Let us die like men,
and not be sold like
slaves!*

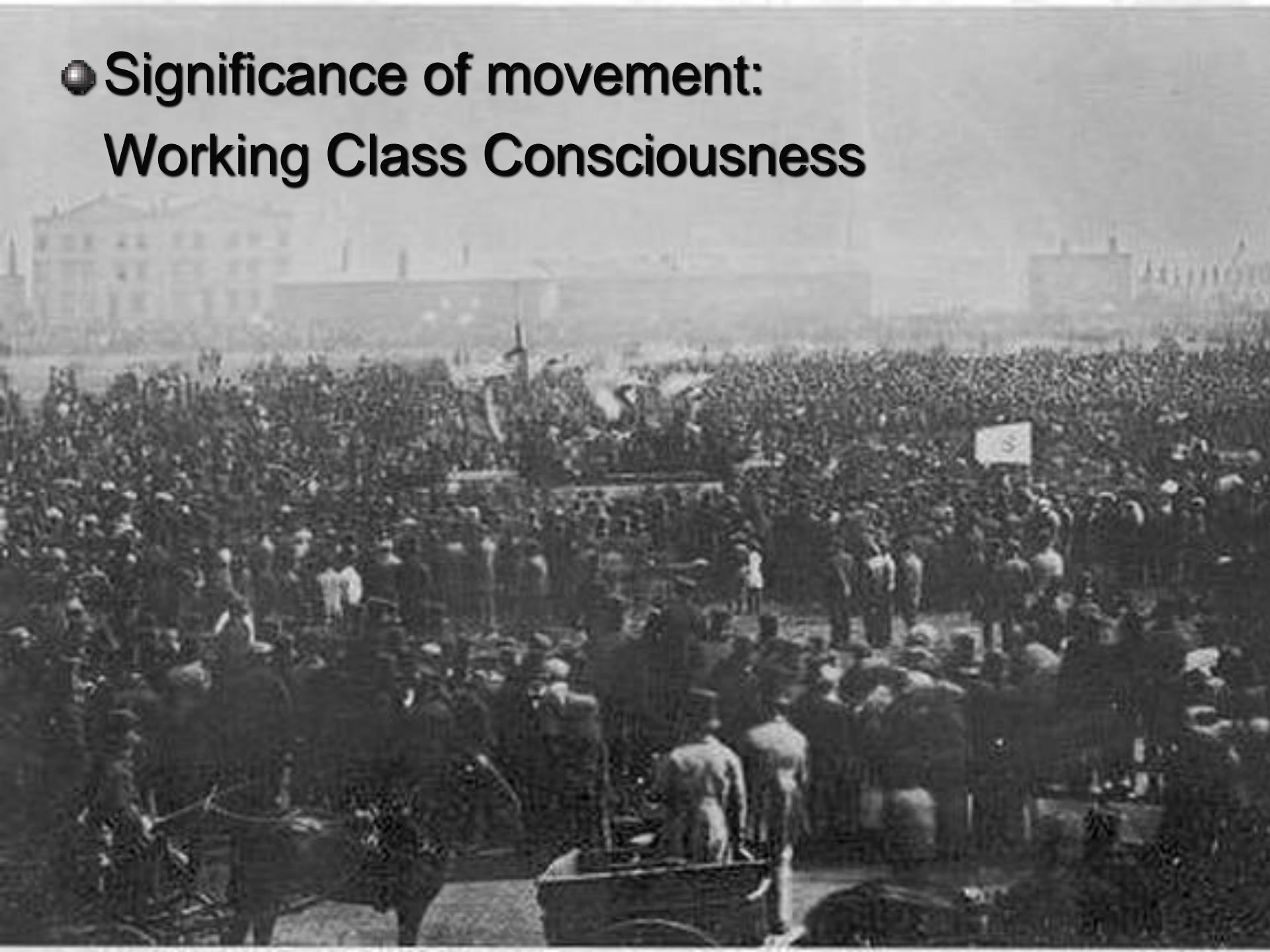


Anti-Corn Law League, 1845



- Give manufactures more outlets for their products.
- Expand employment.
- Lower the price of bread.
- Make British agriculture more efficient and productive.
- Expose trade and agriculture to foreign competition.
- Promote international peace through trade contact.

● **Significance of movement:
Working Class Consciousness**



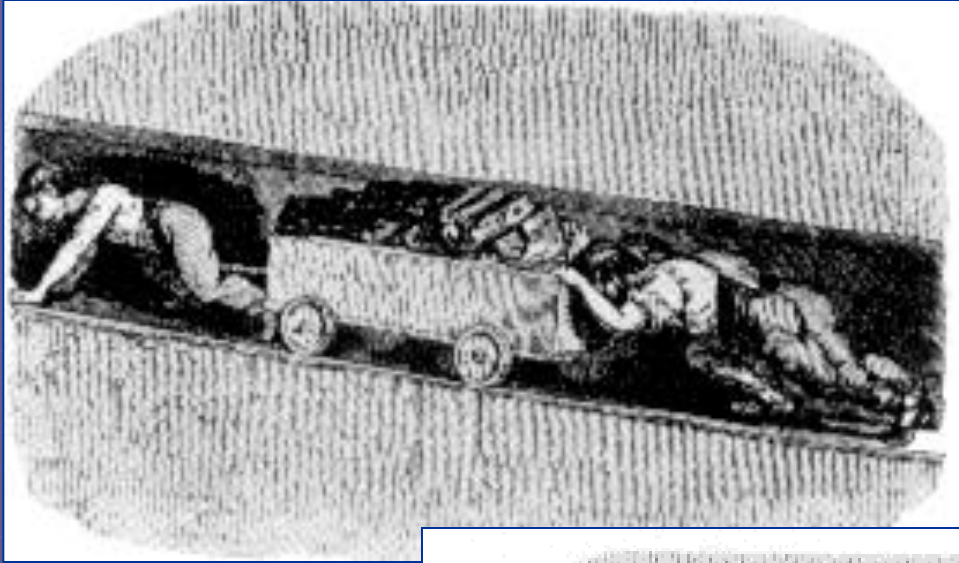
“that these little ones should once more see the rising and setting of the sun.”



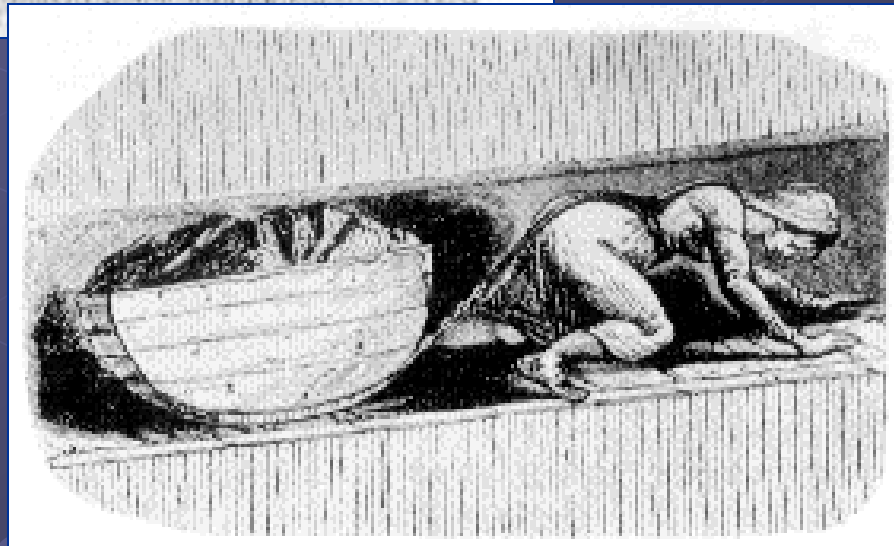
Young Coal Miners



Child Labor in the Mines



Child
"hurriers"



Responses to the Industrial Revolution:

Government Action

- Reports of parliamentary commissions
- Early Factory Acts (1802-1819)
 - 12 hour day for children (ages 9-16)
 - No labor for children under age 9
 - Instruction during working hours

*Only cotton mills // limited enforcement
- Factory Act of 1833
 - Included all textile factories
 - 9-13 yrs old – 8 hrs & elementary ed;
 - 13-18 yrs old – 12 hrs *Ten Hours Act (1847)* (women)
 - Factory inspectors
- Coal Mines Act (1842) – no boys under 10 or women



1833 Factory Act - Documents

My Lord, in the case of Taylor, Ibbotson & Co. I took the evidence from the mouths of the boys themselves. They stated to me that they commenced working on Friday morning, the 27th of May last, at six A.M., and that, with the exception of meal hours and one hour at midnight extra, they did not cease working till four o'clock on Saturday evening, having been two days and a night thus engaged. Believing the case scarcely possible, I asked every boy the same questions, and from each received the same answers. I then went into the house to look at the time book, and, in the presence of one of the masters, referred to the cruelty of the case, and stated that I should certainly punish it with all the severity in my power. Mr. Rayner, the certificating surgeon of Bastile, was with me at the time.

Date.	Names and Addresses of Persons summoned.	Names of the Magistrates who heard the Case, and Place of Hearing.	Nature of the Offence.	Amount of Penalty.	Amount of Costs.	REMARKS.
1862.						
Sept. 20	Mary Jones, Courtgwilym, near Bridgend, Glamorganshire.	Richard Franklyn and Charles Knight, Esqrs., and Captain Quin; Town Hall, Bridgend.	<i>Informations laid by Mr. Buller.</i> Employing three young persons after 6 p.m.	£ s. d. 1 0 0	£ s. d. 1 0 0	Two cases withdrawn on payment of costs.
" 24	John Jones, Forest Factory, near Newbridge, Glamorganshire.	William Perkins, Esq., and the Rev. Evan Morgan; Newbridge, Glamorganshire.	Employing three young persons and one female (adult) after 6 p.m.	1 0 0	1 10 3	Three cases withdrawn on payment of costs.
" 26	William Llewellyn, Lamb and Flag Factory, Glynneath, near Neath.	Howel Gwyn and Griffith Llewellyn, Esqrs.; Town Hall, Neath.	Employing three young persons and two children after 6 p.m.	2 0 0	3 9 0	Four cases withdrawn on payment of costs.
Oct. 1	John Howell, Mynyddiwlwyn, near Blackwood, Monmouthshire.	Frederick Lovick, Esq., and the Rev. Edward Leigh; Tredegar, Monmouthshire.	Employing four young persons after 2 p.m. on Saturday.	1 0 0	2 15 0	Three cases withdrawn on payment of costs.
" 8	Samuel P. Harris, Glyn Gwennfrwd, near Abergavenny, Monmouthshire.	The Honourable W. P. Rodney, Rev. James Parquhar, W. W. Manning, and Thomas Davis, Esqrs.; Town Hall, Abergavenny.	Employing two young persons and two children after 2 p.m. on Saturday.	- -	1 14 0	Withdrawn on payment of costs.
July 21	William Kirk, Burnley	Thomas Hordern Whitaker and John Heelis, Esqrs.; Burnley.	<i>Information laid by Mr. May.</i> Employing two young persons without surgical certificates.	2 0 0	1 0 0	One summons withdrawn on payment of costs, in consideration of the state of trade.



Illiteracy in Europe, c. 1850

Countries with less than 30% illiterate	Countries with 30% to 50% illiterate	Countries with over 50% illiterate
Denmark	Austria	Bulgaria
Prussia	Belgium	Greece
Netherlands	England	Hungary
Scotland	France	Italy
Sweden		Portugal
Switzerland		Romania
		Russia
		Serbia
		Spain

Percentage Distribution of the World's Manufacturing Production

(percentage of world total)

Country	1870	1913
United States	23.3	35.8
Germany	13.2	15.7
United Kingdom	31.8	14.0
France	10.3	6.4
Russia	3.7	5.5
Italy	2.4	2.7
Canada	1.0	2.3
Belgium	2.9	2.1
Sweden	0.4	1.0
Japan	0.0	1.2
India	0.0	1.1
Other countries	11.0	12.2