Cotton and the Industrial Revolution

HI3T5 Value in the Age of Reason

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Recap from earlier weeks

- Textiles an 'embarrassment of riches' for historians of material evaluation
- Wide range of fibres, yarns, weaves, colours, patterns...
- Cotton a key material in the first British industrial revolution, c. 1770-1830
- New machines, factory system, productivity growth, global competitiveness
- Reliance on the Indian cotton industry and slave labour in the Americas
- Test case for economic historians such as Maxine Berg, Giorgio Riello, Tirthankar Roy, Sven Beckert, William Reddy...
- Was this a revolution in evaluation as well as in production?

Short history of spinning technology

- drop spindle
    - ancient – an early known example is from Egypt in 1900 BC
    - start with bundle (related words are 'roving' and 'sliver') of fibre that has been 'carded' to untangle threads and 'combed' to remove the smallest threads
    - 'draw' out the fibres of the bundle with one hand
    - 'twist' the fibres by turning the weighted spindle with the hand
    - 'wind' the twisted yarn onto the spindle when the spindle sinks too low
    - subtleties
        - draw too far and the roving breaks, too little and the yarn too thick
        - too little twist and the yarn weak, too much and it 'locks' and prevents further drawing
        - need same thickness and same twists-per-length over whole length
        - need to grip top of yarn so that twist does not run into roving

- jersey wheel
    - related names are 'Indian wheel,' 'great wheel,' 'long wheel,' 'muckle wheel'...
    - invented in India, circulated there between 500 and 1000 AD
    - main way of spinning in Eurasia until sixteenth century
    - spindle is now fixed, rather than rising and falling
    - spindle is spun by a large wheel moved by hand, rather than directly by hand
    - twist is made by holding yarn at an angle to spindle, rather than by attaching yarn to a hook or notch on the spindle
    - drawing is now done between hand and spindle, rather than between two hands
    - yarn is wound onto spindle by spinning wheel in reverse ('backing off'), rather than winding directly by hand

- saxony wheel
    - related names are ‘flyer’ and ‘long-fibre wheel’
    - invented by Johan Jurgen in 1530 in Brunswick, Germany
    - wheel now driven by foot treadle rather than by hand
    - two hands now used to draw the roving, not just one hand
    - twist now added by a horseshoe-shaped ‘flyer’
    - ‘winding’ now done by a bobbin fed by the flyer
    - twisting and winding now done in the same motion, rather than in two separate motions

- spinning jenny
    - James Hargreaves, Bolton, Greater Manchester, Lancashire
    - Invented 1764, Hargreaves applied for patent 1769
    - No early jennies survive, instead replicas based on 1770 patent drawings
    - 16 spindles rather than one
    - wheel horizontal rather than vertical, but still driven by hand
    - roving held by wooden clamp, rather than hand
    - yarn wound onto spindle using a ‘faller wire’ operated by foot
    - Requires careful coordination of hands (for wheel and clamp) and foot (for faller wire)

- cascade of further inventions
    - Richard Arkwright’s waterframe, 1767, first driven by horsepower then waterpower
    - Samuel Crompton’s spinning mule, 1779
    - Richard Robert’s self-acting mule, 1824

- a revolution in production
    - the jersey and saxony wheels produced about **8** hanks of cotton per machine per day
    - the spinning jenny produced about **25** hanks of cotton per machine per day
    - the self-acting mule produced about **900** hanks of cotton per machine per day

- what about evaluation?