South Bucks

u3a

Science, Engineering and Transport Group

Mini Presentations on Events

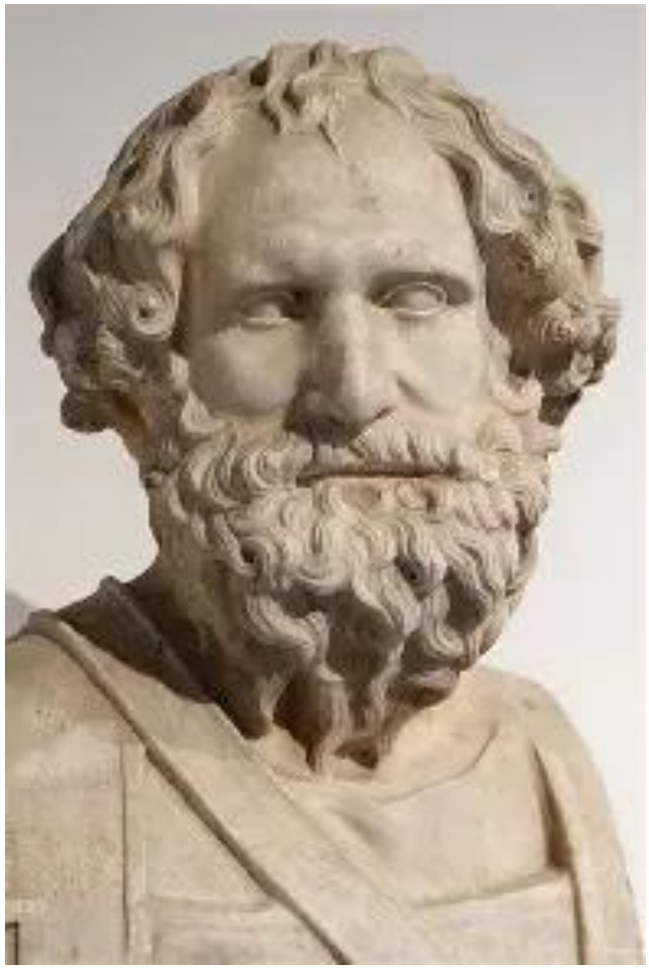
2 October 2025

Anthea Wright – Archimedes
Jenny Corran – Discovery of Vitamins
John Burke – Little is Large
Bina Rawal – Edward Jenner and Smallpox Vaccination
Paul Rose – Concorde
Paul le Blond – Railway 200

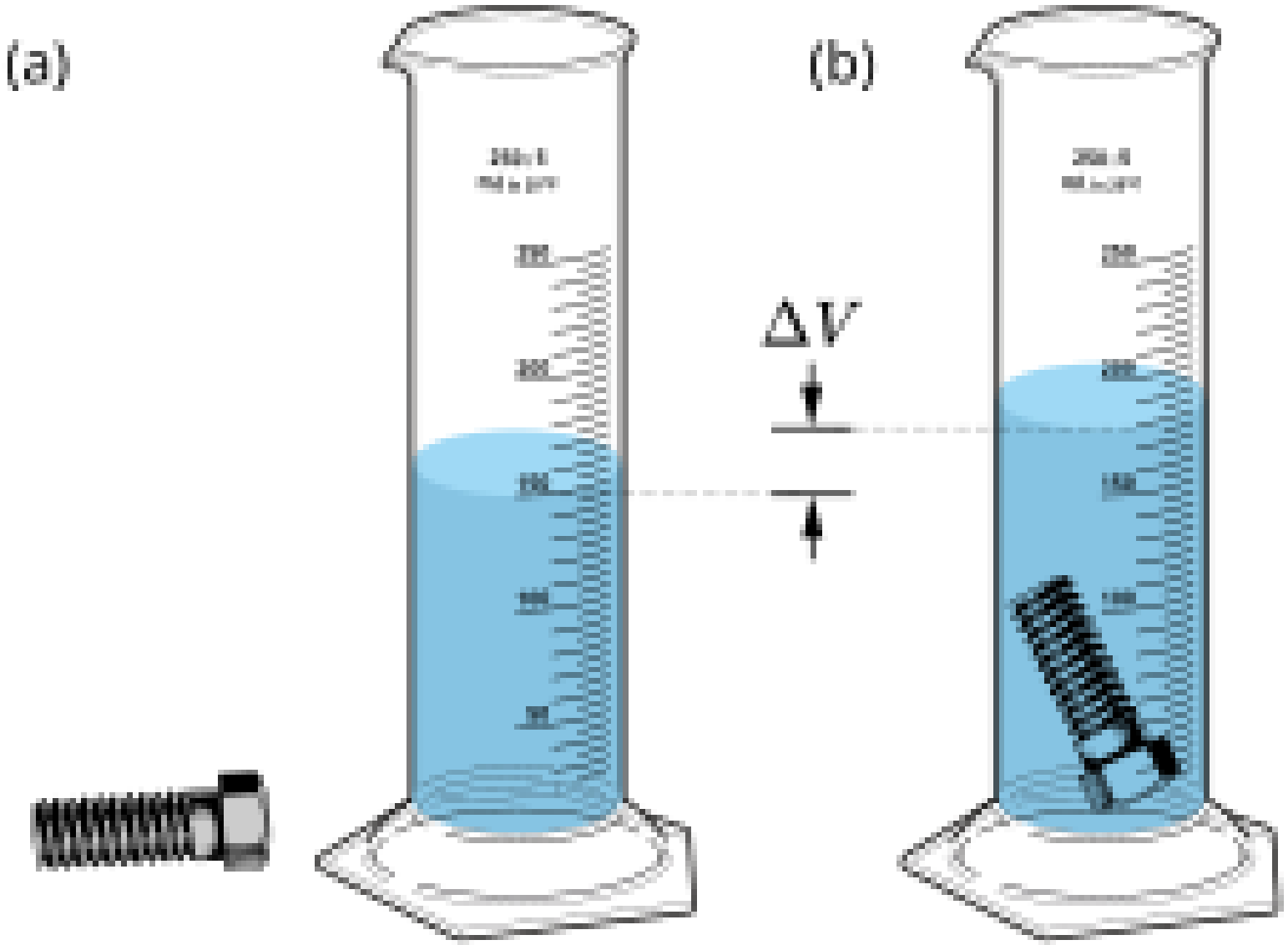
Archimedes Eureka Moment

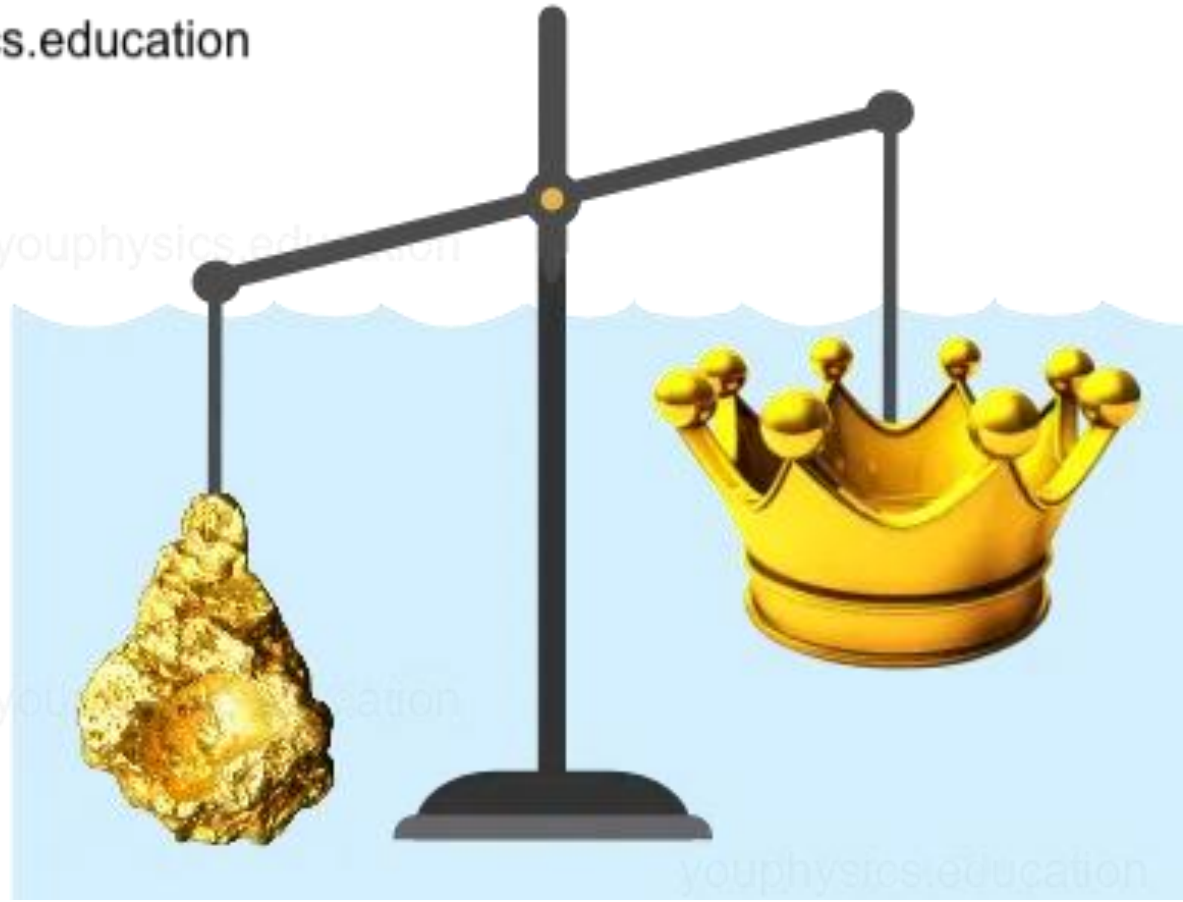
Anthea Wright

Archimedes




EUREKA!

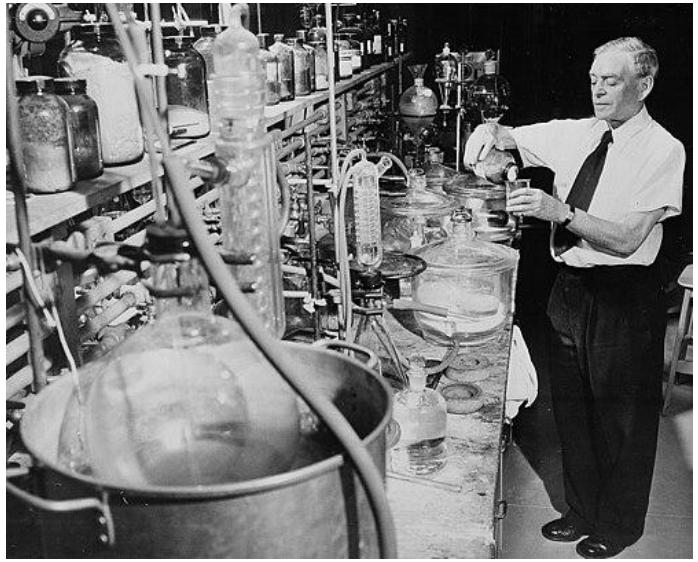

(a)
(b)
ΔV



The Discovery of Vitamins

Jenny Corran

Casimir Funk (1884 – 1967)



Born in Poland

Biochemist

Coined the name “Vitamine” (vita – amine) in 1912

Demonstrated that beri-beri was a deficiency disease

Predicted rickets, pellagra and scurvy were also deficiency diseases

In the body

Vitamin D is essential for:

1. Bone health
2. Immune system support
3. Muscle function
4. Cell growth and differentiation
5. Hormonal regulation

Vitamins are soluble in either fat or water

Fat-soluble vitamins: A, D, E, K
Water-soluble: C, B

In food processing

Fortification vs. Enrichment

Aspect	Fortification	Enrichment
Definition	Adding nutrients that were *not originally present*	Replacing nutrients *lost during processing*
Purpose	To improve public health or prevent deficiencies	To restore original nutrient levels
Example Nutrients	Vitamin D, iodine, folic acid	B vitamins, iron
Common Foods	Breakfast cereals, margarine, salt	White flour, white rice
Regulatory Use	Often used in public health initiatives	Often mandated to maintain nutritional equivalence

Nobel prize-winners - Vitamins

Discovery of vitamins

B1 Christiaan Eijkman (1929)
B12 George Whipple (1934), George Minot (1934), William Murphy (1934)
K Henrik Dam (1943)

Isolation of vitamins

D Adolf Windaus (1928)
C Albert Nagyrapolt (1937)
B2 B6 Richard Kuhn (1938)

Synthesis of vitamins

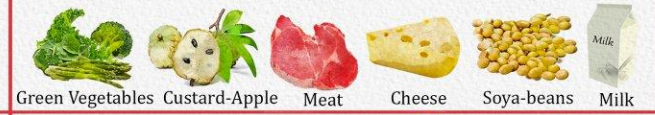
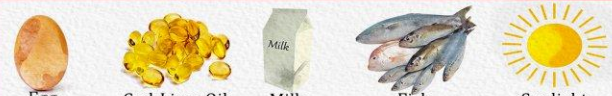
A & B Paul Karrer (1937)

Structure of vitamins by X-ray crystallography

B12 Dorothy Hodgkin (1964)

HEALTHY FOOD

VITAMIN CHART

VITAMIN	FOR	
A	Normal Growth and Development, Normal Night Vision, Healthy Epithelium, Anti-infective.	 Egg, Butter, Papaya, Carrot, Milk, Liver, Cabbage
B1	Growth, Appetite, Normal Intestinal Function, Nerve and Muscle Function.	 Peas, Meat, Potato, Soya-beans, Milk, Wholegrain Cereals
B2	Growth, Healthy Skin, Mouth & Eyes.	 Green Vegetables, Custard-Apple, Meat, Cheese, Soya-beans, Milk
B	Proper Carbohydrate Metabolism, Nervous System.	 Tomato, Potato, Peanut, Banana, Vegetables
B6	Proper Metabolism of Amino Acids, Disease-Resistance, Anti-Emetic.	 Dry Fruits & Nuts, Peas, Pulses, Fish, Meat, Milk
B12	Red Blood Cells, Nitrogen Metabolism, Healthy Nervous Tissue.	 Egg, Meat, Liver, Cheese, Milk
C	Healthy Growth, Good Gum & Teeth, Sound Blood Vessels, Rapid Healing, Resistance against Flu & Colds.	 Guava, Tomato, Orange, Lemon, Grapes, Emblic
D	Proper Utilisation of Calcium & Phosphorus Formation of Bones and Teeth.	 Egg, Cod-Liver Oil, Milk, Fish, Sunlight
E	Normal Reproduction.	 Banana, Green Vegetables, Soya- beans, Egg, Almond, Wheat Germ Oil
K	Normal Blood Coagulation, and Liver Functioning.	 Tomato, Soya- beans, Spinach, Meat, Turnip, Lettuce

Little and Large

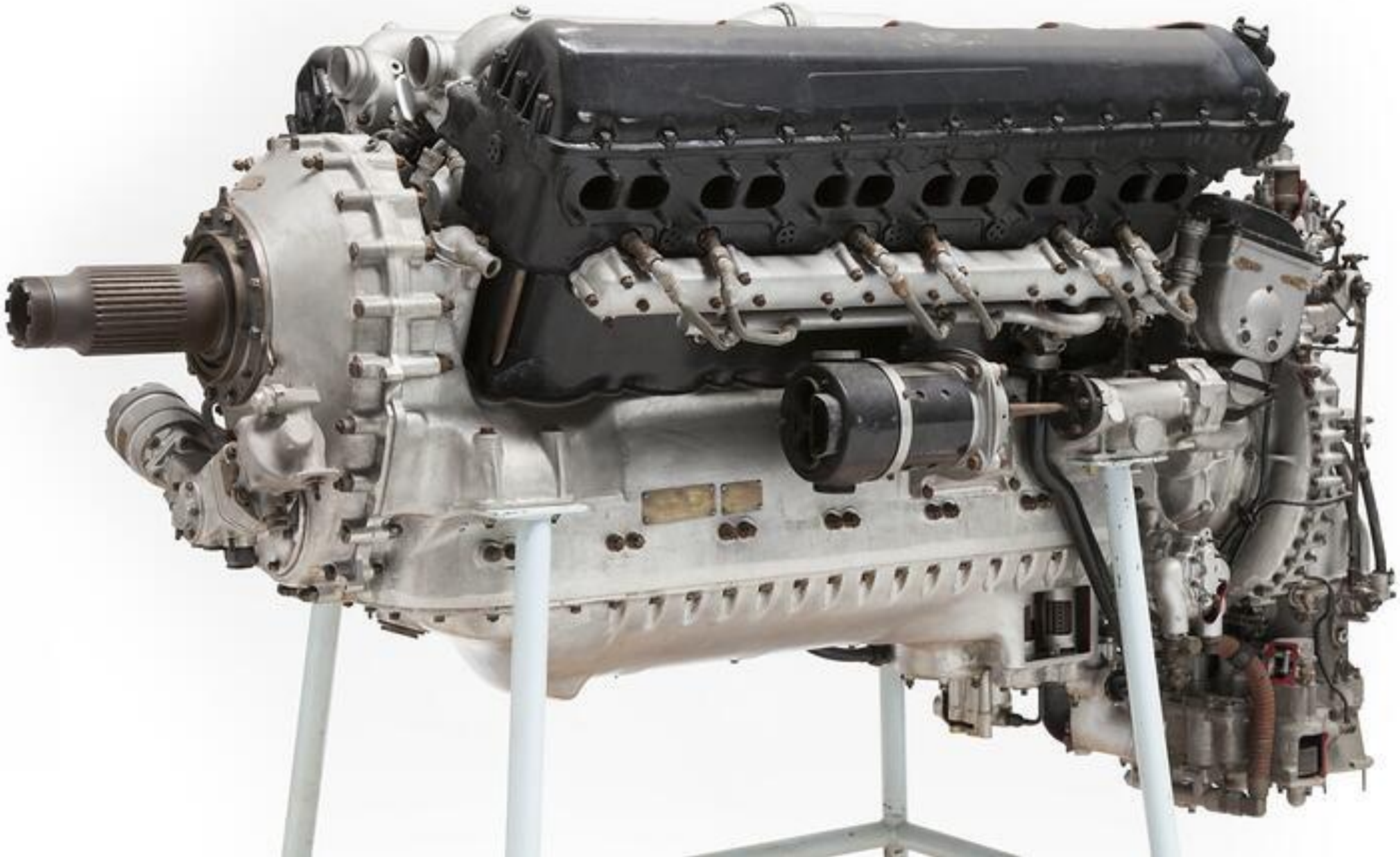
John Burke

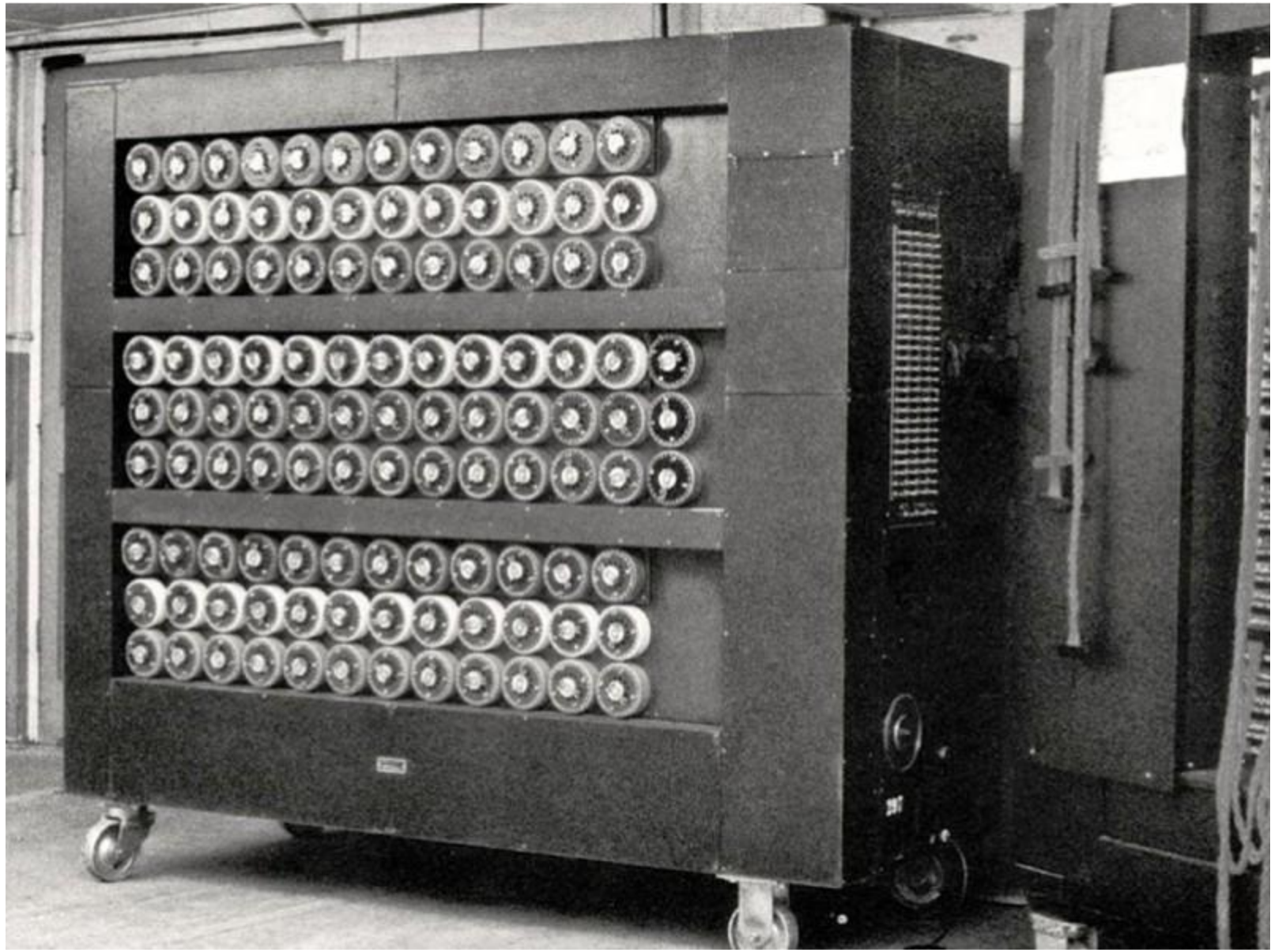

Invention


WW2


L2


BM597
IH C





- Barnes Wallis
- Roy Chadwick
- R J Mitchell
- Charles Rolls/Henry Royce
- Alan Turing
- Robert Oppenheimer
- Neils Bhor
- Richard Feynman
- Enrico Fermi

Isaac Newton

Dimitri Ivanovitch Mendeleev

Percy Shaw (1890-1976)


500,000,000

Edward Jenner and Smallpox Vaccination

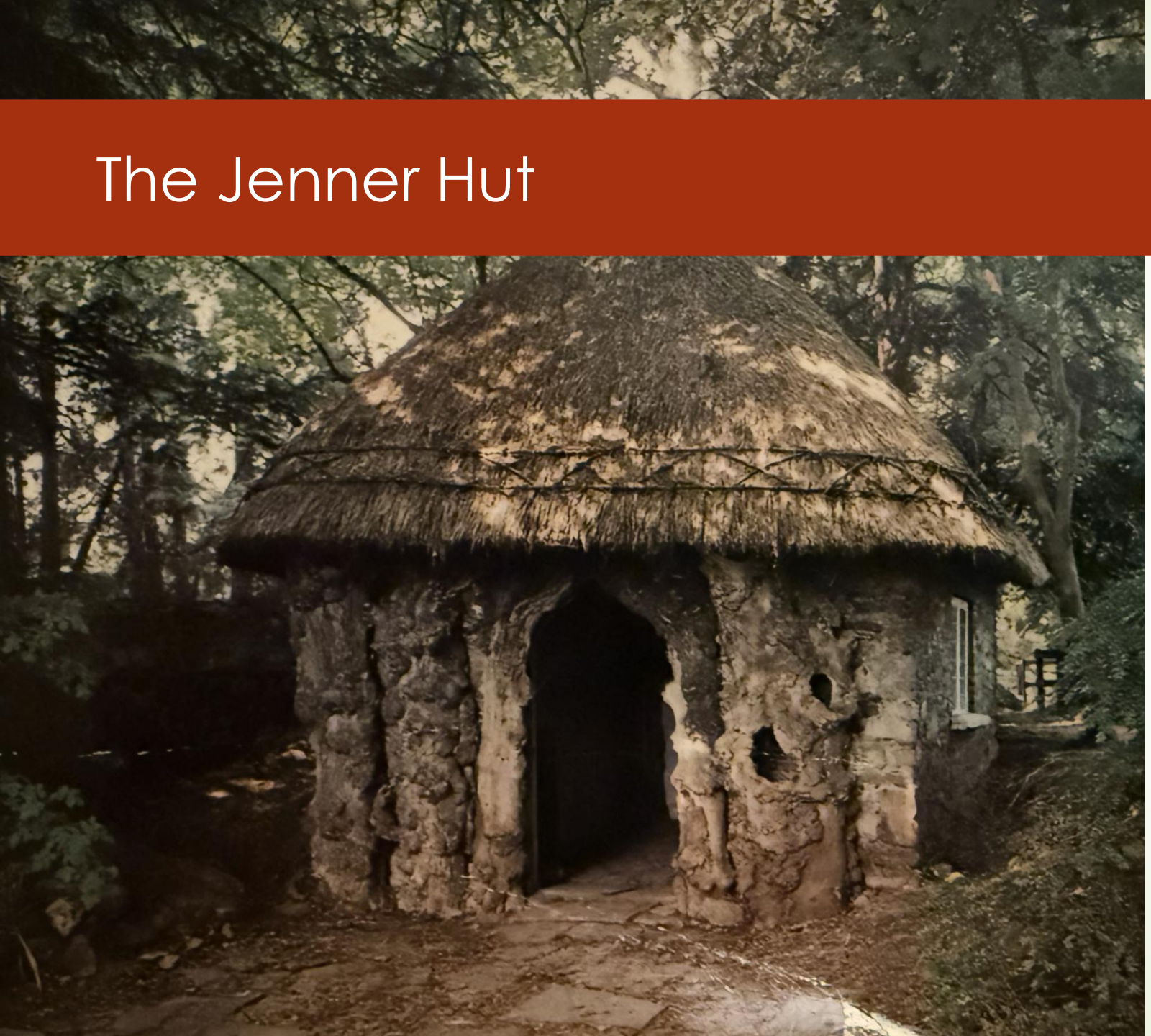
Bina Rawal

Edward Jenner and Smallpox Vaccination

U3A Science Group – 02.10.2025

Bina

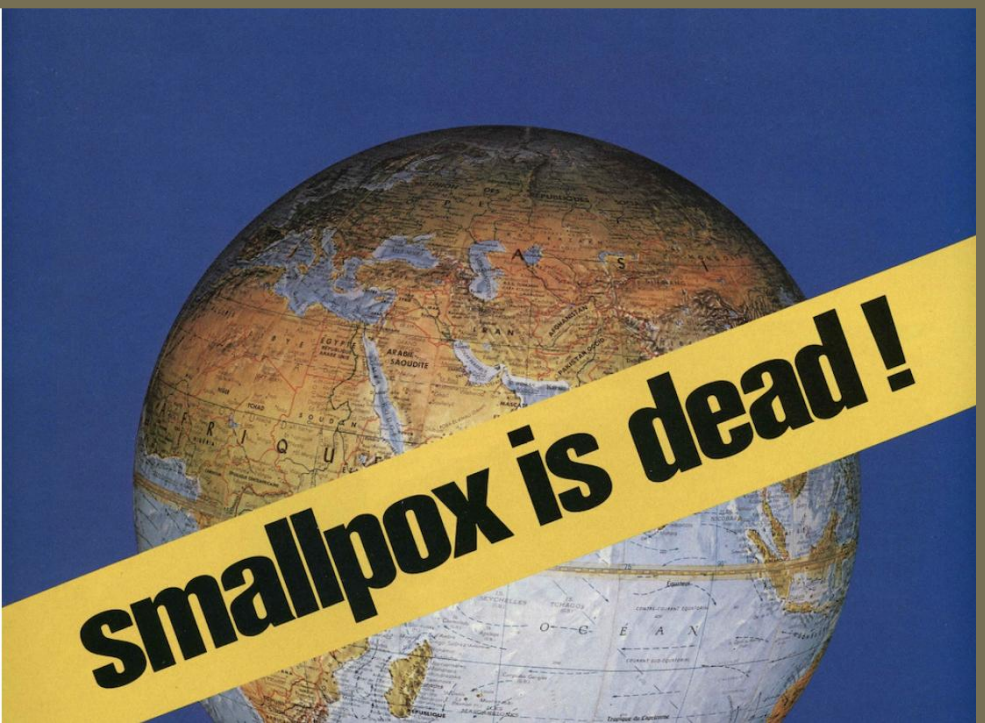
The Jenner Hut



- The Jenner Hut, aka 'The Temple of Vaccinia' is located in the grounds of Jenner's House in Gloucestershire
- Here, Jenner performed the first smallpox vaccination in 1796
- The hide of the cow, (called Blossom) which was the source of cowpox, is on display at St George's Medical School, London
- Vacca is Latin for cow

What Jenner Did in 1796

- Observed that milk maids infected with cowpox seemed to be protected from smallpox
- Took material from a cowpox sore from milkmaid (Sarah Nelmes) and inoculated 8 year old James Phipps with it
- Phipps was unwell for several days but recovered fully
- 2 months later, he inoculated Phipps with material from a human smallpox sore and to test his resistance to it
- Phipps remained healthy and immune to smallpox



Eradication of Smallpox

- WHO launched eradication program in 1959
- Intensified eradication program launched in 1967
- Impressive global collaboration – during cold war – between USA and USSR
- WHO officially declared smallpox had been eradicated in 1980
- Last naturally occurring case was in Somalia in 1977
- Last victim was a medical photographer who acquired the infection from a laboratory in Birmingham University in 1978

Concorde

Paul Rose

Concorde: The Story of Supersonic Passenger Flight

Exploring the legacy of high-speed commercial aviation

Engineering Challenges and Breakthroughs

Supersonic Aerodynamics

Designing for supersonic speeds demanded innovative aerodynamic solutions to reduce drag and maintain stability.

The slender delta wing shape of the Concorde allowed stable flight beyond Mach 2 speeds (1,354 mph).

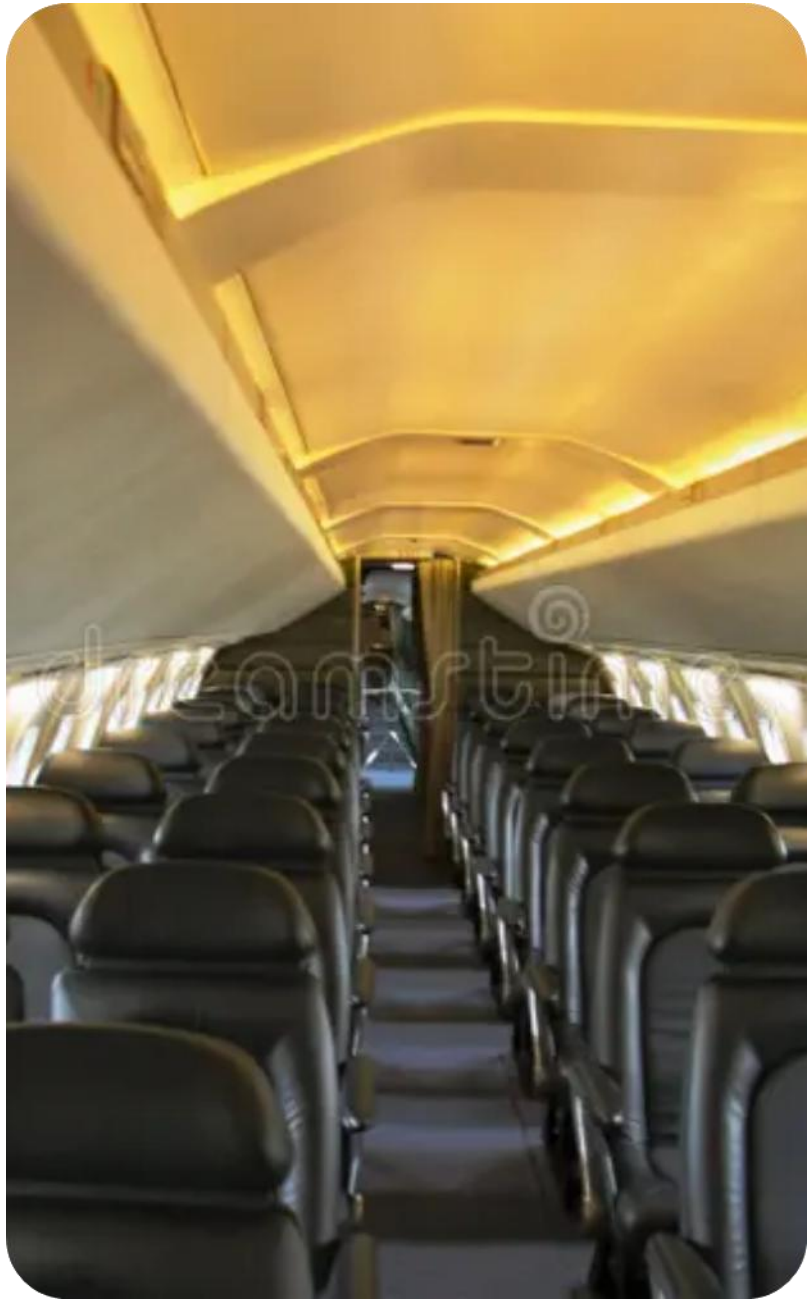
Engine Performance

Advanced engine designs were essential to achieve efficient performance at supersonic speeds.

Heat Resistance

Materials and structures had to withstand extreme heat generated by supersonic travel.

These materials ensure the aircraft maintains strength and stability during high-speed, high-temperature supersonic flight.



Unique Features for Passenger Comfort

Pressurized Cabin

Concorde's pressurized cabins ensured passenger comfort at high altitudes by maintaining optimal air pressure.

Noise Reduction Measures

Advanced noise reduction technology minimized engine and airflow noise for a quieter flight experience.

Comfortable Seating Design

Seating was carefully designed to provide luxury and comfort for passengers on high-speed flights.

No IFE just music

First Class catering no expense spared

Commercial Service Routes and Airlines

Two Concordes on the tarmac at IAD
(Washington Dulles)

Supersonic Transatlantic Flights

Concorde operated fast transatlantic flights connecting major cities, transforming international travel.

The Concorde had a maximum cruising speed of 2,179 km (1,354 miles) per hour, or Mach 2.04 (more than twice the speed of sound), allowing the aircraft to reduce the flight time between London and New York to about three hours.

Major Airlines

Original order by USA carriers cancelled due to politics impacted the future greatly.

British Airways and Air France were the main operators of Concorde, known for luxury and speed.

Flight Route Network

BA operated Concorde to JFK, IAD, MIA with BGI in the winter and originally to SIN and BAH which were dropped due to politics..

BA also used Concorde on charters and Fun Flights to great success!

AF operated Concorde to JFK and RIO.

Role in Shaping Supersonic Travel

Supersonic Flight Innovation

The Concorde pioneered passenger supersonic flight, pushing the boundaries of speed and aviation technology.

Speed Benchmarks

Concorde set industry standards for speed that remain unmatched in commercial aviation.

Luxury Air Travel

Concorde offered unmatched luxury in air travel, influencing modern first-class and business-class designs.

Industry Influence

Challenges faced by Concorde provided valuable lessons shaping future supersonic and commercial aircraft development.

Influence on Aircraft Technology

Advanced Materials Innovation

Concorde introduced innovative lightweight materials critical for supersonic flight and aircraft durability.

Concorde's airframe expanded in length by about **6 to 12 inches** during supersonic flight due to the extreme heat from air friction at Mach 2 speeds. This thermal expansion caused its titanium and steel skin to stretch, a phenomenon accommodated by flexible wiring and a specially developed white paint to dissipate the heat. The expansion was most noticeably visible in the widening of a gap next to the flight engineer's station in the cockpit.

Engine Design Advances

Concorde’s engine technology contributed to developments in fuel efficiency and high-speed propulsion.

After burners used on take off for additional thrust, an eye- catching sight!

Economic and Environmental Issues

High Operational Costs

Concorde faced high operational expenses, impacting its profitability and market competitiveness.

Limited Seating Capacity

The aircraft's small seating capacity of 100 restricted passenger volume and revenue potential.

I was BA's North Atlantic routes Revenue Management Manager produces the revenue for BA to maximise profitability on all routes including Concorde.

Environmental Concerns

Sonic booms and high fuel consumption raised environmental and regulatory challenges for Concorde operations.

Final nail in the coffin!

AF crashing a Concorde on take off at CDG, took all aircraft out of service for a year for upgrades.

High cost of fuel started to make Concorde unprofitable and a loss in confidence after the crash.

The Legacy After Final Flights

End of Concorde Era

Concorde's retirement in 2003 ended the era of commercial supersonic passenger flights.

Aviation History Preservation

Concorde’s legacy is preserved through museums showcasing its design and technological innovations.

Inspiration for Innovation

Concorde continues to inspire new developments in supersonic commercial aviation technology.

A picture of Concorde the first supersonic commercial aircraft at Brooklands museum in Weybridge, Surrey

Railway 200

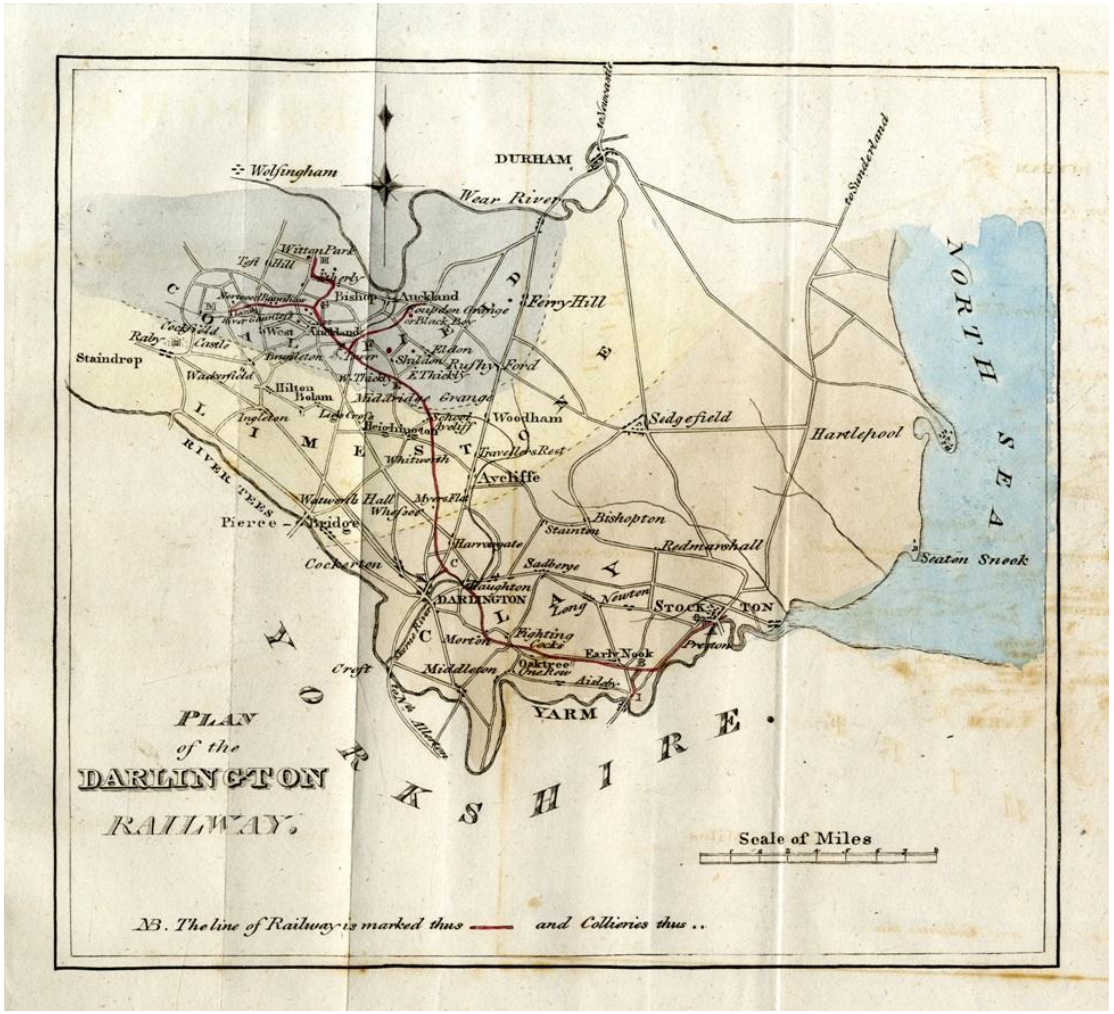
Paul Le Blond

Railway 200 (1)

- 27 September 1825 – Opening of the Stockton & Darlington Railway
- World's first railway to use steam locomotives
- Transported coal from collieries to ports
- Passengers in horse drawn wagons until 1833

Railway 200 (2)

- Parliamentary Act 1821
- Promoted by Edward Pease, a Quaker
- George and Robert Stephenson engineers
- Locomotion No1 built in Newcastle
- Initially 25 miles long
- Extended to Middlesborough



Railway 200 (3)

- Many events
- Heritage lines
- TV programmes
- Main line stations