History of Medicine 1500-2000

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- Chronological survey of Western medicine but focus on:
  - medical knowledge and practice
  - patients and practitioners
  - institutions
- Key issues/debates of each period.
- 1500-1800 and 1800-2000
- Crucial shift in medicine around 1800 that laid foundations of modern medicine.

Historiography

- Up to 1960s = doctors on doctors
- Focus on great men and great discoveries
- 'Whiggish' history; Herbert Butterfield, 1931
  - 'The ratification if not the glorification of the present'.
- Presentism
- 1960s onwards new approach: social history of medicine
- Marginalised groups: women, PATIENTS
- Michel Foucault (1926-84), French philosopher, critique of power relations in medicine.
- New ways of including the wider social and cultural context eg. understandings of disease can be shaped by wider social and cultural conditions cf mental health.

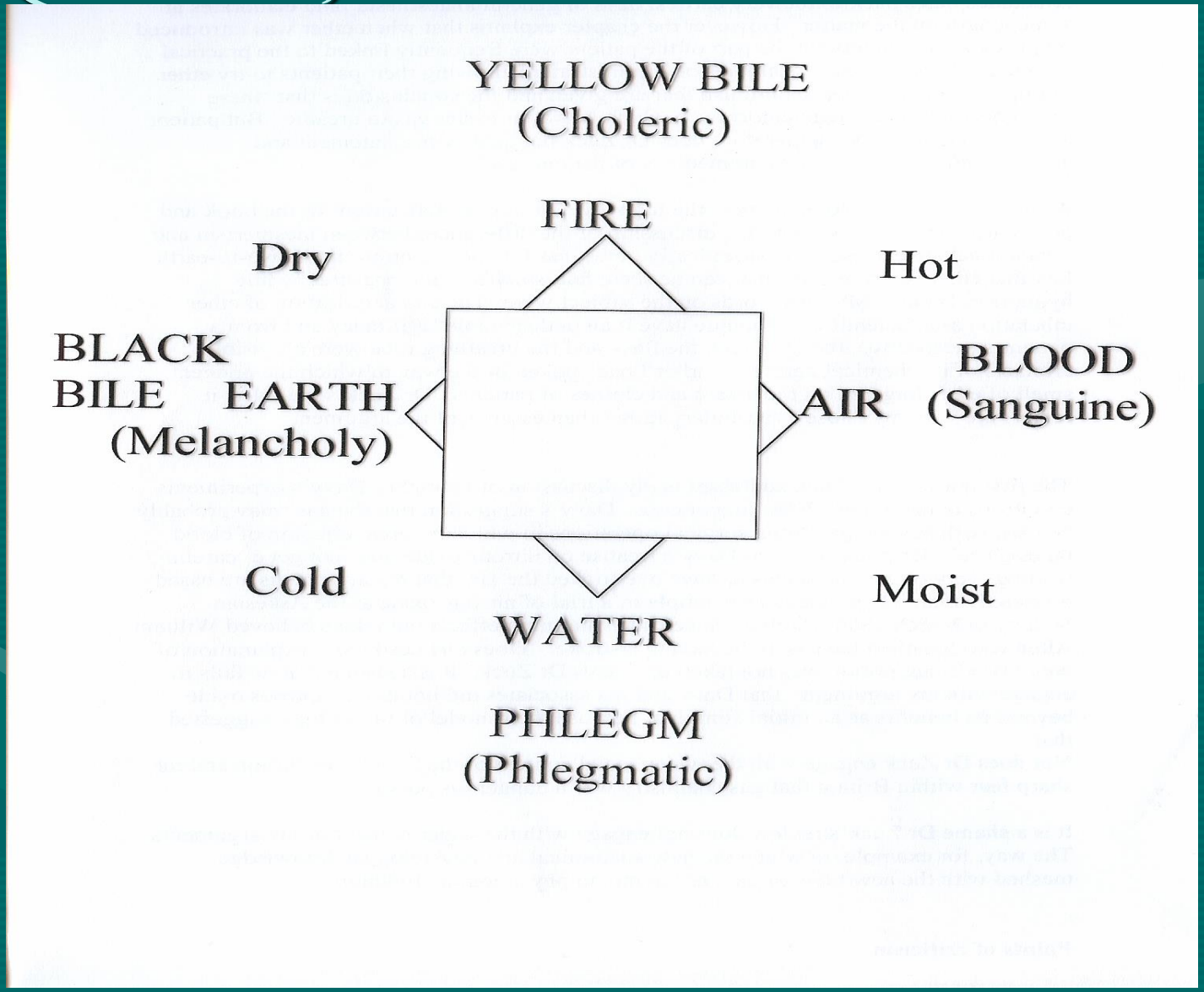
Greek Medicine

- Foundation of Western medical knowledge and practice until 1800s
- Hippocrates 460BC to 370BC.
- Galen AD129 to c.210, Greek speaking physician who worked in imperial Rome
  - synthesised works of Hippocrates, Aristotle and other doctors
  - > 350 texts
  - no successor
- Classical medicine underpinned by 3 key principles
  - Humoralism
  - Drugs – botanical
  - Secular

Humoralism

- Holistic approach; mind and body are looked at as one whole
- Four humours: blood, yellow bile, black bile, phlegm = framework to explain personality and susceptibility to disease; general differences between the sexes, young and old, different races
- Properties of the humours – heat, cold, dryness, moisture – used to explain courses of diseases; organs, vessels and other parts of the body reduced to these qualities
- Each individual had own unique balance of qualities = complexion or temperament
- General patterns according to age/sex – women = colder and moister than men
- Balance of qualities maintained through interaction of four humours = bodily fluids
- Determine temperament eg. yellow bile = hot-headed, quick tempered; black bile = sad/depressed
- Naturalistic approach; everything in nature created from 4 elements: earth, air, fire, water

Qualities, Elements and Humours



Therapies

- Support nature by balancing the body: LIFESTYLE
- Galen's 6 non-naturals: environment/air, motion/rest, sleep/waking, substances taken (food/drink/medicines), substances voided (excretion/vomiting), passions(anger/grief/envy)
- Interpreted as removal of excess or unwanted humours
- Therapies help remove excess humours eg.bloodletting rational basis, local inflammation or fever suggested body had too much blood
- Remained mainstay until mid 19c.
- Medications made from herbs/minerals

Secular

- Religion and magic =-fundamental
- Astrological knowledge part of physician's learning – each zodiac sign ruled part of the body and its diseases
- Christianity played key role in Western medicine
- Widespread belief that illness result of sin/divine displeasure
- God seen as ultimate healer
- First hospitals = hostels to give care and shelter to poor travellers – eg making pilgrimages
- Beds would be near to the altar, confession of sins and absolution before death was thought to be more important than medicine
- LIMITATIONS – warmth, food, some medicines

Zodiac Man

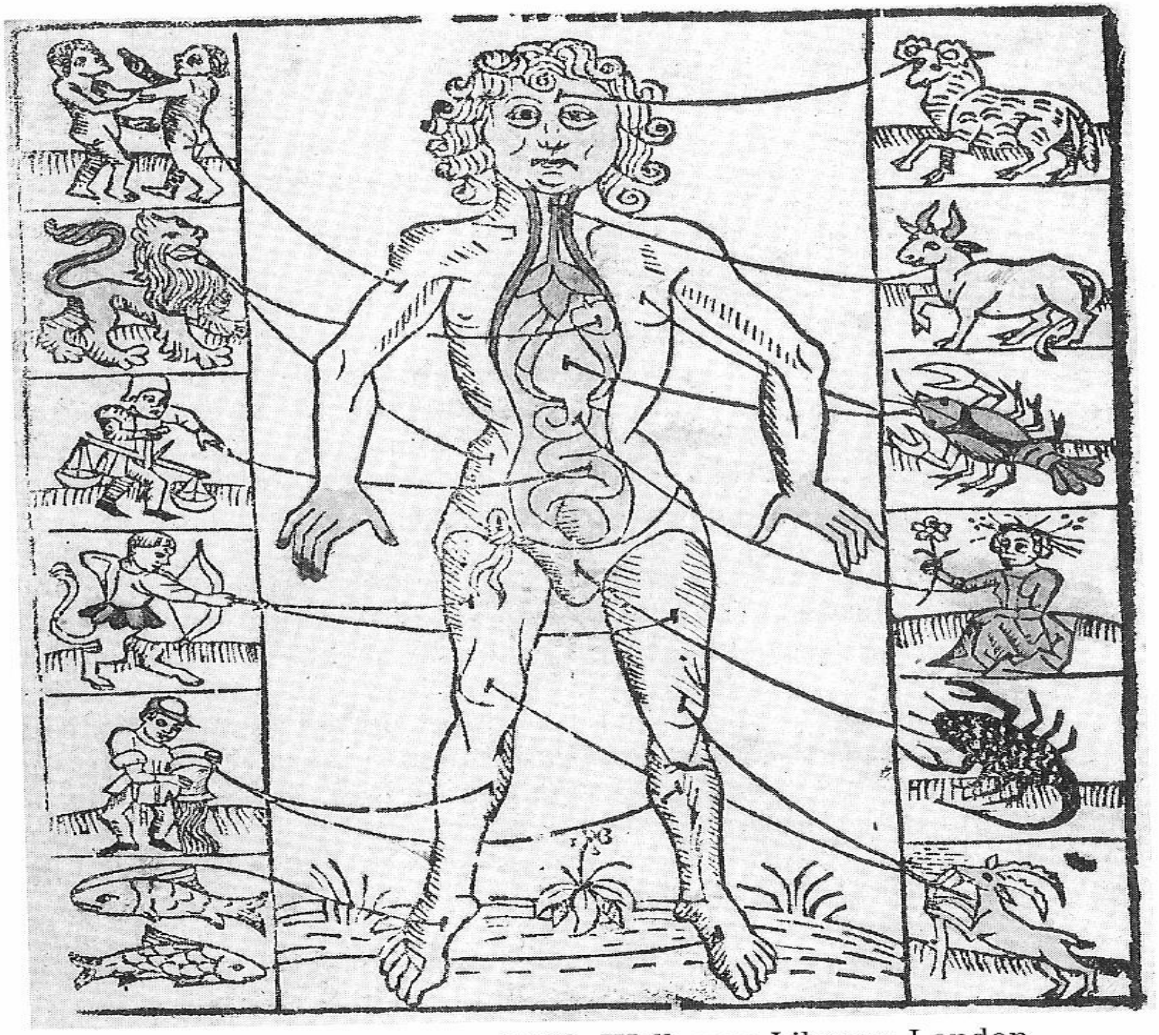


Figure 3.2 A zodiac man, *c*.1483. Wellcome Library, London

Patients and Practitioners

- Physicians – university trained –book-based knowledge
- Surgeons – apprenticeship trained – practical, manual skills
- Apothecaries – apprenticeship trained – made up prescriptions for physicians
- Medical pluralism
- Women = healers – domestic medicine, wisewomen
- Diagnosis – the patient's narrative
- Pulse
- Prognosis
- Treatment
- **Shared understanding of knowledge about the body**

The Renaissance

- Italian city states c.1375-1525
- Rebirth = rediscovery/revival of classical Greek and Roman culture
- Literature, history, philosophy, religion, medicine, mathematics
- Humanism
- Columbus' discoveries: new diseases, syphilis
- New inventions: gunpowder, compass
- Printing technology esp important for medicine

Anatomy

- Galen's *On Anatomical Procedures* 1531
- Jacobus Sylvius (1478-1555), Parisian physician compiled new textbooks for medical students
- 1st recorded human public dissection 1315
- Mondino de'Luizzi (d.1326) Bologna University
- Universities of Montpellier and Padua
- Spain 1391, Vienna 1401
- Autopsies 1250 onwards

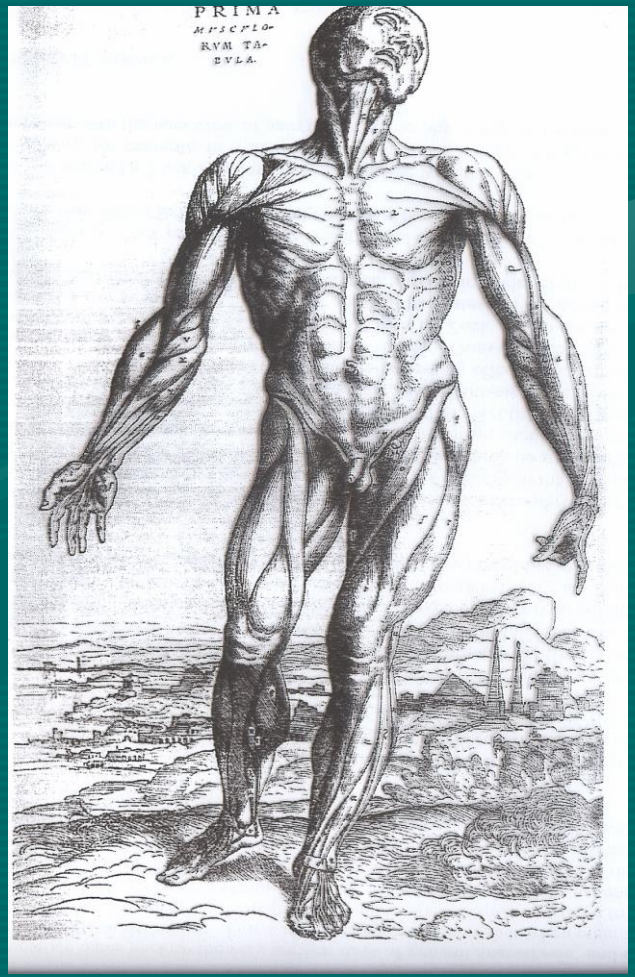
Dissection

Andreas Vesalius (1514-64)

- Padua = centre of new anatomy
- Studied medicine in Paris in 1533-7
- 1537 appointed Padua
- Illustrations as teaching aid
- *De Humani Corporis Fabrica* (On the structure of the human body) 1543
- Quest to revive Galen's anatomy
- Innovative new approach to dissection

Legacy of Vesalius

- Anatomy = central to medicine
- Increased status
- Anatomist = source of new knowledge
- Realdus Colombo (1514-64)
  - Blood moves from r to l ventricle via lungs
- Gabriele Fallopia (1523-63)
  - uterine tubes and third ossicle of the ear
- Hieronymous Fabricius (1533-1619)
  - 'little doors' in veins



The Scientific Revolution

- Between late 16th and early 18th c.
- Celebrated since late 18th c.
- Term coined by Alexandre Koyre in 1939
- Science = 19c. word
- Natural philosophy = astronomy, mechanics, anatomy, physiology
- Concepts, methods, institutions of knowledge
  - based on data
  - collected from experimental observations
  - formulated through mathematics
- became a distinctive trait of Western civilization
- begins to overtake religious world-view

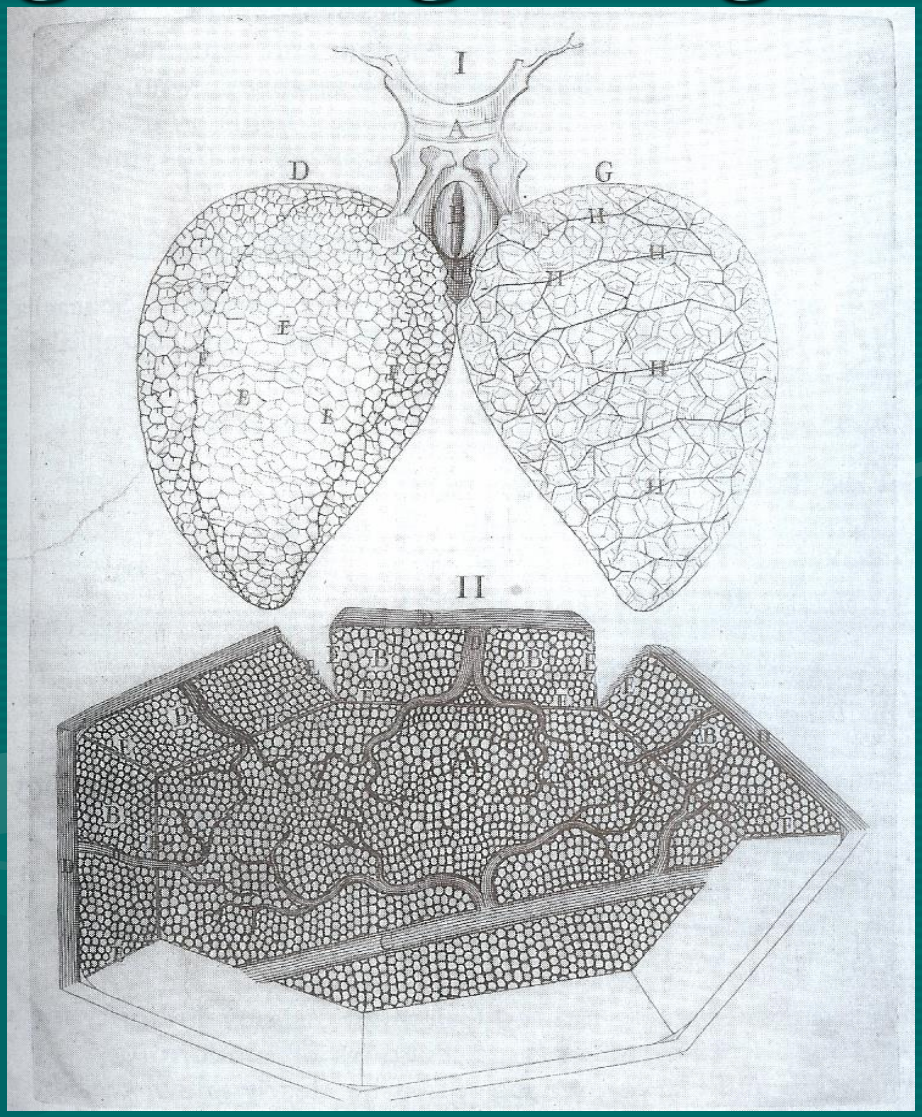
The 'new' science of the 16th and 17th centuries

- Mechanical philosophy; all natural phenomena are produced by mechanical forces; motion and matter
- Francis Bacon (1561-1626): empiricism and induction
- Rene Descartes (1596-1650): French mathematician
  - mind-body dualism; body was pure matter and mind/soul (only possessed by humans) was immaterial thought; each could operate independently
  - model of body = mass of particles in continual motion which were subject to mathematical laws – analogous to a machine – became system of levers and weights, shown in diagrammatic form
  - used this principle to explain the processes in the body
- Mathematical techniques; navigation, cartography, surveying = important new skills for explorers and travellers; also used for land reclamation, canal building and surveying for tax purposes
- Mathematical instruments: telescope, barometer, air-pump, thermometer, pendulum, clock, microscope

Microscopes and Structures

- **Antoni van Leeuwenhoek (1632-1723)**
  - single lens microscope c.1671
  - spirogyra, hydra, protozoa, bacteria, infusoria and human sperm
  - theory of reproduction – animalculism
- **Robert Hooke (1635-1702)**
  - 'To make visible the invisible'
  - curator of experiments at the Royal Society
  - *Micrographia* 1665
- **Jan Swammerdam (1637-80)**
  - theory of emboitment - generations of creatures encapsulated in female eggs

Malpighi's engraving of lungs



New Models of the Body

- **William Harvey (1578-1657)**
  - Circulation of the blood
- **Marcello Malpighi (1628-94)**
- ***'the mechanisms of our bodies are composed of strings, thread, beams, levers, cloth, flowing fluids, cisterns, ducts, filters, sieves and other similar mechanisms. Through studying these parts with the help of Anatomy, Philosophy and Mechanics, man has discovered their structure and function … With this and the help of discourse, he apprehends the way nature acts and he lays the foundation of Physiology, Pathology and eventually the art of Medicine'.*** **1666**

New Models of the Body

- **George Cheyne (1671-1743)**
  - body = mathematical model
- **William Cullen (1710-90)**
  - body = nerves and sensibility

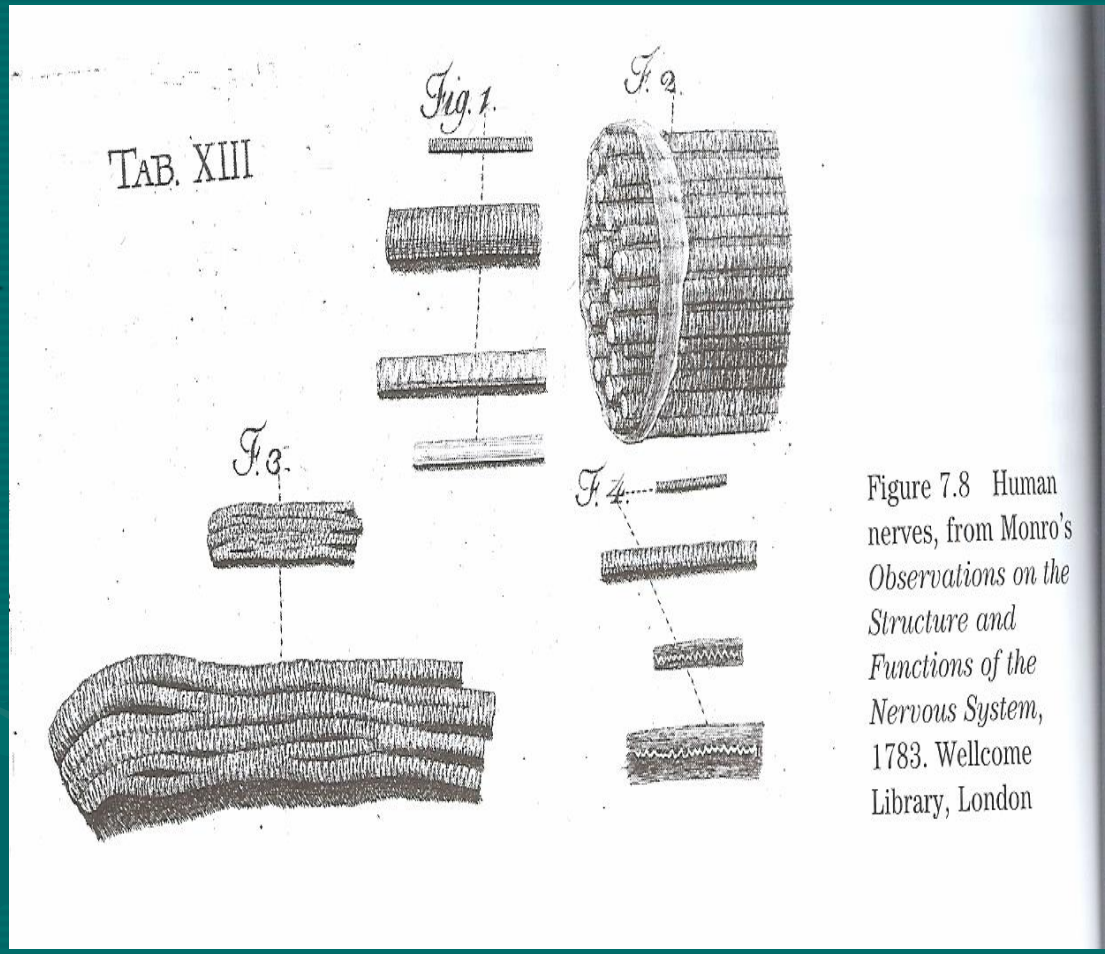


Figure 7.8 Human nerves, from Monro's *Observations on the Structure and Functions of the Nervous System*, 1783. Wellcome Library, London

Enlightenment

- new progressive, optimistic philosophy of progress
- philosophe = one who 'trampling on prejudice, tradition, universal consent, authority, in a word, all that enslaves most minds, dares to think for himself' *Encyclopedie ou Dictionnaire Raisonne des Sciences, des Art et des Metiers*
- centred on elite groups in pre-industrial Europe, fired by talented writers and philosophers
- world seen primarily in secular and scientific terms
- medicine; positive view of its role and benefits

Enlightenment

- **John Locke (1632-1704)**
- *Essay Concerning Humane Understanding* (1690)
  - man gains knowledge through his experience of the natural world
  - connection between man and his environment is point of differentiation from rationalism (eg. Descartes)
- **Classification**
- formal taxonomies – the principles of classification
  - **Karl Linnaeus (1707-78)**
    - devised classification scheme for plants using generic and specific names; ordered by sexual parts
- **Bodies and social order**
  - **Adam Smith (1723-90)**
    - *Wealth of Nations* c.1776; political economy
    - principle of laissez-faire – non-state interference in the market forces of supply and demand
  - **Jeremy Bentham (1748-1832)**
    - driving force of philosophy was enlightened self-interest
    - utilitarianism = 'the greatest happiness of the greatest number'

Gender and Generation

- *Aristotelian*: conception occurs because of male seed acting upon female matter (menstrual blood in womb), female passive/imperfect, male active/perfect
- *Galenic*: conception occurs through male and female seeds mixing; female seed to guts etc, male to nervous system (higher functions); female seed linked to female orgasm (pre-requisite for conception)
- *17th century*
  - eggs; Harvey's work
  - spermatozoa; Leeuwenhoek
  - epigenesis versus preformation
- *18th century*
  - shift from one-sex model (female = inferior eg.vagina is penis inside out)
  - to two-sex model (male and female = different)
  - sexual difference seen as fundamental difference
- science of women; women's nature and social role defined by reproductive system; gynaecology, also reflected within midwifery and extended to foetus
- **Man-Midwives**

Medicine 1500-1800

- Significant growth in knowledge (structure and function) BUT no major impact on medical practice
- Some new chemical remedies but most botanical
- Patients and practitioners continue to share body of knowledge; body remains as a holistic system
- Hospitals: mid 1700s onwards across Europe; gradual shift from places of spiritual/physical care to institutions with focus on medical and surgical care and teaching of medicine.

Medicine 1800s

- by later 18c elite focus on fibres and nerves
- Albrecht von Haller (Swiss) c.1750s
- William Cullen (Edinburgh) c.1750s-70s
- ***but doctrine still based on manipulating the system to restore balance***
- surgery increasing in importance – military; new kinds of education
- expansion of hospitals: shift in what they are and what they do

- new views of hospitals and bodies come together in post-Revolutionary Paris

Paris and the Rise of Scientific Medicine

- **The French Revolution and after**
  - Fall of the Bastille in 1789
  - Initially liberal and fairly moderate (1789-92)
  - More violent, extreme, radical (1793-94)
  - Reconstruction from 1795
  - Napoleon, war and then Congress of Vienna (1815) - restoration of much of older order
- *What does the Revolution mean for French medicine?*
  - Medicine should no longer be bastion of privilege
  - Faculties of medicine, academies of surgery abolished
  - Hospitals nationalised
  - Integration of medicine and surgery, in teaching and in hospitals
  - Broader educational reforms
  - Valuing the practical and the educated in the service of the state

Scientific Medicine

- Elements of 'Paris medicine'
  - pathological anatomy
  - hospital becomes chief site for medical research and training, using patients
  - increasing use of physical examination and (technologically assisted diagnosis)
  - use of medical statistics
- *These make Paris a model and a destination*

Laboratory medicine

- Disease = lesion
- Diagnosed using pathology and anatomy
- Investigation using physiology and chemistry
- German universities central to new research
- Research unparalleled in France/Britain
- Isolation and synthesis of chemicals
- **Justus von Liebig (1803-73)**
- Chemistry professor at Giessen
- Application to agriculture and industry

Chemistry and cells

- **Mathias Schleiden (1804-81) and Theodor Schwann (1810-82)**
- 1830s cells identified as fundamental units
- Cell = nucleus (reproduction unit) and outer membrane
- Reproduction thought to be spontaneous
- Common form of being
- Established 1840s; better microscopes
- Cells explain lesions

Chemistry and cells

- **Rudolf Virchow (1821-1902)**
- 1855 cells created cells r than fluid
- Cell generation = revision of earlier theory: 'there is no life but through direct succession'
- Used to explain pathology
- Normal structure and function = normal cells
- Abnormal cells multiply and create tumours = disease
- Cancer

Physiology and function

- **Claude Bernard (1812-78)**
  - Control experiment
  - Isolation of the effect of one function eg.one particular nerve
  - *Introduction to Experimental Medicine* (1865)
  - Vivisection; application to surgery (anaesthesia late 1840s)
- **Karl Ludwig (1816-95)**
  - Director of Physiological Institute in Leipzig
  - Body = chemicals
  - 1846 kymograph: blood flow rate, blood gas concentrations etc.

Bacteriology

- Mid 19c. theories of fermentation and putrefaction; miasmatic theories of disease: spread through the air; shaped public health's focus on sanitation
- **Louis Pasteur (1822-96)**
  - Studied fermentation in milk, wine, beer etc.
  - Spontaneous generation during decomposition of organic matter
  - Sterilisation, pasteurisation
  - Identified pebrine –silkworm industry in France
  - 1878 onwards argued for germ theory of infection
  - Specific micro-organisms responsible for disease, putrefaction and fermentation
  - Experiments on chicken – cholera, anthrax and rabies
  - Immunisation against disease with old, weak bacterial culture
- Principle of ALL germs – microscopes confirm existence of agents of disease

Laboratories and germs

- 1870s onwards: tb, cholera, diptheria, plague, dysentery, tetanus, gonorrhea, staphylococcus, streptococcus
- 1891 diptheria antitoxin produced – within 10 years mortality rate from disease had dropped by more than 50% - kept in police stations
- BUT
- Most important diseases diminish before germ theory
- Cholera and typhoid improved because of better public health
- Idea of link between dirt and disease = effective measures such as isolation hospitals
- New idea of diseased body as infectious agent

Laboratory Medicine

- Impact of laboratory medicine?
  - Revolutionized medical knowledge between 1830 and 1930: by 1890s integrated into medical teaching
  - Shift from structure and function to dynamic system of complex, integrated physiological processes
- BUT marginal effect on medical practice until 1920s; diagnosis improved but few new drugs

Surgery

- Disease as specific lesion supports surgical intervention
- BUT pain, infection, blood loss
- anaesthesia 1840s, antisepsis 1860s
- expansion in scope and number of operations
- surgical specialisation eg. ophthalmics, Society of Ophthalmologists c. 1881
- 128 specialist hosps in Eng/Wales by 1900
- BUT surgical techniques developed more rapidly than blood transfusion, antibiotics, monitoring

Medicine in 1900

- Doctors
  - Standardised education, University medical schools, qualifications, codes of ethical behaviour,
  - strong collective identity
  - social status
  - experts: public health, coroners, factory inspectors, prisons
  - 1888 Local Govt Act est diploma in public health
- GPs and Consultants
- Institutions
  - Poor Law infirmaries, mostly chronic diseases & old
  - Fever hospitals
  - Hospitals: charities, inc teaching hospitals
- Physiology as main med science
- (Research) Pharmaceutical co.s; Germany, US, UK (Wellcome)

Between the wars, 1918-1939

- State and local authority funds for motherhood
- Poor Law hospitals to local authorities, and more acute work
- Charity hospitals under-funded, exc where organised workers contributions
- TB services developed, inc sanatoria

General Practitioners 1911-1948

- Generalists: mainly treat symptoms
- Gatekeepers to secondary care
- 1900s overstocked market: BMA active
- 1911 Lloyd George National Insurance scheme: compulsory over £150/annum
- individual 4d-employer 2d-state 3d
- panel doctors (GPs) - capitation
- restrictions: hospital costs, families
- doctors' dilemma: state cogs or struggle to make a living?
- lots of opposition BUT most joined in
- 1948 National Health Service: 84% GPs voted against introduction of NHS
- BUT relief from bad debts
- reinforced division between consultants and gps

Consultants 1911-1948

- specialists: hospital and private practice
- low remuneration, maj income fr private patients
- acceptance of gatekeeper role for GPs
- public roles: commissions, committees
- 1948 NHS
  - guaranteed salaries; retained rights to private practice

Interwar success stories

- Physiology
  - Hormones
    - Sex hormones (life style drugs, 'rejuvenation')
    - Insulin represents success of physiological research; in the UK licensed to the MRC
  - Vitamins
    - Glaxo: started to manufacture vitamins to enhance baby food
- Sulfonamides
  - Gerhard Domagk, BAYER, 1932
  - The first effective antibiotics
  - Basis of a class of hypoglycaemic drugs, diuretics, anti-hypertensives (path dependency)
  - UK: M&B 693 transforms May & Baker

WWII

- Emergency Hospital scheme
- Emptied for bomb casualties
- Lost of planning for post-war
- Initially expected to build on local authority hospitals and clinics – but GPs against, and charity hospitals ; schemes get very complex
- Science for war, inc penicillin (UK-US)

Penicillin

- Penicillin
  - Alexander Fleming, St Mary's, 1928
  - H. Florey & E. Chain, Oxford, 1938
  - WWII, US
- Antibiotic bonanza after WWII
  - Large-scale screening exercise

Drugs - post WW2

- Industry grows from US$ 600 million before the war to US$ 7000 million by the end of the 1950s
  - 'Therapeutic revolution'; new and more effective drugs
  - US: consumerism and increasing expectations of good health
  - UK and continental Europe: post-war reconstruction and expansion of welfare state
  - NHS: free medicines until 1952, then prescription charges

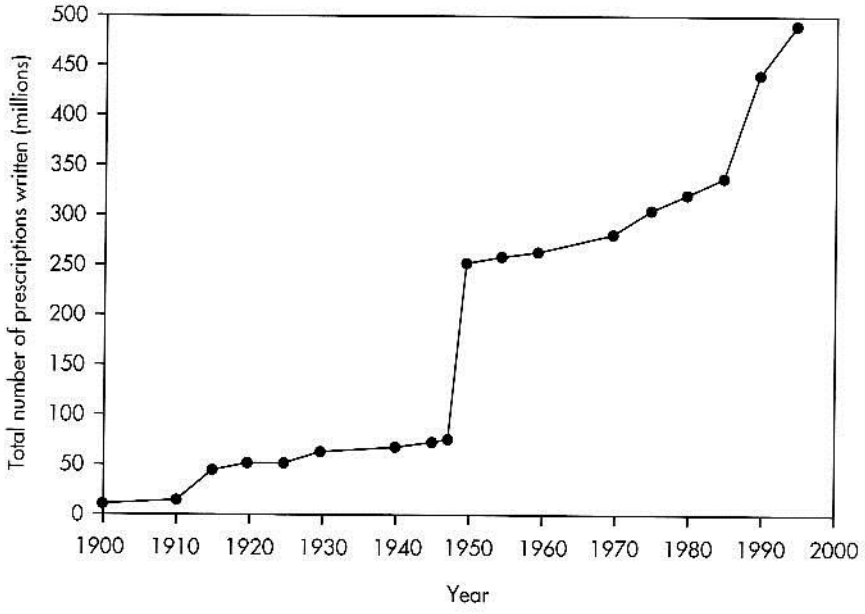


Figure 1.4 Number of prescriptions dispensed, 1900–1995. Based on [34], p. 336; reproduced by permission of the Fondation Mérieux.

From Anderson (ed), *Making Medicines* (2005), p. 15.

Thalidomide

- Producer: Chemie Grunenthal; moved into pharmaceuticals as part of the penicillin goldrush after WWII
- UK: Distillers Company Search for patentable penicillins
- A safe sleeping pill? 'Completely non-toxic and absolutely harmless'
- The ultimate lifestyle drug; turns into a blockbuster
- Grunenthal's response to the reports
  - Denial of causal connection
  - Attempts to conceal numbers
  - Attempts to suppress publication
  - Commissioning of favourable reports
- Company forced to take the drug off the market in 1961
- Long legal aftermath, both in Germany and the UK
- The end of the golden age?
- Increased regulation; R&D longer process

Post WWII

- Labour government, nationalised all hospitals under Ministry, Regional and Local committees
- NHS very popular – doctor led
- Consultants paid, and many more
- Hospitals developed, esp ex-PL, and for OPs
- GPs resisted, remained as independent practices, but now for all patients
- Some private med and hospitals, but not much

1948-74

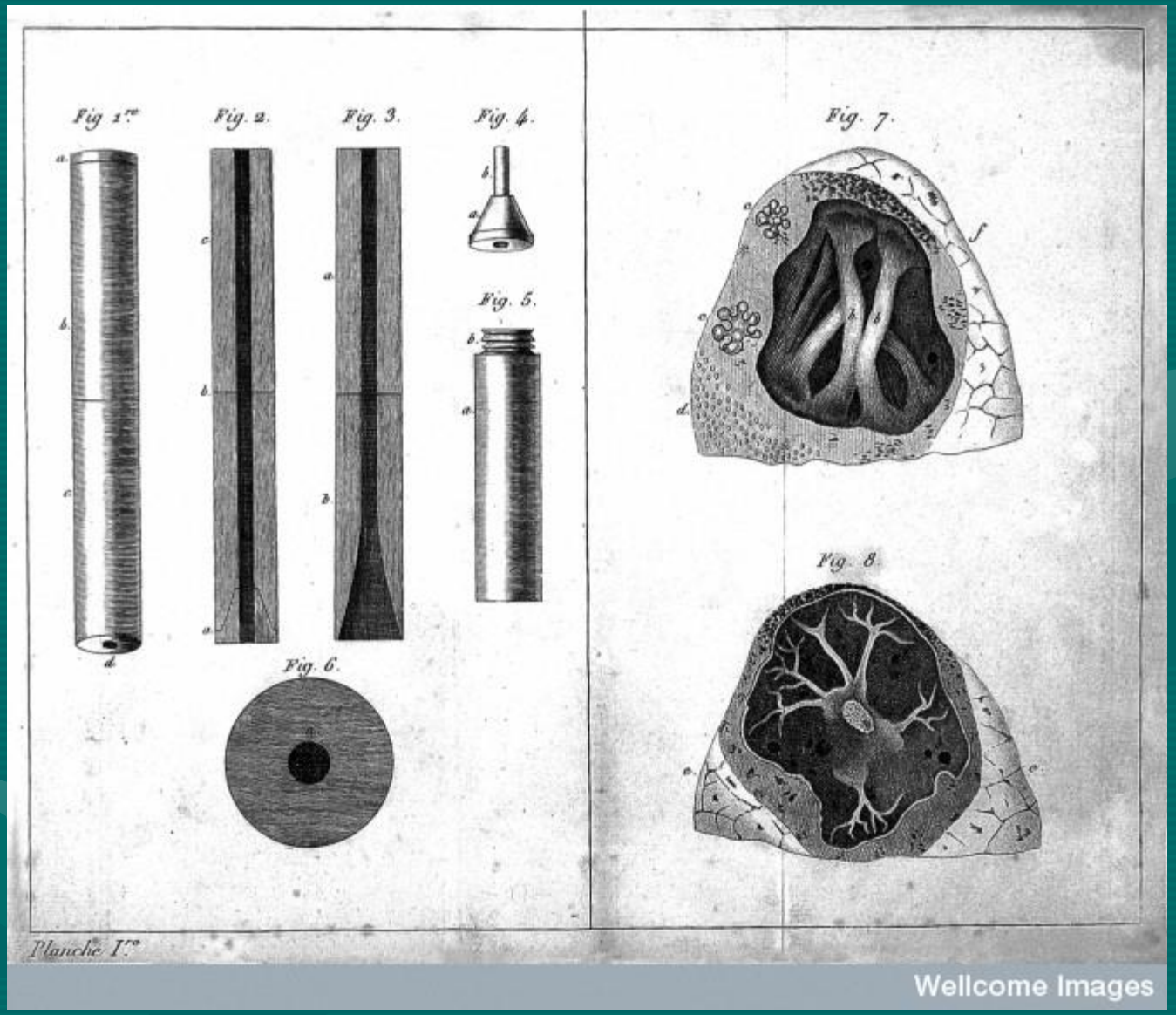
- NHS structure stable, widely admired
- Services developed under consultants
- Little building pre. 1960s, then Dist Gen Hsps
- GPs low status till 1960s, when organised and supported – new GP run clinics and academic
- LA's ran Pub Health (weakened)
- Need for healthy workers and babies slips
- Multi ethnic pop, and docs and nurses
- Loss of deference, esp from 60s; patients to consumers

NHS since 1970s

- Increased manager power esp since 1980s
- Nurses into hierarchies
- More expensive techniques and drugs
- Funding falls behind international standards
- 'Markets' and fund-holding from 1990s, esp since 2000
- National plans and targets, esp from c. 1997
- Private companies, at many levels, esp since 2000
- Big increase in funds since c. 2000
- Constant re-organisation c. every 3 yrs since 1990

Cancer: Diagnosis, Treatment, Theory

- Before 1800
  - not usually diagnosed unless close to the body's surface
  - occasional mastectomies; extremely heroic operations
  - explained as the product of an imbalance of the four humours
- c. 1800
  - becomes disease of organs and tissues
  - Paris Hospitals
  - anatomy as new key science



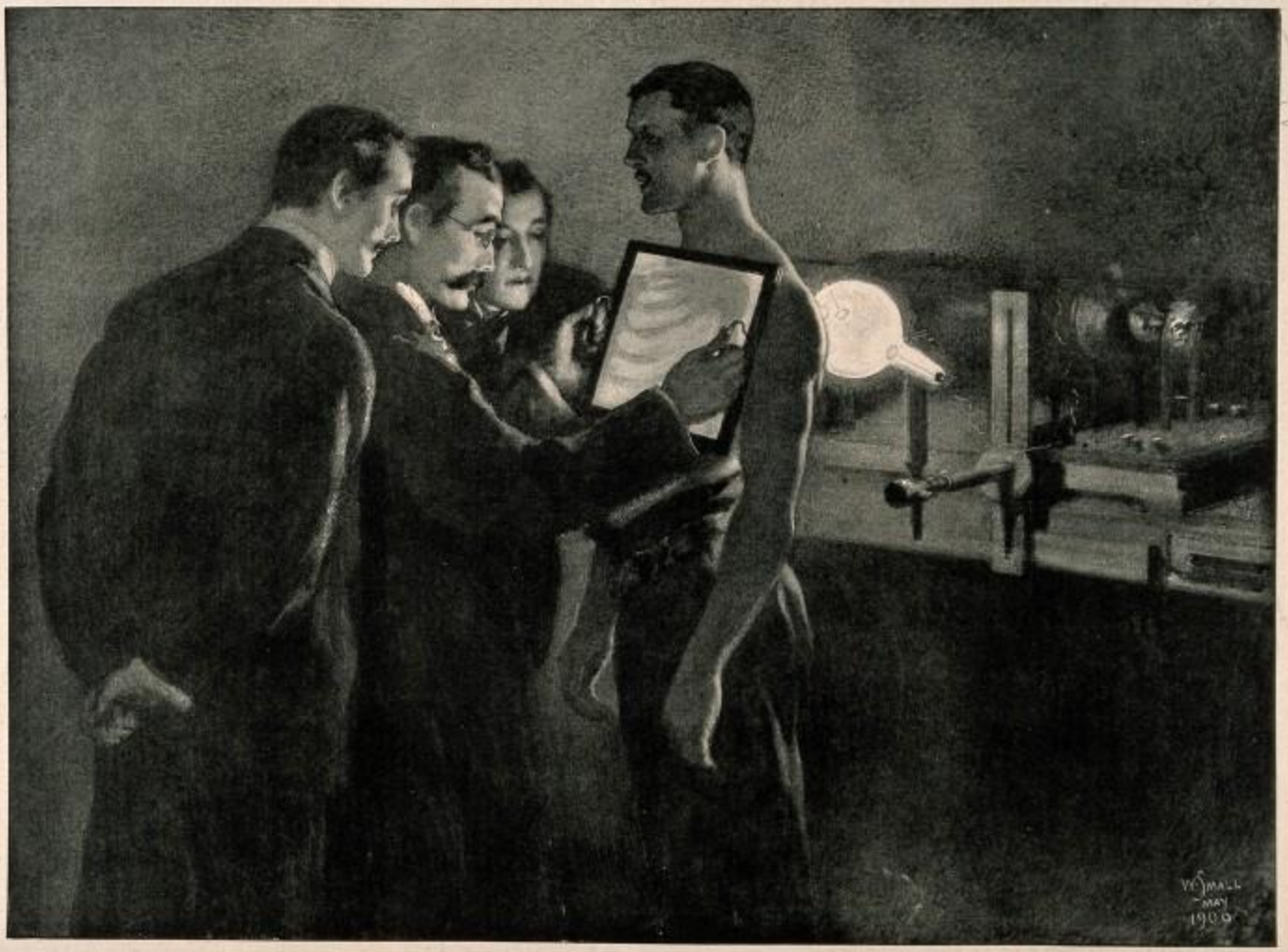
Stethoscope and lungs, Laennec.

Around 1860

- Cancer turns into a disease of cells
- Tumours as products of the uncontrolled proliferation of cells: ‘neoplasms’
- If prone to spread into other tissues, they are ‘malignant’

Around 1900

- Radical surgery
  - Why at this point in time?
- Cancer: a surgical disease
  - Early detection
  - Radical removal
- Science of cancer: first research charities and cancer journals launched
  - e.g. Imperial Cancer Research Fund, 1902
- Cancer hospitals: Christie Hospital c. 1892 as 'Cancer Pavillion and Home for Incurables'
- Another major innovation potentially makes detection of internal cancers easier

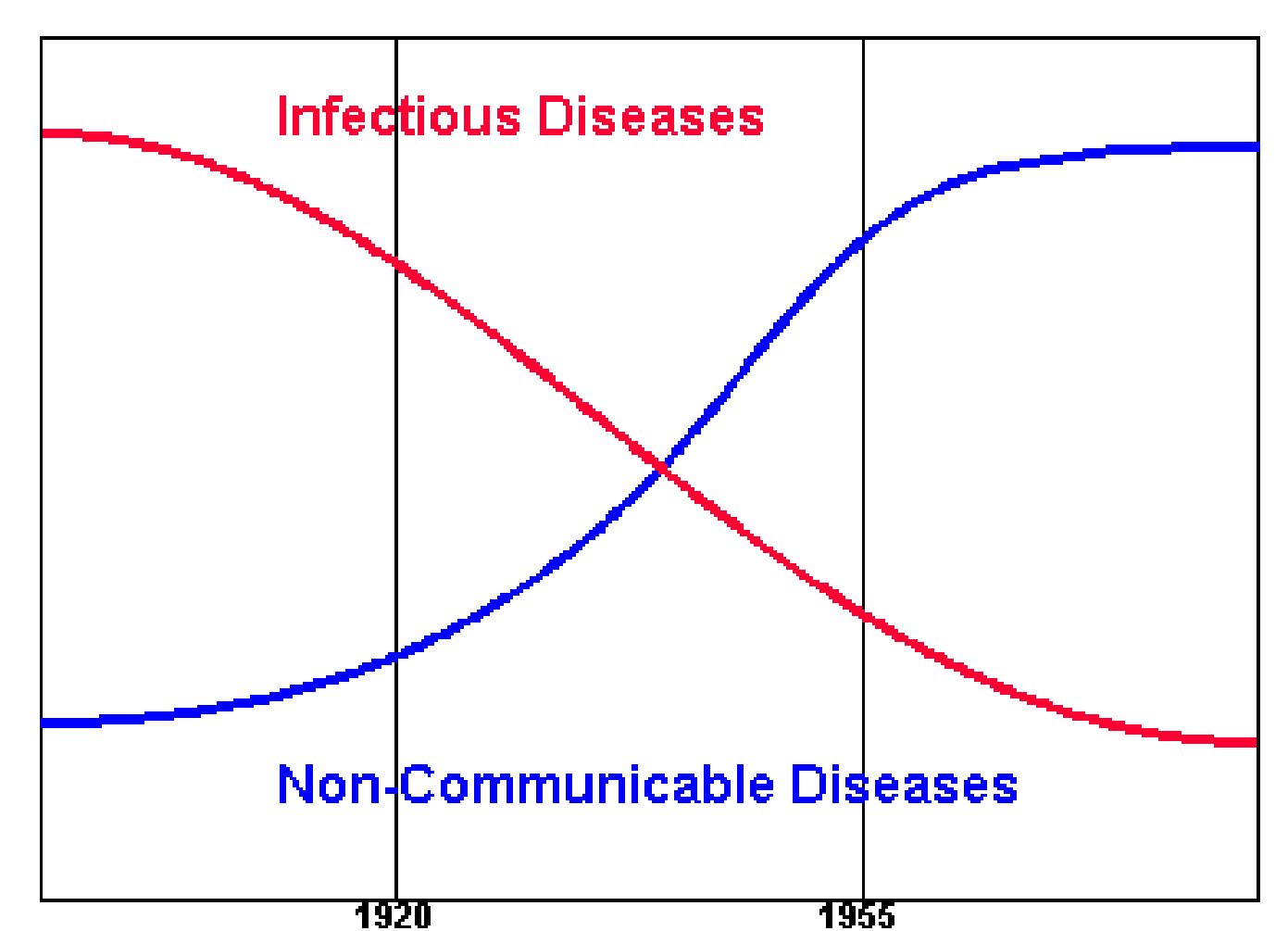


WOUNDED FROM THE FRONT; LOCATING A MAUSER BULLET BY X RAYS IN A LONDON HOSPITAL

DRAWN BY W. SMALL

Wellcome Images

Was cancer on the rise?



1920s onwards

- 1920s radiotherapy: cancer = high tech disease
- 1950s cancer = object of big science
- Link between smoking and lung cancer
- US: unprecedented levels of funding
  - War against disease
  - Model: antibiotics
  - Screening for a cure for cancerLink between smoking and lung cancer
- Chemotherapy: new treatment paradigm, cure?

Summing up …

- Big picture history
- Paradigms AND continuities
  - scientific medicine
  - primary care
  - economics
- Scientific solutions AND new problems
  - infectious/chronic diseases
  - new diseases eg.AIDs