

The (Pre-)History of Medical Physics

(we're older than you believe)

Warning: This presentation contains multiple images of dead physicists.
Viewer discretion is advised.

Often things go back earlier than we think!

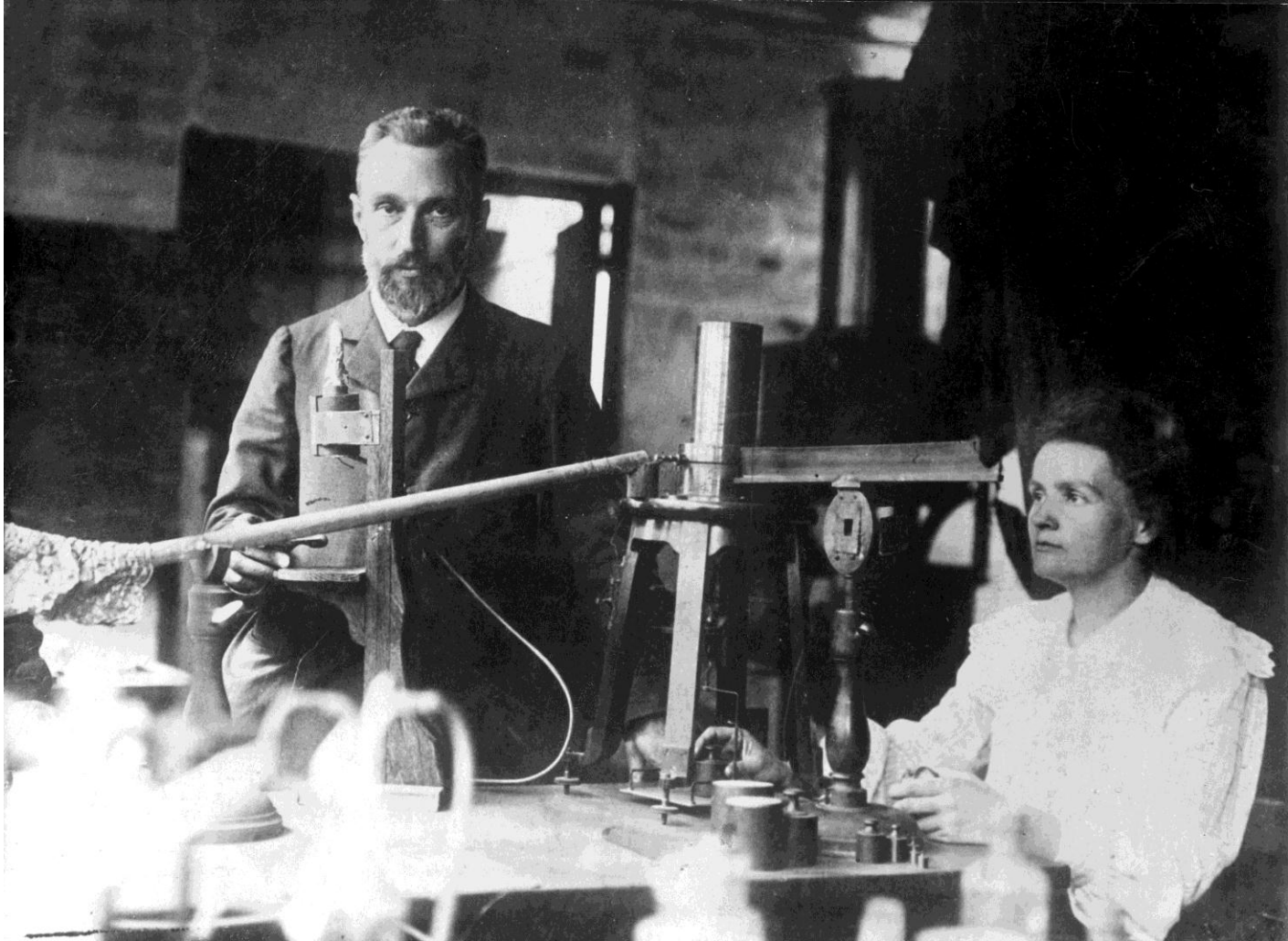


← Recently found in the pocket of a geek in Switzerland

Recently found in a cave in Switzerland →

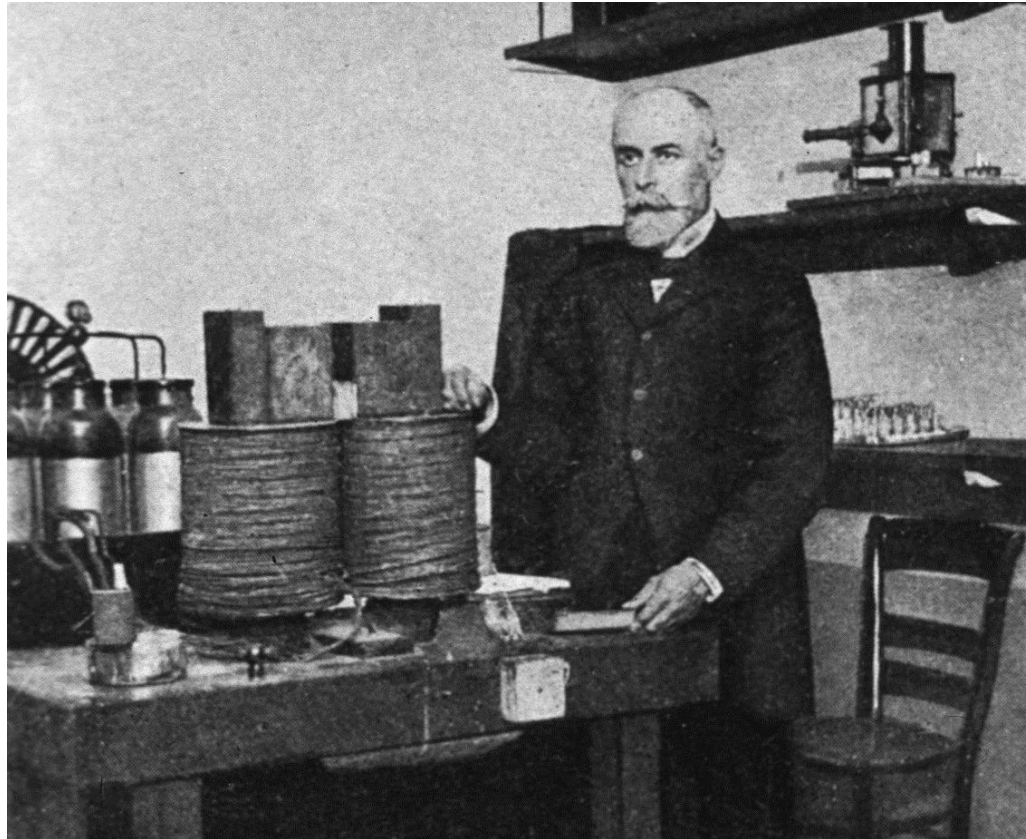


Where these the first medical physicists?



Pierre and Marie Curie in their lab

Or this guy?



Henri Becquerel (Curies' mentor)

Early isotope radiograph (1896)



Or perhaps Roentgen (1895)?



Or the real discoverer of x-rays (1857)?



Or the real discoverer of x-rays (1857)?

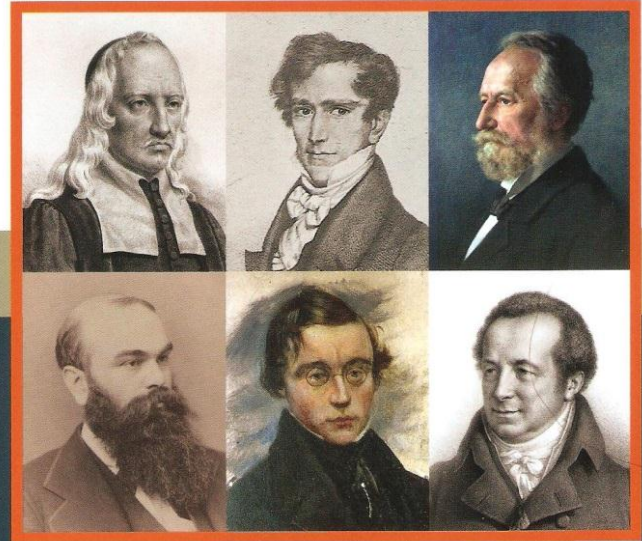


Claude Felix Abel Niepce de Saint-Victor

You MUST read this book!

Physicists and Physicians

A HISTORY OF MEDICAL PHYSICS
FROM THE RENAISSANCE TO RÖNTGEN



Francis A Duck

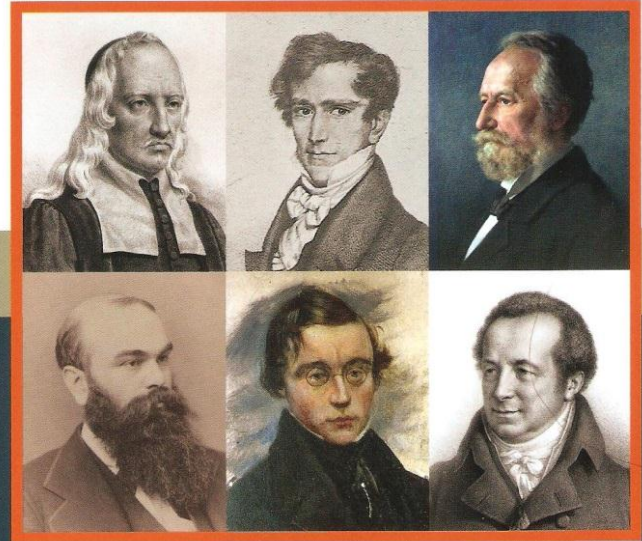


IPeM Institute of Physics and
Engineering in Medicine

How many can you
name?

Physicists and Physicians

A HISTORY OF MEDICAL PHYSICS
FROM THE RENAISSANCE TO RÖNTGEN



Francis A Duck



IPeM Institute of Physics and
Engineering in Medicine

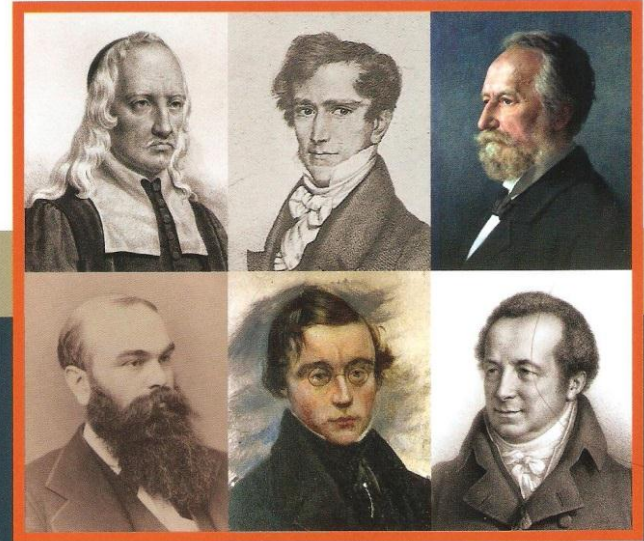
How many can you
name?

Borelli Pelletan Fick

Draper Bird Halle

Physicists and Physicians

A HISTORY OF MEDICAL PHYSICS
FROM THE RENAISSANCE TO RÖNTGEN



Francis A Duck



IPeM Institute of Physics and
Engineering in Medicine

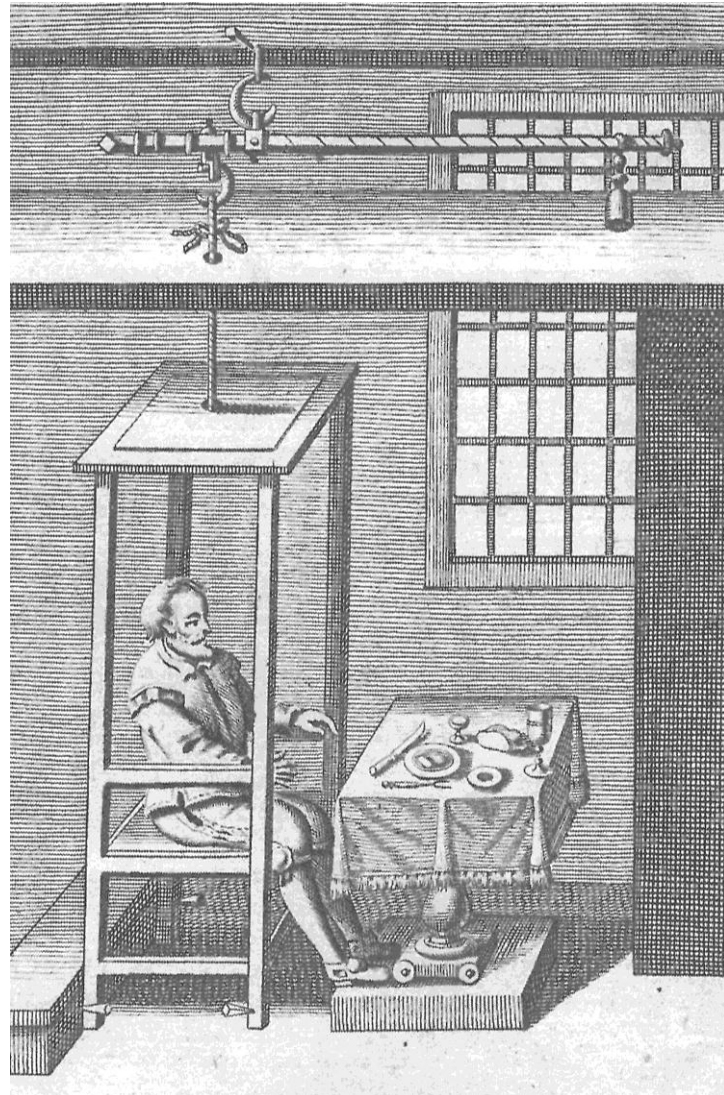
Where it all began - Padua



The first medical physicist?

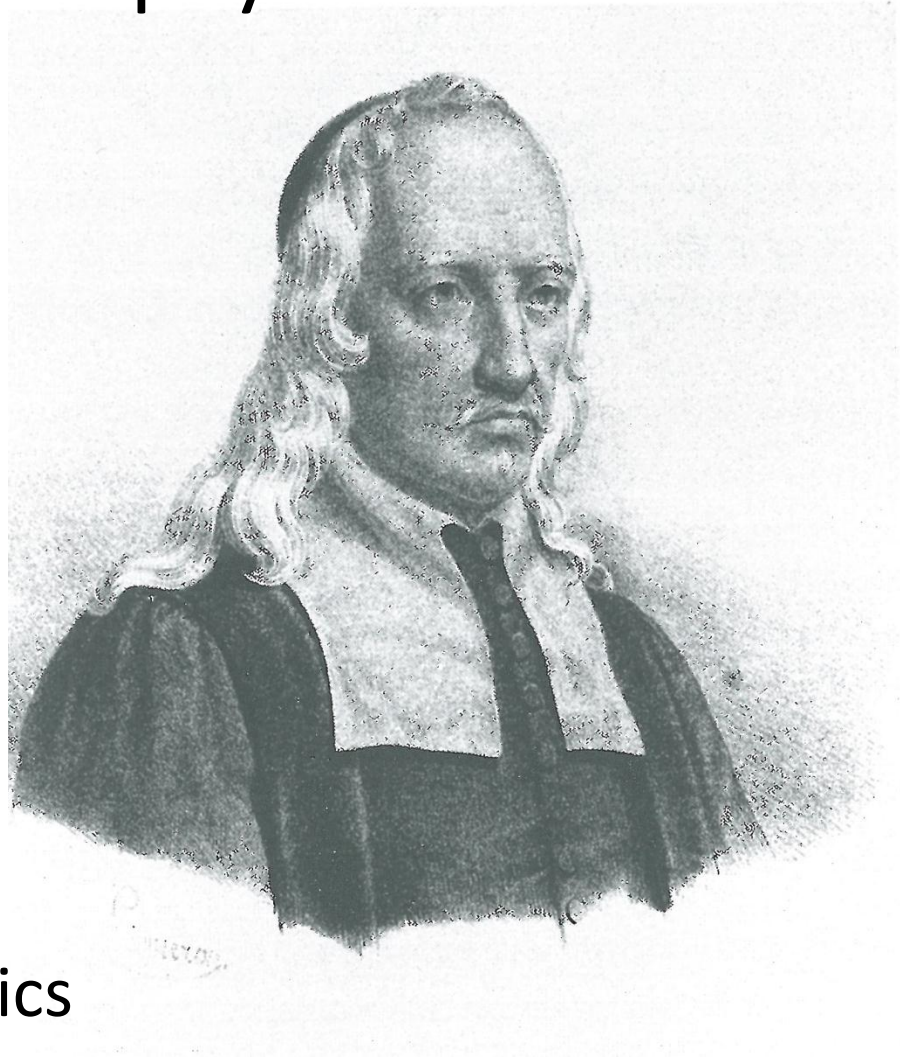
Sanctorius
(1561 – 1636)

(actually, he was a medic)

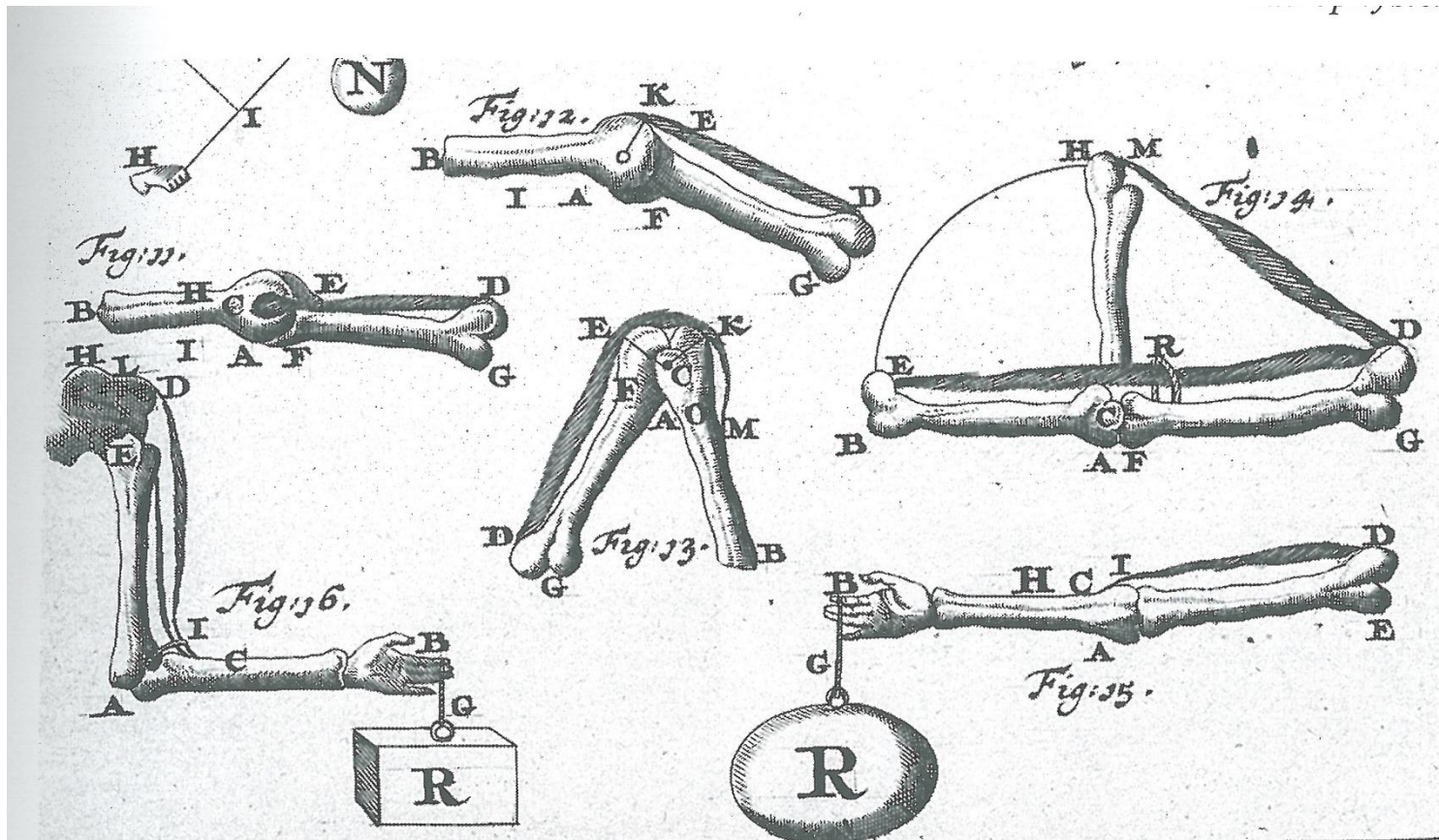


The first real medical physicist?

Giovanni Borelli
(1608 – 1679)

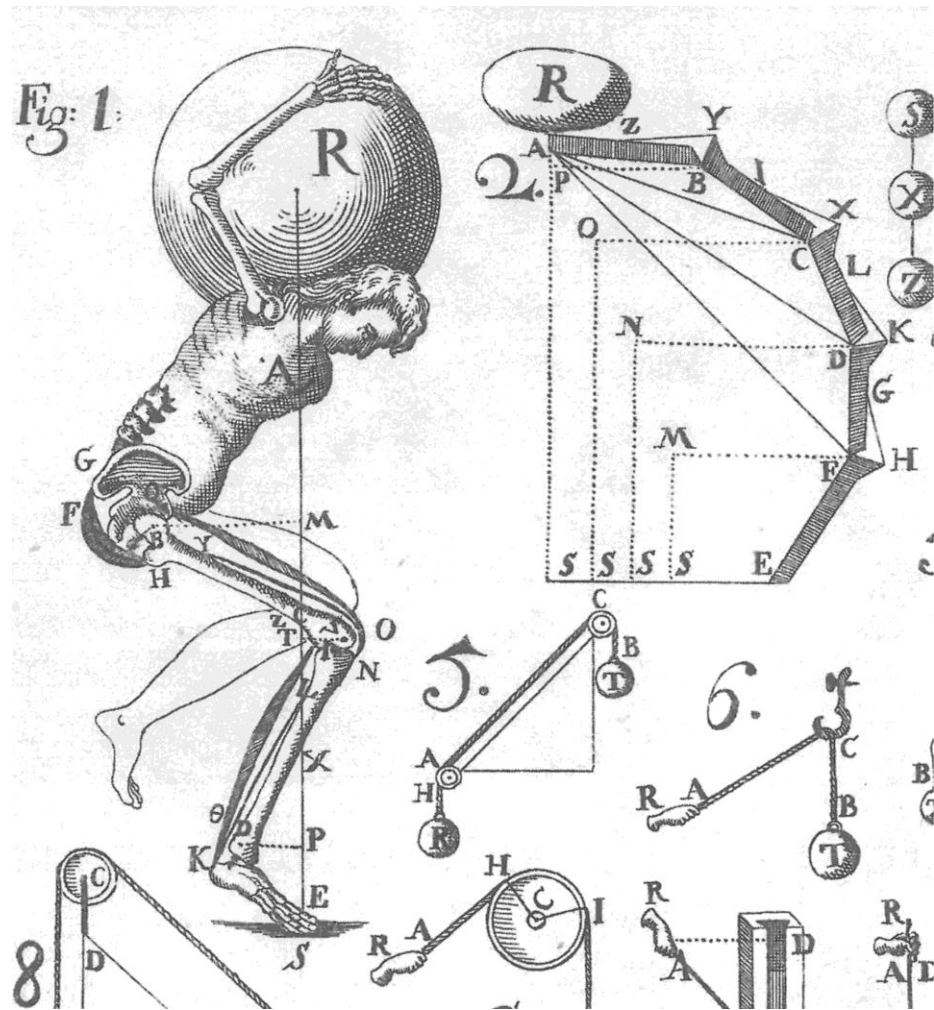


Professor of Mathematics
Pisa



"I undertook this work ... to enlist anatomy into physics and mathematics no less than astronomy"

Iatrophysics

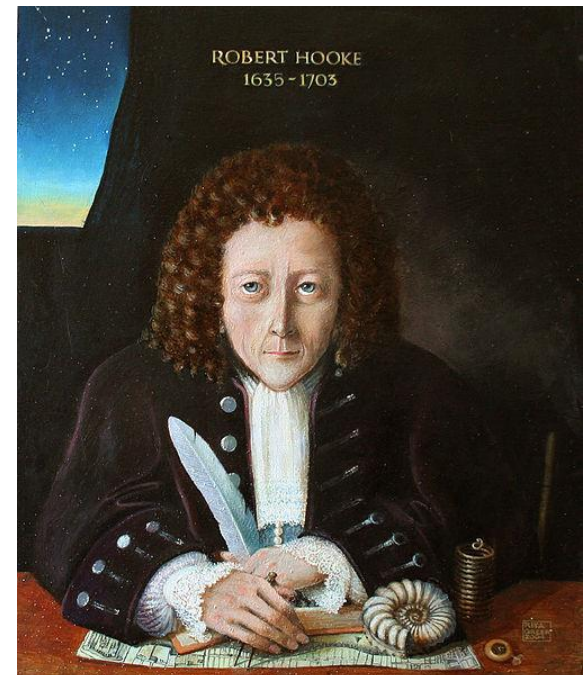


Borelli also considered

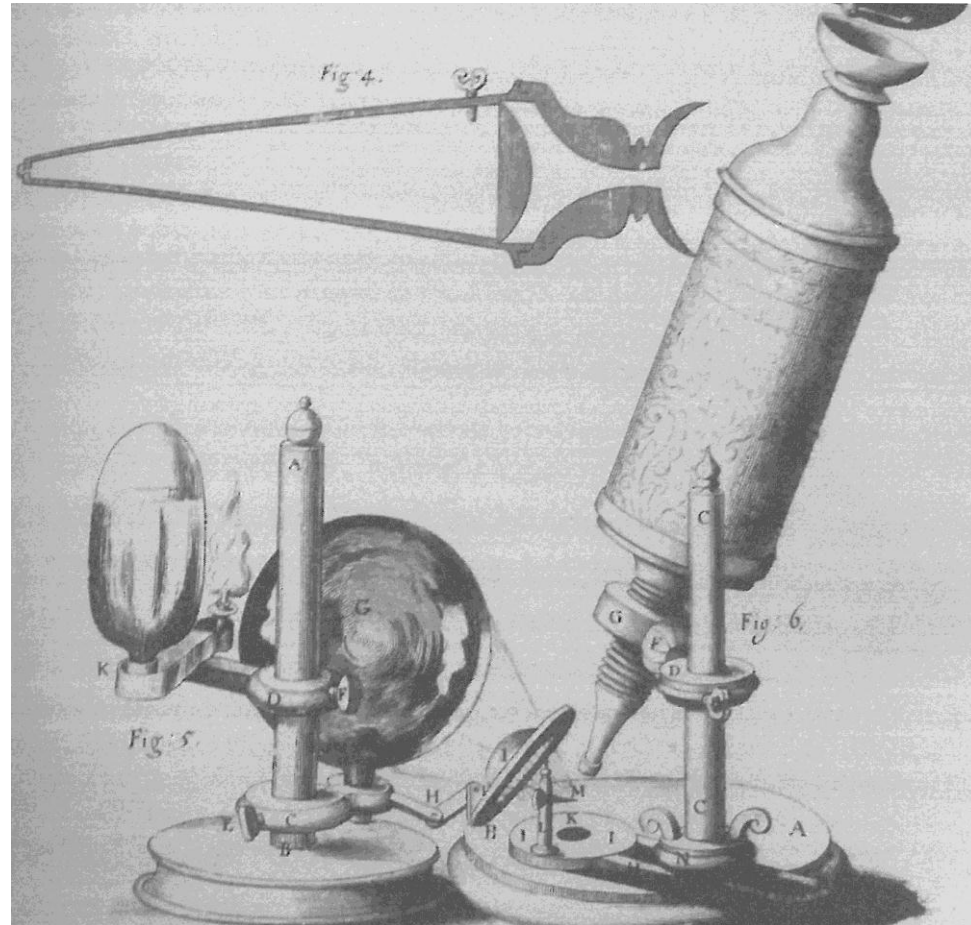
- Muscle contraction
- “nervous juice” (nerve conduction)
- Cardiovascular haemodynamics
- Body heat
- Respiration
- Kidney and liver function

Boyle and Hooke (about 1660)

- Respiration
- Animal experiments
- Purpose of breathing was to bring air into the lungs so that air could interact with the blood



Hooke's Microscope



Daniel Bernoulli (1700 – 1782)

Medicine and
mathematics

- Respiration
- Optics of vision
- Muscle action

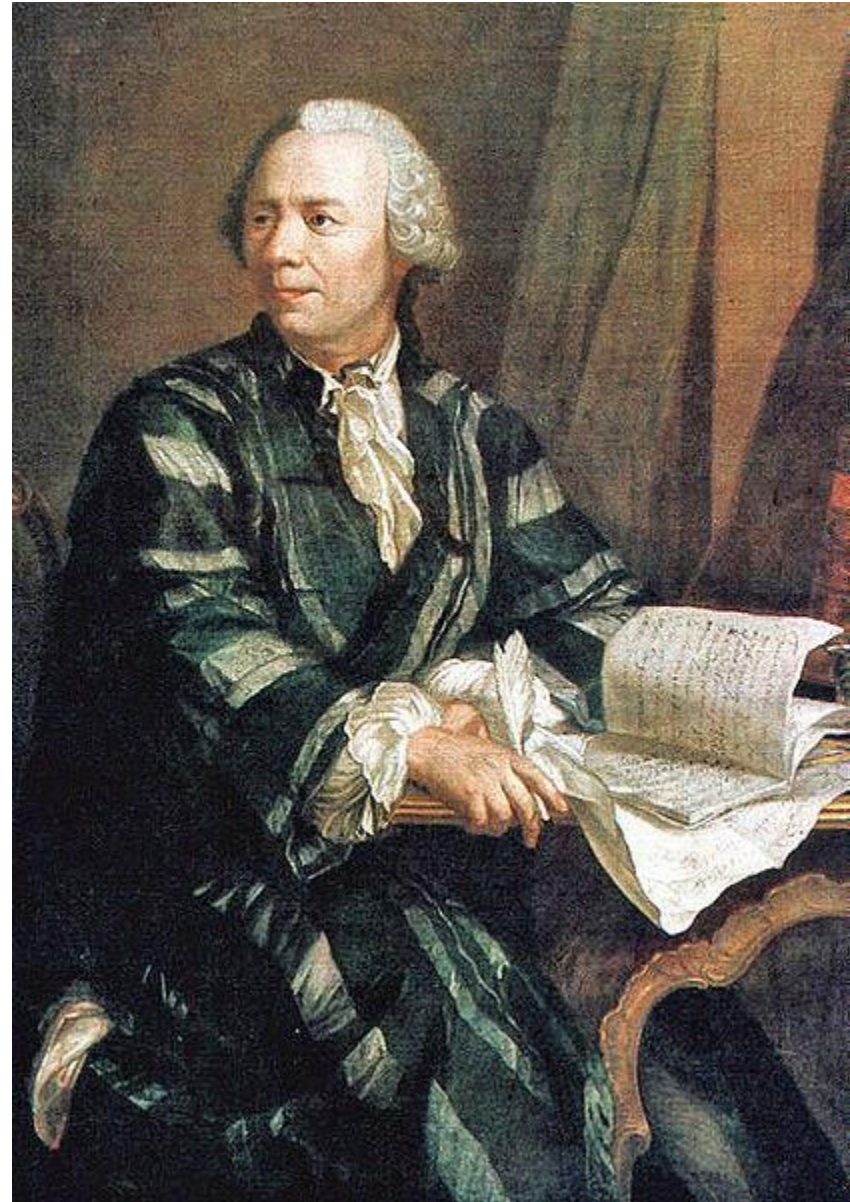


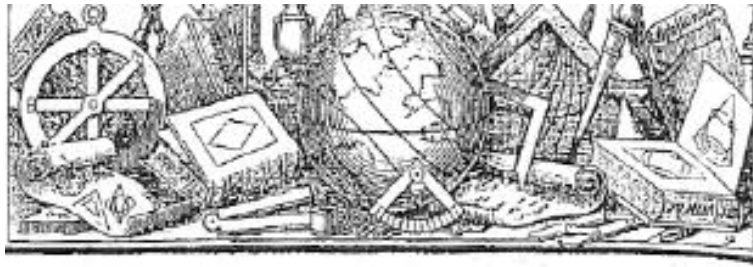
Euler
(1707 – 1783)

*“On the Blood Flow in
the Arteries”*

$$\frac{ds}{dt} + \frac{d(vs)}{dx} = 0$$

$$2\rho \frac{dp}{dz} + v \frac{dv}{dz} + \frac{dv}{dt} = 0$$





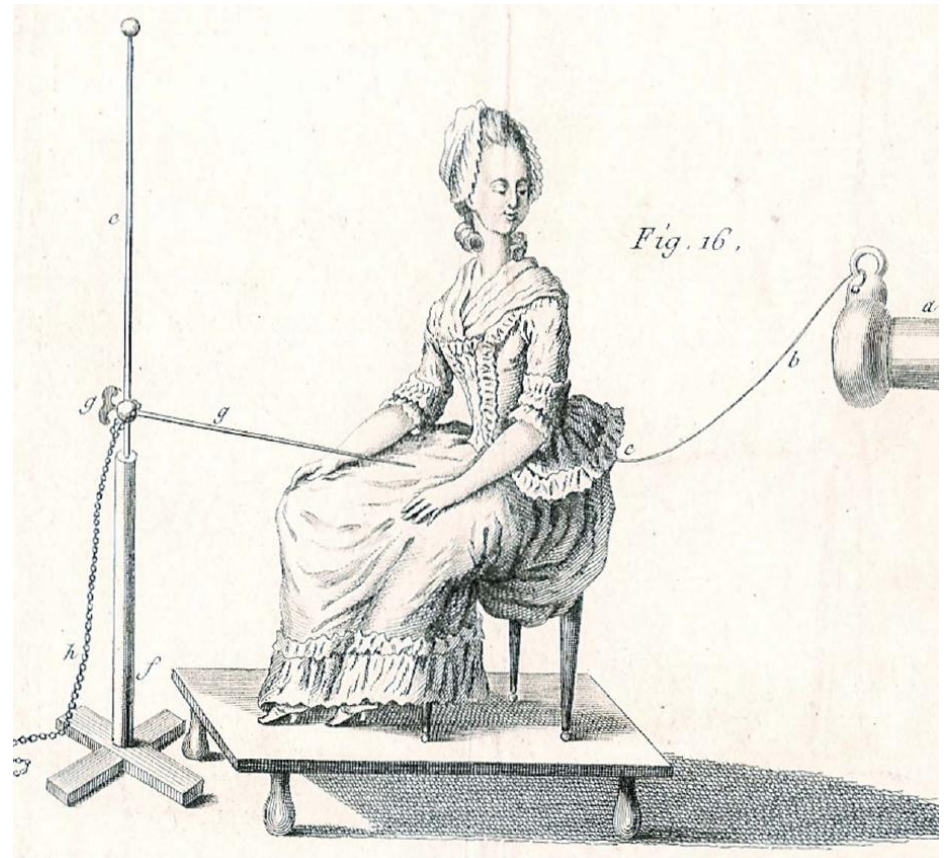
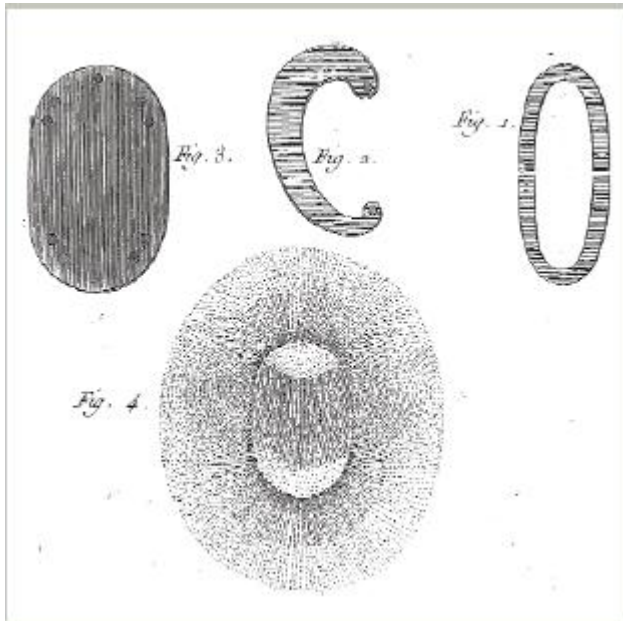
PHYSIQUE MÉDICALE.

L'Histoire de la Societe Royale de Medecine (1779)



Felix Vicq d'Azir
(1748 – 1794)

Investigating therapeutic static electricity and magnetism



Defining “Medical Physics”

“physics applied to the knowledge of the human body, to its preservation, and to the cure of its illnesses”

Professor of Medical
Physics and Hygiene



Jean-Noel Halle
(1754 – 1822)

HALLÉ'S MEDICAL PHYSICS COURSE

The Medical Physics course will discuss the following as applied to observations on animal systems:

1. The properties of the body and the main laws of movement, friction and shock;
2. The explanation of forces and movements in animals through the properties of levers;
3. The extent to which the properties of liquids and their static laws are applicable to the phenomenon of animal circulation;
4. The properties of air, aeriform fluids, vaporised substances; of light, heat, the electric fluid and the magnetic fluid in forming the elements of atmospheric physics and from which general principles of meteorology will be deduced;

5. The physical demonstration of acoustics and of optics applied to animals; the skill of using instruments in microscopic observations; the principles of the construction of hearths favourable to health in our homes, deduced from the phenomenon of the statics of fire; medical electricity;
6. The general properties of organic substances, particularly the recently discovered properties of the nervous system, and their similarity with electricity; the way organic properties alter physical properties;
7. How to experiment on animals;
8. The principles of applying physics to medicine.

Pierre Pelletan (1782 – 1845)

Doctor

Inventor

Entrepreneur

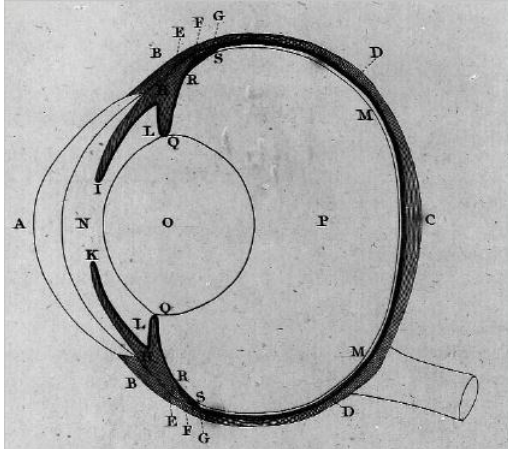
Professor of Medical Physics

Author of physics textbook for medical students



Thomas Young
(1773 – 1829)

Optics
Haemodynamics



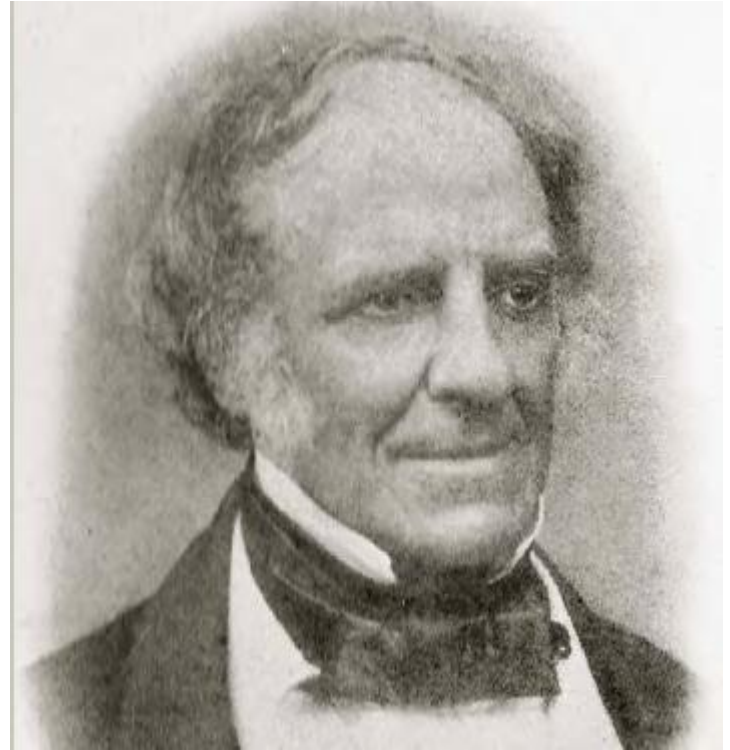
Author of physics text intended for medical students

Neil Arnott
(1788 – 1874)

Doctor

Lectured on physics
applied to medicine

Author of physics text intended for medical students
Inventor of the smokeless stove



Medical Physics Teaching in UK

1798 Wilkinson gives (optional) lectures in physics to students at St Bart's (discontinued)

1834 Thomas Griffiths appointed by St Bart's as a "natural philosophy" lecturer

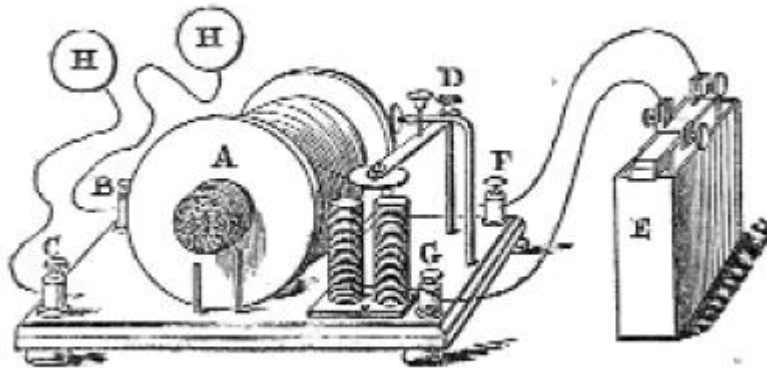
1860 Physics lectures compulsory for medical students

1876 Edith Stoney – first woman lecturer in physics in a medical school

Golding Bird (1814 – 1854)

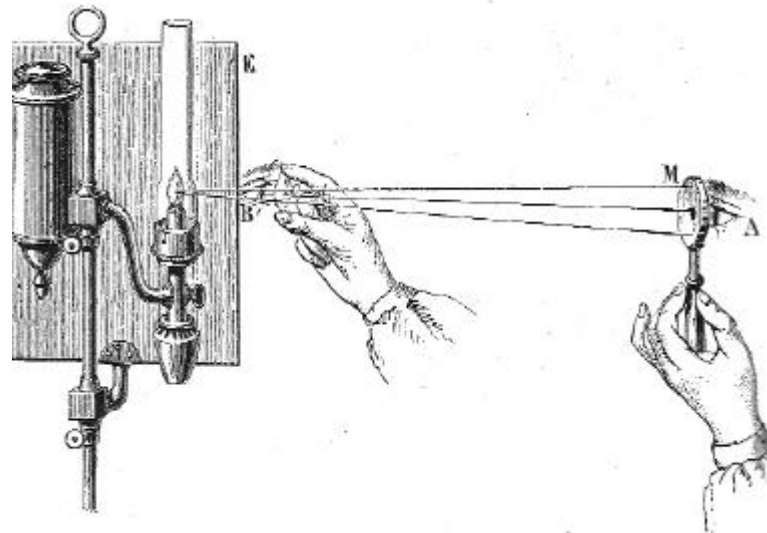
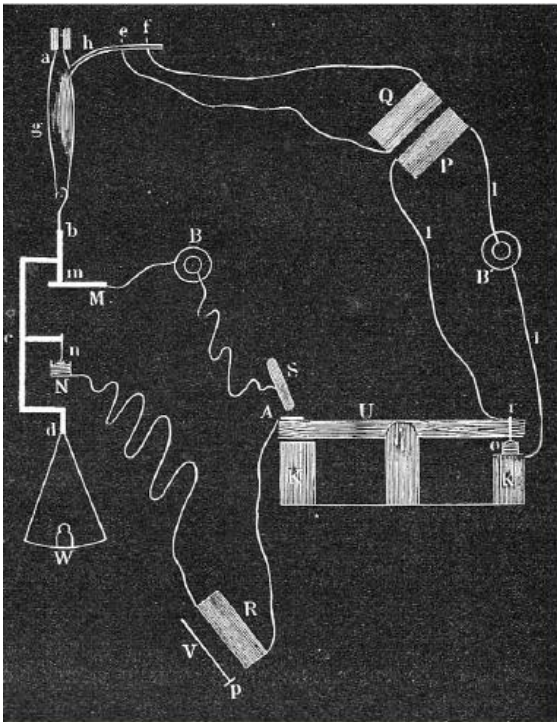
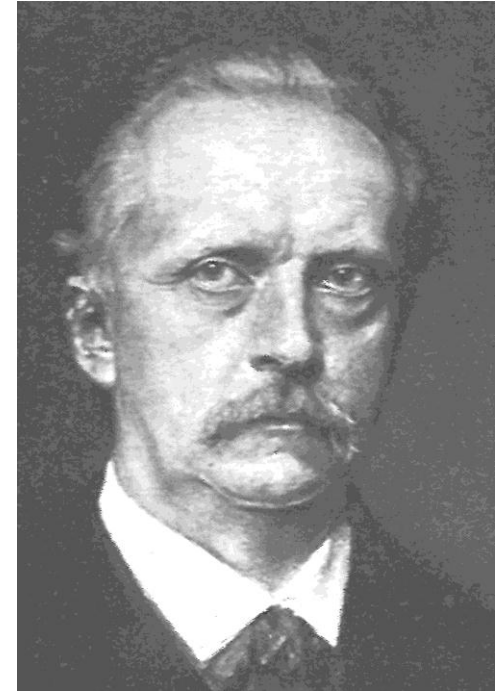
Physics lecturer at St Bart's

Developed electrotherapy
equipment



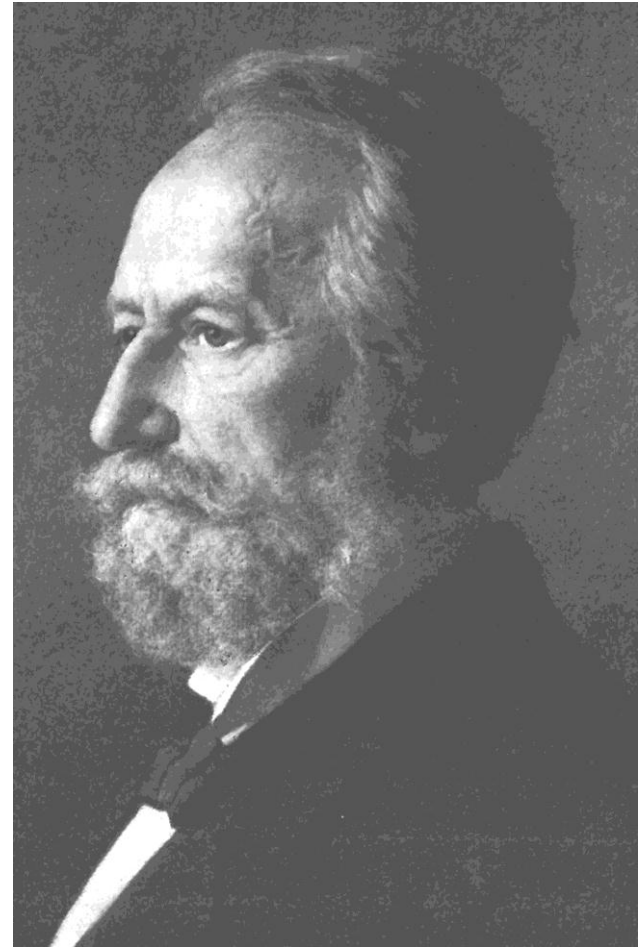
Hermann von Helmholtz (1821 – 1894)

Ophthalmoscope
Nerve conduction



Adolf Fick
(1829 – 1901)

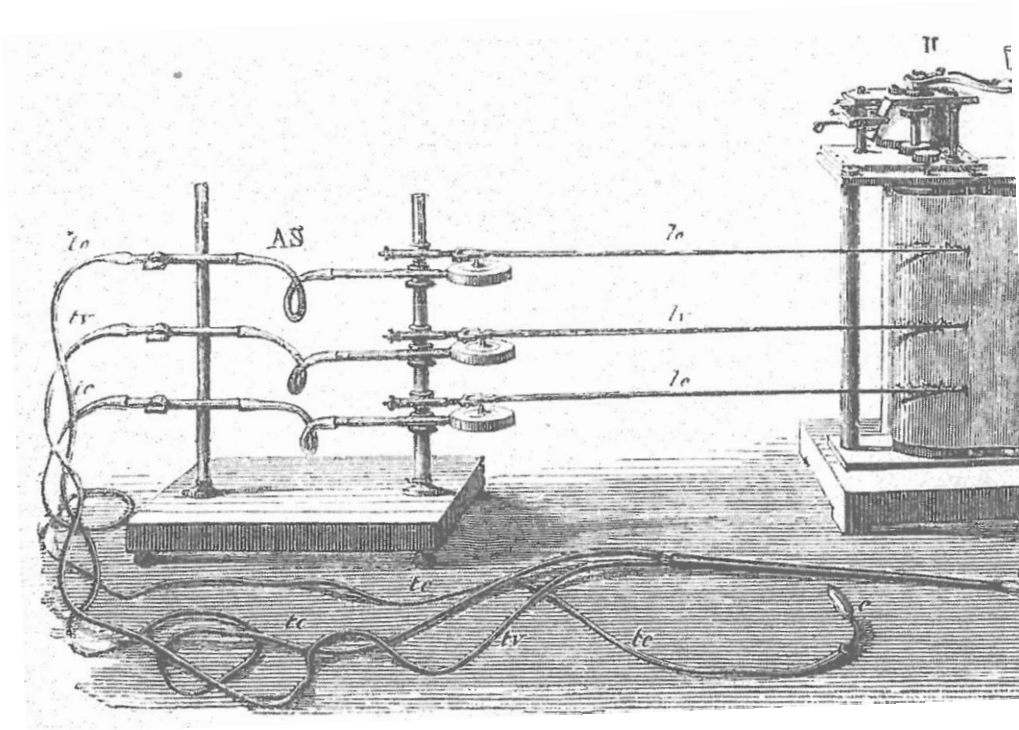
Fick Principle
Plethysmograph
Contact lens
Ophthalmotonometer
Dynamometer



Etienne-Jules Marey

(1830 – 1904)

Physiological measurement

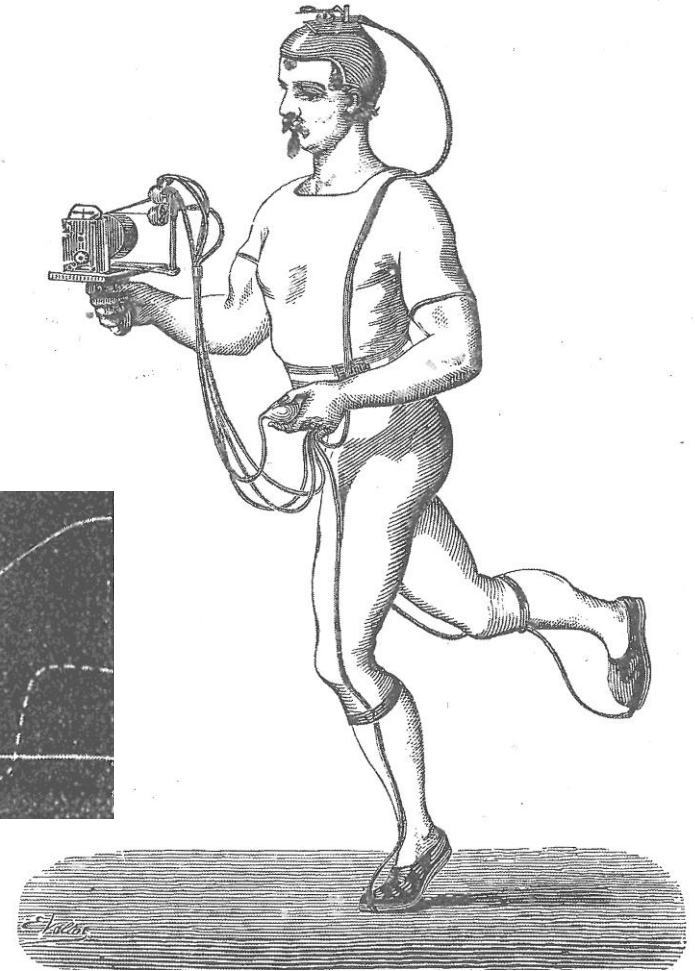
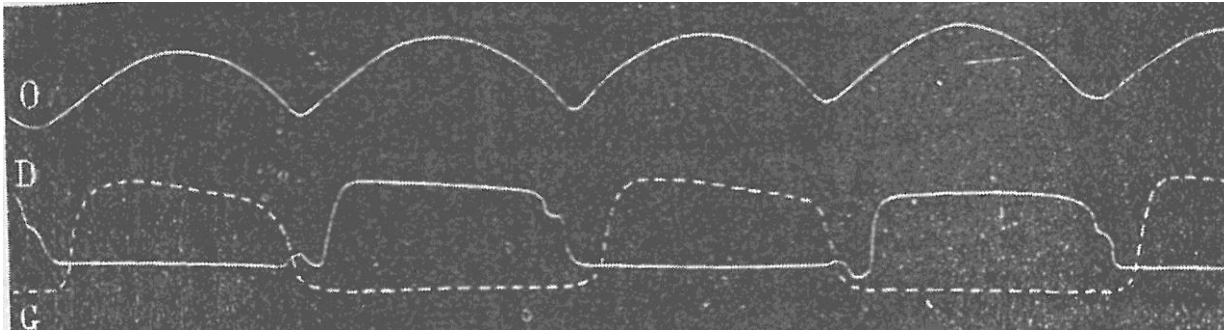


Intracardiac pressure measurement (1859)

Etienne-Jules Marey

(1830 – 1904)

Motion multichannel recording



What about the USA?

1760s – 1780 Natural and experimental philosophy taught to medical students in Philadelphia

1785 - 1819 Natural philosophy lectures at Columbia

1810 – 1811 Medical school option in Pennsylvania

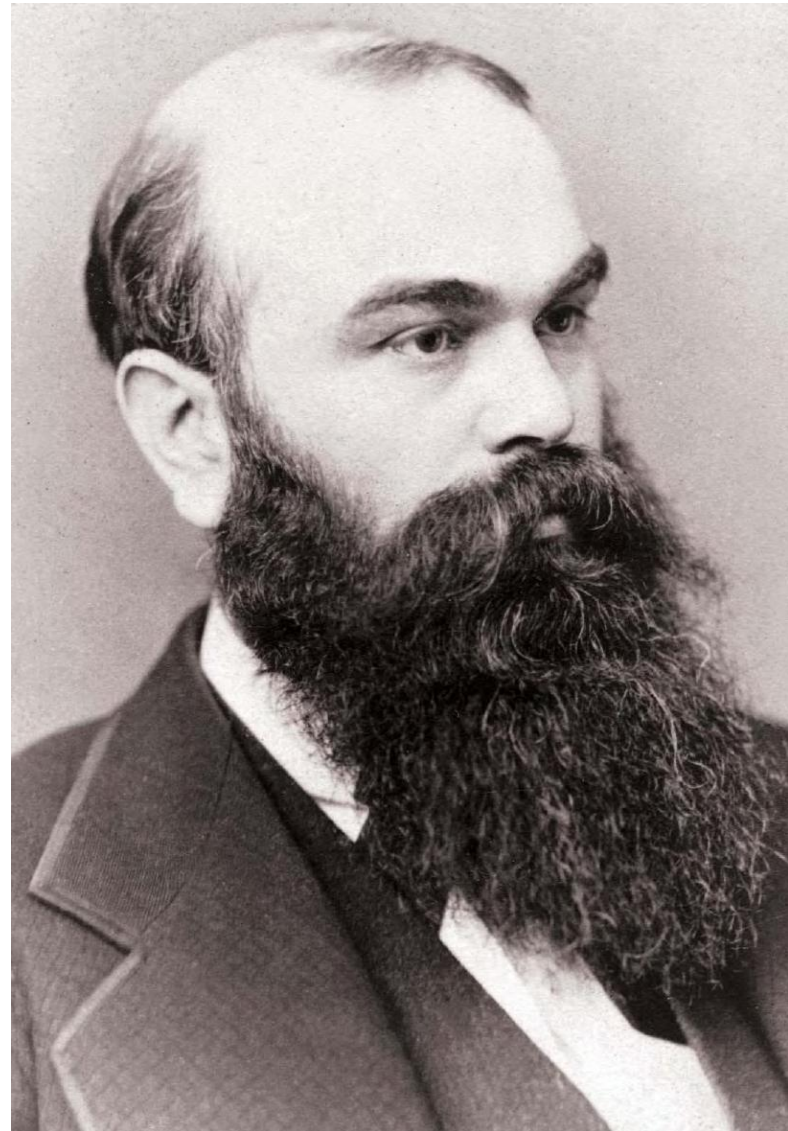
Then it all stopped for years

Until 1880s

Realisation that medical training was inadequate

Requirement in some states for those entering medical school to have knowledge of elementary physics

1885 Draper publishes first American book on medical physics



Then, back in Europe:

Roentgen

Bequerel

Curies



... and the rest is medical physics history.