HISTORY OF PHYSIOLOGY

Lect. Dr. Orhan Onder
11.10.2022

01

Survey

02

What is Physiology

03

Milestones and stars

04

Final Remarks

SCAN ME

What is Physiology

It is the branch of biology that aims to understand the mechanisms of living things, from the basis of cell function at the ionic and molecular level to the integrated behaviour of the whole body and the influence of the external environment

It was used infrequently in antiquity by Galen and others; however, in modern times, it came to represent a separate discipline with well-defined methods.

old french

physiologie

greek

-logía

study of -

greek

phúsis

nature

greek

phusio

nature

late latin

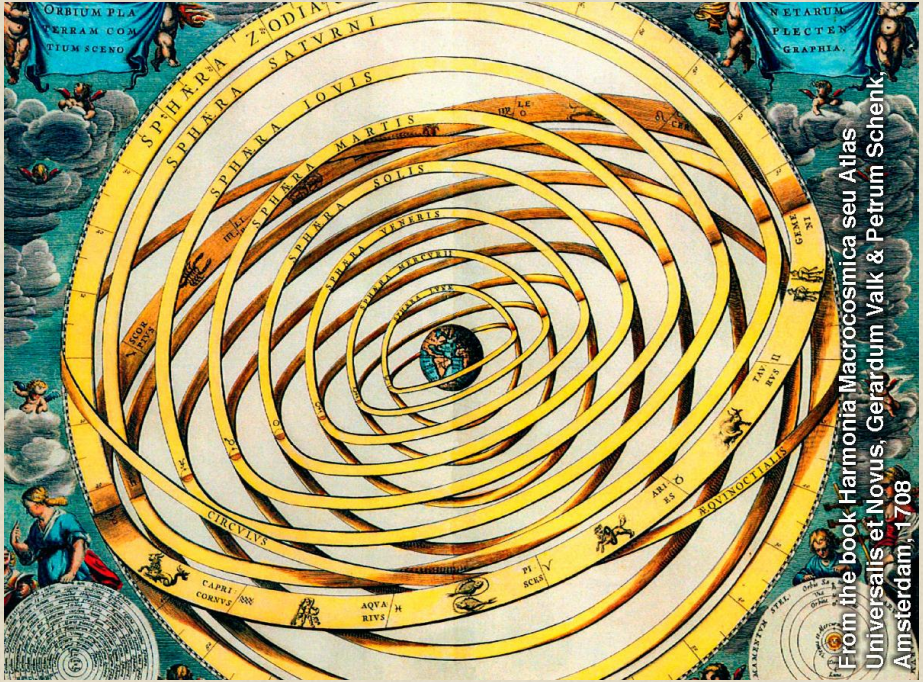
phusiología

late middle english

physiology

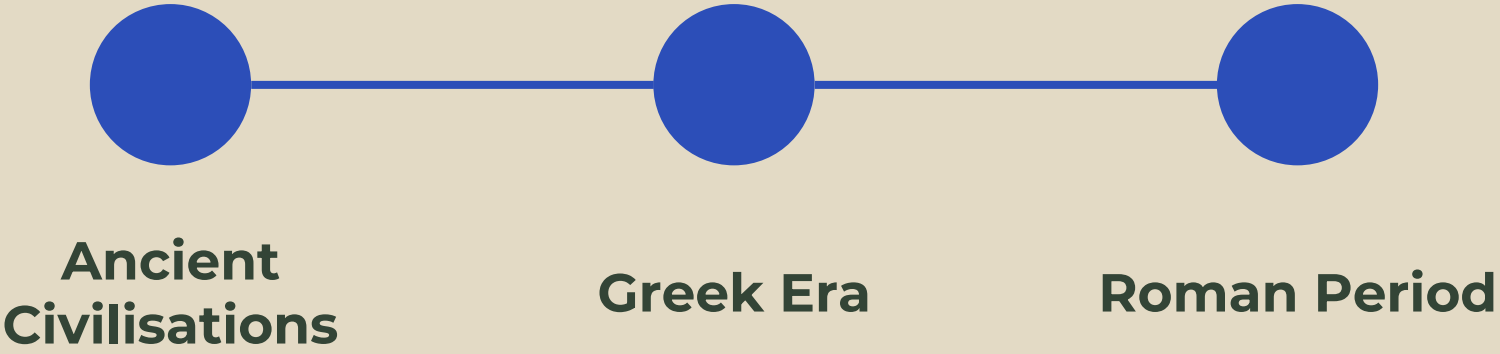
Cosmology & Physiology

—ARISTOTLE

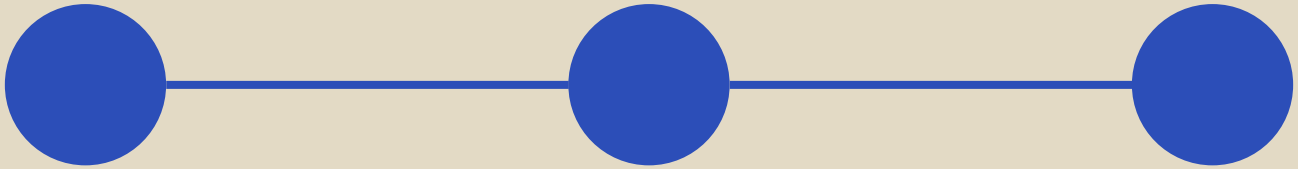


From the book Harmonia Macrocosmica seu Atlas Universalis et Novus, Gerardum Valk & Petrum Schenk. Amsterdam, 1708

TIMELINE



TIMELINE



Medieval Ages

Reneissance

17th - 20th centuries

Mesapotamia

3000-1600 BC

- *Liver as a heart of the body*
  - House of the soul
  - The most central organ in the body
  - Kimo ga futo(jp.), mei you tanzu (chi.) ciğerparem, ciğeri beş para etmez
- *Hepatoscopy*

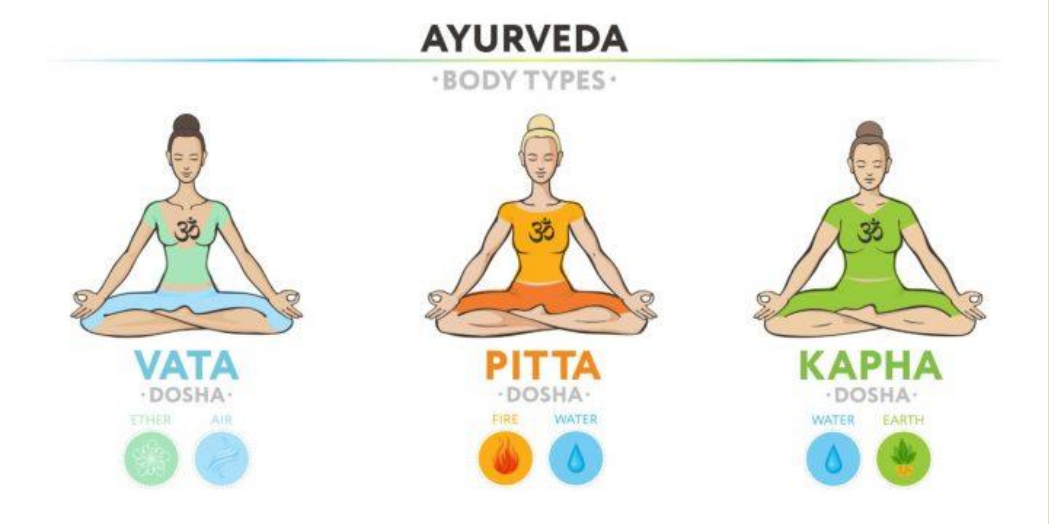
Ancient Egypt

- *Mythology*
- *Horus, Thot etc.*
- *Imhotep*

India

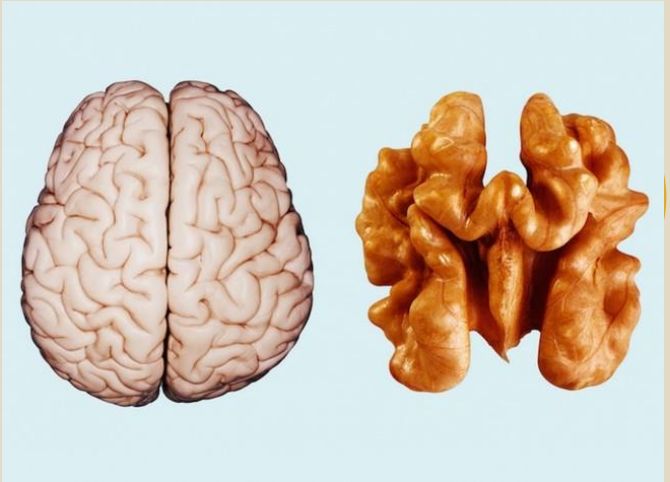
3000-1600 BC

- *Vedic Period*
- *Ayur veda*
- *Rig veda*



Magic-Religion-Science

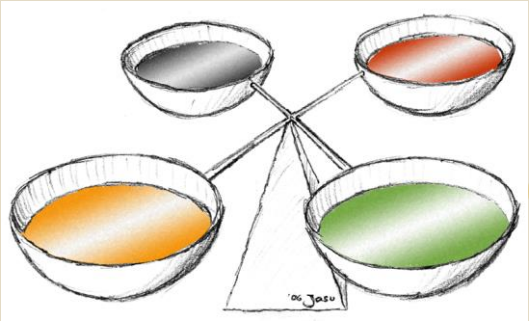
- *Similia similibis curantur*
  - disease may be cured by something that can cause similar symptoms
  - *Homeopathic medicine*
- *Contra contraiis curantur*
  - disease may be cured by something that can cause opposite effects
- **Signature theory**



Humoral Pathology

- *China*
- *Ancient Greek Civilisation*
- *Islamic civilisation*
- *Medieval medicine*

Humoral Pathology



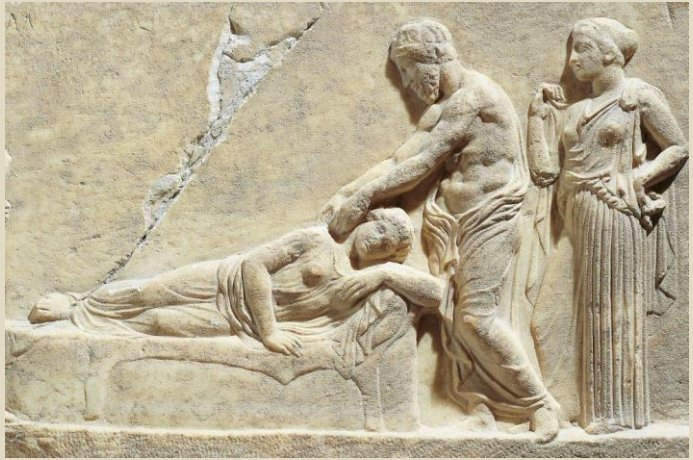
- İmbalance of humors as etiology of diseases
  - Eukrasia-dyskrasia
- Vomitting, sweating, laxatives as treatment

THE FOUR TEMPERAMENTS

The Four Humours Theory (Hippocrates & Galen)

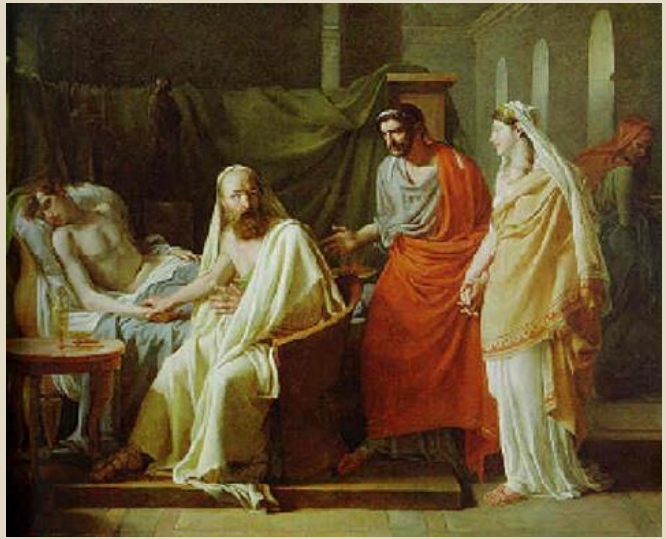
Humour	Temperament	Element	Qualities	Characteristic / Personality
Blood	Sanguine	Air	Hot, moist	Courageous, hopeful, amorous
Yellow bile	Choleric	Fire	Hot, dry	Short tempered, ambitious
Black bile	Melancholy	Earth	Cold, dry	Introspective, sentimental
Phlegm	Phlegmatic	Water	Cold, moist	Calm, unemotional

Ancient Greek medicine



- Mythological period
  - Asclepios, Hygieia
- Philosopher Physicians
  - Empedokles
  - Alcmaeon
- Scientific Period
  - Hippocrates
  - Herophilos
  - Erasistratos

Ancient Greek medicine



- **Hippocrates**
  - Humoral pathology
- **Erasistratos**
  - pneuma-pathology

Ancient Roman medicine

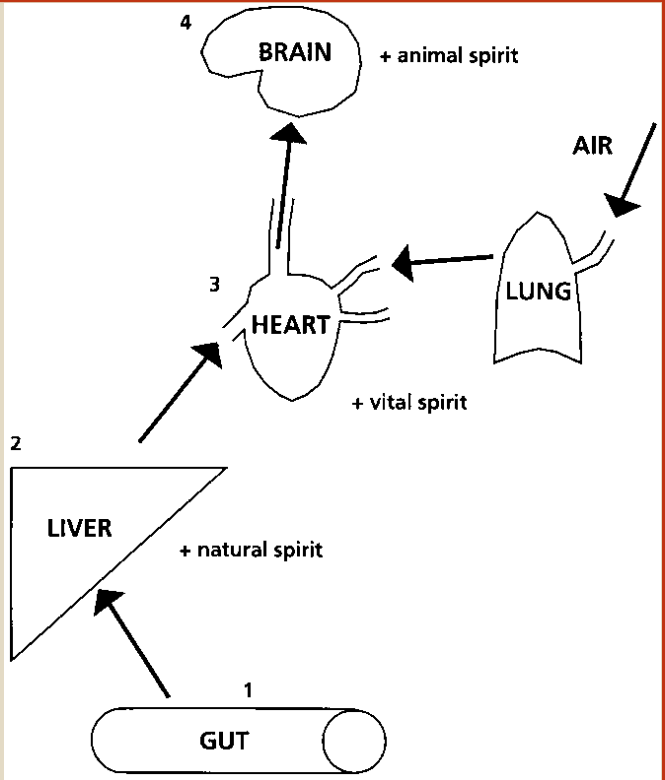
Galen (of Pergamon), 129 – ca. 216

- His views dominated Western medical science for more than 1,300 years
- Theorized on many medical subjects like anatomy, physiology, pathology, symptomatology and treatment

Ancient Roman medicine

Galen (of Pergamon), 129 – ca. 216

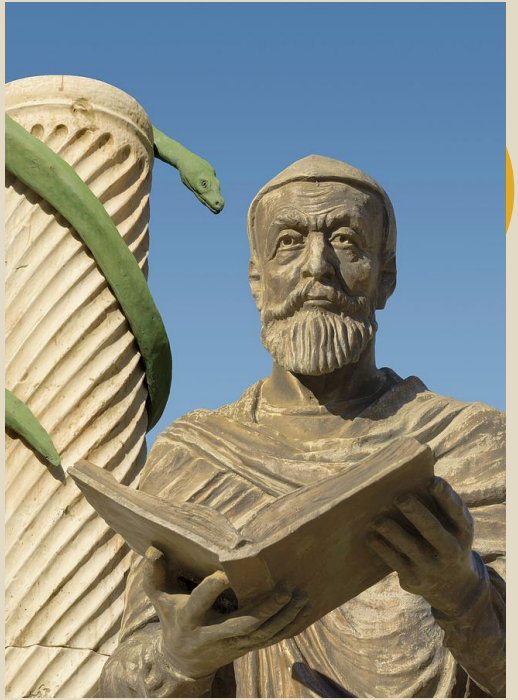
- Galenic understanding of nutrition and circulation proceeded as follows:
- Food is consumed, absorbed, and transformed in the liver into blood with natural spirit (pneuma physicon).
- It passes to the lung, where it is imbued with air or vital spirit (pneuma zoticon).
- It then flows outward, in both arteries and veins, to all the organs including the brain, which adds animal spirit (pneuma psychicon), the source of motion.



Ancient Roman medicine

Galen (of Pergamon), 129 – ca. 216

- First pyhsician to show the differences between venous and arterial blood, but thought that they were completely separate from each other
- Interpreted his findings on respiration and circulation in a wrong and complicated way
- Still remained as an unchallenged authority in his lifetime, and his work established a legacy that continued for over a thousand years



Medieval ages

- The pulmonary circulation was first described by the Arab intellectual Ibn al-Nafis (13th century). He refuted Galen by announcing that blood did not pass through pores in the cardiac septum but went from the right heart to the left through the lungs.
- Three hundred years later, the Spanish physician and cleric Servetus also described pulmonary circulation in a religious treatise.

Renaissance

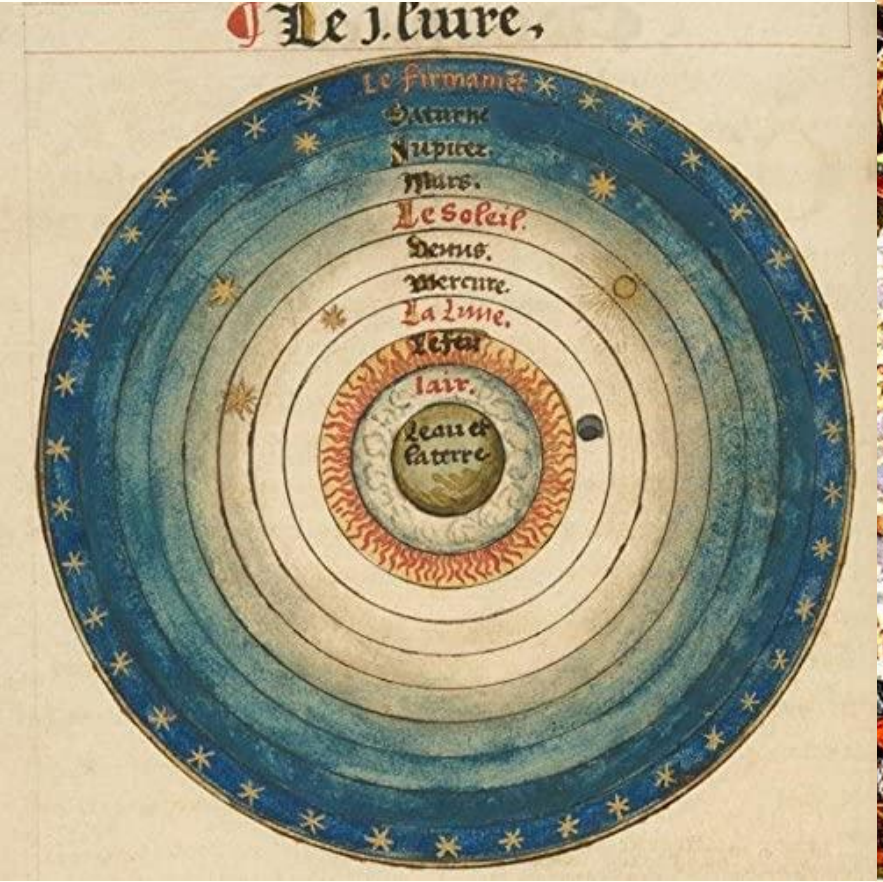
Age of Discovery/Exploration

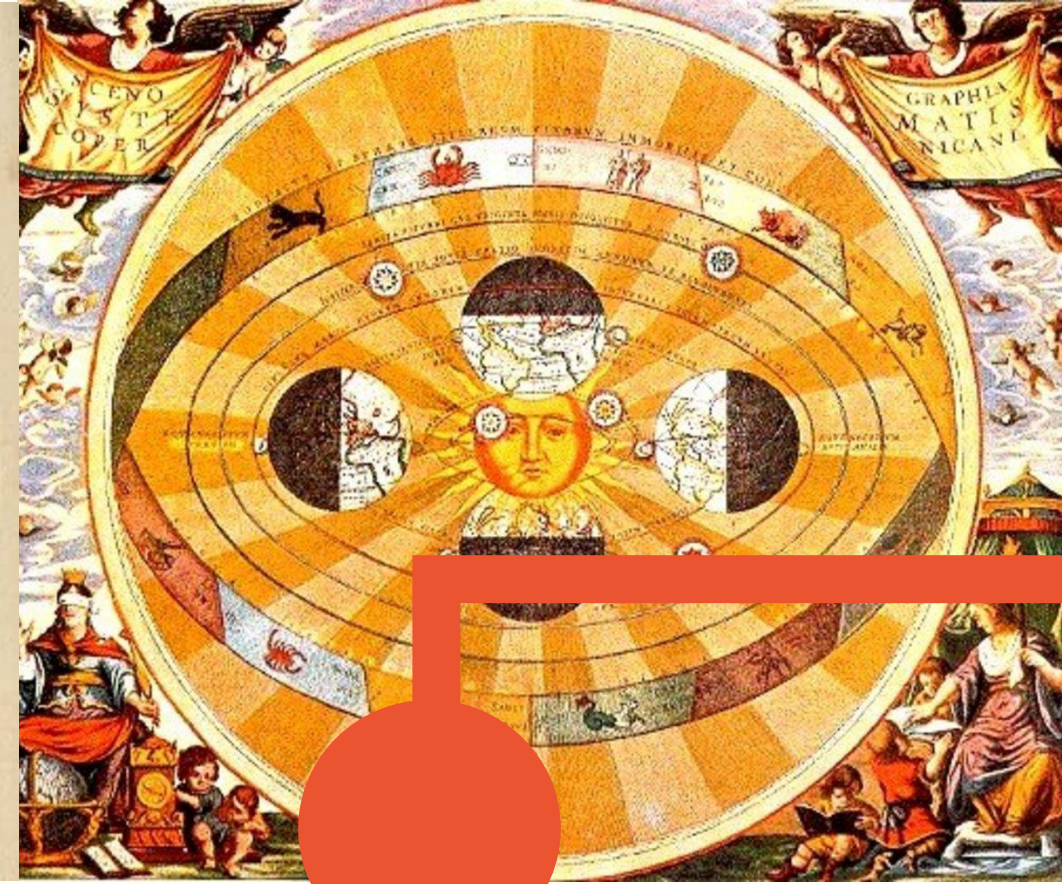
- In the 15th century, anatomy in Europe began to blossom (e.g. Vesalius), but the distinction between anatomy and function was not very clear yet.

theocentric

anthropocentric

neo-galenists





Geocentric & Heliocentric

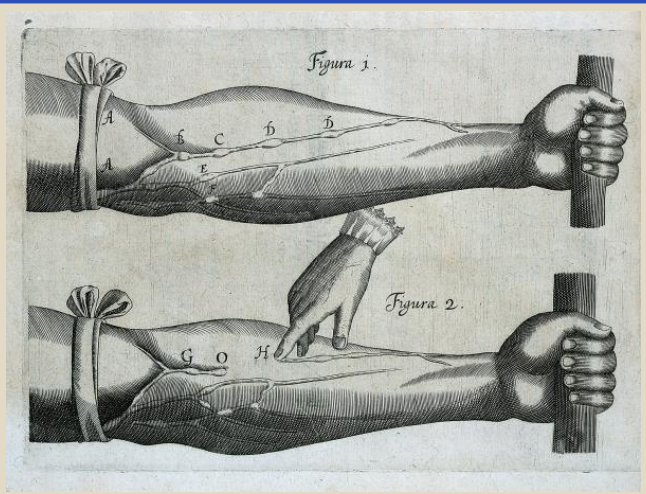
Copernican Revolution

Perspective

Renaissance

William Harvey, 1578 – 1657

- We can consider William Harvey's book on the circulation of the blood (de Motu Cordis, 1628) as the starting point of physiology.
- Although some people initially rejected the concept, by and large it was quite rapidly accepted all over Europe, and several researchers became interested in human function in general.



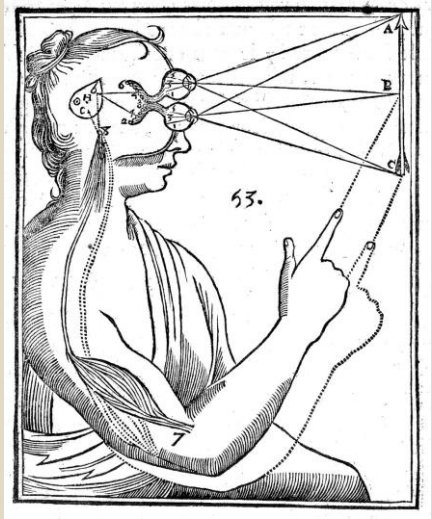
Renaissance

- Following Harvey, others were inspired to seek mechanistic explanations for life functions.
- Italian physician Santorio Santorio invented a pendulum machine to count the pulse, devised a large thermometer to measure body heat, used a metabolic balance chair to weigh his own ingesta and excreta.
- Paracelsus and Iatrochemistry

«Measure all that is measurable and make those things measurable which have hitherto not been measured»

— GALİLEO GALİLEİ

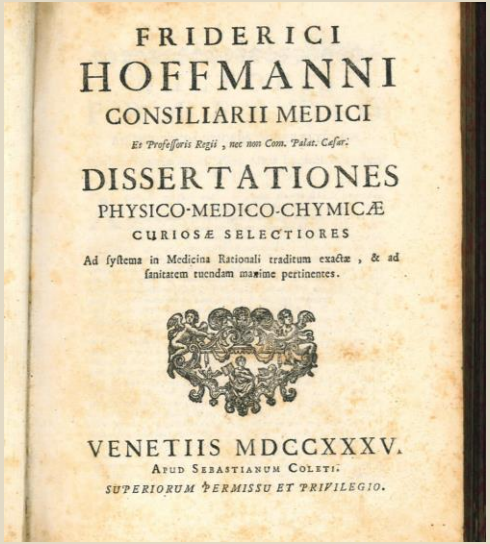
Treatise on Human
René Descartes
1664



Beast Machine Theory

Renaissance

- Iatromechanists defined and described disease through physical analogies involving pumps, levers, springs, and pulleys.
- These physiologists also noticed that chemistry could mimic the living phenomena of fermentation, combustion, and decomposition. Because bodily processes could be described in similar terms, iatrochemistry became a specialized subset of early modern physiology.
- The English iatrochemist John Mayow studied living beings as units of combustion.


FRIDERICI
HOFFMANNI
CONSILIARII MEDICI
Et Professoris Regii, nec non Com. Palat. Cesar.
DISSERTATIONES
PHYSICO-MEDICO-CHYMICÆ
CURIOSÆ SELECTIORES
Ad systema in Medicina Rationali traditum exactæ, & ad sanitatem tuendam maxime pertinentes.
VENETIIS MDCCXXXV.
Apud Sebastianum Coleti.
SUPERIORUM PERMISSU ET PRIVILEGIO.

17th – 18th centuries

- After about 1750, a standstill followed. This period lasted for about 100 years and was seen all over Europe in the sciences.
- According to German philosophers, the intelligent human was able to understand the natural phenomena; the **experiment-based approach was not necessary**.
- Teaching in medicine consisted of reading Latin texts. Medicine was considered an **art** rather than a science.

Rebirth of physiology

- In the middle of the 19th century, the microscope was not introduced to medical students in Leiden, and auscultation (invented by Auenbrugger and introduced in the clinic by Laennec in 1819) was not or hardly used in 1850.
- About 1840, a number of young medical doctors in Germany became proponents of the concept ‘medicine = science’ and proposed that science should be introduced in the medical curriculum.

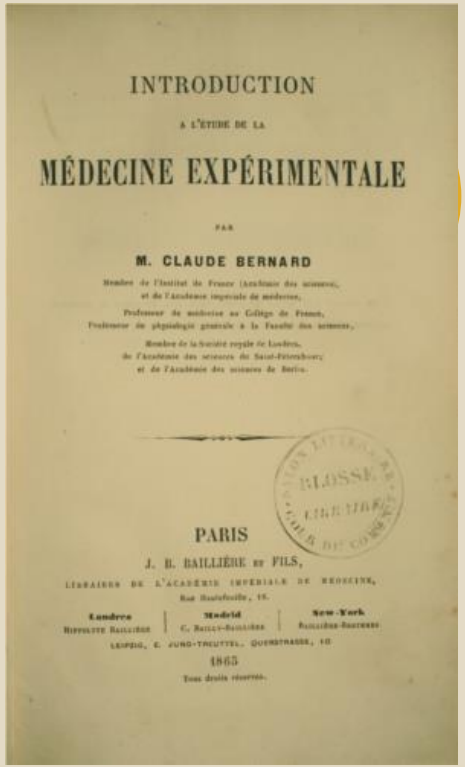
Rebirth of physiology

- Teachers and students in medicine demanded better understanding of human functional processes to be able to provide good patient care.
- Quite suddenly, great physiologists arose: Carl F.W. Ludwig in Germany and Claude Bernard in France

19th – 20th centuries

Claude Bernard 1813-1878

- Father of modern physiology
- His main contribution, however, was the elaboration of an approach to experimentation, now known as ‘the scientific method.’
- Introduction to the Study of Experimental Physiology (1865)
- Bernard would observe a phenomenon, localize it to an anatomical structure, and then surgically alter that structure in order to study its effects.


INTRODUCTION

À L'ÉTUDE DE LA

MÉDECINE EXPÉRIMENTALE

PAR

M. CLAUDE BERNARD

Membre de l'Institut de France (Académie des sciences), et de l'Académie impériale de médecine,

Professeur de médecine au Collège de France,
Professeur de physiologie générale à la Faculté des sciences,

Membre de la Société royale de Londres, de l'Académie des sciences de Saint-Pétersbourg et de l'Académie des sciences de Berlin.

PARIS

J. B. BAILLIÈRE ET FILS,

LIBRAIRES DE L'ACADÉMIE IMPÉRIALE DE MÉDECINE,

Rue Hautefeuille, 19.

Londres | Madrid | New-York

LEIPZIG, C. FUNG-TRICHTEL, QUERSTRASSE, 10.

1865

Tous droits réservés.

19th – 20th centuries

- Later in the 19th and early 20th century many physiologists became known. Examples are Ivan Pavlov (psychophysiology), Charles Sherrington (neurophysiology), Otto Frank and Ernest Starling (cardiovascular physiology and hormones), Angelo Mosso (ergograph, sphygmomanometer), Camillo Golgi (nervous system, malaria), Sidney Ringer (Ringer's solution), and Willem Einthoven (electrophysiology).
- Recognition of the importance of physiology became apparent with the establishment of the Nobel Prize in Physiology or Medicine (first awarded in 1901).

FINAL REMARKS

Similia similibis curantur

Contra contraiis curantur

THANKS

Does anyone have any questions?

orhnonder@gmail.com
orhan.onder@marmara.edu.tr

References

Duffin J. History of medicine. University of Toronto Press, 2010.

McGraw R. Encyclopedia of Medical History. MacMillan Press, 1985.

Westerhof N. A short history of physiology. Acta Physiol (Oxf). 2011 Aug;202(4):601-3.