HISTORY OF PHYSICAL SCIENCES

Andrzej K. Wróblewski

What history ?

What physics ?

History of physics, and science in general, is quite often presented in a distorted way. Some authors tend to judge the past by using only the present state of knowledge

Such an approach leads to a **false** picture of the past, because all mistakes, wrong turns and blind alleys which formed an important part of history are neglected.

It results in a deformed representation of the development of physics as an orderly, logical progress which has always led straight to its present state

Physics never developed in this way!

”The historian of science would lose immensely if he failed to make use of superior modern knowledge to evaluate the discoveries and theories of the past. But it is just in doing so that he is exposed to the greatest danger. Because science does genuinely progress by making discoveries and detecting mistakes, the temptation is almost irresistible to regard the discoveries of the past as simply anticipating and contributing to the science of the present and to write off the mistakes as leading nowhere. It is precisely this temptation, belonging as it does to the essence of science, that can sometimes make it more difficult for us to understand how discoveries and theories were in fact made and were seen by their authors in their own day. It can lead to the most insidious form of the falsification of history.”

A. C. Crombie, *The History of Science from Augustine to Galileo*, p. 22

History should never be just a list of names and dates

Old discoveries and ideas cannot be appraised by using only the present perspective and knowledge

We must try:

- to look at the world through the eyes of scientists who lived at a given time,

and

- to understand the problems they saw, the methods they used to solve them, and the answers they gave at the time

Never !

trust historic information in physics textbooks

unless their authors had really studied
the history of physics

Physics is growing and changing all the time

Around the middle of the XXth century we did not have

quarks, gluons, quantum chromodynamics, intermediate bosons, electroweak theory, transistors, computers, lasers, holography, superconductivity at high *T*, fullerenes, quantum wires and dots, nanotubes, graphene, pulsars, quasars, magnetars, Higgs boson, gravitational waves...

φύσίς - nature

”*Physicks*... is that Knowledge which leads us to the Reasons and Causes of every Effect which Nature produces.”

(1735)

Examples of physics textbooks of the past

COMPENDIVM

NATVRALIS
PHILOSOPHIAE.

LIBRI DVODECIM DE *consideratione rerũ naturalium, earumq; ad ſuum Creatorem reductione, Per fratrem Franciſcum Titelmannum Haſſelenſem, ordinis fratrum Minorum, ſanctarum ſcripturarum apud Louanienſes prælectorem.*

PARISIIS,
Apud Ioannem Lodoicum Tiletanum, ex aduerſo Collegij Remenſis. 1545.

ORDO ET MATERIA LIBRORVM DVODECIM SEQVENTIVM.

- Liber primus tractat de principiis rerum naturalium.
- Liberſecundus de cauſisrerum naturalium,
- Liber tertius,de motu & accidetibus eius.
- LiBer quartus, de infinito, loco,vacuo,& tempore.
- Liber quintus de generatione & corruptione rerum naturalium.
- Liber ſextus, de meteorlogicis impreſsionibus.
- Liber ſeptimus, de cœlo & mundo
- Liber octauus,de anima in generali,& de potentiis vegetatiuis, deque longitudine & breuitate vitæ.
- Liber nonus,de ſenſibus exterioribus & eorum ſenſibilibus.
- Liber decimus,de ſenſibus interioribus, deque ſomno & vigilia.
- Liber vndecimus,de intellectu & præcellentibus eius officiis.
- Liber duodecimus,de appetitu ſenſitiuo & voluntatis præcellentia.

ARNOLDI SENGUERDII

INTRODUCTIONIS AD PHYSICAM LIBRI SEX.

VLTRAJECTI.
Apud IOANNEM à WAESBERGE
ANNO M D C XLIV.

INDEX CAPITVM

LIBRI I.

LIBRI II.

LIBRI III.

LIBRI IV.

LIBRI V.

LIBRI VI.

FINIS.

Contents

Introductionis ad physicam libri sex (1644)

Famous textbook of physics

Traité de Physique

by Jacques Rohault

(Paris, 1671),

contained not only physics

in the present sense

but also

astronomy, cosmology,

meteorology, mineralogy,

geology, physiology, and

anatomy

(12 editions in French, 12 in Latin, and 3 in English 1671-1739)

TRAITE'
DE
PHYSIQUE.

PAR

JAQUES ROHAULT.

PREMIERE PARTIE.

A AMSTERDAM,
Chez JAQUES LE JEUNE.
clɔ Iɔc LXXII.
Sur la Copie imprimée à Paris.

TABLE
DES CHAPITRES
De la
PREMIERE PARTIE.

ROHAULT's SYSTEM OF Natural Philosophy,

ILLUSTRATED WITH

Dr. SAMUEL CLARKE's Notes

Taken mostly out of

Sir ISAAC NEWTON's Philosophy.

VOL. I.

Done into ENGLISH

By JOHN CLARKE, D. D. Dean of *Sarum*.

The THIRD EDITION.

LONDON,

Printed for JAMES, JOHN, and PAUL KNAPTON, at the *Crown* in *Ludgate-Street*.

MDCCXXXV.

THE CONTENTS OF PART I.

PART II.

The CONTENTS.

PART III.

PART IV.

The CONTENTS.

TRAITTE'
DE
PHYSIQUE.

PREMIERE PARTIE.

CHAPITRE PREMIER.

Ce que c'eſt que la Phyſique, & de quelle maniere on en doit traitter.

CE mot de Phyſique, conſideré tout ſeul, & ſelon ſon étymologie, ne ſignifie autre choſe que naturel; mais on s'en ſert icy pour ſignifier la ſcience des choſes naturelles, c'eſt à dire cette ſcience qui nous enſeigne les raiſons & les cauſes de tous les effets que la Nature produit. I. *Ce que l'on entend par la Phyſique.*

Comme ce n'eſt qu'aprés avoir étudié la Phyſique, qu'on peut s'aſſurer s'il y a une Phyſique ou non, ce ſeroit contre II. *Qu'il eſt inutile de s'arreſter à certaines queſtions*

ROHAULT's
SYSTEM
OF
Natural Philoſophy.

PART I.

CHAP I.

The Meaning of the Word Phyſicks, and the Manner of treating ſuch a Subject.

THIS Word, *Phyſicks*, ſtrictly ſpeaking, and according to the Etymology of it, ſignifies no more than *Natural*; but we here uſe it to ſignify the Knowledge of natural Things, that is, that Knowledge which leads us to the Reaſons and Causes of every Effect which Nature produces. 1. *The Meaning of the Word Phyſicks.*

2. But becauſe we muſt firſt ſtudy natural Philoſophy, before we can be certain whether there be any ſuch thing as *Phyſicks* or no; I ſhould not proceed in a proper Method, if I ſhould here undertake to reſolve this Difficulty. I ſhall 2. *That it is needleſs to ſtop at previous Queſtions.*

In the first half of the **XVIIIth century** there were some textbooks of physics which did not include biology, but it became common practice only in the XIXth century

In the **XVIIIth century** some parts of what we now call physics, such as statics, hydro- and aero-statics, hydro- and aero-dynamics, geometrical optics, were called ”mixed mathematics”

Physics textbooks in the **XIXth century** usually included meteorology

ESSAI DE PHYSIQUE

PAR

MR. PIERRE VAN MUSSCHENBROEK,

Professeur de Philosophie & de Mathématiques à Utrecht;

Avec une Description de nouvelles sortes de

MACHINES PNEUMATIQUES,

Et un Recueil d'Expériences

PAR MR. J. V. M.

Traduit du Hollandois

Par MR. PIERRE MASSUET, *Docteur en Médecine.*

TOME I.

A LEYDEN,

Chez SAMUEL LUCHTMANS,

Imprimeur de l'Université. 1739

Musschenbroek
Essai de physique (1739)

TABLE
DES
CHAPITRES,
CONTENUS DANS CET OUVRAGE.

TOME PREMIER.

TABLE DES CHAPITRES.

TOME SECOND.

PHILOSOPHIA
UTILIS
ET
JUCUNDA
IN USUM
STUDIOSÆ JUVENTUTIS
CONCINNATA
A
P ANDREA GORDON
Ordinem S. Benedicti in Pontificio
Scotorum Monasterio Ratisbonæ Professo
Philosophiæ in Academia Erfurtensi
Professore Publico.

TOMUS III.

PHYSICAM CUM APPENDICE
DE ELECTRICITATE EXHIBENS.

Cum Permissu Superiorum.

Pedeponti prope Ratisbonam, vulgo
Stadt am Hof.
Impensis IOANNIS GASTL, Bibliopolæ.
Anno 1745.

Elenchus Tomi III.

Ca-

Ca-

F I N I S.

In the XVIIIth century physics was divided into general (*physica generalis*) and particular, or special (*physica specialis*, *physica particularis*).

General physics dealt with common properties of all bodies, that is: extension, impenetrability, mobility, inertia, gravitation

Special physics comprised phenomena and properties by which bodies differed, that is electrization, magnetism, hardness, transparency etc.; also problems of astronomy, chemistry and natural history

General physics included Newton's mechanics and all that which was the consequence and development of ideas in his

Philosophiae naturalis principia mathematica

In the second half of the XVIIIth century chemistry, zoology, botany and mineralogy were usually treated separately and special physics comprised only the phenomena of heat, light, electricity, and magnetism

However, because of the ignorance of the principle of conservation of energy these topics were not yet combined to form one consistent field of science: physics in the present sense

ELEMENTA PHILOSOPHIÆ

Ad

RATIONIS

Et

EXPERIENTIÆ

ductum conscripta,

Atque

Usibus Scholasticis

accommodata

a

P. Bertholdo Hauser, S. J.

In Episcopali Universitate Dilingana Mathematum Professore.

Tomus IV.

Physica Generalis.

Cum Privilegio Cæsareo, & Superiorum Facultate.

AUGUSTÆ VIND. & OENIPONTI,
Sumptibus JOSEPHI WOLFF, Bibliopolæ,
MDCCLVIII.

PHYSICA PARTICVLARIS,

QVAM

AVDITORVM

PHILOSOPHIAE VSIBVS

ACCOMODAVIT

LEOPOLDVS BIWALD

E SOCIETATE IESV,

PHYSICAE

IN

VNIVERSITATE GRAECENSI

PROFESSOR PVBLICVS,

ET ORDINARIVS.

EDITIO SECVNDA,

AB AVTHORE RECOGNITA.

CVM SPECIALI PRIVILEGIO S. C. R. MAIESTATIS.

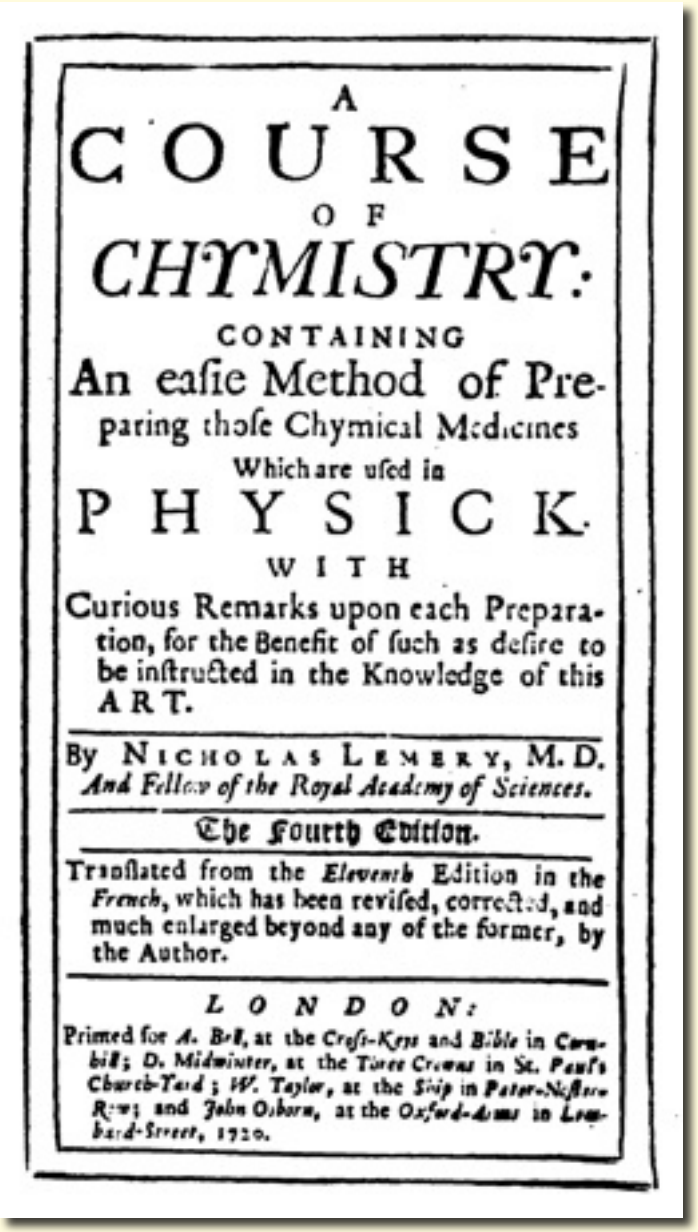
GRAECII,

SVMPTIBVS IOSEPHI MAVRITII LECHNER,

BIBLIOPOLAE ACADEMICI.

1769.

Other meanings of the word ”physics”



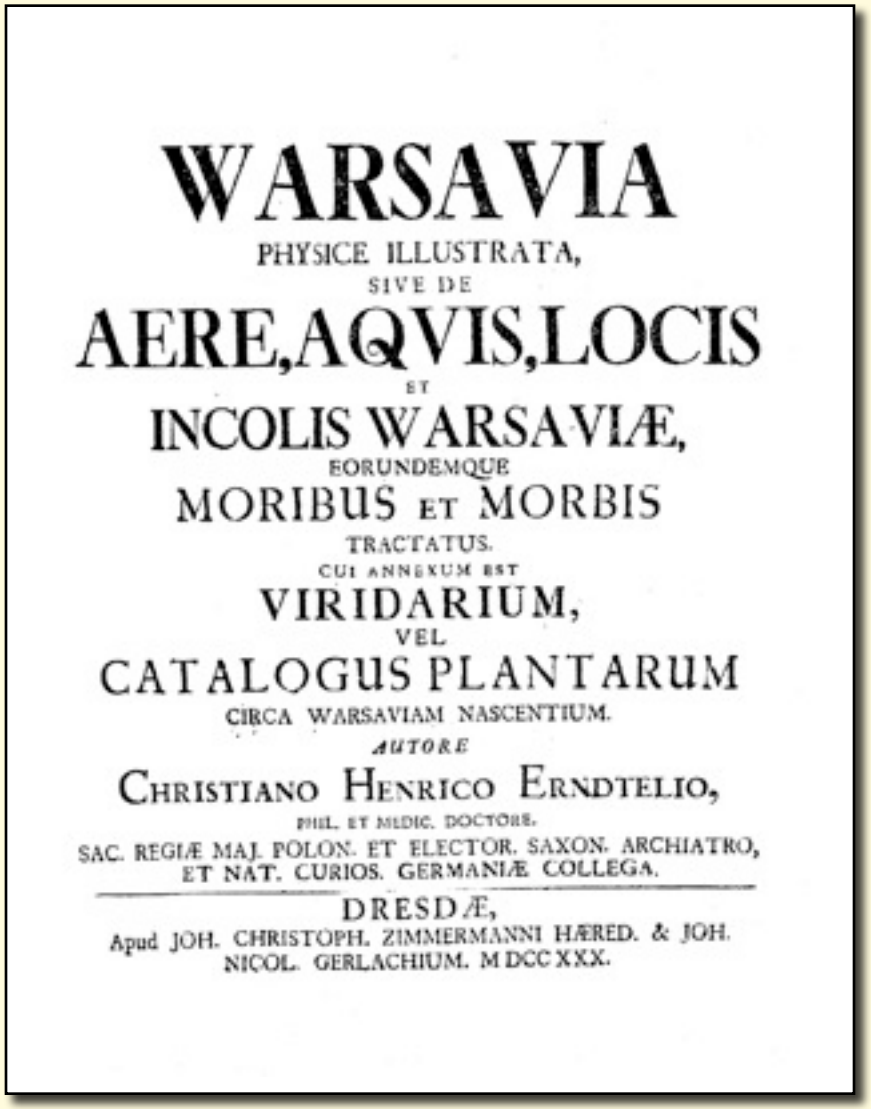
A
COURSE
OF
CHYMISTRY:
CONTAINING
An easie Method of Preparing those Chymical Medicines
Which are used in
PHYSICK.
WITH
Curious Remarks upon each Preparation, for the Benefit of such as desire to be instructed in the Knowledge of this ART.

By NICHOLAS LEMERY, M. D.
And Fellow of the Royal Academy of Sciences.

The Fourth Edition.

Translated from the *Eleventh* Edition in the *French*, which has been revised, corrected, and much enlarged beyond any of the former, by the Author.

LONDON:
Printed for *A. Bell*, at the *Cross-Keys* and *Bible* in *Cornhill*; *D. Midwinter*, at the *Three Crowns* in St. *Paul's Church-Yard*; *W. Taylor*, at the *Ship* in *Pater-Noster-Row*; and *John Osborn*, at the *Oxford-Arms* in *Lombard-Street*, 1720.



WARSAVIA
PHYSICE ILLUSTRATA,
SIVE DE
AERE, AQVIS, LOCIS
ET
INCOLIS WARSAVIÆ,
EORUNDEMQUE
MORIBUS ET MORBIS
TRACTATUS.
CUI ANNEXUM EST
VIRIDARIUM,
VEL
CATALOGUS PLANTARUM
CIRCA WARSAVIAM NASCENTIUM.
AUTORE
CHRISTIANO HENRICO ERNDTELIO,
PHIL. ET MEDIC. DOCTORE.
SAC. REGIÆ MAJ. POLON. ET ELECTOR. SAXON. ARCHIATRO,
ET NAT. CURIOS. GERMANIÆ COLLEGA.

DRESDÆ,
Apud JOH. CHRISTOPH. ZIMMERMANNI HÆRED. & JOH. NICOL. GERLACHIUM. M DCC XXX.

Program of the course

1. Physical sciences in Antiquity and the Middle Ages
2. The emergence and rise of modern science
3. Physics in the Enlightenment (XVIIIth century)
4. The age of classical physics (XIXth century)
5. The age of quantum physics (XXth century)

Information

Introduction

Prehistory of science

Greek science

Science in the Middle Ages

From Copernicus to Newton

Newton's ***Principia***

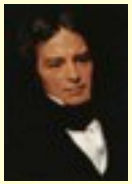
Physics of gases and heat

Optics from Kepler to Newton

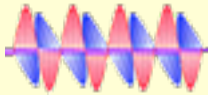
Physics in the Enlightenment (1)

Physics in the Enlightenment (2)

XIXth century physics (1)



XIXth century physics (2)

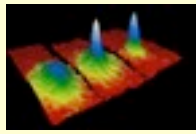


Physics around 1900

XXth century physics (1)

XXth century physics (2)

XXth century physics (3)



XXth century physics (4)

Present physical sciences