

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...

φύσις - 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 NATVRALES PHILOSOPHIAE.

LIBRI DVODECIM DE
consideratione rerū naturalium, earumq;
ad suum Creatorem reductione, Per fra-
trem Franciscum Titelmanum Hassel-
lensem, ordinis fratrum Minorum, san-
ctarum scripturarum apud Loua-
nienses prælectorem.



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

ORDO ET MATERIA LIBRORVM DVODECIM SEQUENTIVM.

- ☛ Liber primus tractat de principiis rerum natu-
ralium.
- ☛ Liber secundus de causis rerum naturalium,
- ☛ Liber tertius, de motu & accidentibus eius.
- ☛ Liber quartus, de infinito, loco, vacuo, & tem-
pore.
- ☛ Liber quintus de generatione & corruptione
rerum naturalium.
- ☛ Liber sextus, de meteorologicis impressionibus.
- ☛ Liber septimus, de cælo & mundo
- ☛ Liber octauus, de anima in generali, & de poten-
tiis vegetatiuis, deque longitudine & breuitate
vitæ.
- ☛ Liber nonus, de sensibus exterioribus & eorum
sensibilibus.
- ☛ Liber decimus, de sensibus interioribus, deque
somno & vigilia.
- ☛ Liber vndecimus, de intellectu & præcellenti-
bus eius officiis.
- ☛ Liber duodecimus, de appetitu sensitivo & vo-
luntatis præcellentia.



ARNOLDI SENGUERDII
INTRODUCTIONIS
AD
PHYSICAM
LIBRI SEX.



ULTRAJECTI.
Apud IOANNEM A WASSERBERG
ANNO MDCXLIV.

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On the principles of physics
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On external causes
On quantity
On finiteness and infinity
On place
On void
On motion
On time

Book 2

On the world
On the heavens
On celestial spheres
On the stars
On elements in general
On elements, of which the world is built

Book 3

On qualities
On change
On generation and corruption
On transformation of elements or their
 generation
On mixtures or generation of mixtures
On temperatures
On destruction of mixtures

Contents

Introductionis ad physicam libri sex (1644)

Book 4

On meteors in general
On comets
On remnants of fiery meteors
On winds
On earth motions
On watery meteors
On apparent meteors

Book 5

On earths
On juices
On metals
On stones

Book 6

On main parts of animals
On experiencing soul
On experiencing
 and senses in general
On external senses
On internal sense
On sensual desire
On ability to motion
On vigilance and sleep
On rational soul

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.

MDCCLXXII.

Sur la Copie imprimée à Paris.

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ROHAULT'S
SYSTEM

OF

Natural Philosophy,

ILLUSTRATED WITH

D^r 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.

L O N D O N,

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

MDCCLXXXV.



THE
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OF

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16. *Of hard Bodies put into Liquors.*
17. *Of Accretion, Diminution, and Alteration.*
18. *Of Forms.*
19. *Of Elements according to the Opinion of the Ancients.*
20. *Of the Elements of the Chymists.*

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22. *Of the Form of a Hard and of a Liquid Body, or of Hardness and Liquidity.*
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16. *Conjectures whereby to explain the Phenomena of Mars, Jupiter, and Saturn.*
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17. *A Caution about the Poles and the Circles.*
18. *An Explication of the Sun's Phenomena.*
19. *An Explication of the apparent Motion of the fixed Stars.*
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26. Of a Fever.



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, considéré 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.

Comme ce n'est qu'après avoir étudié la Physique, qu'on peut s'assurer s'il y a une Physique ou non, ce seroit con-

I.
*Ce que l'on
entend par
la Physique.*

II.
*Qu'il est
inutile de
s'arrester à
certaines
questions*

A

tre



ROHAULT'S SYSTEM

O F

Natural Philosophy.

PART I.

CHAP I

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



HIS 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.

2. *That it
is needless to
stop at pre-
vious Ques-
tions.*

VOL. I.

B

I shall

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



E S S A I
D E
P H Y S I Q U E

P A R
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

P A R M R. J. V. M.

Traduit du Hollandois

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

T O M E I.



A L E Y D E N,
Chez SAMUEL LUCHTMANS,

Imprimeur de l'Université. 1739

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CONTENUS DANS CET OUVRAGE.

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Musschenbroek *Essai de physique (1739)*

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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.

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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

Ufibus Scholasticis

accommodata

a

P. Bertholdo Hauser, S. J.

*In Episcopali Universitate Dilin-
gana Mathematicum Professore.*

Tomus IV.

Physica Generalis.

CUM PRIVILEGIO CÆSAREO, & SUPERIORUM FACULTATIS.

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

PHYSICA
PARTICVLARIS,

QVAM

AVDITORVM

PHILOSOPHIÆ 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.

G R A E C I I,

SVMPTIBVS IOSEPHI MAVRITII LECHNER,
BIBLIOPOLAE ACADEMICI.

1 7 6 9.

Other meanings of the word "physics"

A COURSE OF CHYMISTRY:

CONTAINING
An easie Method of Pre-
paring those Chymical Medicines
Which are used in
PHYSICK.

WITH
Curious Remarks upon each Prepara-
tion, 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.

L O N D O N :

Printed for A. B. at the *Cross-Keys* and *Bible* in *Corn-
hill*; D. Midwinter, at the *Three Crowns* in *St. Paul's
Church-Yard*; W. Taylor, at the *Ship* in *Paternoster-
Row*; and John Osborn, at the *Oxford-Arms* in *Lon-
don-Street*, 1720.

WARSAVIA
PHYSICE ILLUSTRATA,
SIVE DE
AERE, AQVIS, LOCIS
ET
INCOLIS WARSAVIÆ,
EORUNDEMQVE
MORIBUS ET MORBIS
TRACTATUS.
CUI ANNEXUM EST
VIRIDARIUM,
VEL
CATALOGUS PLANTARUM
CIRCA WARSAVIAM NASCENTIUM.
AUCTORE
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



Physics in the Enlightenment (1)



Introduction



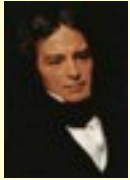
Physics in the Enlightenment (2)



Prehistory of science



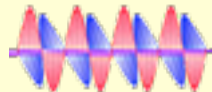
XIXth century physics (1)



Greek science



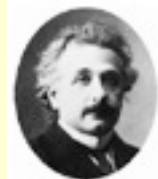
XIXth century physics (2)



Science in the Middle Ages



Physics around 1900



From Copernicus to Newton



XXth century physics (1)



Newton's *Principia*



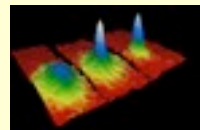
XXth century physics (2)



Physics of gases and heat



XXth century physics (3)



Optics from Kepler to Newton



XXth century physics (4)



Present physical sciences

