

# Exploring the Territories of Science and Religion



Buddhists.

Fetichists.

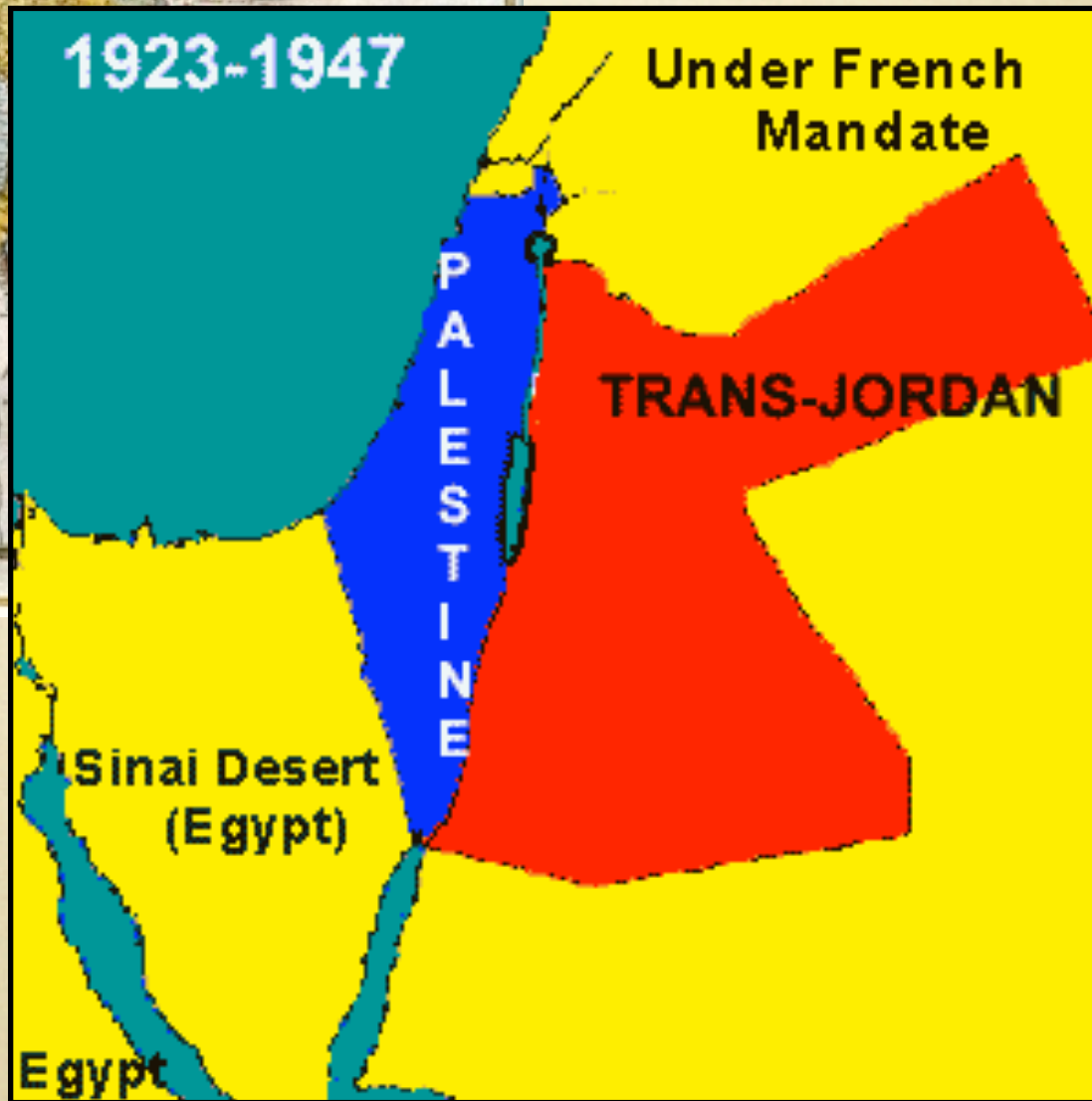
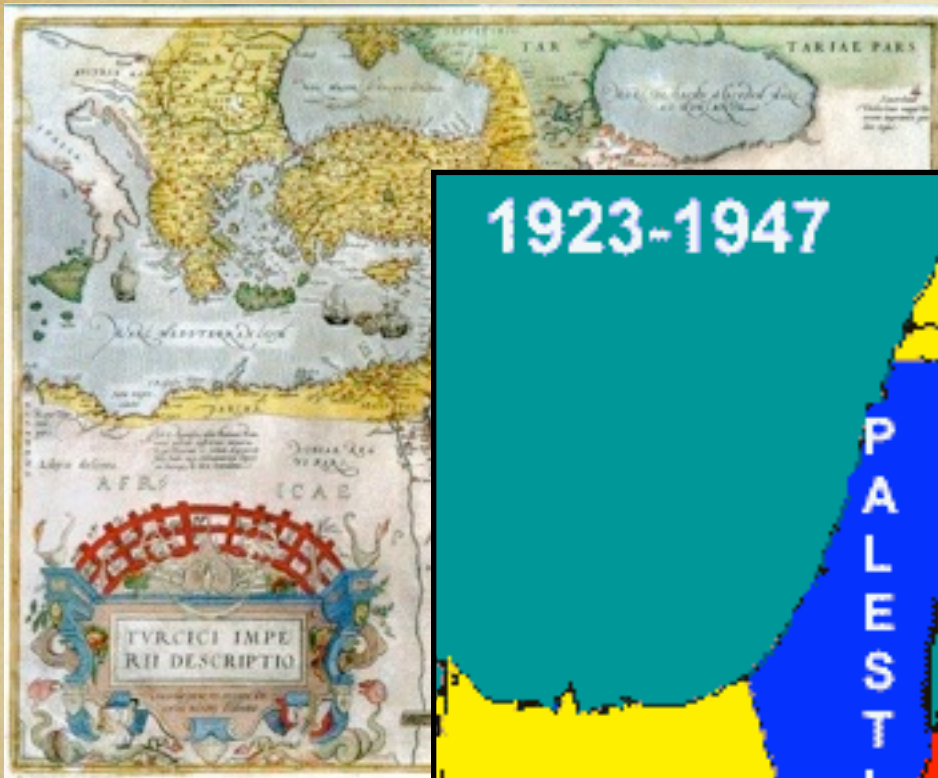
Mohammedans.

Peter Harrison  
University of Queensland  
New College Lectures, 2014

## LECTURE 2: THE INVENTION OF MODERN SCIENCE

1. The Virtue of Science
2. Science or Natural Philosophy?
3. Natural Philosophy and Natural Theology
4. From Natural Philosophy to Science







## LECTURE 2: THE INVENTION OF MODERN SCIENCE

### **1. The Virtue of Science**

### 2. Science or Natural Philosophy?

### 3. Natural Philosophy and Natural Theology

### 4. From Natural Philosophy to Science



‘Science can increase in itself by addition; thus when one learns several conclusions of geometry, the same specific habit of science increases in that man. Yet a man’s science increases ... in so far as one man is quicker and readier than another in considering the same conclusions.’

*Summa theologiae* 1a2ae. 52, 2.





[*Scientia*] is usually defined: a habit of the mind which is reliable, stable, clear, and directed toward a necessary matter by way of its proper cause. It is called a habit because it is different from actual scientific knowledge....

Collegii Societ. Jesu Monachi; G. 1675

SVMMA  
**PHILOSOPHIÆ**  
**QVADRIPARTITA;**  
*De rebus Dialecticis, Ethicis, Physicis,*  
*& Metaphysicis;*  
 Authore  
**FR. EVSTACHIO.**  
 A S. Paulo, ex Congregatione  
 Fulienfi, Ordinis Cister-  
 ciensis:  
*In finitis mendis repurgata.*



ATAVORVM.  
 UM MOYARDUM;

MDCLXXII. Digitized by Google

... & per se, quomodo Physiologiam unicam esse scientiam  
 dicimus, item Dialecticam, Moralem, &c.

Quod igitur spectat ad Scientiam priori modo sumtam; Primo  
 quæritur Quid sit. Definiri solet, **Habitus mentis verus**, certus, evidens  
 rei necessariæ per propriam causam. Dicitur **habitus**, ut distinguatur  
 ab actuali scientia; **habitus mentis**, ut distinguatur ab habitibus volun-  
 tatis; **verus**, ut distinguatur ab **Errore**, qui est **habitus mentis** falsus;


I 5

De Sci-  
 entiam  
 prior, ac  
 ceptione  
 I. Diffi-  
 cultas,  
 Quid  
 sit.  
 certus,

LEXICON  
**PHILOSOPHICVM,**  
 QVO TANQVAM CLAVE  
 PHILOSOPHIAE FORES  
 APERIUNTVR.

Informatum opera & studio  
**RODOLPHI GOELENII**  
 SENIORIS, IN ACADEMIA MAVRITIANA,  
 quae est MARCHIONVRGI, Philosophiae Pro-  
 fessoris primarij.

*2<sup>da</sup> SAECULO ALTERI PROSVNT,*  
*seruata.*



**FRANCOVRTI,**  
 Typis viduae Matthiae Beckeri, impensis Petri Museuli  
 & Ruperi Pistorij.

MDCCLXIII.

*S. Heron*

*Scientia* is taken in two ways: properly speaking as a habit acquired through demonstration.

SCENOGRAPHIA.

Scenographia seu εὐλωγογραφία est pars Opticae, quae inuestigat, quomodo x-  
 dificationum imagines pingere con-  
 ueniat, & ostendit, quomodo fieri pos-  
 sit, vt quae in imaginibus apparent,  
 non videantur inconcinna vel defor-  
 mia, propter distantias & altitudines

corum fundamentum. See Grundriss der  
 ductus fundamenti Grundriss / aut  
 positio fundamenti der Grundlegung.  
 Hinc est Scenographus. De reliquis Fri-  
 dericus Commandinus videatur.

SCIENTIA.

Scientia duobus modis accipitur. Proprie  
 M m m m m

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1070

S. ante C:

pro eo habitus, quem per demonstra-  
 tionem acquirimus. Sic accipit Arist.  
 lib. 6. Ethic. c. 3. Demonstratio requirit  
 materiam subiectam eodem se modo  
 semper habentem, materiam ex qua  
 principia, hoc est, tales propositiones,  
 quae causas conclusionis proximas &  
 xternas contineat. Scientia, inquit  
 Themistius, est nouitia per demonstra-  
 tionem acquisita.

Improprie accipitur pro quibusuis aliis  
 habitibus intellectiuis. Hoc tamen in-  
 tellectus non potest acquirere sine  
 demonstratione.

spondet quaestioni si εἴη, id est, an  
 Res sit simpliciter, quae longe alia est  
 est a quaestione εἴη. Dionysius Lambinus  
 contra versionem Petronij in lib. 1. E-  
 thicor. cap. 3. Iam haec loquendi forma,  
 Quae res εἴη, vel quaestio εἴη, nata est  
 à Graecorum loquendi consuetudine.  
 Cum enim significabant se scire rei a-  
 licuius esse etum, verbi causa, Lunam  
 deficere, dicebant se scire εἴη εἴη, id  
 est, rem ita se habere, quod Latini Phi-  
 losophi barbare loquentes verterunt,  
 scire quod est.

D. Scientia, 2 ; f.g. דַּגְנָהּ dagnah, δειξιμια  
Knowledge, learning, skill, cunning, properly the  
act of him that knoweth, secondly the state of the  
thing known, taken passively, πρὸ γυώσεως τῶ γινώ-  
σκουσῶν, thirdly a habit of knowledge got by de-  
monstration, Arist. 7. Ethic. 3. fourthly any habit  
of the understanding. ¶ Scientia, Scal. ὄν γινώσεως

**Scientia:** ... properly the act of him that knoweth, ... a habit of knowledge got by demonstration....

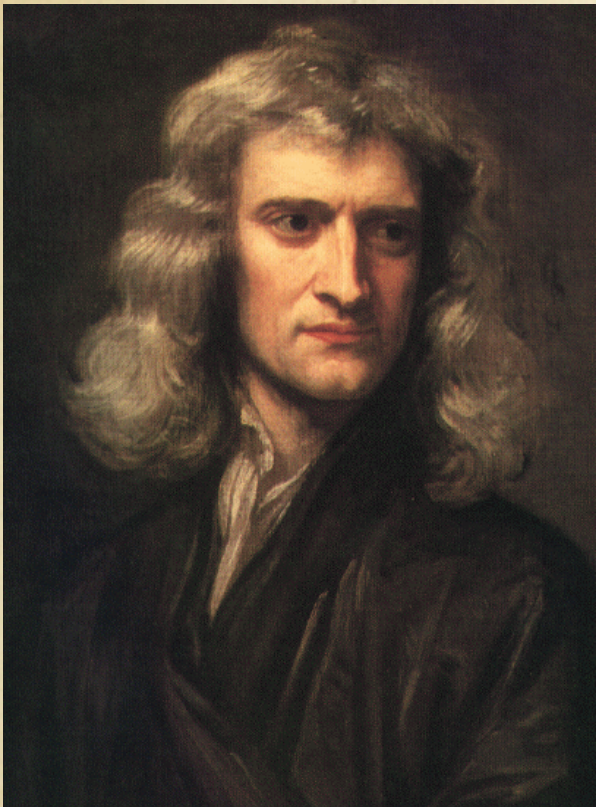
Thomas Holyoake, *A Large Dictionary in Three Parts* (London, 1676). s.v. scientia

Conclusion 1. In the early modern period (c 17th Century), the virtues of religion and science both begin to be objectified into beliefs and sets of practices.

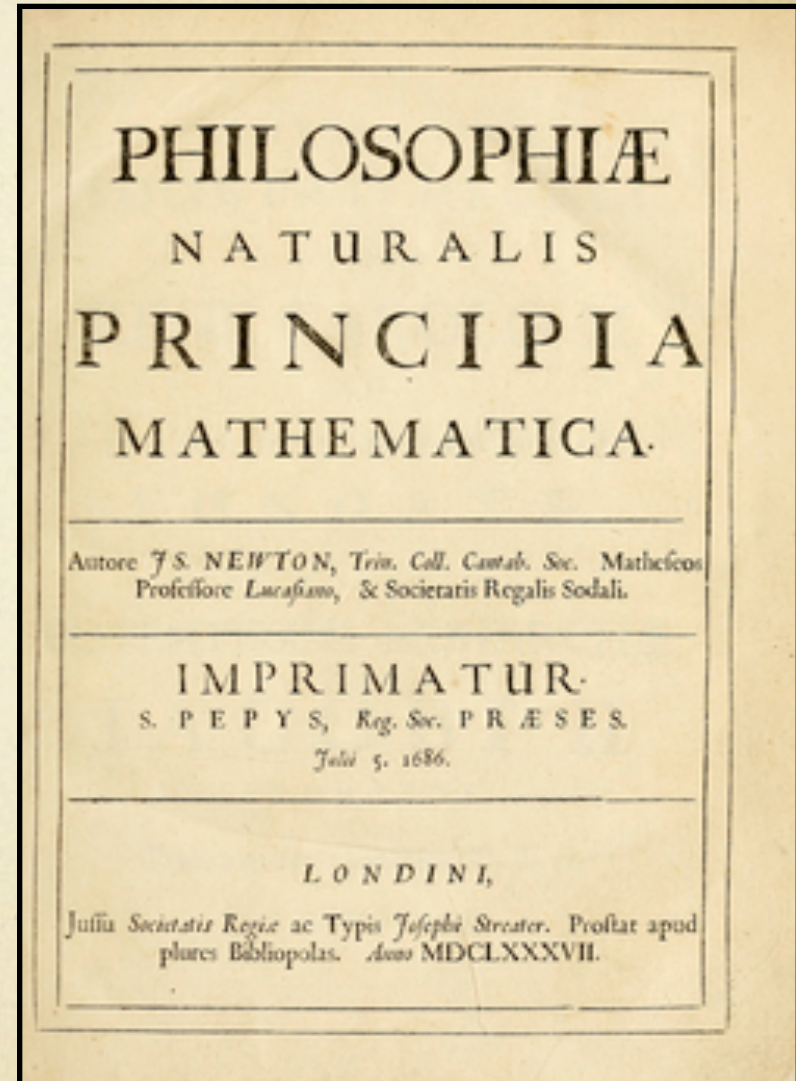


## LECTURE 2: THE INVENTION OF MODERN SCIENCE

1. The Virtue of Science
- 2. Science or Natural Philosophy?**
3. Natural Philosophy and Natural Theology
4. From Natural Philosophy to Science



Isaac Newton, *Mathematical Principles of Natural Philosophy* (1687)



# **Classifying the Sciences**

(Aristotle)

## **Theology**

Eternal, Immovable, Separable from Matter

## **Mathematics**

Eternal? Immovable, Separable from Matter?

## **Physics (Natural Philosophy)**

Finite, Movable, Inseparable from Matter





Plato (429-347 BCE)

And the motions which are naturally akin to the divine principle within us are the thoughts and revolutions of the universe. These each man should follow, and by learning the harmonies and revolutions of the universe ... so that having assimilated them he may attain to that best life which the gods have set before mankind, both for the present and the future.

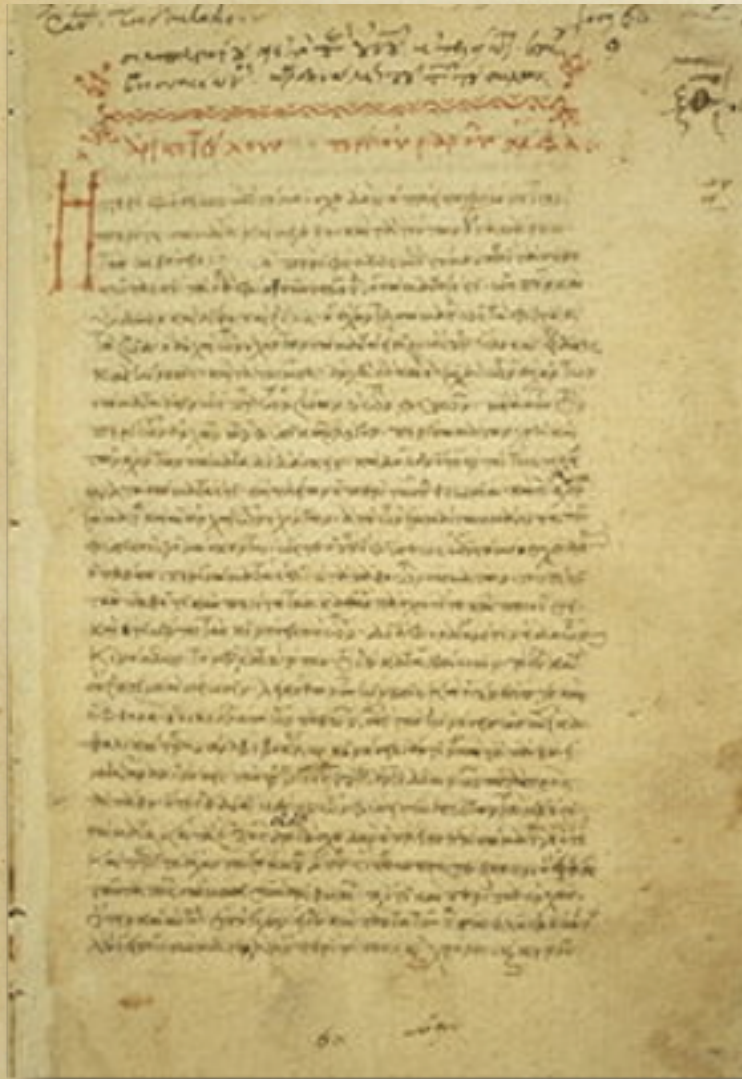
*Timaeus* 91c-d



Lucius Seneca (1BC-AD65)

‘Philosophy is not an occupation of a popular nature.... It moulds and builds the personality, orders one’s life, regulates one’s conduct, shows one what one should do and what one should leave undone’

Seneca to Lucilius 16.3.



**Physics (*phusiologia*) is useful: ...**  
because it contributes to leading  
the superior part of the soul, which  
is the intellect, towards its  
perfection—for which study of  
theology is particularly valuable; it  
is an auxiliary for moral virtues; a  
ladder that leads towards  
knowledge of God and ideas; and  
finally it incites us to piety and to  
acts of thanksgiving towards God'

**Simplicius (c 490-c 560)**

De huius praecipua divisione Sphaerarum.



Claudius Ptolemy (90-168)

**W**ith regard to virtuous conduct in practical actions and character, this science [mathematical astronomy] above all things, could make men see clearly; from the constancy, order, symmetry and calm which are associated with the divine, it makes its followers lovers of this divine beauty, accustoming them and reforming their natures, as it were to a spiritual state.'

*Almagest, 1.1*



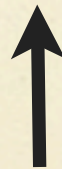
Claudius Ptolemy (90-168)

# Classifying the Sciences

(Aristotle)

## Theology

Eternal, Immovable, Separable from Matter



## Mathematics

Eternal? Immovable, Separable from Matter?



## Physics (Natural Philosophy)

Finite, Movable, Inseparable from Matter

‘First let me tell you in general that there is one overriding concern common to all philosophers.... In common, all philosophers strove by dedication, investigation, discussion, by their way of life, to lay hold of the blessed life (*beata vita*). This was their one reason for philosophizing; but I rather think that the philosophers also have this in common with us. . . . Therefore the urge for the blessed life is common to philosophers and Christians’

Sermon 150.



Augustine of Hippo (354-430)



Friday, 12 September 14



Conclusion 1. In the early modern period (c 17th Century), the virtues of religion and science both begin to be objectified into beliefs and sets of practices.

Conclusion 2. In the pre-modern period Christianity and Natural Philosophy compete as rival spiritual practices, rather than as sets of incompatible beliefs.

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‘I wished to be a theologian; for a long time I was troubled, but now see how God is also praised through my work in astronomy.’

Johannes Kepler, *Gesammelte Werke*, XIII, 40.



Johannes Kepler (1571-1630)

‘Discovering to others the perfections of God displayed in the creatures is a more acceptable act of religion, than the burning of sacrifices or perfumes upon his altars.’

The rational contemplation of nature is ‘philosophical worship of God.’

*Usefulness of Natural Philosophy*, Works II, 62f.

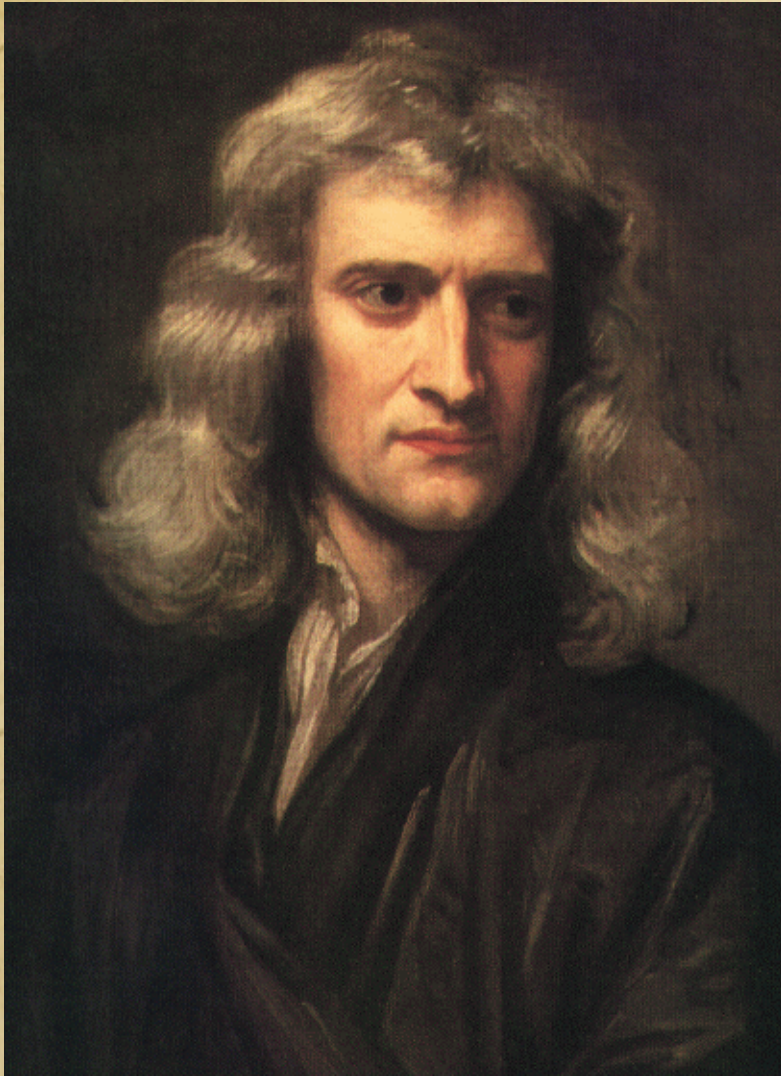


Robert Boyle (1627-91)

For man by the fall fell at the same time from his state of innocency and from his dominion over creation. Both of these losses however can even in this life be in some part repaired; the former by religion and faith, the latter by arts and sciences.

Francis Bacon, *Novum Organum* II, §52.

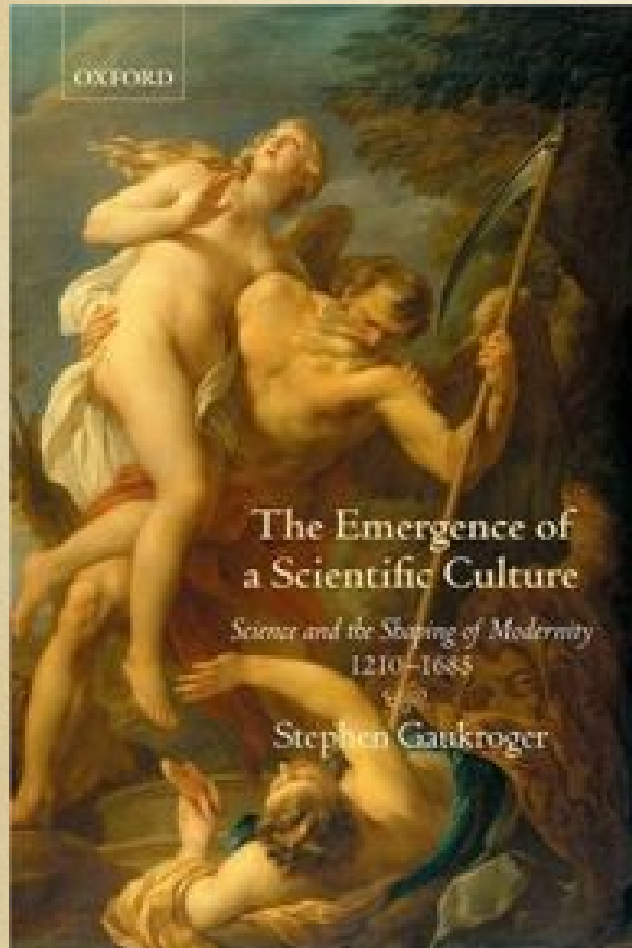




Isaac Newton (1642-1727)

'... the business of true philosophy is ... to inquire after those laws on which the Great Creator actually chose, to found this most beautiful Frame of the World, not those by which he might have done the same, had he so pleased.'

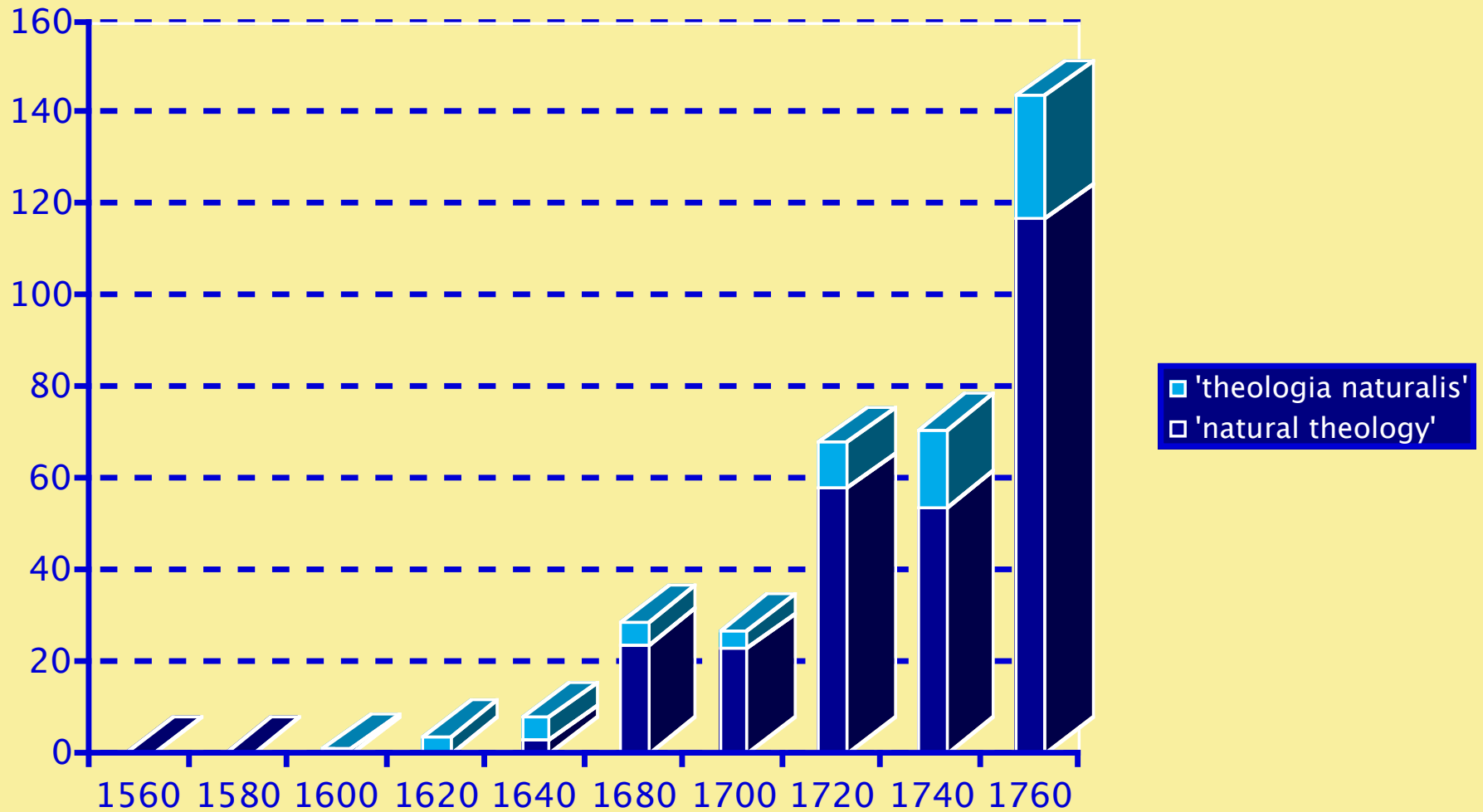
Roger Cotes, Preface to Newton's  
*Principia*, 2nd edn.



... a good part of the distinctive success at the level of legitimation and consolidation of the scientific enterprise in the early-modern West, derives not from any separation of religion and natural philosophy, but rather from the fact that natural philosophy could be accommodated to projects in natural theology.

Stephen Gaukroger, *Emergence of a Scientific Culture*

Frequency of the expressions 'natural theology' or  
'*theologia naturalis*', in English books, 1560-1740



LE SPECTACLE  
DE  
LA NATURE.  
TOME HUITIEME,  
Contenant ce qui regarde  
L'HOMME EN SOCIÉTÉ  
AVEC DIEU.  
SECONDE PARTIE.  
NOUVELLE ÉDITION.



A PARIS,  
Chez les Freres ESTIENNE, rue S. Jacques,  
à la Vertu.  
M. DCC. LXXI.  
*Avec Approbation & Privilège du Roi.*

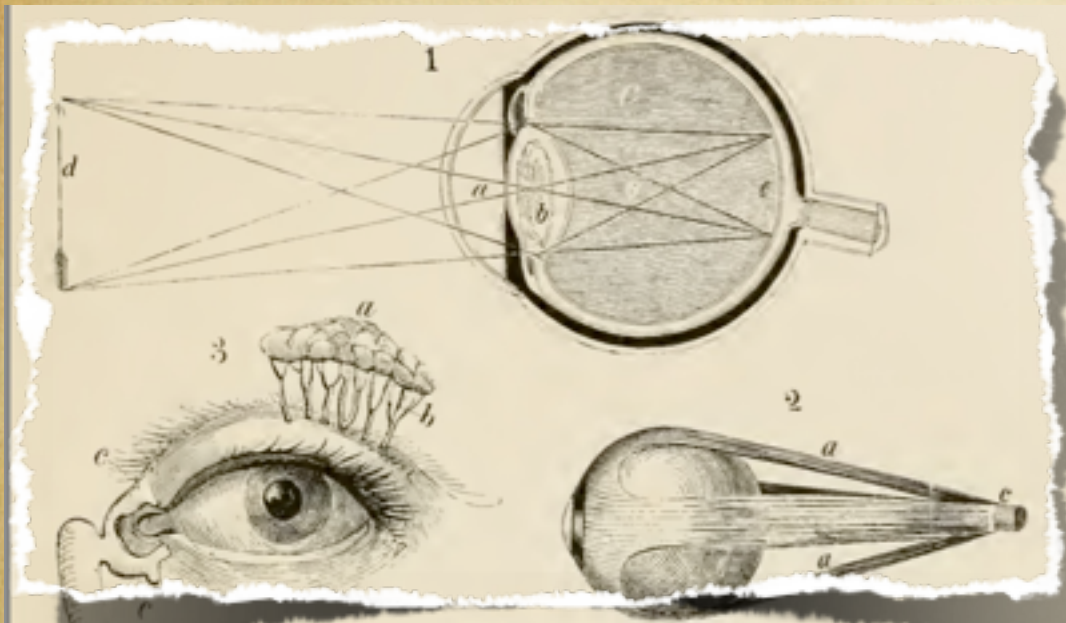
Noël Antoine Pluche

1688-1761

‘All nature is link'd together by one universal Law of Harmony and Agreement: and as the Whole Earth declares itself to be the Work of one only all-wise Creator, so it is no less evident that the Good of Man was the only chief End and Design of is forming it.’







There is a uniformity of plan observable in the universe. The whole of nature is a system; each part either depending on other parts, or being connected with other parts by some common law of motion, or by the presence of some common substance.

NATURAL THEOLOGY:  
 OR,  
 EVIDENCES  
 OF THE  
 EXISTENCE AND ATTRIBUTES  
*OF THE DEITY*;  
 COLLECTED FROM THE APPEARANCES OF  
 NATURE.

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BY WILLIAM PALEY, D. D.  
 ARCHDEACON OF CARLISLE.

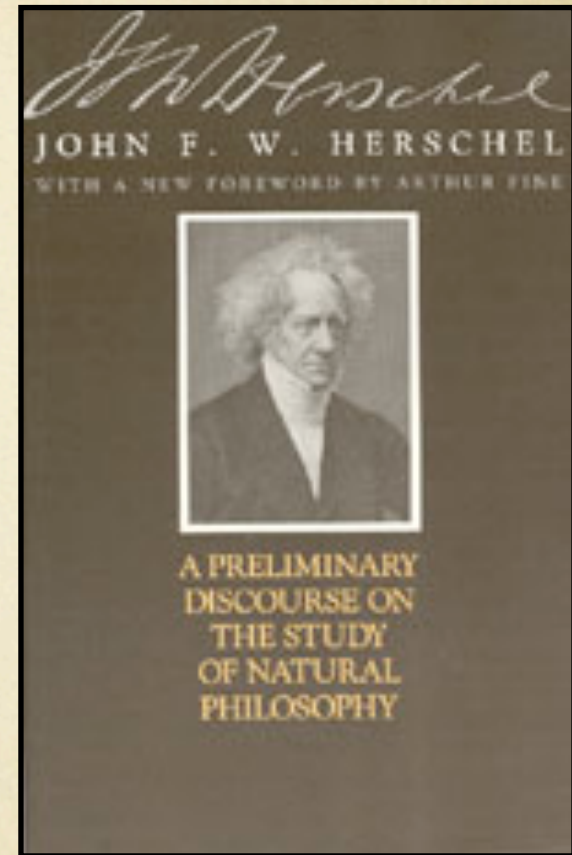
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 BY H. MAXWELL, NO. 25, NORTH SECOND-STREET.  
 1802.

William Paley  
 (1743-1805)

the natural philosopher 'is led to the conception of a Power and Intelligence superior to his own, and adequate to the production and maintenance of all that he sees in nature.'

'the observation of the calm, energetic regularity of nature, the immense scale of her operations, and the certainty with which her ends are attained, tends, irresistibly, to tranquilize and re-assure the mind, and render it less accessible to repining, selfish, and turbulent emotions.'



John Herschel  
(1792-1871)

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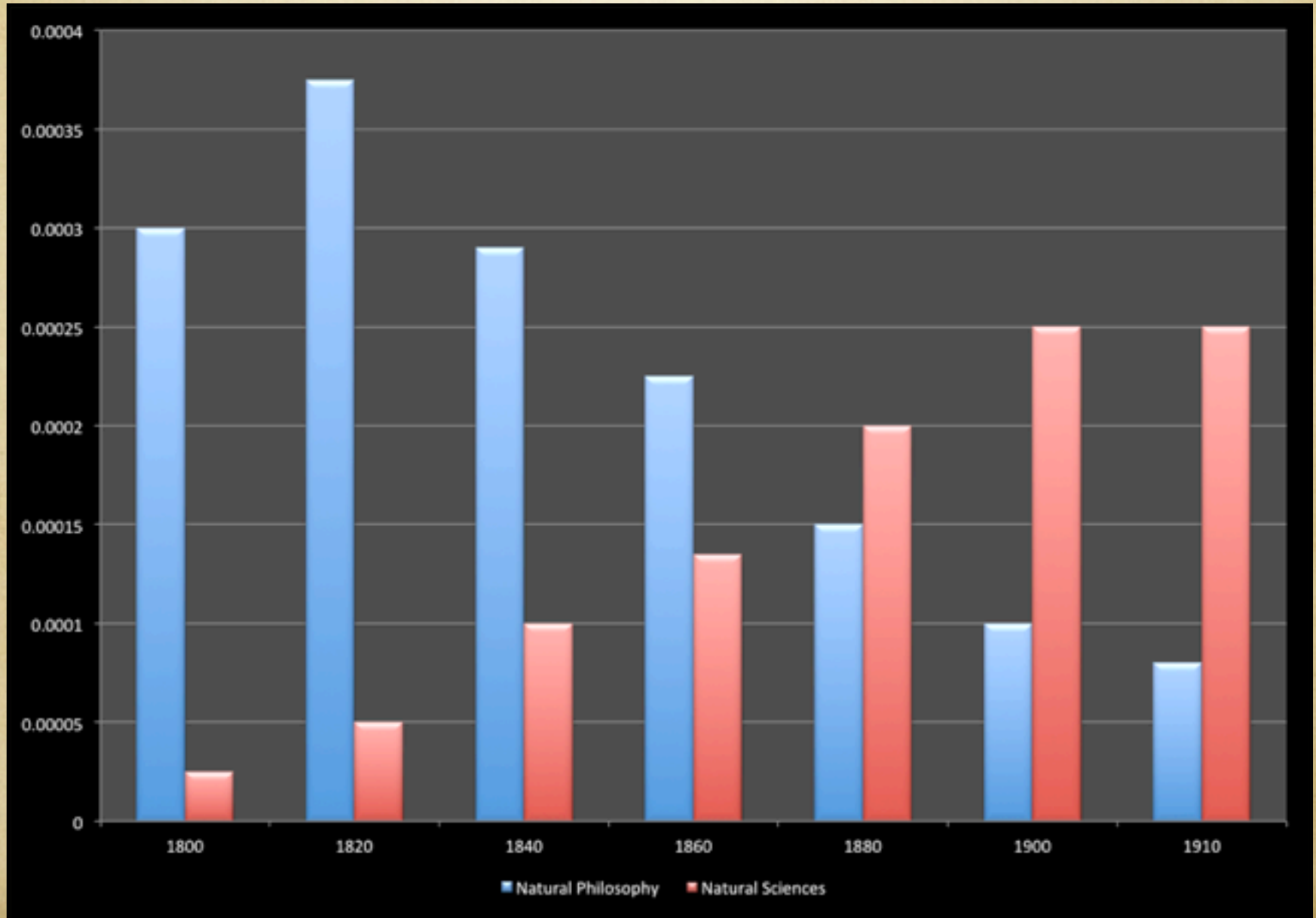
- Science excludes moral and theological
- Science as an advanced stage of historical development
- Scientific Method
- Profession of 'Scientist'

“We shall, for convenience’ sake, use the word ‘science’ in the sense which Englishmen so commonly give to it; as expressing physical and experimental science, to the exclusion of theological and metaphysical.”

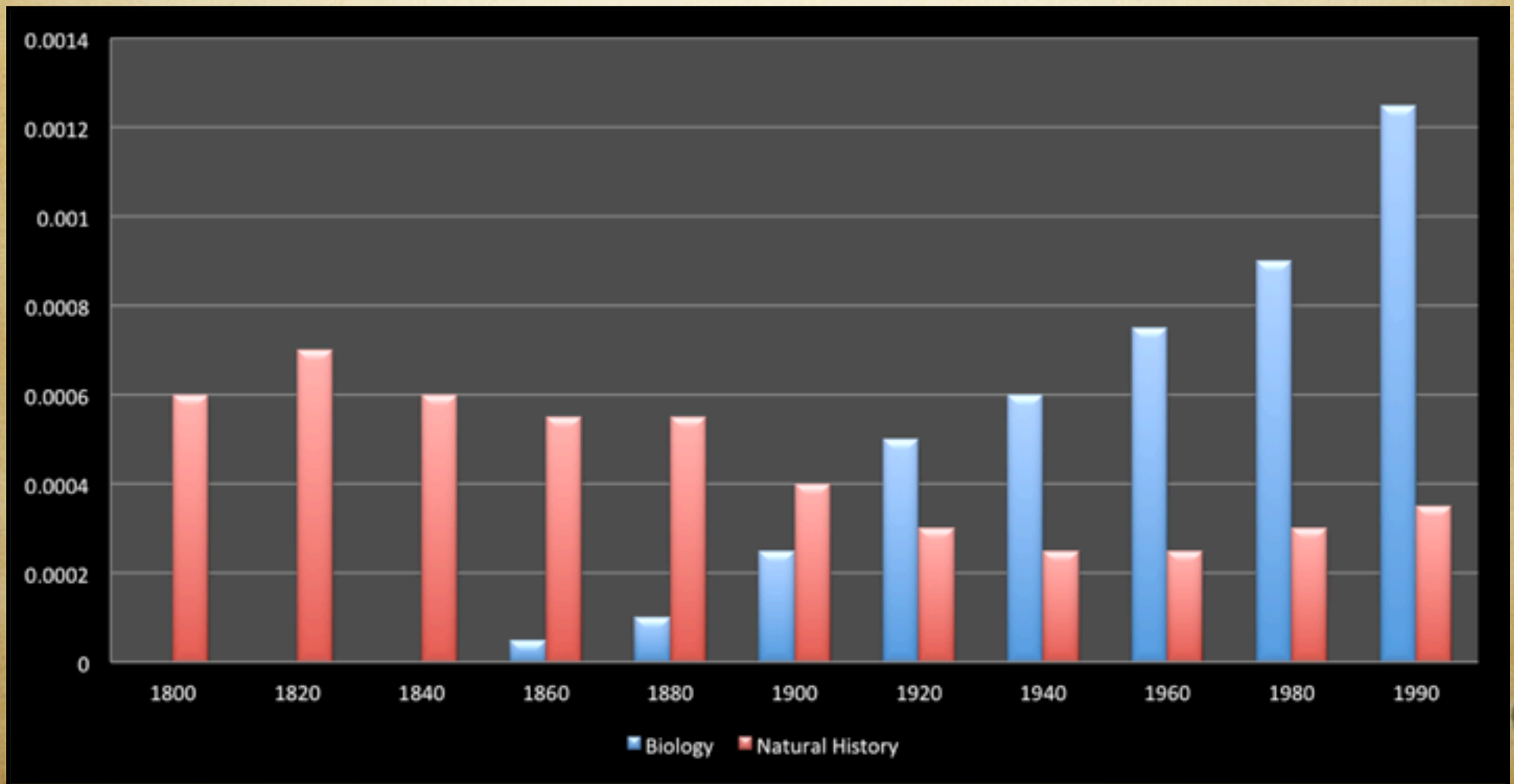
W. G. Ward, *Dublin Review*,  
April 1867.



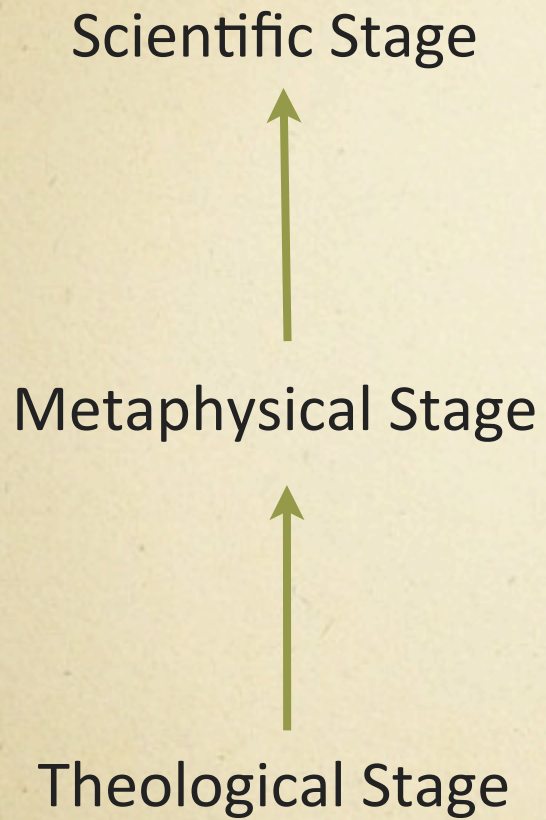
Relative frequency of the terms 'natural philosophy' and 'natural sciences' in English books, 1800-1910.



# Relative Frequency of 'natural history' and 'biology' in English Books, 1800-2000.







Auguste Comte (1798-1857)

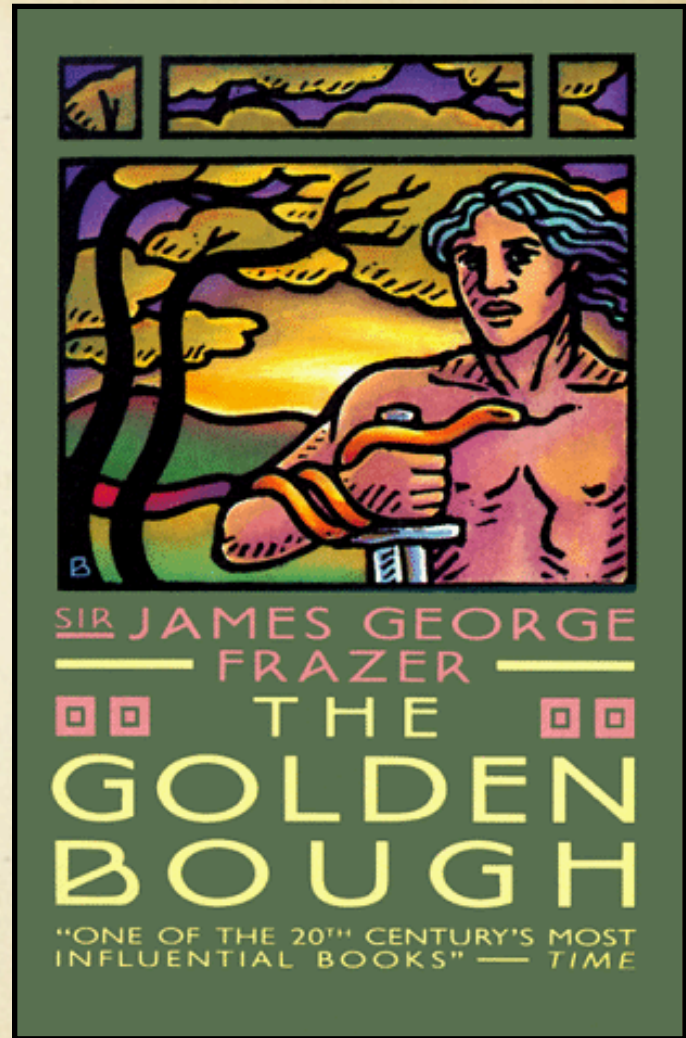
Science



Religion

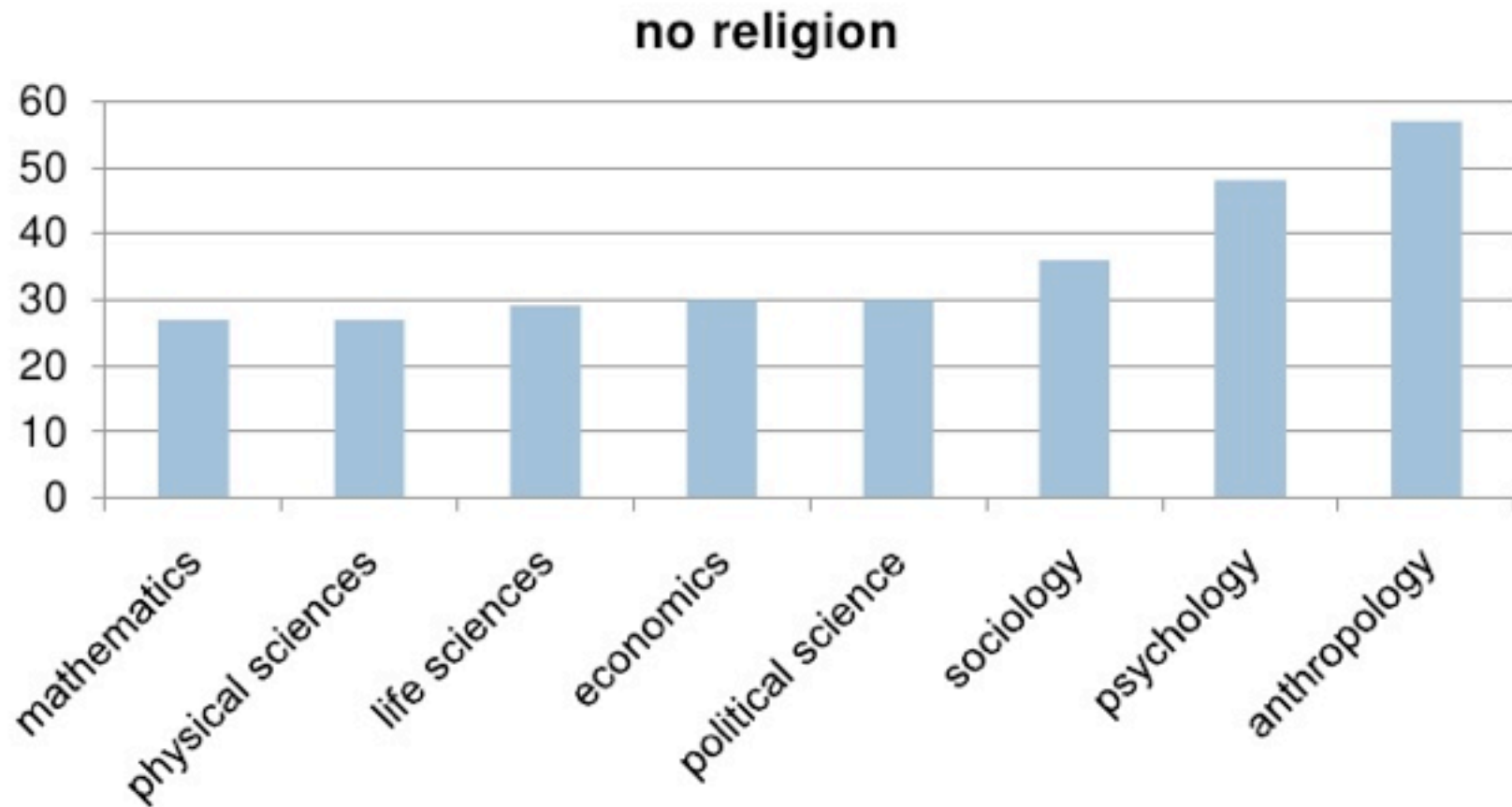


Magic



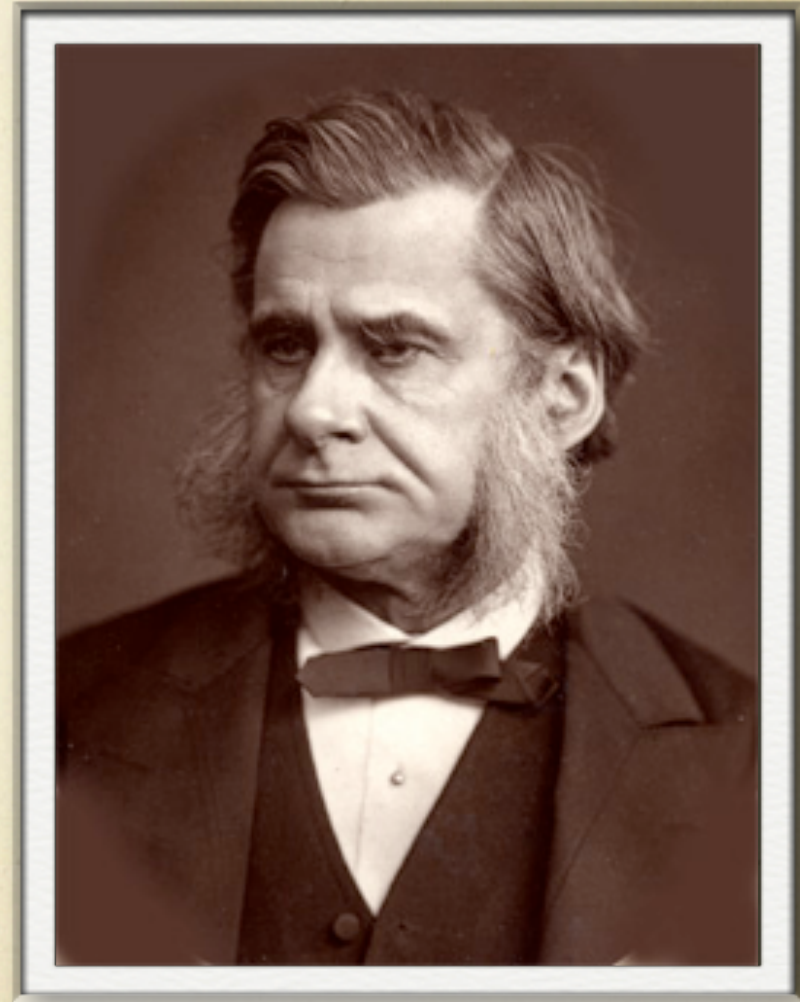
James George Frazer (1798-1857)

# Affiliation by Academic Discipline

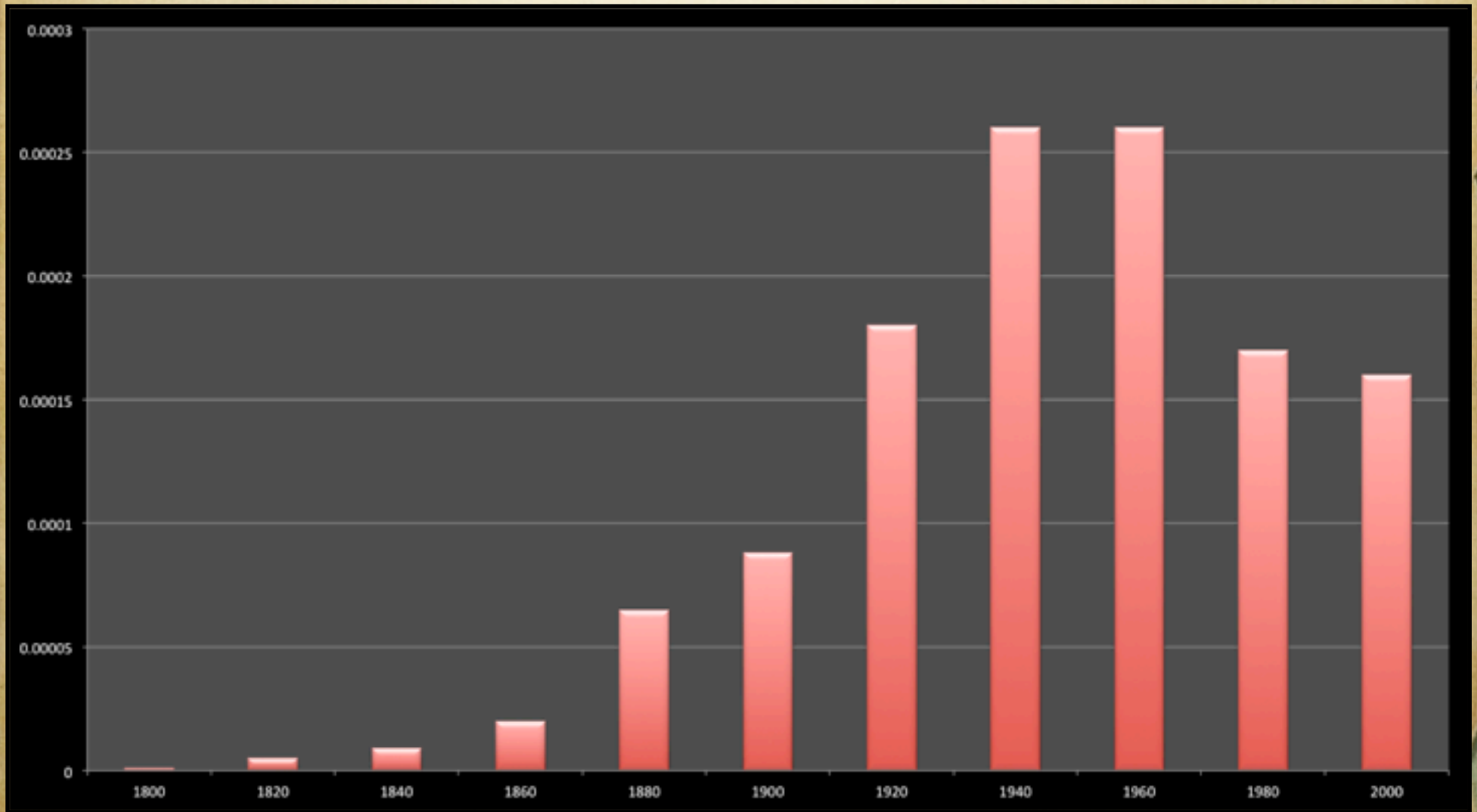


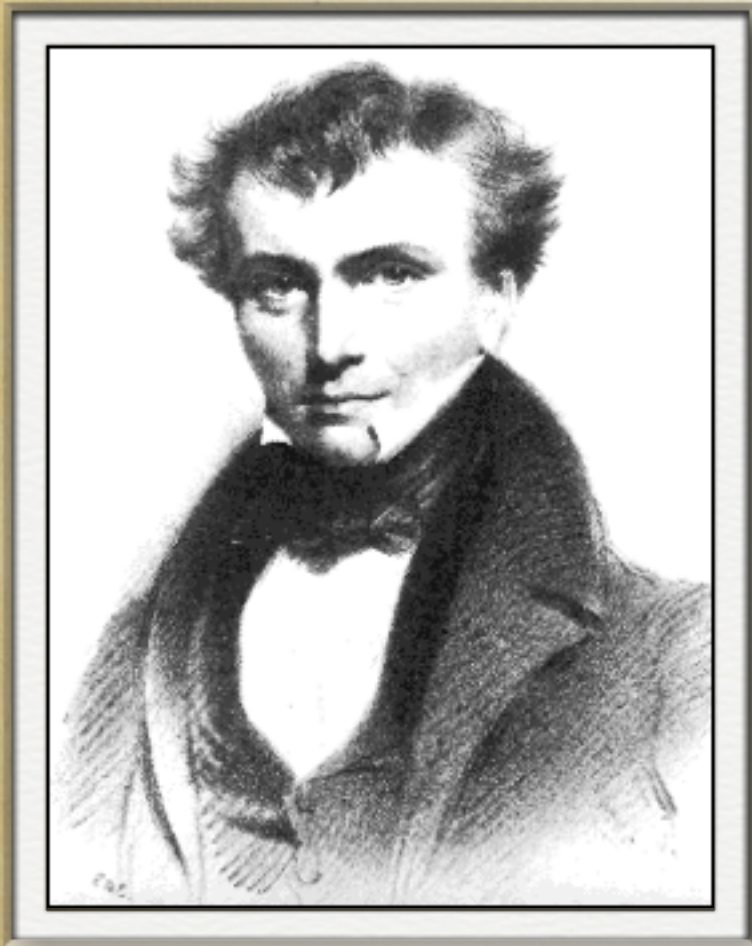
“The scientific method [is] the only method by which truth could be attained, anywhere and under any circumstances.... the scientific method [is] that which must sooner or later extend itself to all forms of inquiry.”

Thomas Henry Huxley, *Mechanics Magazine*, Oct 20, 1871



## 'Scientific Method' in English books, 1800-2000

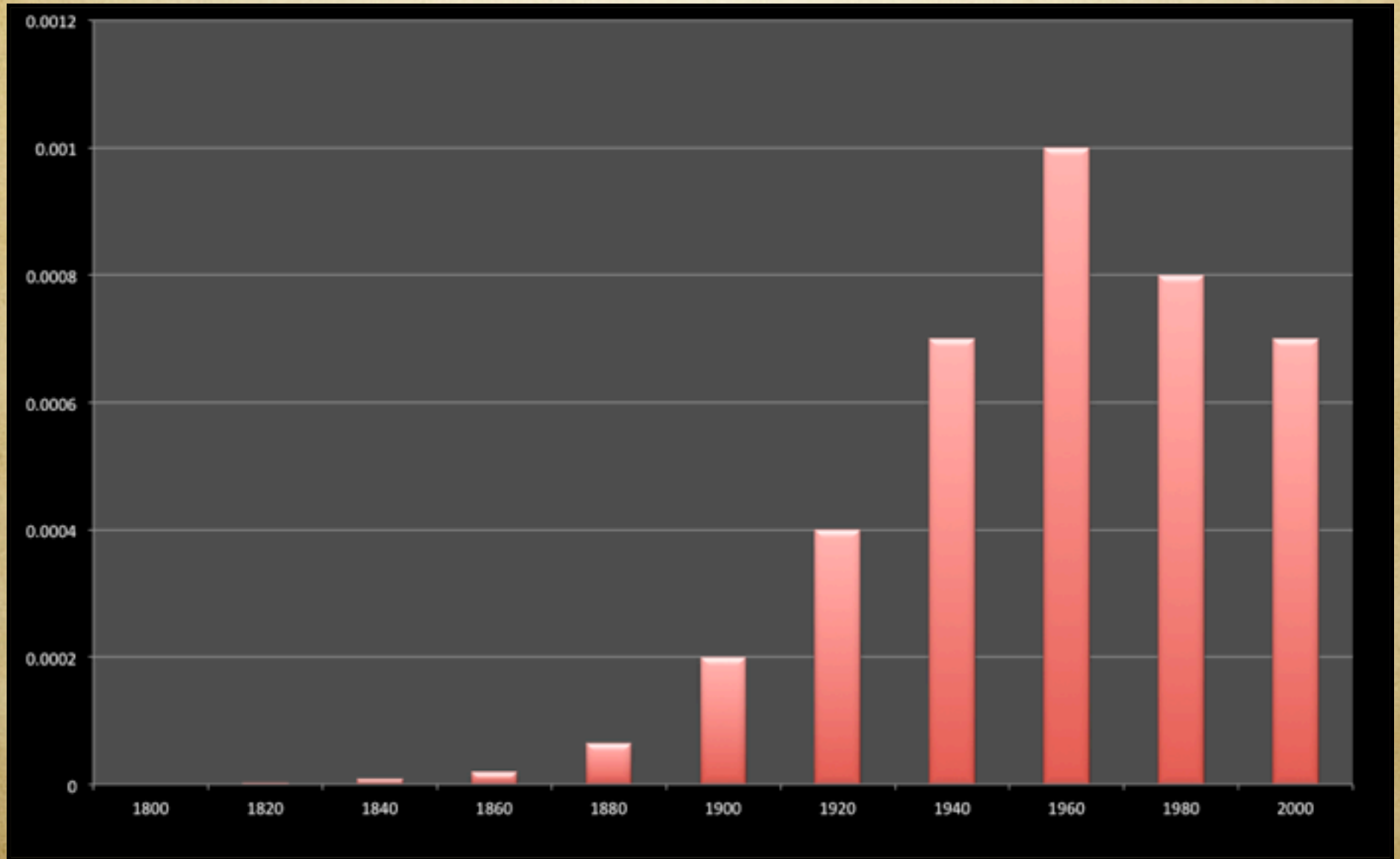




The natural sciences are like “a great empire falling to pieces.” This partly owing to “the want of any name by which we can designate the students of the knowledge of the material world collectively.”

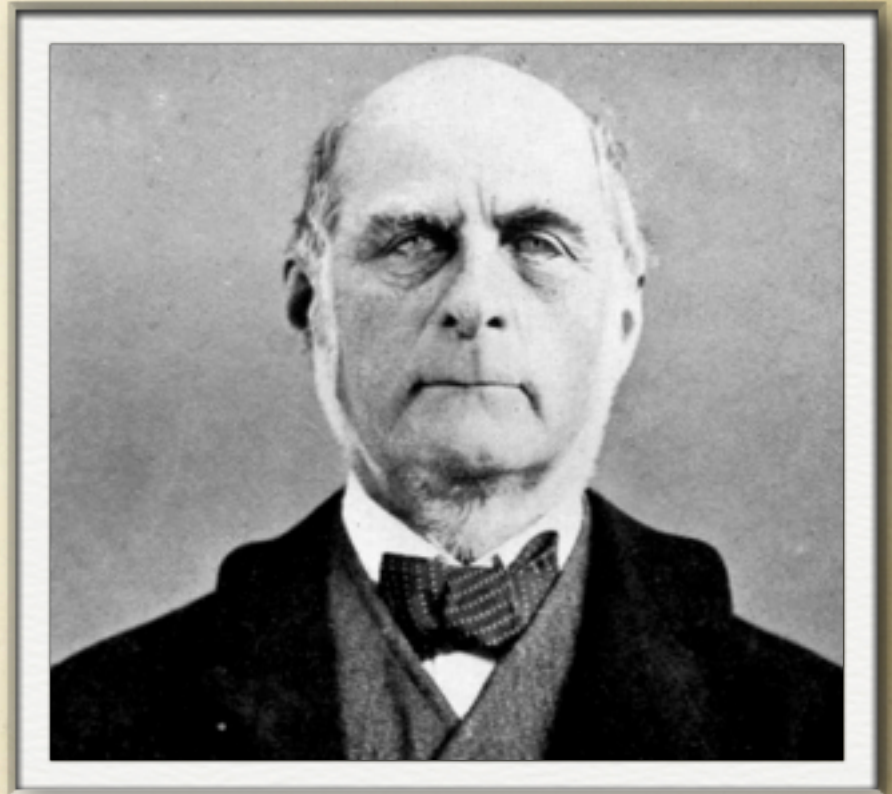
William Whewell, *Quarterly Review* 51 (1837)

# Frequency of the expression 'Scientist' in English Books, 1800-2000.



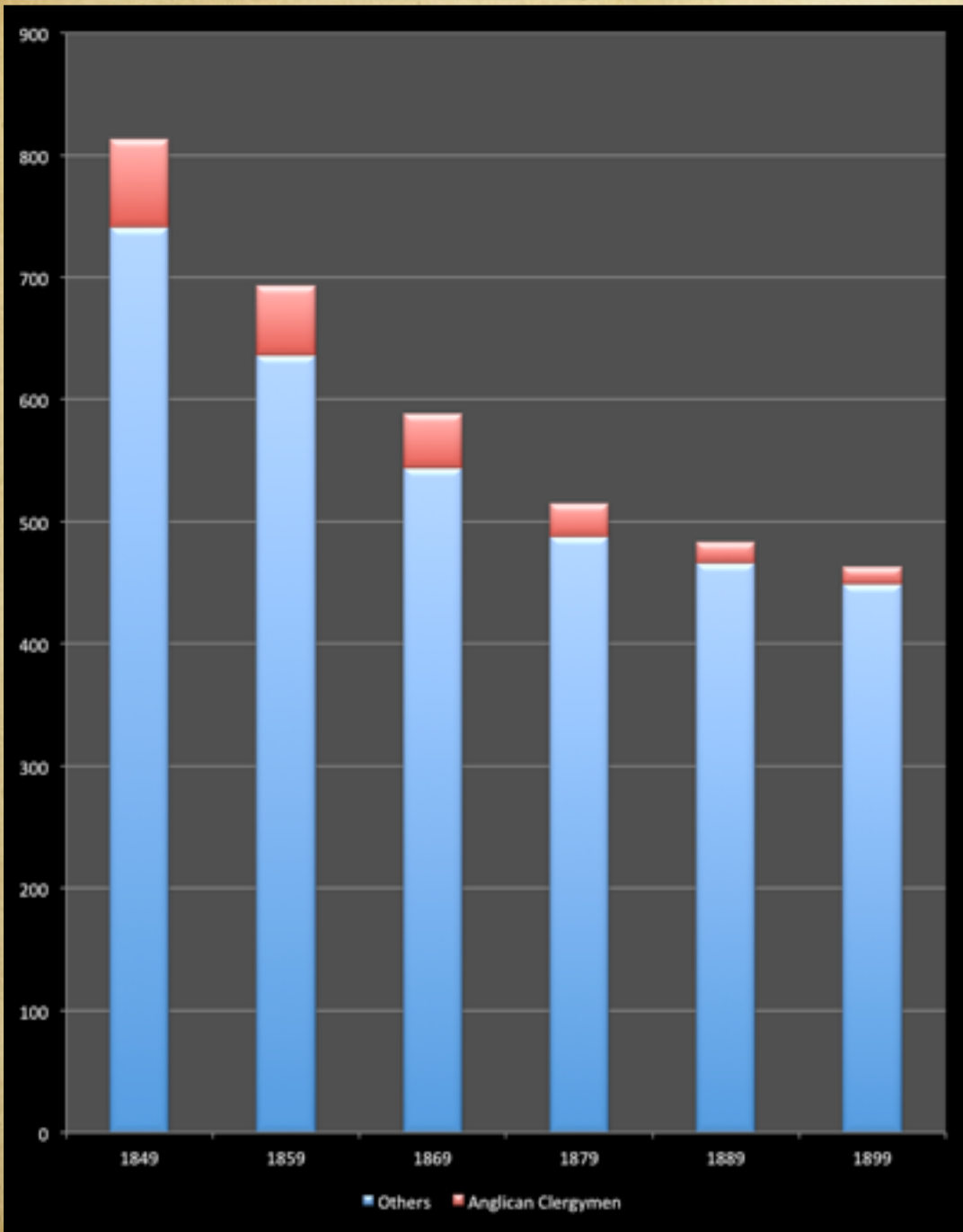
“the sons of clergymen rarely take a lead in science.... the pursuit of science is uncongenial to the priestly character.”

Francis Galton, *English Men of Science* (1874)





# Membership of Royal Society, 1849-99.



Anglican Clergymen (red)

Laity (blue)

# 'Science and Religion' in English Books, 1800-2000

