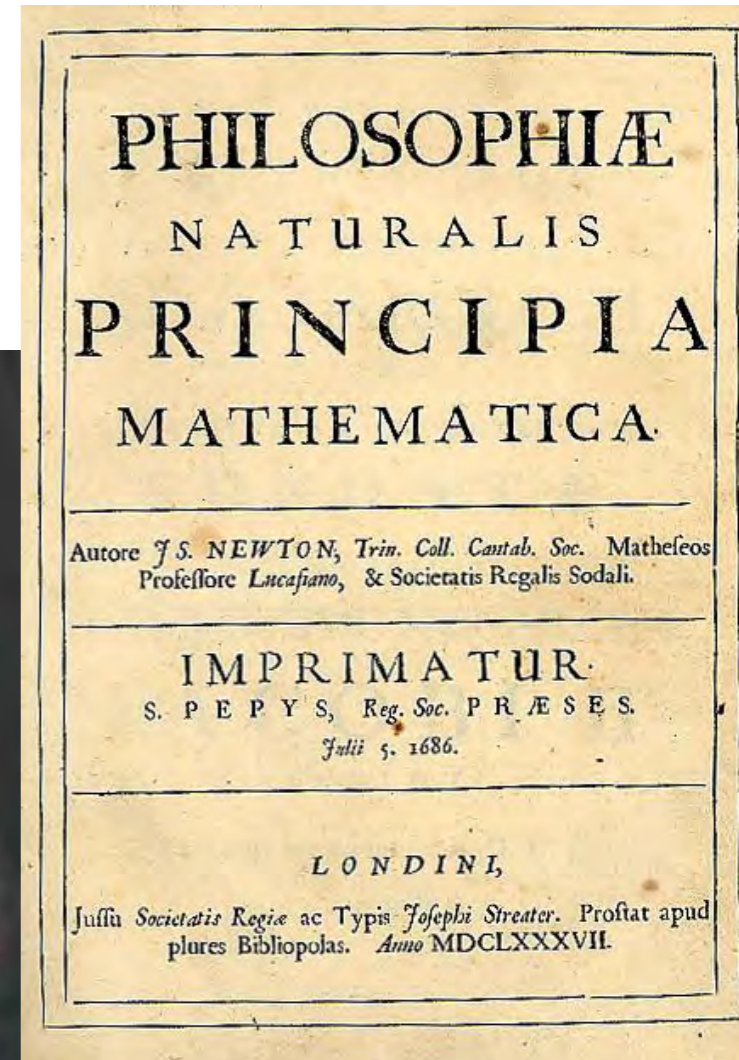
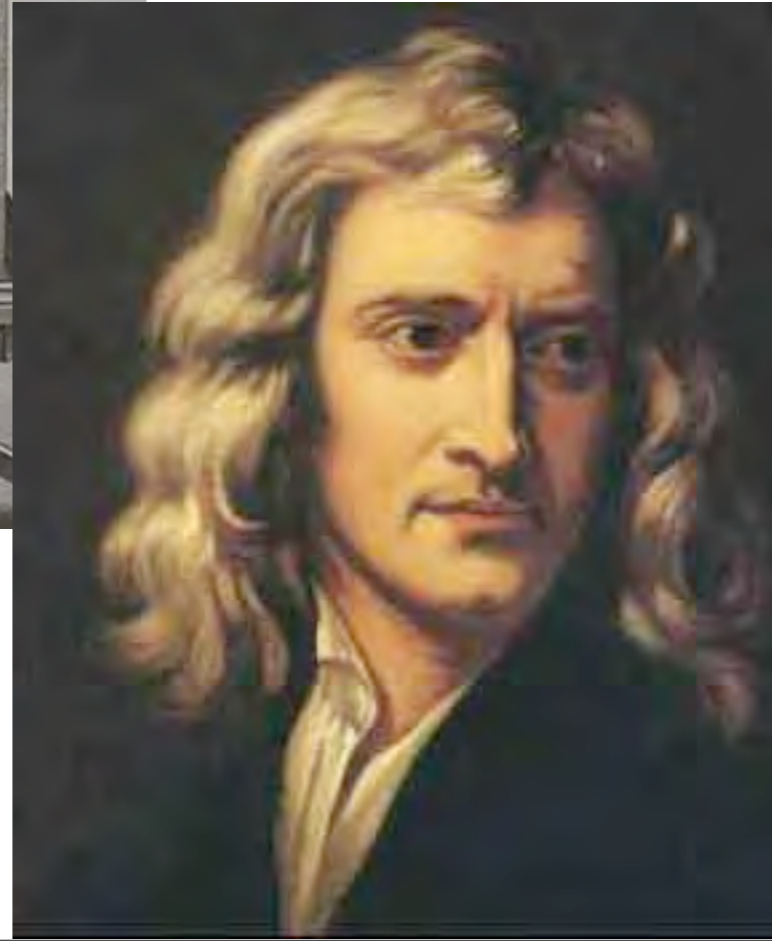


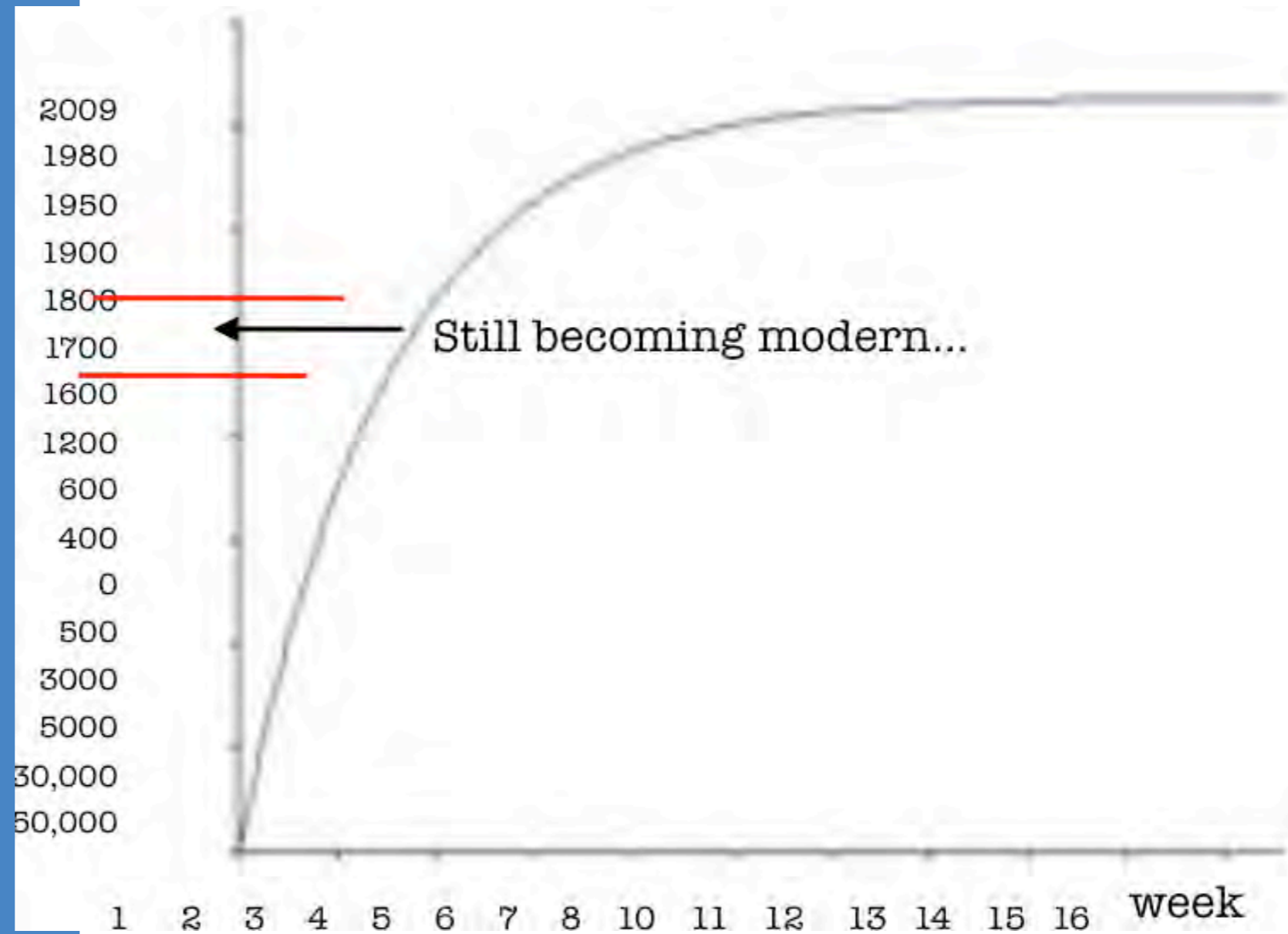
# scientific information-2

**History of Information**  
**Feb 24**  
**2000**





# stuck in the past?





# recap: political revolution

---

"Those dreadful  
revolutions,  
which cannot be  
beheld upon  
Paper, without  
horror."

*Sprat, History*

**English Civil War, 1642-1651**

**Commonwealth & Protectorate, 1649-1659**

**Restoration, 1660**

**Great Plague, 1665**

**Fire of London, 1666**

**Glorious Revolution, 1688**



"La sange du juste à Londres fera faute  
Bruslez par foudre de vingt trois le six,  
La dame antique cherra de place haute  
De meme sute plusiers seront occis"

## recap: conspiracy theory



"Sir Thomas Crewe . . . . hath heard at the  
Committee for examining the burning of the  
city, . . . .that it was done by plots . . . it was  
bragged by several Papists that upon such a day  
in such a time, we should find the hottest  
weather that ever was in England; and words of  
plainer sense"

--Pepys, November 2, 1666

"We talked much of Nostradamus his prophecy of  
these times, and the burning of the City of  
London, some of whose verses are put into  
Booker's Almanac this year . . . . My Lady Carteret  
herself did tell us how abundance of pieces of  
burnt paper were cast by the wind . . .she took  
one up . . . wheron there remained no more nor less  
than these words: "Time is, it is done"

--Pepys, February 3, 1666/7



# recap: social revolution

## café society & the public sphere



"Have they not the same security that the whole Nation has for its lives and fortunes? of which this is esteem'd the Establishment, that men of all sorts, and qualities, give their voice in every law that is made in Parliament." -- Sprat

## significant developments? the world of clubs

"knowledge presumes a community of knowers" --GN

## the English gentleman

"Though the Society entertains very many men of particular Professions; yet the farr greater Number are Gentlemen, free, and unconfin'd."-- Sprat

ROBERTI  
**BOYLE,**  
NOBILISSIMI ANGLI.



recap:  
organization of knowledge

---

***from the cabinet***

***to the museum***

-----

***from hierarchical order***

***to the alphabet***

-----

***from natural history***

***to natural philosophy***

***to science***



# recap: who?

"take the measure  
of the *Royal  
Society*, ... from  
the **honor**, and  
**reputation**, of  
many of those Men,  
of whom it is  
compos'd  
--Spratt

"Followers of  
nature itself  
and truth"

-Henry  
Oldenburg

## **scientific revolutionaries**

Boyle (1627-1691)

Wren (1632-1723)

Locke (1632-1704)

Hooke (1635-1703)

Newton (1642-1727)

Halley (1656-1742)

Huygens (1629-1695)

Mercator (1620-1687)

Moxon (1627-1691)

Graunt (1620-1674)

Petty (1623-1687)



## *from theory ...*

---

"I come now to  
the second period  
of my narration"  
--Spratt

**... to practice**

"what they did" -- Spratt

**matters of trust**

the importance of publication

everyman and experts

individuals and institutions





"their intention was more to communicate to each other  
their discoveries ... some resemblance, to the Academy  
lately begun at Paris"

--Sprat

## society of letters

---



Henry Oldenburg  
1619–1677

**corresponding secretary**

Henry Oldenburg, 1662

*Journal des Scavans*, 1665

*Philosophical Transactions*, 1665

advertisements, articles, abstracts

**challenges**  
publicity & profit



# "publish'd to the world"

Robert Hooke  
1663-1703

"to print a Paper of **advertisements...** wherein will be contained heads or substance of the inquiries they are most solicitous about, together with the progress they have made and the information they have received from other hands ... a short account of such other philosophicall matters as accidentally occur."

--Robert Hooke

## **cures for sickenss:**

"[Publication] is a most heroick Invention: For by such concealments, there may come very much hurt to mankind. If any certain remedy should be found out against an Epidemical disease; if it were suffer'd to be ingross'd by one man, there would be great swarms swept away, which otherwise might be easily sav'd."

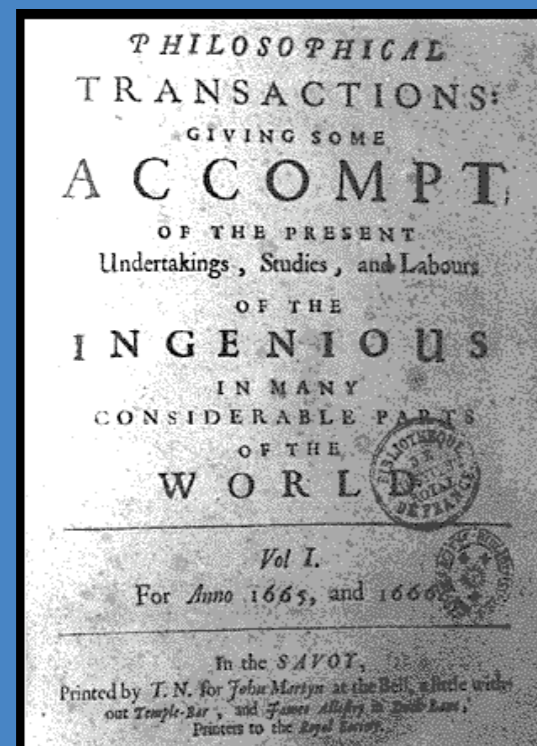
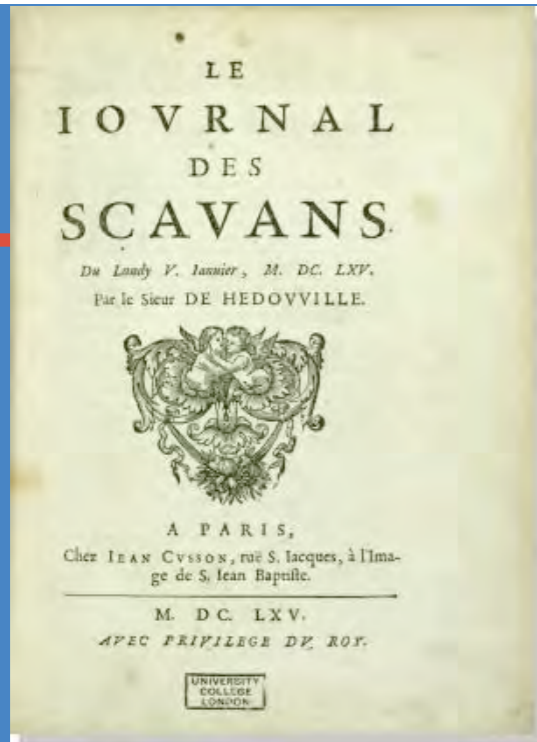
-- Sprat

## **scientific societies & intellectual property?**

"To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries"



# L'IMPRIMEUR AU LECTEUR.



Le dessein de ce Journal estant de faire sçavoir ce qui se passe de nouveau dans la Republique des lettres, il sera composé,

Premierement d'un Catalogue exact des principaux livres qui s'imprimeront dans l'Europe. Et on ne se contentera pas de donner les simples titres, comme ont fait jusques à present la pluspart des Bibliographes: mais de plus on dira dequoy

ils traitent, & à quoy ils peuvent estre utiles.

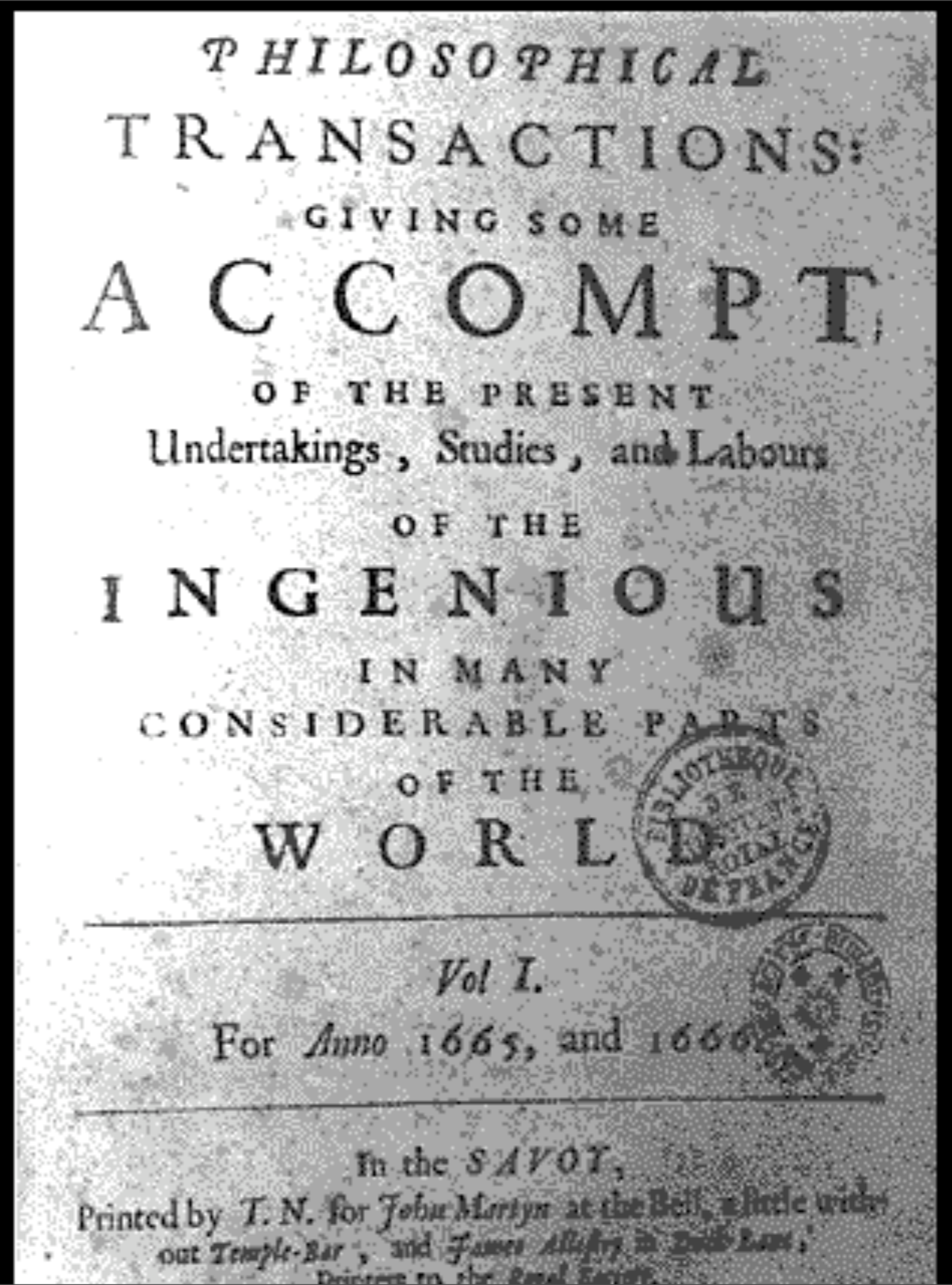
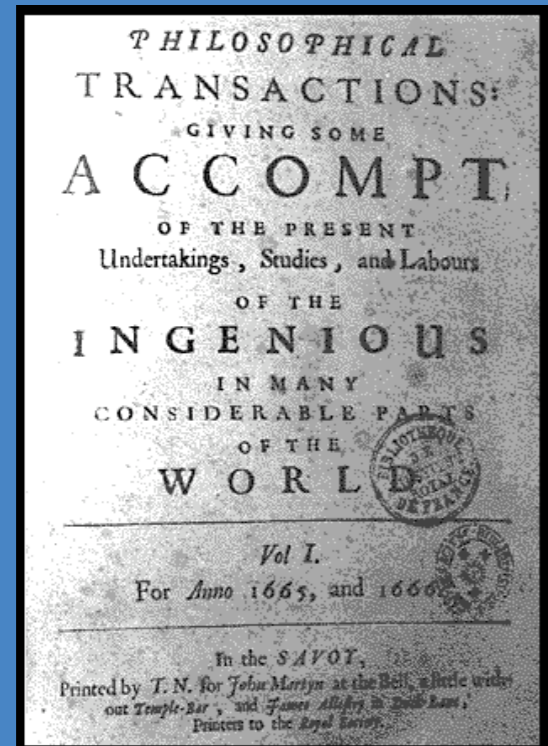
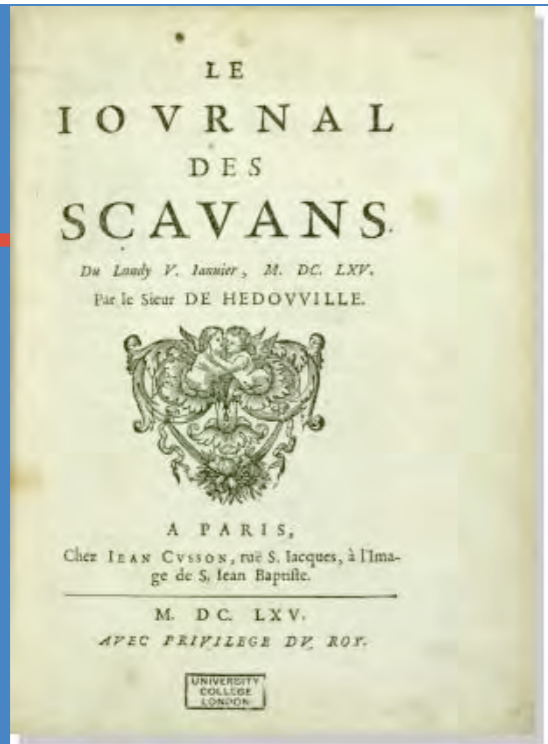
Secondement, quand il viendra à mourir quelque personne celebre par sa doctrine & par ses ouvrages, on en fera l'Eloge, & on donnera un Catalogue de ce qu'il aura mis en jour, avec les principales circonstances de sa vie.

En troisieme lieu on fera sçavoir les experiences de Physique & de Chymie; qui peuvent servir à expliquer les effets de la Nature: les nouvelles decouvertes qui se font dans les Arts & dans les Sciences, comme les machines & les inventions utiles ou curieuses que peuvent fournir les Mathematiques: les observations du Ciel, celles des Meteorres, & ce que l'Anatomie pourra trouver de nouveau dans les animaux.

En quatrieme lieu, les principales decisions des Tribunaux Seculiers & Ecclesiastiques, les censures de Sorbonne & des autres Universtitez, tant de ce Royaume que des Pays estrangers.

Enfin, on taschera de faire en sorte qu'il ne se passe rien dans l'Europe digne de la curiosité des Gens de lettres, qu'on ne puisse apprendre par ce Journal.

Le seul denombrement des choses qui le composeront pourroit suffire pour en faire connoistre l'utilité. Mais j'advertiray qu'il sera tres-advantageux à ceux qui entreprendront quelque ouvrage considerable, puis qu'ils pourront s'en servir pour publier leur dessein, & inviter tout le monde à leur communiquer les manuscrits; & les pieces fugitives qui pourront contribuer à la perfection des choses qu'ils auront entrepris.





(1)

Numb. 1.

# PHILOSOPHICAL TRANSACTIONS.

Munday, March 6. 1665.

## The Contents.

*An Introduction to this Treatise. An Account of the Improvement of Optick Glasses at Rome. Of the Observation made in England, of a Spot in one of the Belts of the Planet Jupiter. Of the motion of the late Comet predicted. The Heads of many New Observations and Experiments, in order to an Experimental History of Cold; together with some Thermometrical Discourses and Experiments. A Relation of a very odd Monstrous Calf. Of a peculiar Lead-Ore in Germany, very useful for Essays. Of an Hungarian Bolus, of the same effect with the Bolus Armenus. Of the New American Whale-fishing about the Bermudas. A Narrative concerning the success of the Pendulum-watches at Sea for the Longitudes; and the Grant of a Patent thereupon. A Catalogue of the Philosophical Books published by Monsieur de Fermat, Counsellour at Tholouse, lately dead.*

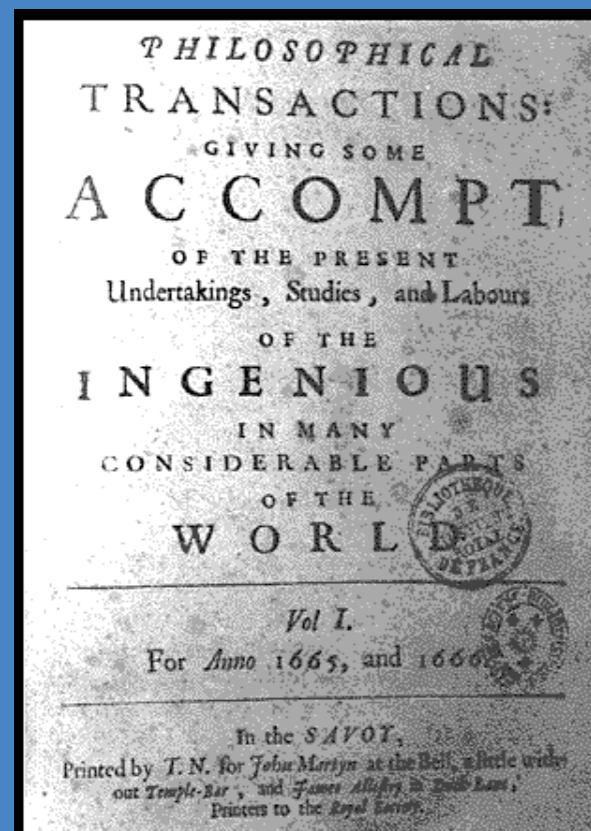
## The Introduction.



Hereas there is nothing more necessary for promoting the improvement of Philosophical Matters, than the communicating to such, as apply their Studies and Endeavours that way, such things as are discovered or put in practise by others; it is therefore thought fit to employ the *Press*, as the most proper way to gratifie those, whose engagement in such Studies, and delight in the advancement of Learning and profitable Discoveries, doth entitle them to the knowledge of what this Kingdom, or other parts of the World, do, from time to time, afford, as well

A

of





(1)

Numb. 1.

# PHILOSOPHICAL TRANSACTIONS.

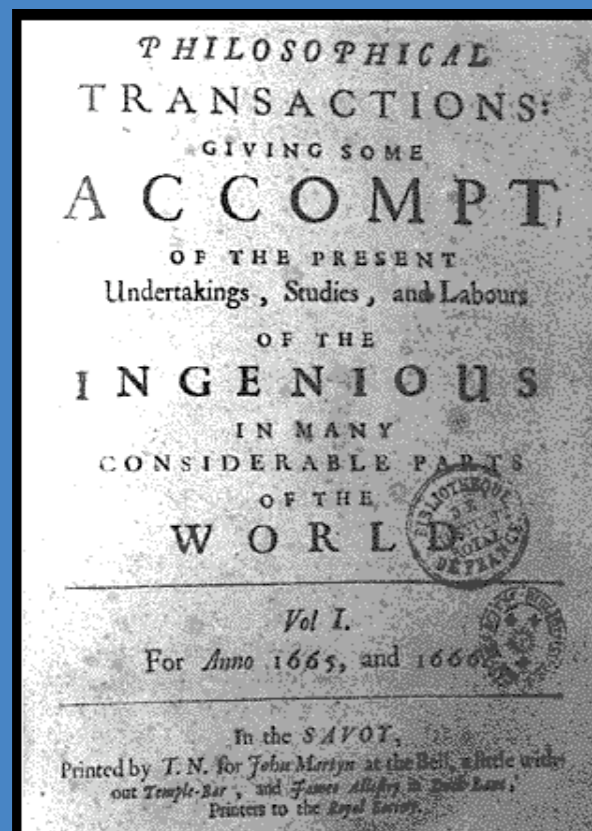
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Munday, March 6. 1667.

(10)

## *An Account of a very odd Monstrous Calf.*

By the same Noble person was lately communicated to the *Royal Society* an Account of a very Odd Monstrous Birth, produced at *Limington* in *Hampshire*, where a Butcher, having caused a Cow (which cast her Calf the year before) to be covered, that she might the sooner be fatted, killed her when fat, and opening the Womb, which he found heavy to admiration, saw in it a Calf, which had begun to have hair, whose hinder Leggs had no Joynts, and whose Tongue was, *Cerberus*-like, triple, to each side of his Mouth one, and one in the midst: Between the Fore-leggs and the Hinder-leggs was a great Stone, on which the Calf rid: The *Sternum*, or that part of the Breast, where the Ribs lye, was also perfect Stone; and the Stone, on which it rid, weighed twenty pounds and a half; the outside of the Stone was of Grenish colour, but some small parts being broken off, it appeared a perfect Free-stone. The Stone, according to the Letter of Mr. *David Thomas*, who sent this Account to Mr. *Boyle*, is with Doctor *Haughteyn* of *Salisbury*, to whom he also referreth for further Information.



*A Discourse of the Rule of the Decrease of the Height of the Mercury in the Barometer, according as Places are elevated above the Surface of the Earth, with an Attempt to discover the true Reason of the Rising and Falling of the Mercury, upon change of Weather.*

By EDM. HALLEY.

THE Elastick Property of the *Air* has been long since made out, by Experiments before the *R. Society* and elsewhere; and the Resistance of its Spring is found to be nearly equal to the Weight or Force that compresses it; as also, that the Spaces the same *Air* occupies, under dif-

proceeding

*A Table shewing the Altitude to given Heights of the Mercury.*

Inch.	Feet.
30	0
29	915
28	1862
27	2844
26	3863
25	4922
20	10947
15	18715
10	29662
5	48378
1	91831
0,5	110547
0,25	129262
0,1	29 mil. or 154000
0,01	41 mil. 216169
0,001	53 mil. 278338

*A Table shewing the Heights of the Mercury at given Altitudes.*

Feet.	Inch.
0	30, 00
1000	28, 91
2000	27, 86
3000	26, 85
4000	25, 87
5000 feet	24, 93
1 mile	24, 67
2	20, 29
3	16, 68
4	13, 72
5	11, 28
10	4, 24
15	1, 60
20	0, 95
25	0, 23
30	0, 08

"A Discourse on the Rule of the Decrease of the Height of Mercury in the Barometer, According as Places are Elevated Above the Surface of the Earth, with an Attempt to Discover the True Reason of the Rising and Falling of the Mercury, upon Change of Weather"

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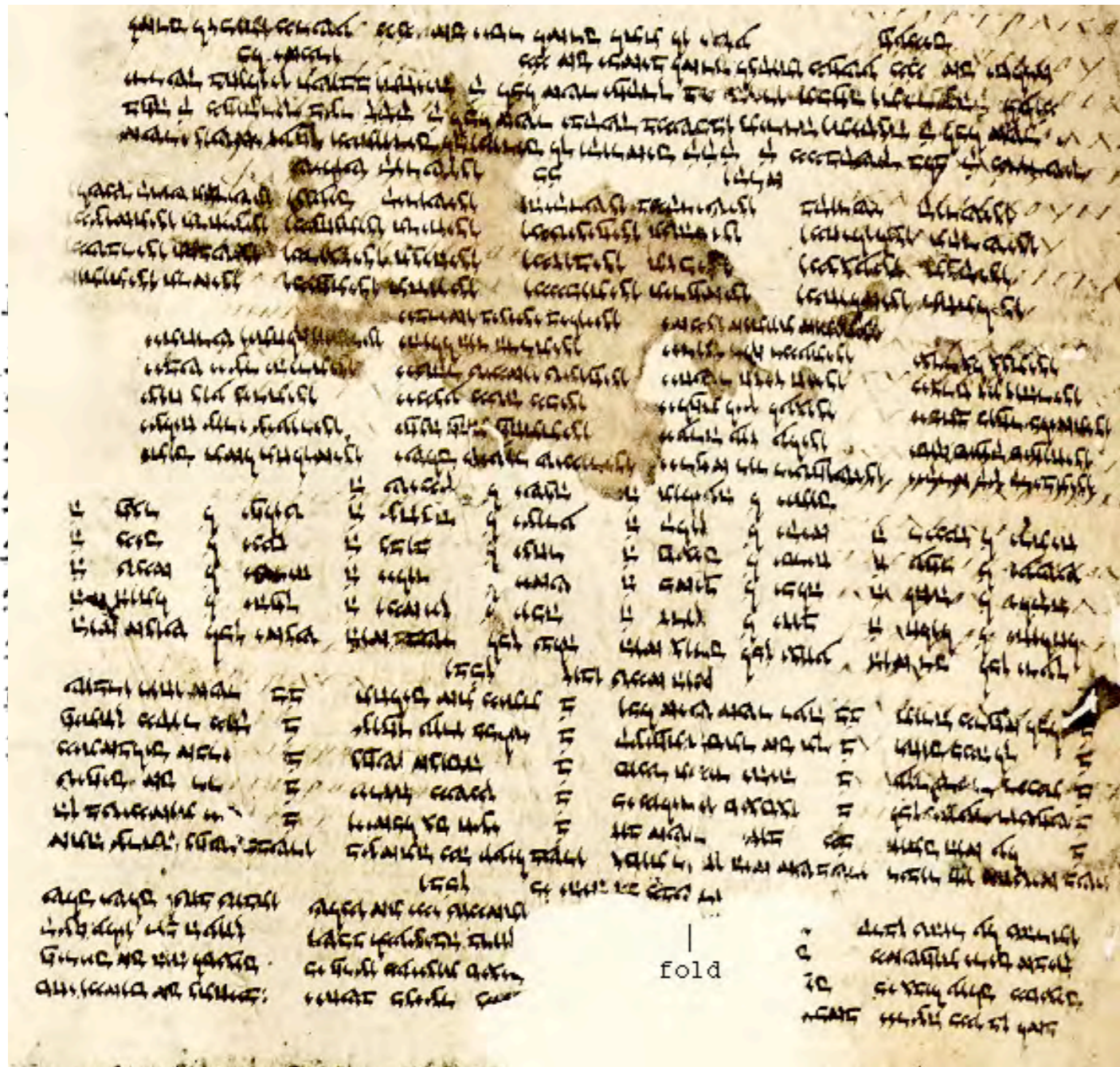
*Philosophical Transactions, 1686*

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ROYAL SOCIETY.

179

A  
S C H E M E

At one View representing to the Eye the Observations of the Weather for a Month.

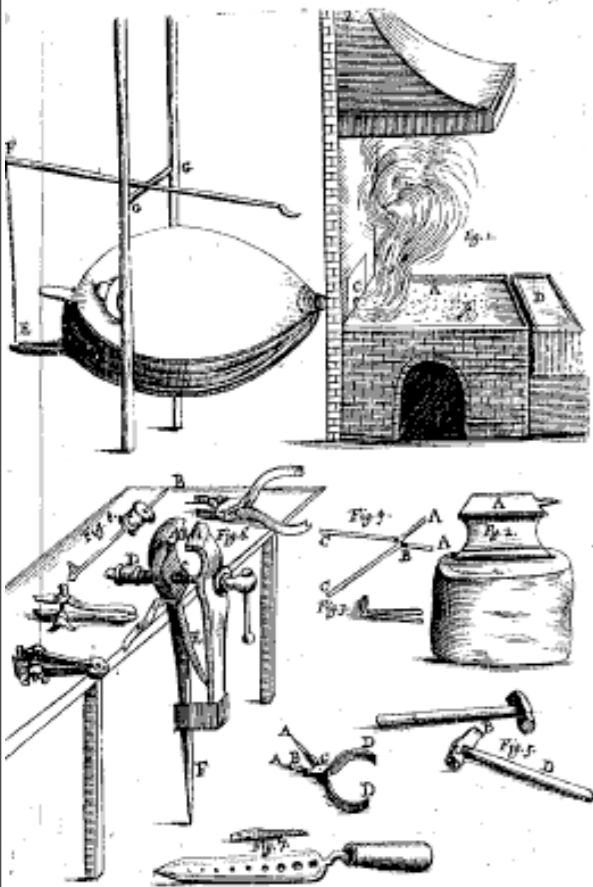
Days of the Month and Place of the Sun. Remarkable hours.	Age and sign of the Moon at Noon.	The Quarter of the Wind and its strength.	The Degree of Heat and Cold.	The Degree of Dryness and Moisture.	The Degree of Pressure.	The Force or violence of the Wind.	The Note or Remark of the Day.	General Observations to be made after the Day is filled with Observations.
12. 4 12. 40 12. 46 12. 52	27 Perigee.	W. 10 W.S.W. 7	20 18	10 10	10 10	Clear Thunder, far ward the S.	A great dew in the N. E. Thunder, far ward the S. A very great Thunder'd Tide.	From the last quadrant with change to winter was very common but cold for the time; the Wind very violent between N. and W.
13. 8 13. 14 13. 20 13. 26 13. 32 13. 38 13. 44	28 N. Moon, S.	S.W. 10 S. 10	18 17	10 10	10 10	A clear Sky all day, but a little yellowish at 4 P.M.	Not by much as yesterday. Thunder in the North.	a little below the last year Wind, and all the Wind rose at length, the Quadrant was distant ing it is come very low, after which it began to refresh.
14. 0 14. 6 14. 12 14. 18 14. 24 14. 30 14. 36 14. 42	29 N. Moon, S.	S. 10 S. 10	17 16	10 10	10 10	Overcast and very low the ground, but very much upon Marble fountains.	No dew upon the ground, but very much upon Marble fountains.	the Wind rose at length, the Quadrant was distant ing it is come very low, after which it began to refresh.

proceeding

"A Discourse on the Rule of the Decrease of the Height of Mercury in the Barometer, According as Places are Elevated Above the Surface of the Earth, with an Attempt to Discover the True Reason of the Rising and Falling of the Mercury, upon Change of Weather"

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*Philosophical Transactions, 1686*



MECHANICK  
**EXERCISES,**  
 OR,  
 The Doctrine of  
**Handy-works.**

Began Jan. 1. 1677. And intended to be  
 Monthly continued.

By Joseph Moxon Hydrographer to the  
 Kings most Excellent Majesty.



LONDON,

Printed for Joseph Moxon at the sign of Atlas on  
 Ludgate-Hill, 1677.

not so philosophical

**philosophers, physicians, and  
 mechanics**

"this freedom ... which they use  
 in embracing all assistance ... is  
 most advantageous to them"

--Sprat

Joseph Moxon,  
 astronomy  
 mathematics  
 navigation  
 self-help, ..

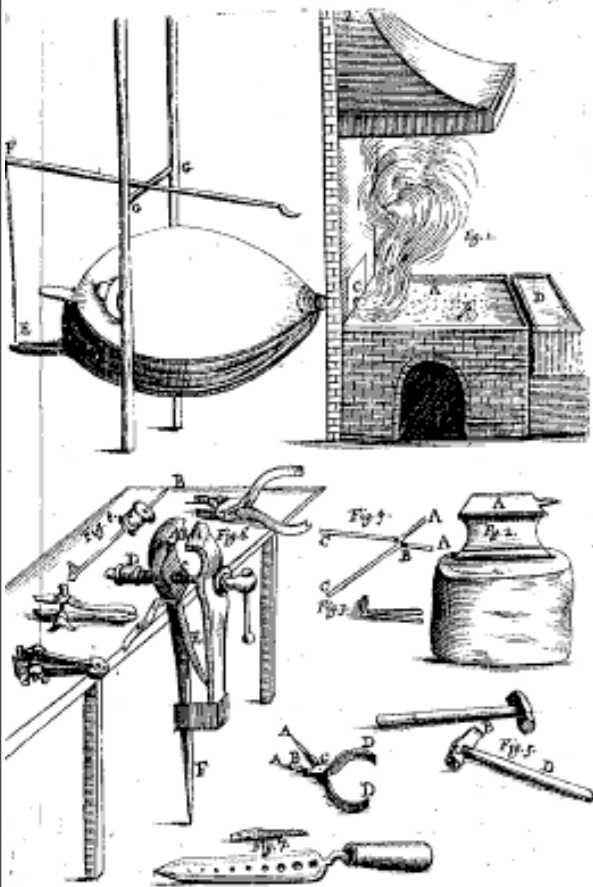
1677-86?

*Mechanick Exercises*

Hofl Science - 14



Joseph Moxon  
 1627-1691



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Numb. I.

1

*MECHANICK EXERCISES:*

Or, the Doctrine of

**Handy-works.**

Applied to the Art of

**Printing.**

P R E F A C E.

**B**efore I begin with Typographie, I shall say  
 some-what of its Original Invention; I mean  
 here in Europe, not of theirs in China and  
 other Eastern Countries, who (by general  
 assent) have had it for many hundreds of years,  
 though their Invention is very different from ours; they  
 Cutting their Letters upon Blocks in whole Pages or  
 Forms, as among us our Wooden Pictures are Cut; But  
 Printing with single Letters Cast in Mettal, as with us  
 here in Europe, is an Invention scarce above Two hundred  
 and fifteen years old: and yet an undecidable Controversie



Joseph Moxon  
 1627-1691



# publishing & priority

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## **Hooke v Newton**

"It now remains to know the propriety of a curve Line (not circular nor concentrical) made by a centrall attractive power which makes the velocitys of Descent ...

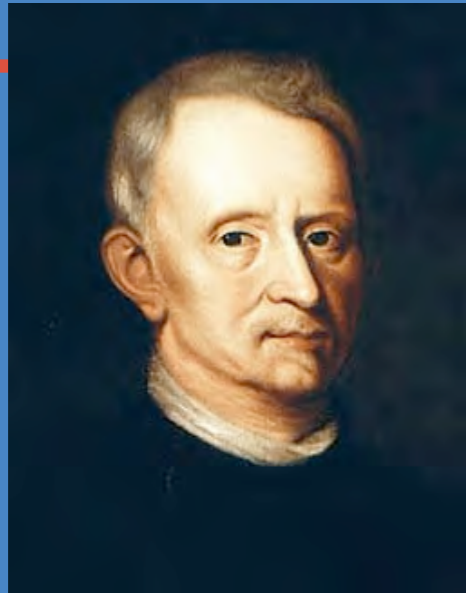
in a Duplicate proportion to the Distances Reciprocally taken. I

doubt not but that by your excellent method you will easily find out what the curve must be."

--Hooke to Newton, Jan 4, 1681



Isaac Newton  
1642-1727



Christiaan Huygens  
1629–1695

# publishing & priority

## Hooke v Huygens

"I my self had an other way of continuing and equalling the vibrations of a pendulum by clock work long before I heard of Monsieur Zulichems way, nay though equated with a Cycloeid **yet I have not either cryd eureka or publisht it** and yet I think I can produce a sufficient number of Credible witnesses that can testify for it about these 12 years. Soe that the argument that he soe much Relys upon to secure to him the Invention is not of soe great force as to perswaid all the World that he was the first & Sole inventor of that first particular of applying a pendulum to a clock."

--Hooke



# publishing & profit

---



"Hooke concealed his invention about  
Watches too long; pray tell him not to  
do so with what other things hee hath  
of that kind."

--Moray to Oldenburg

7002  
THE  
LONGITUDES

EXAMIN'D.

Beginning with a short Epistle to the

*Longitudinarians;*

AND

Ending with the Description of a *Curry*, pretty

MACHINE

Of my Own,

Which I am (almost) sure will do for  
the LONGITUDE, and procure me

THE

*Twenty Thousand Pounds.*

By JEREMY THACKER,  
OF Beverley in Yorkshire.

*Quid non mortalia pectora cogis*

*Auri sacra Fames!*

LONDON:

Printed for J. ROBERTS, at the Oxford-Arms  
in Warwick-Lane. 1714. Price 6d.

# publish and perish

"we are now arriv'd at that excessive  
censuring humor, that he who takes upon him  
to commend any thing ... will raise to  
himself farr more Enemies than Friends ..  
this sowness of Criticism"  
--Sprat

"The wits .. had powerful strategies at  
their disposal for challenging the worth  
of any printed book ... and the truth of  
any printed statement".  
--Adrian Johns, *The Nature of the Book*

Jeremy Thacker, *Longitudes Examin'd*



John Arbuthnot

1667-1735



# Stubbe's animadversions

---

## **Mistakes about the SWEATING-SICKNES, and its Cure.**

TO shew the great Utility of the Royal Society, he says

They will be able by degrees to purchase such Extraordinary Inventions, which are now close lock'd up in Cabinets; and then to bring them unto one Common Stock, which shall be upon all occasions exposed to all mens use. This is a most Heroick Invention; For by such concealments, there may come very much hurt to mankind. If any certain remedy should be found out against an Epidemicall disease, if it were suffer'd to be engross'd by one man, there would be great Swarms swept away, which otherwise might be easily sav'd. I shall instance in the Sweating-Sickness. The Medicine for it was almost Infallible. But, before that could be generally published, it had almost dispeopled whole Towns. If the same disease should have returned, it might again have been as destructive, had not the Lord Bacon ta-ken care to set down the particular course of Physick for it in his History of Henry the Seventh, and so put it beyond the possibility of any private man's invading it. This out to be imitated in all other Sovereign Cures of the like nature to avoid such dreadful casualties.

One would think by the words of our Historian, That the Cure of the Sweating-Sickness, were recorded by no Body but the Lord Bacon that it was almost Infallible; that the Sweating-Sickness did not return again; And that the Cure was rather concealed (and needed to be generally published) at first, then to be discovered by Observation and Experiments of those that first fell sick. But there is no such thing: for the same cure is related by Polydore Virgil, and Holinshed in their Histories of Henry the Seventh. And the same sickness did rage in the twenty second year of the said King his Reign, as well as the first. And the Cure related was so far from being almost Infallible, that my Lord Bacon only saies it commonly recovered the sick: and after it was so generally known, yet the twenty second year of that Kings Reign, many dyed of it (as Holinshed saith) howbeit not in the same number, by reason of the remedy found out at the beginning of it. To convince the Reader of the truth of what I say, and to shew how unacquainted





# Stubbe's animadversions

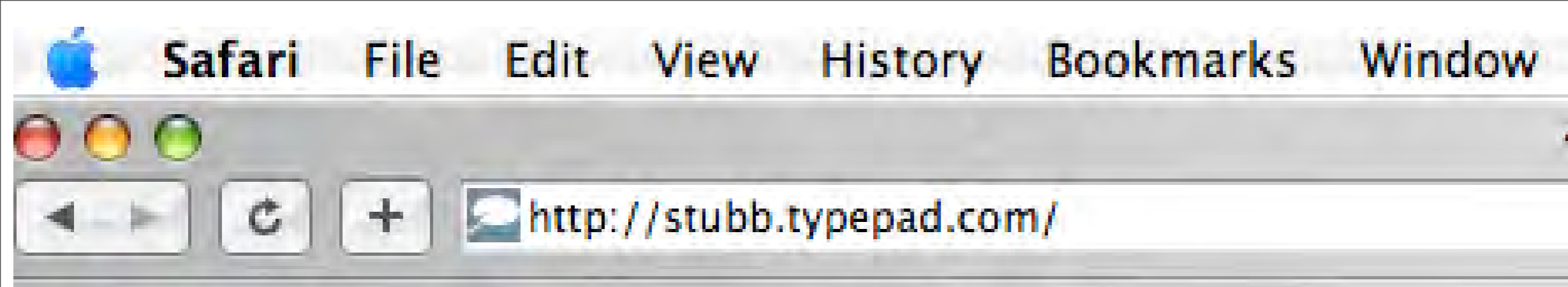
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Safari

File

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View

History

Bookmarks

Window



http://stubb.typepad.com/

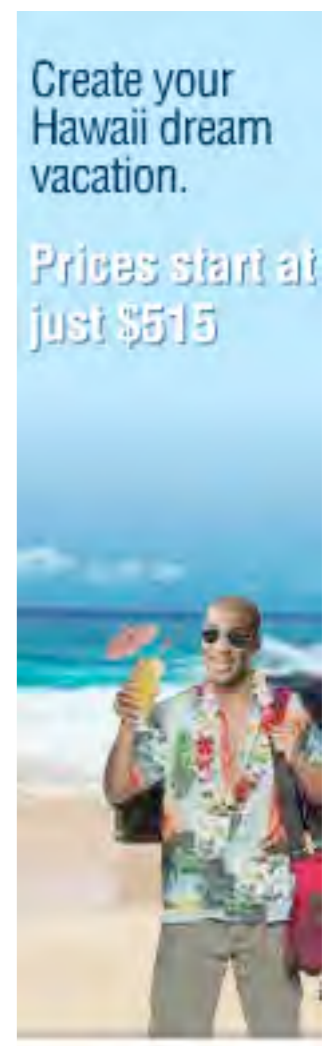
# Stubbe's animadversions

## Mistakes about the SWEATING-SICKNES, and its Cure.

TO shew the great Utility of the Royal Society, he says

They will be able by degrees to purchase such Extraordinary Inventions, which are now close lock'd up in Cabinets; and then to bring them unto one Common Stock, which shall be upon all occasions exposed to all mens use. This is a most Heroick Invention; For by such concealments, there may come very much hurt to mankind. If any certain remedy should be found out against an Epidemicall disease, if it were suffer'd to be engross'd by one man, there would be great Swarms swept away, which otherwise might be easily sav'd. I shall instance in the Sweating-Sickness. The Medicine for it was almost Infallible. But, before that could be generally published, it had almost dispeopled whole Towns. If the same disease should have returned, it might again have been as destructive, had not the Lord Bacon ta-ken care to set down the particular course of Physick for it in his History of Henry the Seventh, and so put it beyond the possibility of any private man's invading it. This out to be imitated in all other Sovereign Cures of the like nature to avoid such dreadful casualties.

One would think by the words of our Historian, That the Cure of the Sweating-Sickness, were recorded by no Body but the Lord Bacon that it was almost Infallible; that the Sweating-Sickness did not return again; And that the Cure was rather concealed (and needed to be generally published) at first, then to be discovered by Observation and Experiments of those that first fell sick. But there is no such thing: for the same cure is related by Polydore Virgil, and Holinshed in their Histories of Henry the Seventh. And the same sickness did rage in the twenty second year of the said King his Reign, as well as the first. And the Cure related was so far from being almost Infallible, that my Lord Bacon only saies it commonly recovered the sick: and after it was so generally known, yet the twenty second year of that Kings Reign, many dyed of it (as Holinshed saith) howbeit not in the same number, by reason of the remedy found out at the beginning of it. To convince the Reader of the truth of what I say, and to shew how unacquainted



BOOK NOW





# trust and expertise

---

SOCRATES: Let us consider the matter in this way: If the wise man or any other man wants to distinguish the true physician from the false, how will he proceed?

.... He will consider whether what he says is true, and whether what he does is right, in relation to health and disease?

... But can any one attain the knowledge of either unless he have a knowledge of medicine?

... No one at all, it would seem, except the physician can have this knowledge; and therefore not the wise man; he would have to be a physician as well as a wise man.

--Plato, *Charmides*



# medical knowledge

---

"Cramp be thou  
faintless  
As our Lady was  
sinless  
When she bare  
Jesus"

--Pepys

**sickness:** plague and pox  
a test for trustworthiness

"so great a Number of  
*Contemporaries* ... that lov'd truth so  
zealously; sought it so constantly;  
and upon whose labours, mankind might  
**so freely rely"**

--Sprat



# nasty, brutish, and short

## the European experience

black death: 1347

plague again: 1665

in London, of about 1/2 million, 100,00 died

"[W]ar, plague, famine -- reduced the population of France by the end of the reign to its lowest point for three centuries."

Blanning

## European vs Chinese Medicine

aspects of trade?

*Huang Di Nei Jing [Inner Classic of the Yellow Emperor]*

?300 BC

Hofl Science - 22





# nasty, brutish, and short

---



"gradual eradication of small pox was responsible for much of the population growth that occurred in England in the eighteenth century."

--Peter Razzell

**Queen Anne (1665-1714)**

17 pregnancies

3 still births

10 miscarriages

3 died in infancy of **smallpox**

**William Duke of Gloucester (1689-1700)**



# spreading plague/ spreading news

---



Daniel Defoe  
1659?-1731

"We had no such thing as printed newspapers, in those days, to spread rumours and reports of things; and to improve them by the invention of men, as I have lived to see practised since. But such things as those were gathered from letters of merchants, and others, who corresponded abroad, and from them was handed about by word of mouth only; so that things did not spread instantly over the whole nation as they do now. But it seems that the Government had a true account of it, and several councils were held, about ways to prevent its coming over; but all was kept very private."

--Daniel Defoe, *Journal of the Plague Years*





## slow progress

---

The plague is much in Amsterdam, and we in fears of it here. Pepys, **Dec.** 31, 1663

The talk upon the 'Change is, that De Ruyter is dead, with fifty men of his own ship,  
of the plague, at Cales, **June** 30, 1664

We were told to-day of a Dutch ship of 3 or 400 tons, where all the men were dead of  
the plague, and the ship cast ashore at Gottenburgh. **Sept.** 24, 1664

hence to the Coffee-house ... where all the newes is of the Dutch being gone out, and  
of the plague growing upon us in this towne, **May** 24, 1665

In the evening home to supper; and there, to my great trouble, hear that the plague is  
come into the City (though it hath these three or four weeks since its beginning been  
wholly out of the City); but where should it begin but in my good friend and  
neighbour's, Dr. Burnett, in Fanchurch Street: which in both points troubles me  
mightily. **June** 10, 1665

The towne grows very sickly, and people to be afeard of it; there dying this last week  
of the plague 112, from 43 the week before,.The Mortality Bill is come to 267; June  
29th, 1665 Above 700 died of the plague this week. **July** 13, 1665

The sickness is... almost every where, there dying 1089 of the plague this week.  
**July** 19, 1665



# tracking diseases

KNX 1070 News



**how good are we?**

**Beef Recall Amid E. coli Worries**



**U.S. Food and Drug Administration**

[FDA Home Page](#) | [Search FDA Site](#) | [FDA A-Z Index](#) | [Contact FDA](#)

**Peanut Product Recalls:  
Salmonella Typhimurium**

Updated: February 13, 2009

An elderly North Carolina man died in November from the same strain of salmonella that's causing the outbreak, officials in that state said Friday.



# cause or cure?

---

## **fatal mistakes**



# MICROGRAPHIA:

OR SOME

Physiological Descriptions of the  
OF

## MINUTE BODIES

MADE BY

MAGNIFYING GLASSES

WITH

OBSERVATIONS and INQUIRIES thereupon.

By R. HOOKE, Fellow of the ROYAL SOCIETY

*Nonnulli acule quantum contendere Latine,  
Non tamen idcirco contentas Lippas senege. Hocat. Ep. lib. 1.*



Fig. 1.



Fig. 2.

Fig. 3.



Schem. XV



# attacking smallpox

"the ingenious Invention of that Excellent person, Doctor Wren, of injecting liquors into the veins of an Animal, seems to be reducible to this head: I cannot stay, nor is this a fit place, to mention the several Experiments made of this kind by the most incomparable Mr. Boyle, the multitudes made by the lately mention'd Physician Doctor Clark, the History whereof, as he has been pleas'd to communicate to the Royal Society, so he may perhaps be prevail'd with to make publique himself: But I shall rather hint, that certainly, if this Principle were well consider'd, there might, besides the further improving of Bathing and Syringing into the veins, be thought on several ways, whereby several obstinate distempers of a humane body, such as the Gout, Dropsie, Stone, &c. might be master'd, and expell'd; and good men might make as good a use of it, as evil men have made a perverse and Diabolical. And that the filling of the pores of the skin with some fluid vehicle, is of no small efficacy towards the preparing a passage for several kinds of penetrant juices, and other dissoluble bodies, to insinuate themselves within the skin." --Hooke



# inoculation



Voltaire

[François-Marie Arouet]

1694-1778

"It is whispered in Christian Europe that the English are mad and maniacs: mad because they give their children smallpox to prevent their getting it, and maniacs because they cheerfully communicate to their children a certain and terrible illness with the object of preventing an uncertain one. The English on their side say: 'The other Europeans are cowardly and unnatural: cowardly in that they are afraid of giving a little pain to their children, and unnatural because they expose them to death from smallpox some time in the future.' To judge who is right in this dispute, here is the history of this famous inoculation which is spoken of with such horror outside England."

Voltaire, *Letters on England*



# foreign born disease foreign born cure

---



Lady Mary Wortley  
Montague  
1689–1762

## **inoculation**

Tibet, 11th century

Turkey, ? 16th century

England, France 18th century



# medical trials

---



**a shortage of numbers**

**rebuilding London**

Hooke, Wren

**tracking population**

Graunt, Petty

**accounting for death**

how many sick? how many died? how  
many recovered? how many?

*An Extraēt of two Essays in Political Arithmetick concerning the comparative Magnitudes, &c. of London and Paris by Sr. William Petty Knight. R. S. S.*

The excellent Author of these two Essays, has in several former of the same Nature made it appear that Mathematical Reasoning, is not only applicable to Lines and Numbers, but affords the best means of Judging in all the concerns of humane Life. In the present he endeavours to prove *London*, as it now is, the most considerable City now in being, by shewing it much to exceed *Paris*, (which not only the *French* but foreigners have asserted to be the chief City of *Europe*.) both in People, Housing, and Wealth: The first by comparing the Bills of Mortality, whereby he finds that the People of *London* are as many as those of *Paris* and *Rouen* put together. The second by comparing the number of Houses, which by the Chimny-Books are found above 80000 in *London*, whereas a great Author among the *French*, (who seldome faile to magnifie their own things,) reckons but 50000 Houses in *Paris*. As to the third, to wit the Wealth, he conceives that there is yet a much greater disproportion, there being no comparison between them for Trade, and besides a good argument drawn from the Law-Suites of both places, he concludes from the *Paris* bills of Mortality, that two 5ths of the People of *Paris* are so poor

## competitive counts

---



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*A further Assertion of the Propositions concerning the Magnitude, &c. of London, contained in two Essays in Political Arithmetic; mentioned in Philos. Transact. Numb. 183; together with a Vindication of the said Essays from the Objections of some Learned Persons of the French Nation, by Sr. W. Petty Knt. R.S.S.*

1. I T could not be expected that an Assertion of *Londons* being bigger than *Paris* and *Rouen*, or than *Paris* and *Rome* put together, and bigger than any City of the World, should scape uncontradicted, and 'tis expected that I (if continuing in that Perswasion) should make some Reply to these contradictions.

2. I begin with the Ingenious Author of the *Novelles de la Republique des Lettres*, who saith that *Rey* in *Persia* is far bigger than *London*; for that in the 6th. Century of Christianity (I suppose *An. 550*) It had 15000, or rather 44 thousand *Moschees* or *Mahometan Temples*. To which I reply, that I hope this Objector is but in jest, for that *Mahomet* was not borne till about the Year 570, and had no *Moschees* till about 50 Years after

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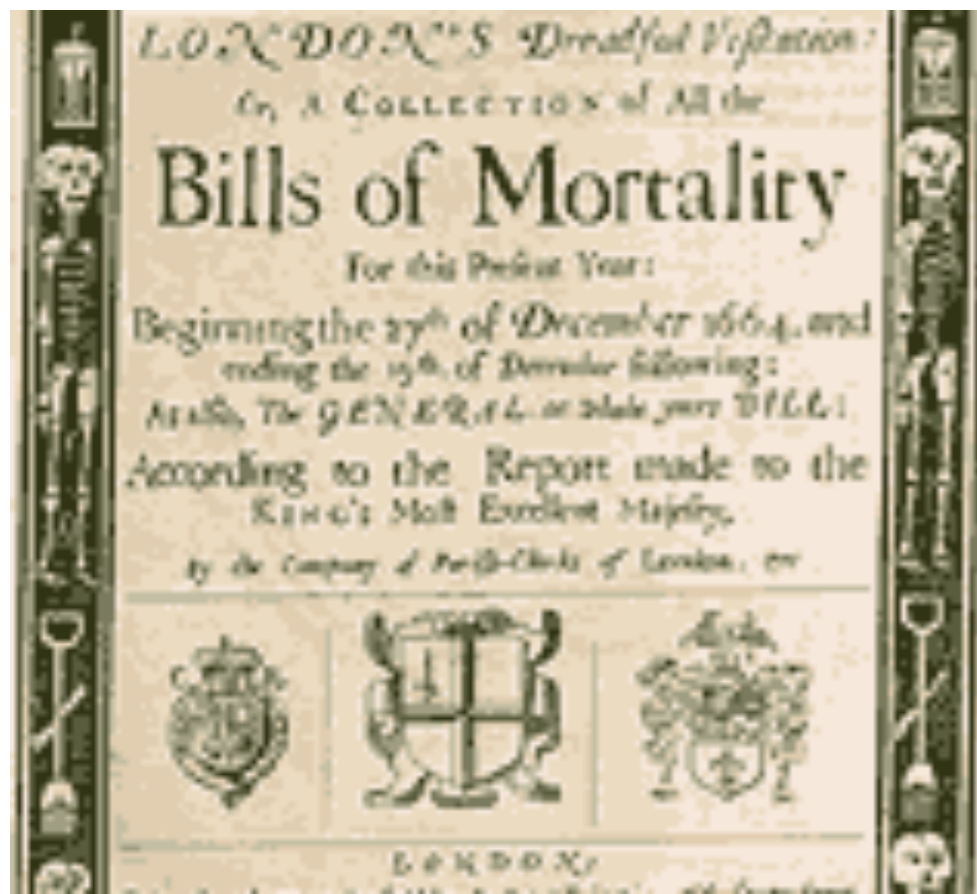
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**battle with 'declinists'**



# death rate

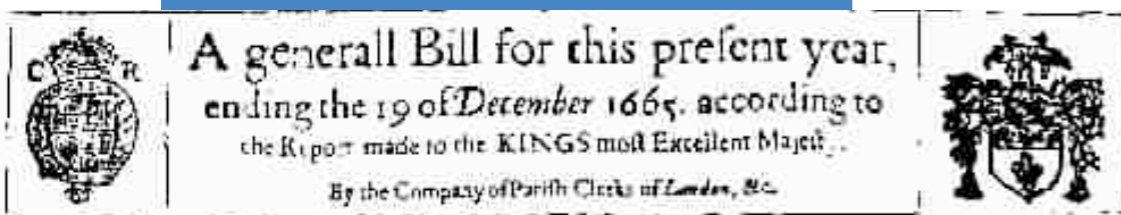
**1603:** regular bills of mortality

**1611:** incorporation of parish clerks counting by "searchers"

**1629:** other deaths

**1728:** age of deceased

**1837:** last bills



*The Diseases and Casualties this year.*

A Bortive and Stillborne	517	Executed	21	Pallie	30
Aged	1545	Floz and Small Pox	655	Plague	68598
Aque and Peaver	5237	Found dead in Streets, fields, &c.	2	Plasme	6
Appoplex and Suddenly	116	French Pox	86	Plurisie	19
Bedric	10	Frighted	23	Posionous	1
Blind	9	Gout and Sciatica	27	Quinse	35
Bleeding	16	Grief	26	Rickets	157
Bloody Flux, Scouring & Flux	187	Gripping in the Guts	128	Killing of the lights	157
Burns and Scalded	8	Hungel & made away themselves	7	Leprosie	14
Calenture	3	Headmoultshot & Mouldfallen	14	Scurvy	107
Cancer, Gangrene and Fistula	56	jaundies	100	Shingles and Swine pox	2
Canker, and Thrush	10	Impostume	107	Sores, Ulcers, broken and heilled	82
Childred	625	Kild by severall accidents	46	Spleen	14
Christomes and Infants	1258	Kings Evill	28	Spotted Fever and Purples	1029
Cold and Cough	68	Leprosie	2	Stoppung of the stomack	334
Collick and Winde	124	Lethargy	14	Strep and Stranguy	38
Consumption and Tiblick	4808	Livergreen	1	Suet	100
Convulsion and Morice	1056	Meygram and Headach	1	Teeth and Worms	1014
Distracted	1	Mealles	7	Vomiting	51
Double and Turpany	1476	Murthered and Shot	9	Vunn	7
Drowned	30	Overiaid & Starved	45		
Col Males	5114				
Col Females	4853				
Col In all	9967				
Col Males	48569				
Col Females	48137				
Col In all	96706				
Col of the Plague	68598				
Increased in the Burials in the 130 Parishes and at the Pest-houses this year	79009				
Increased of the Plague in the 130 Parishes and at the Pest-houses this year	68598				



# political arithmetic



William Petty  
1623-1787

## politics and population

**William Petty, RS (1623-1687)**

surveyor

*Political Arithmetic of Ireland*

velocity of circulation  
natural vs market price  
economic surplus  
population change



# headcounters

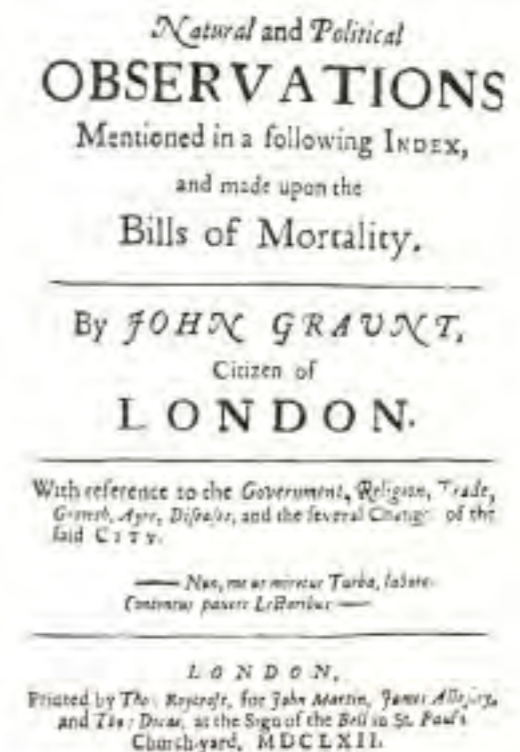


John Graunt  
1620–1674

"His Majesty gave this particular charge to His Society, that if they found any more such Tradesmen, they should be sure to admit them all, without any more ado."

--Pratt

**John Graunt, RS**  
*Natural and Political  
Observations ...  
upon the Bills of Mortality*  
1662





# births, marriages, & deaths

(194)

The Number of the Weddings, Christenings, and Burials, that were in the Parish of Cranbrook, from March 26, 1560 to March 24, 1649; (as appears by the Register) only in the years 1574 and 1565 the Christenings are wholly omitted, because the Register is very imperfect for the greater part of those years.

Years	Weddings	Christened			Buried		
		M.	F.	Both	M.	F.	Both
1560	20	36	35	89	29	21	50
61	24	46	53	79	23	27	45
62	31	32	26	58	40	31	71
63	15	28	31	49	19	24	43
64	23	29	29	58	19	9	28
65	29	44	29	73	37	34	71
66	25	39	26	65	69	35	104
67	23	40	41	81	30	21	56
68	22	38	44	82	31	31	62
69	22	36	35	71	25	19	44
	231	370	317	687	319	246	565

(195)

The Table of the Parish of Cranbrook.

Years	Weddings	Christened		Both	Buried		Both
		M.	F.		M.	F.	
1570	22	37	44	74	22	24	62
71	18	42	27	74	21	18	47
72	21	31	24	79	18	29	62
73	20	28	11	71	19	21	40
74	28				28	21	50
75	23				18	14	34
76	29	49	42	91	27	17	44
77	16	16	48	64	25	28	44
78	14	42	32	82	22	18	40
79	24	47	42	91	26	18	44
	223	220	298	601	221	225	446
80	39	47	45	89	22	21	45
81	52	80	45	107	12	30	42
82	28	38	48	114	14	27	41
83	48	59	44	101	24	20	44
84	25	51	31	102	24	29	53
85	21	60	72	132	17	14	30
86	19	11	19	60	28	24	50
87	20	41	13	58	28	22	50
88	24	17	19	70	24	21	45
89	19	11	14	60	17	22	41
	223	210	204	601	221	225	446

74 O 1 74



# counting difficulties

## An INDEX of the Positions, Observations, and Questions contained in this Discourse.

1. **T**he Occasion of keeping the Account of Burials arose first from the Plague, Anno 1592, page 3
2. Seven Alterations, and Augmentations of the published Bills, between the years 1592, and 1662, pag. 4, 5, 6, 7, 8, 9, 10
3. Reasons, why the Accounts of Burials, and Christnings should be kept universally, and now called for, and pursued by the Magistrate, p. 11
4. A true Account of the Plague cannot be kept, without the Account of other Diseases, p. 12
5. The ignorance of the Searchers no impediment to the keeping of sufficient, and usefull Accounts, p. 13
6. That about one third of all that were ever quick die under five years old, and about thirty six per Centum under six, p. 14
7. That two parts of nine die of Acute, and seventy of two hundred twenty nine of Chronical Diseases, and four of two hundred twenty nine of outward Griets, 14, 15
8. A Table of the Proportions dying of the most notorious, and formidable Diseases, or Casualties, p. 16
9. That seven per Centum die of Age, bid.
10. That some Diseases, and Casualties keep a constant proportion, whereas some other are very irregular, p. 16, 17
11. That not above one in four thousand are Starved, p. 17
12. That

## shame

"The Old-Women Searchers, after the mist of a Cup of Ale, and the bribe of a two-grout fee ... cannot tell whether this emaciation or leanness were from a phthisis, or from an Hectick Fever, Atrophy, &c. or from an Infection of the Spermatick parts ... onely hated persons, and such, whose very Noses were eaten off were reported by the searchers to have died of this too frequent Malady."

## principle

## fear



a long wait

Mr. MAITLAND'S  
ACCOUNT  
OF  
INOCULATING  
THE  
SMALL POX  
Vindicated,

From Dr. WAGSTAFFE'S Misrepre-  
sentations of that PRACTICE;  
with some Remarks on Mr. MAS-  
SEY'S Sermon.

The Second Edition.

To which is added,  
His First ACCOUNT of *Inoculating*  
the SMALL POX.

L O N D O N:

Printed and Sold by J. PEELE, at *Lock's*  
*Head* in *Paternoster-Row*. 1722.

**gathering data**

**experimental trials**  
Newgate Prison

**medical wars**

**general distrust**





# a long wait

Panel Suggests Using Inmates in Drug Trials - New York Times

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**The New York Times** U.S.

WORLD U.S. N.Y. / REGION BUSINESS TECHNOLOGY SCIENCE HEALTH SPORTS OPINION ART

**Panel Suggests Using Inmates in Drug Trials**

Several government agencies and private companies tested pharmaceuticals on inmates at Holmesburg prison in Philadelphia from 1951 to 1974.

By ANN URSINA  
Published: August 13, 2006

PHILADELPHIA, Aug. 7 — An influential federal panel of medical advisers has recommended that the government loosen regulations that severely limit the testing of pharmaceuticals on prison inmates, a practice that was all but stopped three decades ago after revelations of abuse.

The proposed change includes provisions intended to prevent problems that plagued earlier programs. Nevertheless, it has dredged up a painful history of medical mistreatment and incited debate among prison rights advocates and researchers about whether prisoners can truly make uncoerced decisions, given the environment they live in.

Supporters of such programs cite the possibility of benefit to prison populations, and the potential for contributing to the greater good.

Until the early 1970's, about 90 percent of all pharmaceutical products were tested on prison inmates, federal officials say. But such research diminished sharply in 1974 after revelations of abuse at prisons like Holmesburg here, where inmates were paid hundreds of dollars a month to test items as varied as dandruff treatments and dioxin, and where they were exposed to radioactive, hallucinogenic and carcinogenic chemicals.

In addition to addressing the abuses at Holmesburg, the regulations were a reaction to revelations in 1972 surrounding what the government called the Tuskegee Study of Untreated Syphilis in the Negro Male, which was begun in the 1930's and lasted 40 years. In it, several hundred mostly illiterate men with syphilis in rural Alabama were left untreated, even after a cure was discovered, so that researchers could study the disease.

"What happened at Holmesburg was just as gruesome as Tuskegee, but at Holmesburg it happened smack-dab in the middle of a major city, not in some backwoods in Alabama," said Allen M. Hombler, an urban studies professor

U.S. News & World Report University, via Associated Press

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Human Drug Testing by the CIA (Aug. 1977)

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**gathering data**

**experimental trials**  
Newgate Prison

**medical wars**

**general distrust**



# a long wait

Panel Suggests Using Inmates in Drug Trials - New York Times

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**The New York Times** U.S.

WORLD U.S. N.Y. / REGION BUSINESS TECHNOLOGY SCIENCE HEALTH SPORTS OPINION ART

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SUNSHINE

PHOTO: Prison Medical Research

## gathering data

## experimental trials Newgate Prison

## medical wars

## The vaccine-autism debate should end now

New rulings in the U.S. state what science has shown for years: thinking that the shots cause the disorder is 'very wrong'

## general distrust

Article | Comments (7)

ANDRE PICARD

From Thursday's Globe and Mail

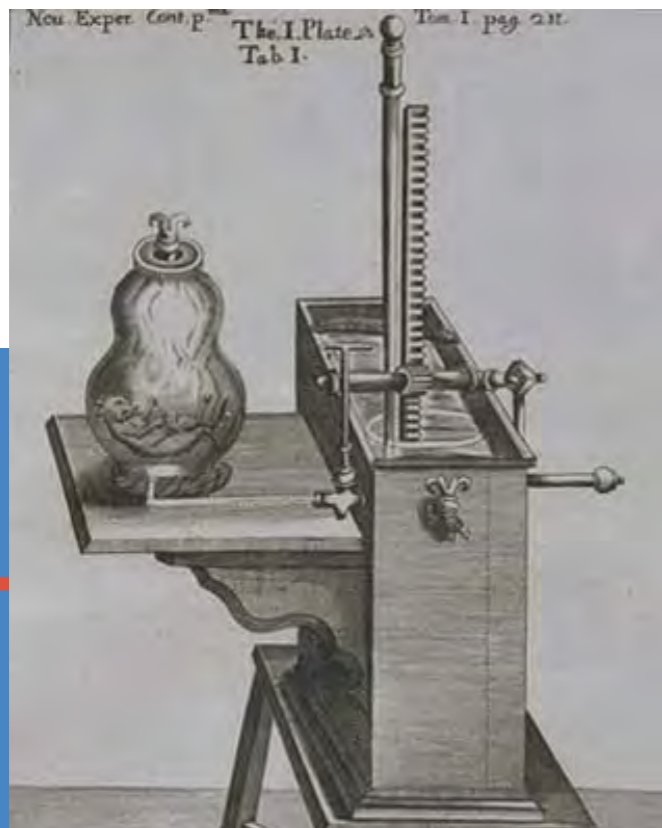
E-mail Andre Picard | Read Bio | Latest Columns

February 19, 2009 at 9:33 AM EST

Vaccines do not cause autism.

The science proving this point has been quite clear for a number of years. But last week, the scientific evidence was given an important legal booster shot.

Judges at the U.S. "vaccine court" ruled on three test cases in which it was claimed that the standard childhood vaccine for measles, mumps and rubella caused autism, and they were



# scientific knowledge

**matters of trust**

**in machines**

**in books**

**in calculation**

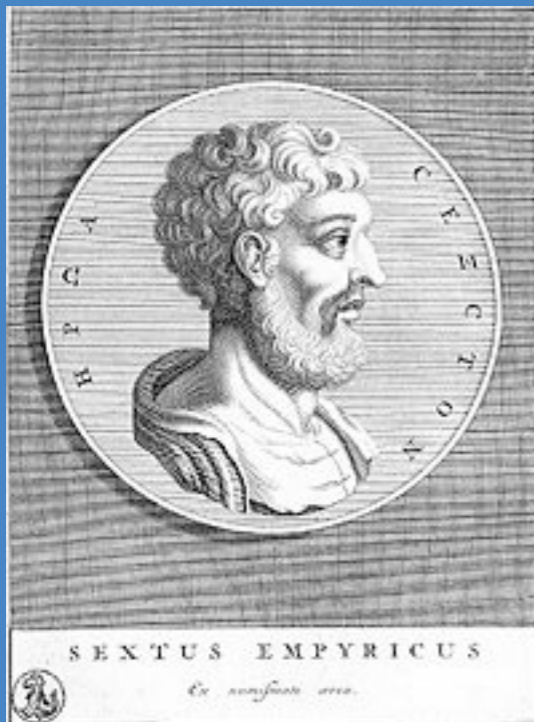
**in people**



Robert Boyle  
1627–1691



# machines



Sextus Empiricus  
160-210

**Boyle v Hobbes**

**Hooke v Huygens**

"the right *Art of Experimenting*"--Sprat

"the testimony of two witnesses," -- Boyle

"I judged that whatever men's eyes were in  
the younger age of the World, our eyes in  
this old age of it needed spectacles"

--Hooke, in defense of scientific devices



## a history of failed demos

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"And thither anon come all the Gresham College, and a great deal of noble company: and the new instrument was brought called the Arched Viall, where, being tuned with lute-strings, and played on with keys like an organ, a piece of parchment is always kept moving; and the strings, which by he keys are pressed down upon it, are grated in imitation of a bow, by the parchment; and so it is intended to resemble several vialls played on with one bow, but so basely and harshley, that it will never do. But, after three hours' stay, it could not be fixed in tune"  
--Pepys, October 5, 1664



# books

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## **battle of the books**

Adrian Johns, *The Nature of the Book*, 1998

*error*

*malice: Halley, Newton, Arbuthnot v Flamsteed*

*piracy*

"coined by John Fell ... to describe the rapacious practices of London printers and booksellers. ... a pirate was someone who indulged in the unauthorized reprinting of a title ... it soon came to stand for a wide range of ... transgressions ... almost any book could, in principle, find itself accounted a piracy."

*plagiarism*

*fraud*



# back to manuscript?

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"I will write my Name in each Book with my own Hand"

J. Desaguliers,

*Course of Experimental Philosophy*, 1734

"These men had discovered the central, overwhelming paradox rending early modern print culture. The

only really effective way to guarantee the authenticity of their printed sheets was to abandon

the defining element of print itself. ... they returned to inscribing their authorship by hand"

--Adrian Johns



# calculation

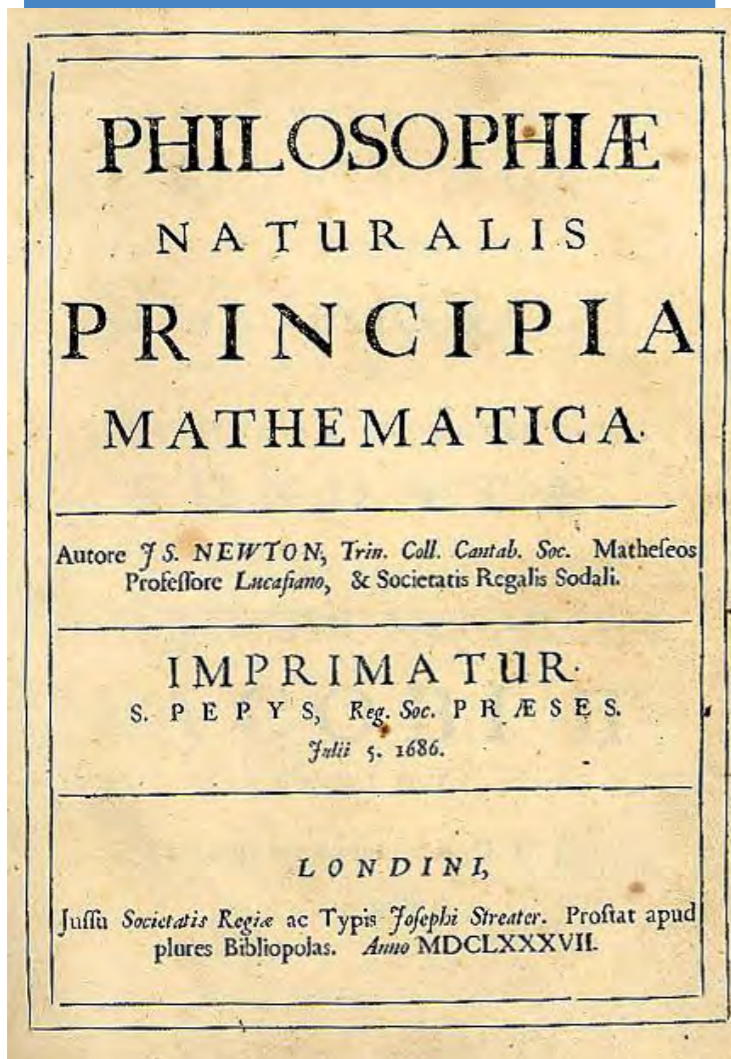
**quantification and enumeration**

**vs**

**observation and anecdote**

"calculation brings everything to a certainty which before floated in the mind indefinitely"

--Samuel Johnson







# a parting of the ways

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## **Royal Society**

"as may conduce to the illustration and  
improvement of Philosophy, and of all  
Laudable and Useful Arts and Practices. ...

Neither have we discouraged or refused the  
Essays of some famous Philosophers, learned  
Philologers and *Antiquaries*"

--Henry Oldenburg, *Philosophical Transactions*,  
1667



# a parting of the ways

---

## **Royal Society**

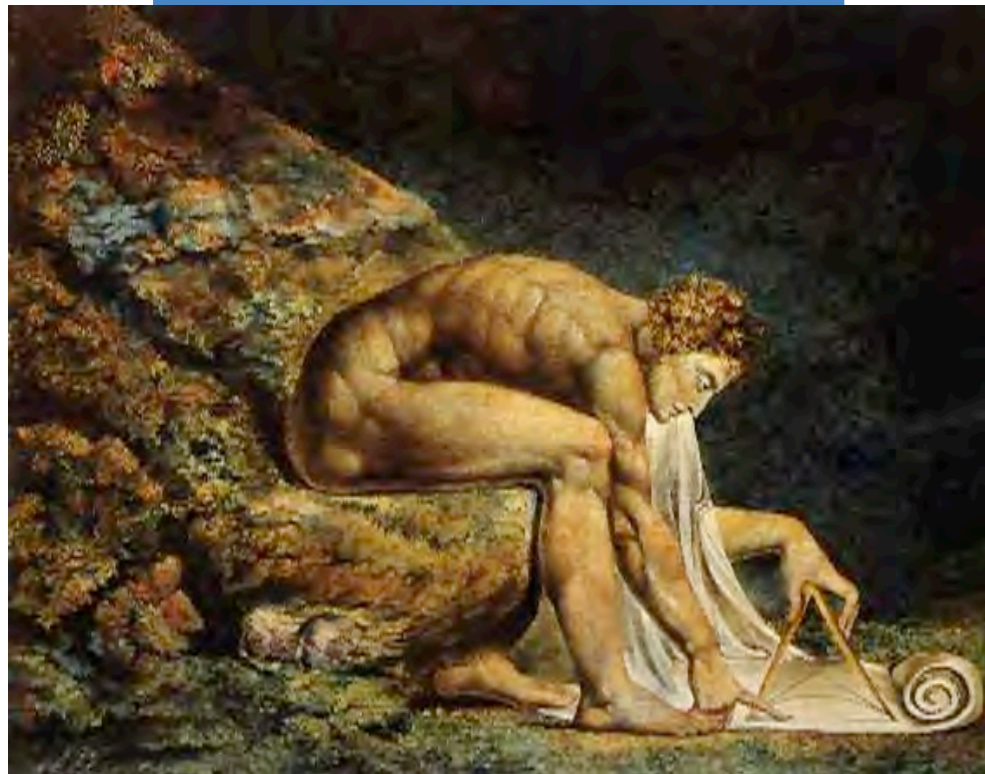
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1667

## **Society of Antiquaries, 1717**

Kunstschränk, Kunstkammer, Curiosities ...



# towards two cultures?



William Blake's  
"Isaac Newton", 1795

## poets and scientists

"botanize upon his mother's grave"

--William Wordsworth

"advice from Satan's kingdom"

"I turn my eyes to the Schools &  
Universities of Europe  
Wash'd by the Water-wheels of Newton"

--William Blake



# another parting

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Antonio Panizzi

**the British Museum (Library)**

**the Mechanic's Library**





# expertise & quality

"to commit the work to the care of such men, who, by the freedom of their education the plenty of their estates, and the usual generosity of Noble Bloud, may be well suppos'd to be most averse from sordid considerations"

--Sprat

"the distribution of credibility followed the contours of English society"

--Steven Shapin

"from the **honor, and reputation**, of these Men ... *Gentlemen*, free and unconfind'd ... an *Assembly*, ... whose privileges shall be the same .. gain shall be in common"

--Sprat

**Hooke's**  
subordination

**Graunt's**  
"shop arithmetic"



**Petty &**  
Anne Greene



# animadversions

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"there is less credit to be placed in the Narrations of some of our *Virtuosi*, who have been so mistaken in their Accounts ... with what *negligence* and *imperfectness* will they register things? how *unphilosophical* will their memories be?"

--Stubbe

"The Royall Societie (generally) had the like for [Hobbes]; and he would long since have been ascribed a member there but for the sake of one or two person whom he took to be his enemies. Dr. Wallis ... Mr Boyle. I might adde Sr Paul Neile, who disobliges every body."

--John Evelyn, *Brief Lives*



# from open ...

"Put an advertisement in the *Courant* "by that Means, you'll have the Assistance of the most able Men in the Kingdom."

-Susanne Centilivre, *Love's Contrivance*, 1703

"it suffices, if many of them be plain, diligent, and laborious observers: such, who though they bring not much knowledge, yet bring their hands, and their eyes uncorrupted"

-Sprat





... to closed

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**membership**

**peer review**

**back to the university**





(1)

Numb. 1.

# PHILOSOPHICAL TRANSACTIONS.

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Munday, March 6. 166<sup>4</sup>.

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## The Contents.

*An Introduction to this Tract. An Account of the Improvement of Optick Glasses at Rome. Of the Observation made in England, of a Spot in one of the Belts of the Planet Jupiter. Of the motion of the late Comet predicted. The Heads of many New Observations and Experiments, in order to an Experimental History of Cold; together with some Thermometrical Discourses and Experiments. A Relation of a very odd Monstrous Calf. Of a peculiar Lead-Ore in Germany, very useful for Essays. Of an Hungarian Bolus, of the same effect with the Bolus Armenus. Of the New American Whale-fishing about the Bermudas. A Narrative concerning the success of the Pendulum-watches at Sea for the Longitudes; and the Grant of a Patent thereupon. A Catalogue of the Philosophical Books publisht by Monsieur de Fermat, Counsellour at Tholouse, lately dead.*

Beginning the Thirty first Volume.

# PHILOSOPHICAL TRANSACTIONS.

For the Months of *January, Feb. March and April. 1720.*

## The CONTENTS.

- I. *Some Remarks on a late Essay of Mr. Cassini, wherein he proposes to find, by Observation, the Parallax and Magnitude of Sirius.* By Edmund Halley, L. L. D. Astron. Reg. Geom. Prof. Savil. & R. S. S.
- II. *An Account of the External Maxillar, and other Salivary Glands: Also of the Insertions of all the Lymphatics (as well above as below the Subclavians) into the Veins; which Glands and Insertions have not hitherto been mentioned, or not truly described by any Authors.* By Richard Hale, M. D. Reg. Soc. & Col. Med. Lond. Soc.
- III. *De Peste Constantinopoli grassante. Auctore nupero V. Cl. Emanuele Timone, M. D. Hoc scriptum ab Auctore Clarissimo, qui Constantinopoli per multos annos Medicinam fecerat, Excellentissimo A legato Britanico, Roberto Sutton, Eq. Aurato, traditum, ejusdem Equitis permisso, cum Societate Regia communicavit idem R. Hale, M. D.*
- IV. *An Account of a Luminous Appearance in the Air, seen at Dublin on January the 12th, 1720.* By Philip Percival, Esq; Brother to the Right Honourable the Lord Percival, F. R. S. and communicated by his Lordship to the Royal Society.

change to believe in

- V. *Of the Infinity of the Sphere of Fix'd Stars.* By Edmund Halley, L. L. D. R. S. S.
- VI. *Of the Number, Order, and Light of the Fix'd Stars.* By the same.
- VII. *An Account of the Method of making Sugar from the Juice of the Maple Tree, in New England.* By the Honourable Paul Dudley, Esq; F. R. S. Communicated by John Chamberlayne, Esq.
- VIII. *A Copy of an Affidavit made in Scotland, concerning a Boy's living a considerable time without Food.* Communicated by Patrick Blair, M. D. F. R. S.
- IX. *A Discourse concerning a Method of discovering the Virtues of Plants by their External Structure.* By the Same.
- X. *An Account of a Book, Entituled, Geometria Organica, sive Descriptio Linearum Curvarum Universalis.* Auctore Colino Mac Laurin, Matheseos in Collegio Novo Abredonensi Professore, & R. S. S.



# summary

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## **beginnings of science**

*from facts and curiosities to evidence and  
calculation*

*from certainty to trust*

*from "diligent and laborious individuals"  
to credentials and institutions*



# ahead

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## 26 Feb: Information Work

- Thompson, E.P. 1967. [Time, Work-Discipline, and Industrial Capitalism](#). *Past & Present* 38 (Dec): 56-97.
- Edwards, James Don. 1960. [Early Bookkeeping and its Development into Accounting](#). *Business History Review* 34(4): 446-458..