Henry Oldenburg & the 350th Birthday of the Learned Journal

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Oldenburg and the 350th Birthday of the Learned Journal

CONTEXT

Copernicus (1473–1543)

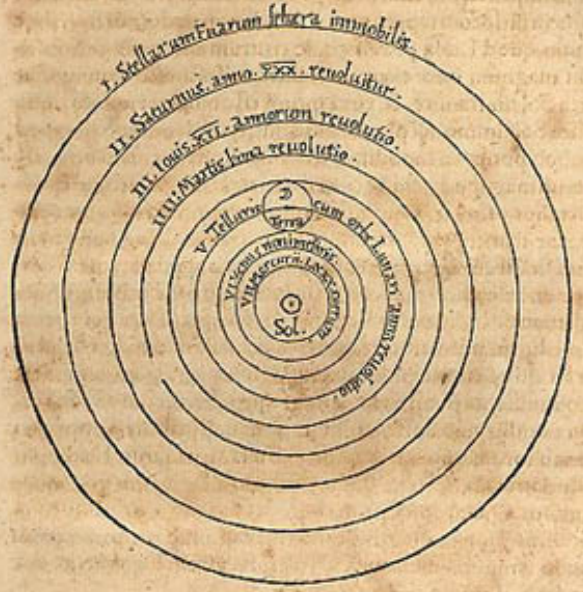
NICOLAI
COPERNICI TO-
RINENSIS DE REVOLVTIONI-
bus orbium cœlestium,
Libri VI.

IN QVIBVS STELLARVM ET FI-
XARVM ET ERRATICARVM MOTVS, EX VETE-
ribus atq; recentibus obseruationibus, restituit hic autor.
Præterea tabulas expeditas luculentasq; addidit, ex qui-
bus eosdem motus ad quoduis tempus Mathe-
matum studiosus facillime calcu-
lare poterit.

ITEM, DE LIBRIS REVOLVTIONVM NICOLAI
Copernici Narratio prima, per M. Georgium Ioachi-
mum Rheticum ad D. Ioan. Schone-
rum scripta.

Cum Gratia & Priuilegio Cæs. Maiest.
BASILEAE, EX OFFICINA
HENRICPETRINA.

net, in quo terram cum orbe lunari tanquam epicyclo contineri diximus. Quinto loco Venus nono mense reducitur. Sextum deniq; locum Mercurius tenet, octuaginta dierum spacio circũ currens. In medio uero omnium residet Sol. Quis enim in hoc



pulcherrimo templo lampadem hanc in alio uel meliori loco ponet, quàm unde totum simul possit illuminare? Siquidem non inepte quidam lucernam mundi, alij mentem, alij rectorem uocant. Trimegistus uisibilem Deum, Sophoclis Electra intuentẽ omnia. Ita profecto tanquam in solio regali Sol residens circum agentem gubernat Astrorum familiam. Tellus quoque minime fraudatur lunari ministerio, sed ut Aristoteles de animalibus ait, maximam Luna cum terra cognationẽ habet. Cõcipit interea à Sole terra, & impregnatur annuo partu. Inuenimus igitur sub hac

Andreas Vesalius (1514-64)

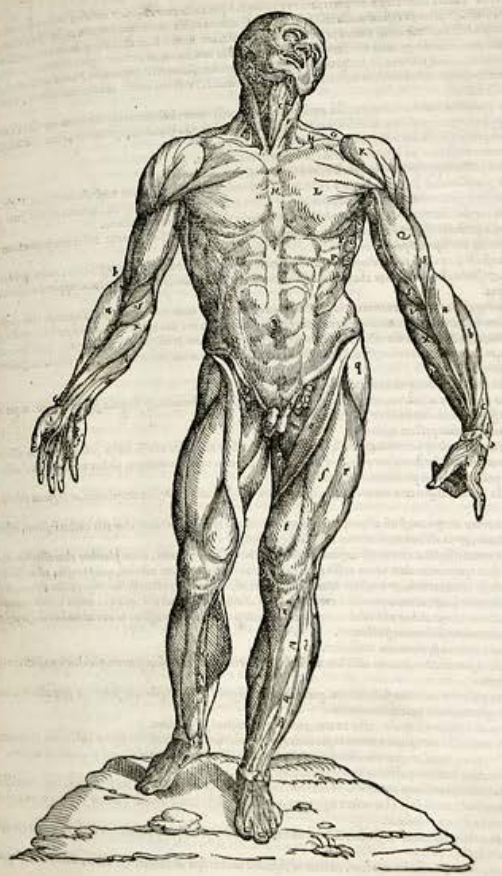
ANDREAE VESALII,
DE CORPORIS HVMANI
fabrica Liber Secundus,

LIGAMENTIS OSSA CARTILAGINESQVE INVICEM COMMITTENTIBVS, ET Musculis, uoluntariorum motuum instrumentis, dedicatus: & figuras ipsi proprias, uti nunc describebatur, proponens.

TABVLAE seriatim modò sequentes, omnibus ferè secundi libri Capitibus communes erunt. Primæ enim quatuordecim, integros exprimunt hominis humq; ordine prima, anteriorem uiri faciem delineatam continet: secunda latus ostendit: tertia, quarta, quinta, sexta, septima, octaua, anteriorem faciem quoq; proponunt, in hoc illud ue latus, pro musculorum, qui indicantur, natura & situ magis repositam. Sex uerò octauam consequentes, posteriorem corporis faciem referunt, omnes propemodum ita effigiatæ, ut musculi in præcedẽte tabula omnino conspicui, in sequente resecti, ab insertione pendeant. Deinde omnes tabulæ ita inuicem congruunt, ut uni, quæ anteriorem exprimit faciem, alis succedere possit, posteriorem exhibens. Integrum namque erat, tertiæ subiungi nonam, mox quartam, dein decimam: insuper quintam, illi uerò undecimam: postmodum sextam, ab hac duodecimam: deinceps septimã, quam sequeretur decima tertiæ: cui rursus succederet octaua, & huic decimaquarta. Vnde etiam non inopportunè feceris, si utraque serie has musculorum tabulas intuearis, atque quid singulæ potissimùm exprimant, ex ipsarum earundemq; characterum indicibus obiter requiras, quò promptius à Capitum contextu ad eas recurras. Perpaucis enim secundi libri Capitibus peculiares figuræ præponentur: ijs nimirum duntaxat, quorum musculi communibus figuris scitè omnes exprimi nequiuerunt. in quorum numero sunt, oculum mouentes musculi, laryngis musculi, peni peculiares, & recto intestino & ceruici uesicæ proprij. Dein primi Capitis fronti tabella adhibebitur, ligamentorum differentijs ostendendis præcipuè apta: & secundi Capitis initium eas ostendet figuras, quæ musculorum compositioni intelligendæ sunt idoneæ.

Porrò nõ sufficerit, in una tabula musculum aliquem intueri, etiamsi illum charactere insigniuerim: sed ut uideas, ubi nam quisque emineat, alteri ve succumbat, passim tibi is uenit inquirendus, & potissimùm spectandus, ubi totus se offert. quod ferè fit, ubi peculiariter uni musculo plures characteres adhibentur, præcipuè quum is extra aliorum ordinẽ maiusculo Græcis charactere peculiari notatur. Quòd uerò in integras tabulas, musculorum effigies ita digesserim, neque singulis Capitibus singuli articuli cum suis musculis appicti sint, ea potissimum occasione factum puta, quòd illi, si priuatim articuli pingerentur, à nemine, nisi Anatomes peritissimo, possent distingui. Nunc autem, quum omnia cohæreant, cuiusobuium est, qua sede quisque musculus reperiatur: adeò sanè, ut prolixus fuisset operæ precium, integras ad hunc modum tabulas delineari, quantumuis etiam seorsim articuli fuissent expressi. Insuper si singulis Capitibus suos musculos adhibere, uel aliqua ratione necessarium fore putassem, non hoc usu studiosi caruissent: quandoquidem præter sumptum, nullus labor insuper mihi impendendus erat. Ex his namque integris tabulis necessariò sculptis, particulas singulas articulos ve seorsim transcindendos dare, non maioris mihi esset operæ, quàm ex chartis, quibus tabulæ iam impressæ sunt, nunc caput, nunc brachium, nũc crus aut thoracem utut uisum esset, abscindere, & sculptori offerre. Ad hæc, idem semper labor lectori in uertendis foliis impendisset, quum eadem pagina & musculorum effigiem, & characterum indicem, ac deinde musculorum descriptionem historiamq; continere nequeat.

PRIMA MVSCVLORVM TABVLA.



Francis Bacon (1561-1626)

- Publications
  - Essays, 1597-1625
  - The advancement of learning, 1605
  - Novum Organum, 1620
  - New Atlantis, 1627
- God-father of the scientific revolution
  - systematic observation as the route to truth
  - scientific method and the experiment
  - investigation as a state sponsored collective activity
  - inspired the founders of the Royal Society and the first true journal

Intellectual Ferment 1543 -1620

- Individualism: ownership of ideas
  - Consequence of the Renaissance (1400-1600)
- Technology
  - Introduction of printing (1440s)
- Investigating the unknown is allowed
  - Discovery of the New World (1492)
  - Humanism and the refounding of Church thinking based on the newly rediscovered classical texts of the bible
    - Erasmus (c1469-1536)
  - Reformation and new ideas
    - Luther (1485-1546), Vesalius (1514-64) and Copernicus (1473-1543)
- New philosophy
  - Francis Bacon (inductive method and “torturing nature”)
  - Galileo (the experiment “il cimento” - ordeal)

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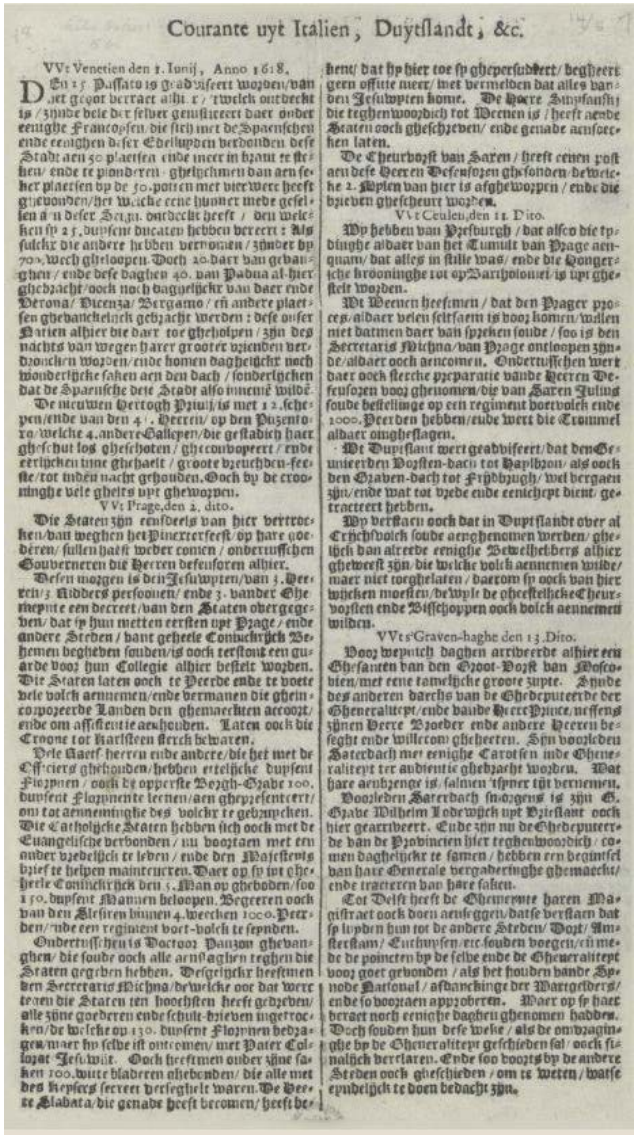
First Newspapers 1620s



Courante uyt Italien, Duytslandt, &c.

VVt Venetien den 1. Iunij, Anno 1618.

Den 25 Passato is Graef Oliuert wozden/van het Casteel Zara/ gheuangen ghenomen/ende naer Venetien ghebzacht/ende alhier in de Gheuangenisse ghestelt. Dese Graef Oliuert is de ghene die onlancx de Stadt Gradisca ouerrompelt heeft/ende daer in ghebleuen is/ende hem daer onthouden heeft/tot dat hy van de Venetiaenen daer uyt ghedzeuen is geweest. Dese Graef Oliuert is oock de ghene die onlancx de Stadt Aquileia ouerrompelt heeft/ende daer in ghebleuen is/ende hem daer onthouden heeft/tot dat hy van de Venetiaenen daer uyt ghedzeuen is geweest. Dese Graef Oliuert is oock de ghene die onlancx de Stadt Aquileia ouerrompelt heeft/ende daer in ghebleuen is/ende hem daer onthouden heeft/tot dat hy van de Venetiaenen daer uyt ghedzeuen is geweest.

VVt Prage, den 2. dito.

Die Staten zyn eenstdeels van hier vertrocken/van weghen het Pinxterfeest/op hare goederen/sullen haest weder comen/ onderwylen Gouverneren die Heeren defensoren alhier.

Desen morgen is den Jesuwyten/van 3. Heeren/3. Ridders persoonen/ende 3. bander Ghemeynte een decreet/van den Staten overgegeven/dat sy hun metten eersten uyt Prage/ende andere Steden/hant geheele Coninckrijck Behemen begheben souden/is oock terstont een guarde voor hun Collegie alhier bestelt wozden. Die Staten laten oock te Peerde ende te voete vele volck aennemen/ende vermanen die gheincorporeerde Landen den ghemaeckten accoozt/ende om assistentie aenhouden. Laten oock die Croone tot Karlsteen sterck bewaren.

Dese Graef heeren ende andere/die het met de Officiers ghehouden/hebben eenelijcke duysent Flozynen/ooch de opperste Bozgh-Graue 100. duysent Flozynente leenen/aen ghezeesenteert/ om tot aennemingke des volcks te gebruycken. Die Catholijcke Staten hebben sich ooch met de Euangelische verbonden/ nu voortaen met een ander vzedelijck te leven/ende den Maiestets brief te helpen maintencren. Daer op sy tot ghelaet Coninckrijck den 5. Man op ghebooden/soo 150. duysent Mannen beloopen. Begeeren ooch van den Vlesiren binnen 4. weecken 1000. Peerden/ende een regiment voet-volck te senden.

Ondertusschen is Doctoor Panzow ghevanghen/ die soude ooch alle aenslaghen teghen die Staten gegeven hebben. Desgelijcks heeftmen den Secretaris Michna/de welcke oor dat were teaen die Staten ten hoochsten heeft gedreven/ alle zyne goederen ende schult-brieven ingetrocken/de welcke op 130. duysent Flozynen bedzagen/maer hy selve ist ontcomen/ met Pater Colazat Jesuwit. Ooch heeftmen onder zyne saken 100. witte bladeren ghebonden/ die alle met des Keysers secreet verseghelt waren. De Heere Slabata/die genade heeft becomen/ heeft behent/ dat hy hier toe sy ghepersuadeert/ begheert geen offitte meer/ wet vermelden dat alles vanden Jesuwyten komt. De Heere Smyrsansky die teghenwoozdich tot Weenen is/ heeft aende Staten ooch gheschzeben/ ende genade aensoecken laten.

De Cheurvozst van Saxen/ heeft eenen post aen dese Heeren Defensozen ghesonden/ de welcke 2. Wpken van hier is afghewozpen/ ende die bzieven ghescheurt wozden.

VVt Ceulen, den 11. Dito.

Wy hebben van Pzesburgh/ dat alsco die sydinghe aldaer van het Tumult van Pzage aenquam/ dat alles in stille was/ ende die Hongersche krooninghe tot op Bartholomei is upt gheselt wozden.

Wt Weenen heeftmen/ dat den Pzager pzoces/aldaer veten seltsaem is voor komen/wallen niet datmen daer van spzeken soude/ soo is den Secretaris Michna/van Pzage ontloopen zynde/aldaer ooch aencomen. Ondertusschen wert daer ooch sterche pzeparatie bande Heeren Defensozen voor ghenomen/die van Saxen Juling soude bestellinge op een regiment boetvolck ende 1000. Peerden hebben/ende wert die Trommel aldaer ongheslagen.

Wt Duytslant wert gradviseert/dat den Geunieerden Dozsten-dach tot Haplhzon/ als ooch den Graven-dach tot Fzydzugh/ wel bergaen zyn/ende wat tot vzede ende eenichept dient/ getracteert hebben.

Wy verstaen ooch dat in Duytslandt over al Oxhsvolck soude aengenomen worden/ ghelijck van alreede eenighe Bewelhebbers alhier gheweest zyn/die welcke volck aennemen wilde/ maer niet toeghelaten/ daarom sy ooch van hier wyeken moesten/de Wyle de ghestelschte Cheurvozsten ende Bisschoppen ooch volck aennement wilden.

VVt s'Graven-haghe den 13. Dito.

Voor wepnich daghen arriveerde alhier een Ghesanten van den Czoot-Vozst van Moscouien/met eene tamelijcke groote zupte. Synde des anderen daeghs van de Ghedeputeerde der Gheneraliteyt/ende bande Heere Prince/neffens zynen Heere Vzoeder ende andere Heeren deseght ende willecom ghetheeten. Syn voorleden Saterdach met eenighe Carotsen inde Gheneraliteyt ter audientie ghebzacht wozden. Wat hare aenbzenge is/ salmen upmer tijt vernemen.

Voorleden Saterdach smozgens is zyn G. Gzabe Wilhelm Lodewijck uyt Vzieslant ooch hier gearriveert. Ende syn nu de Ghedeputeerde van de Pzovincien hier teghenwoordich/ comen dagheljcks te samen/ hebben een beginsel van hare Generale vergaderinghe ghemaeckt/ ende tracteren van hare saken.

Tot Delft heeft de Ghemeynte haren Magistraet ooch doen aenseggen/ datse verstaen dat sy luyden hun tot de andere Steden/ Dozt/ Amsterstam/ Enchuysen/ etc. souden voegen/ en mede de poincten by de selve ende de Gheneraliteyt voor goet gevonden/ als het houden bande Synode Nationael/ afdanckinge der Wargelders/ ende so voortaen appzoberen. Waer op sy haer beraet noch eenighe daghen ghenomen hadden. Doch souden hun dese wetse/ als de ontzagynghe by de Ghenerealiteyt geschieden sal/ ooch sinalijck verklaren. Ende soo voozts by de andere Steden ooch ghe schieden/ om te weten/ watse eyndelijck te doen bedacht zyn.

- *Courant out of italie, germanie,* [etc.]
- Translation of first Dutch newspaper (opposite)

F Marin Mersenne (1588-1648)

- A Minim Friar at the Place Royale, Paris
- Centre of a letter-writing circle with Fermat, Pascal, Descartes and Galileo
- Admirer of Bacon
- Inspired the founders of the French Academy

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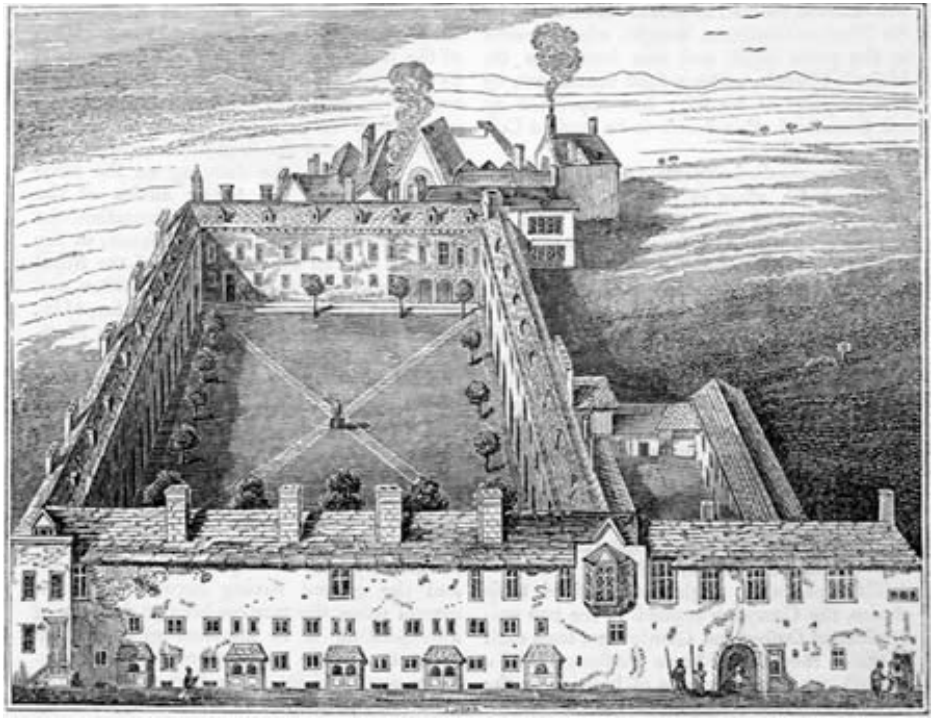
Learned Societies

- First scholarly societies
  - Accademia del Lincei, Rome 1603-30
    - Founded by Prince Federico Cesi
    - Galileo demonstrates telescope 1611
    - Galileo's publisher in Rome
  - Accademia del Cimento, Florence 1657-67
    - Founded by the Medici, Grand Duke Ferdinand II and his brother Leopold
    - Dedicated to confirming Galileo's works through the experiments conducted in its laboratories
    - Published its results in *Saggi di naturali esperienze*
  - Royal Society of London, 1660
    - Set up as a Baconian institution for research

Wadham College & John Wilkins (1614-72)

- Warden of Wadham College 1648
- Founded the Experimental Philosophy Club during the Commonwealth Period
- Club hosted Boyle, Hooke and Oldenburg
- Joint First Secretary of the Royal society 1660

Royal Society of London, 28 November 1660



- First established at Gresham College (had been used for meetings of the “Invisible College” since 1645) after a lecture by Christopher Wren who was Professor of Astronomy there
- Founding Fellows 40 in number each paying 1*s* a week

Too Many… Books

- “One of the diseases of this age is the multiplicity of books; they doth so overcharge the world that it is not able to digest the abundance of idle matter that is every day hatched and brought forth.”

– Barnaby Rich, 1611

Building Blocks in Place

- Problems with books (1610s)
- Development of modern scientific practice (1610-20)
  - "The Scientific Method": Bacon ("torturing nature")
  - "The Experiment": Gallileo (*il cimento* "the ordeal")
- Growth in individual scholars wanting recognition (and safety from intellectual piracy) by their peers
  - First learned societies (1603, 1657,1660)
- A desire for (scientific) "news"
  - letter writing circles (Marsenne 1588-1600)
  - development of first newspapers (1621)
- Infrastructure: improvements in postal systems

Oldenburg and the 350th Birthday of the Learned Journal

INVENTION

Henry Oldenburg (c1618-1677)

- Born in Bremen, Germany
- Resident in London from 1652 as diplomat
- Involved with Robert Boyle as tutor of relative
- Fluent in five languages
- Appointed without any salary (joint) Secretary to the Royal Society in 1663
- In 1664 considered making money through a printed newsletter

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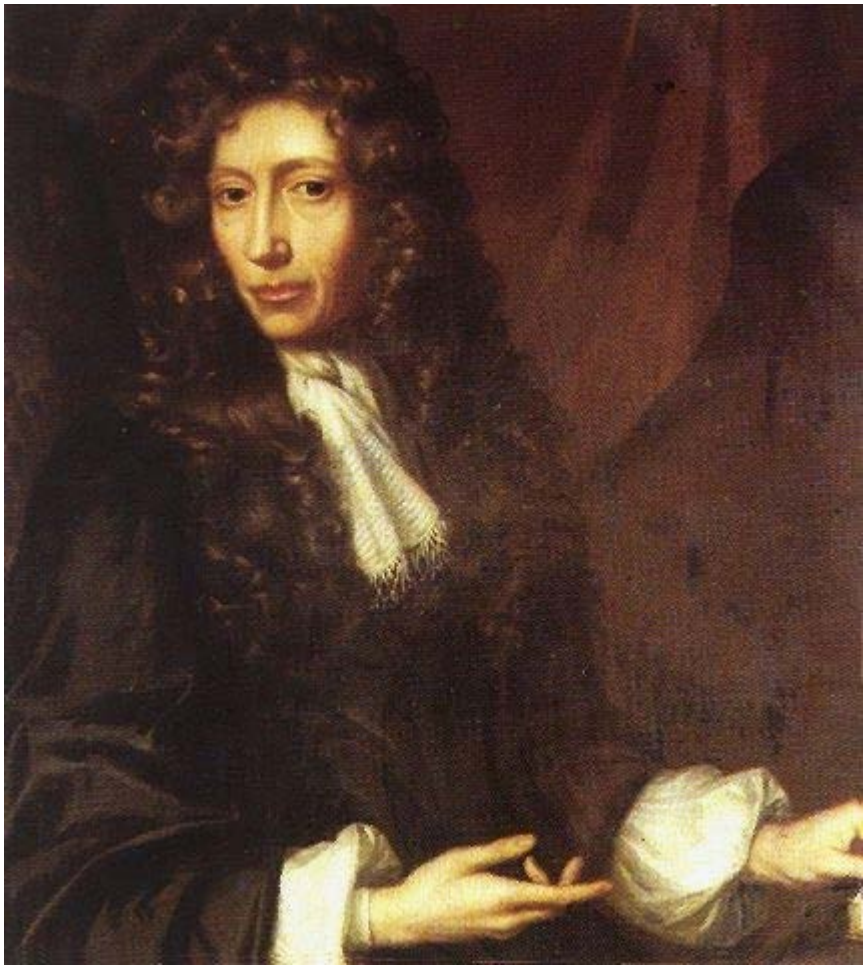
Robert Boyle (1627-91)



- 7th son of the Earl of Cork, Oldenburg's patron
- Worked and lived in Oxford in 1655-68
- Founding Fellow of the Royal Society
- Boyle's Gas Law pressure x volume = constant

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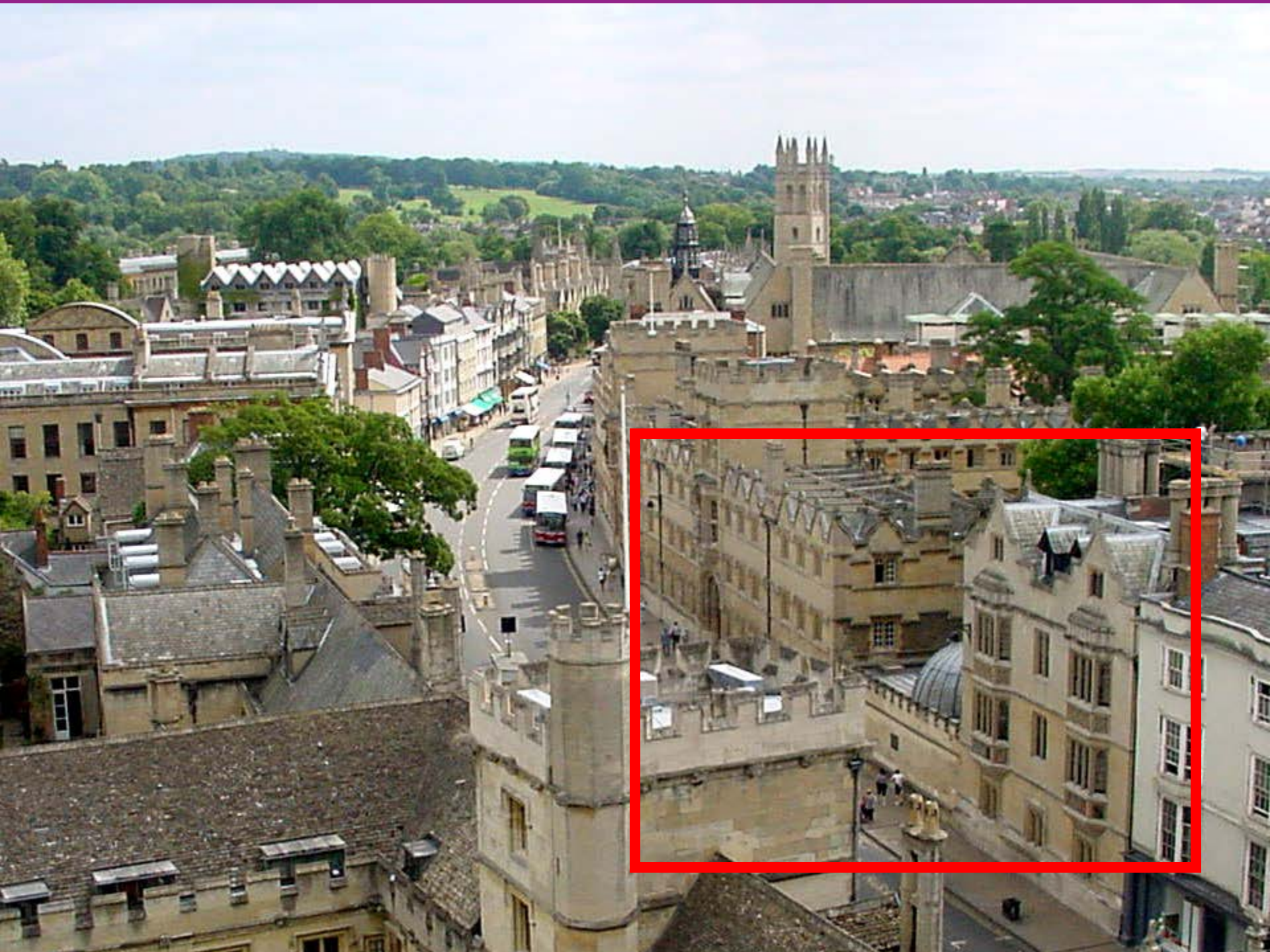
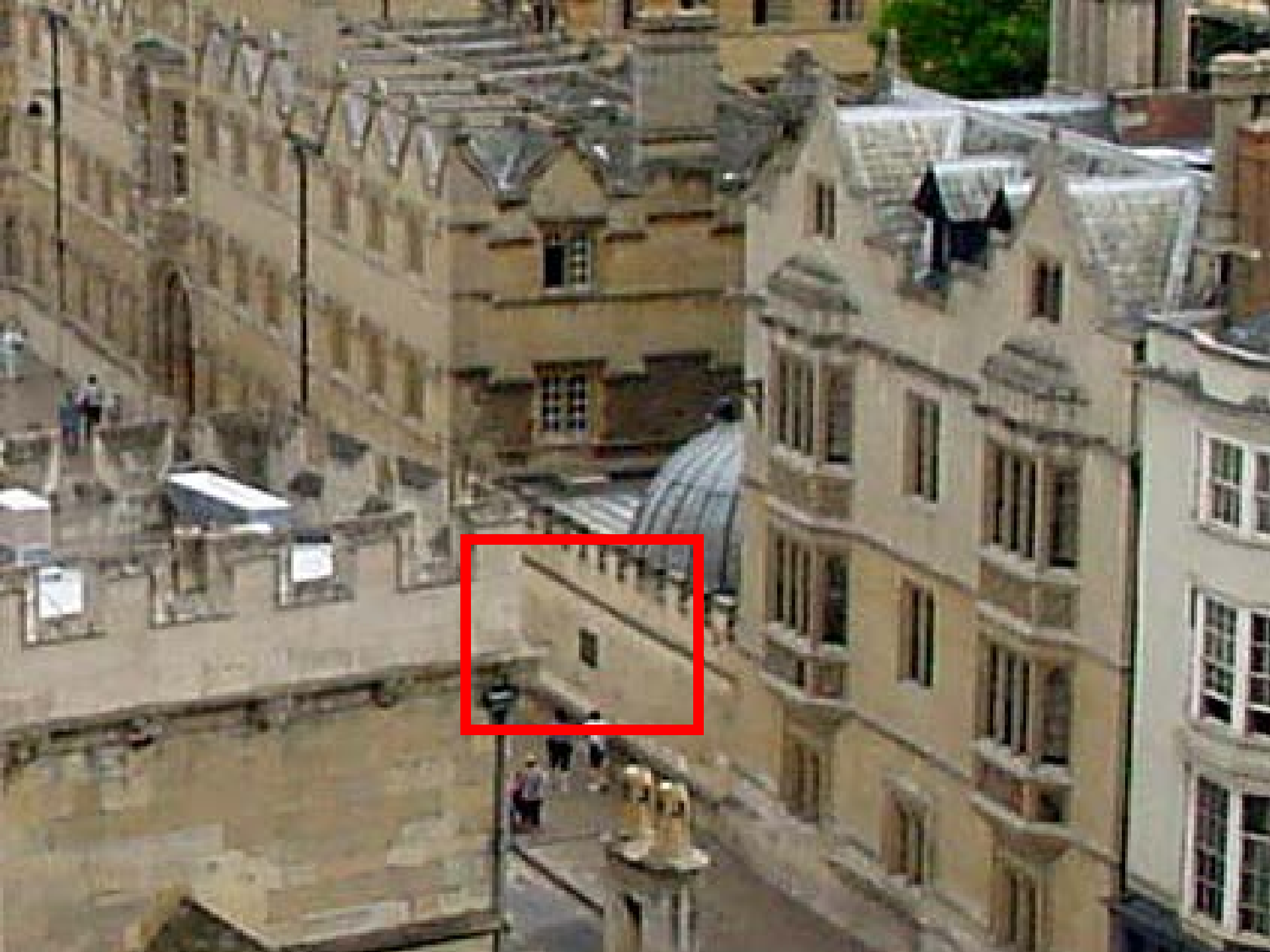
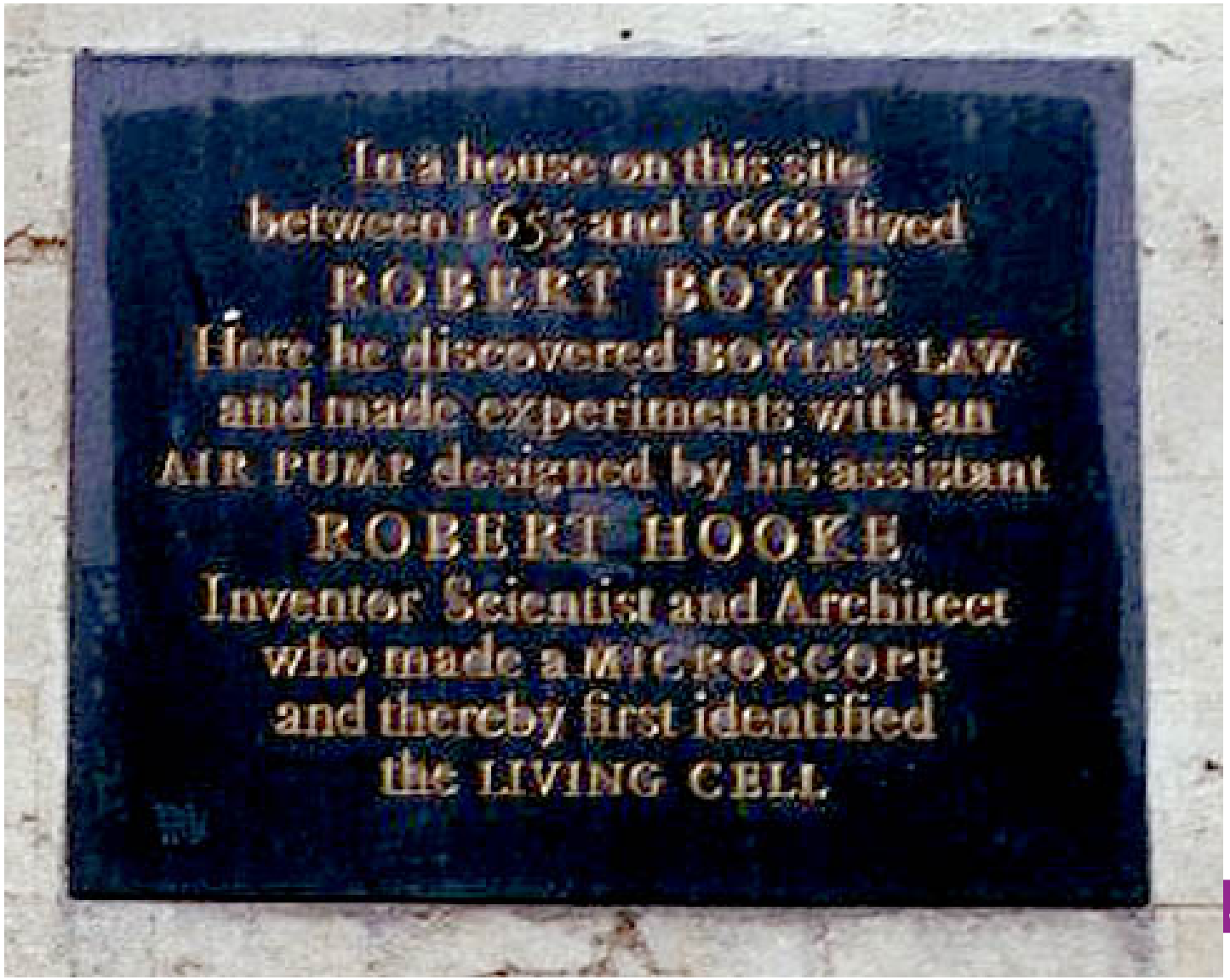




High Street, Oxford



Robert Hooke (1635-1703)

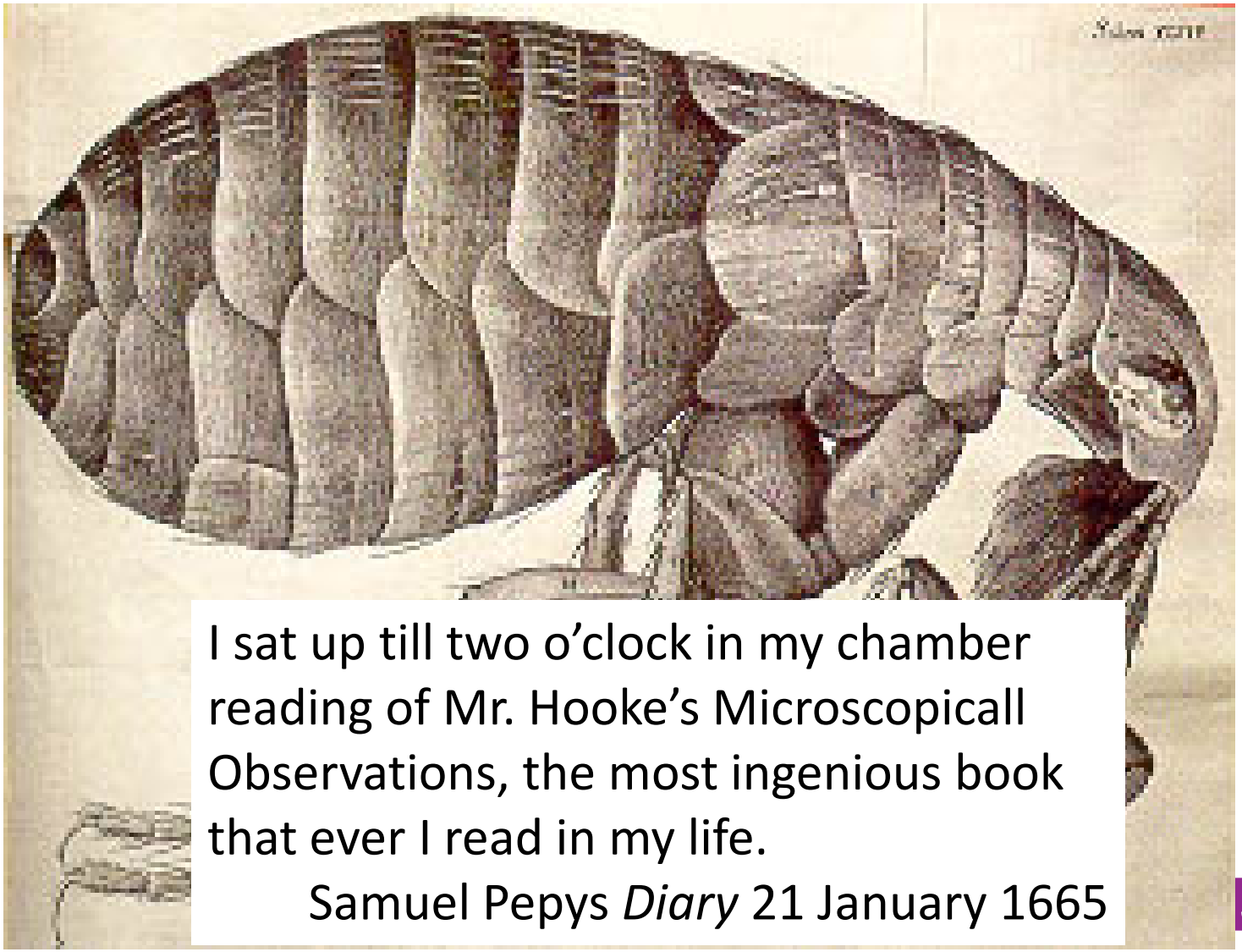
- Founder of microscopy and elements of mechanics (Hooke's Law)
- Worked with Boyle in Oxford from 1658
- First Royal Society Curator of Experiments: first salaried scientist in England!
- No known likeness

Robert Hooke's Proposal (1663)

- A weekly printed publication providing:

  … a brief discourse of what is new and considerable in their letters from all parts of the world, and what the learned and inquisitive are doing and have done in physick, mathematicks, mechanicks, opticks, astronomy, medicine, chymistry, anatomy, both abroad and at home.

Hooke's Flea from *Micrographica, 1665*

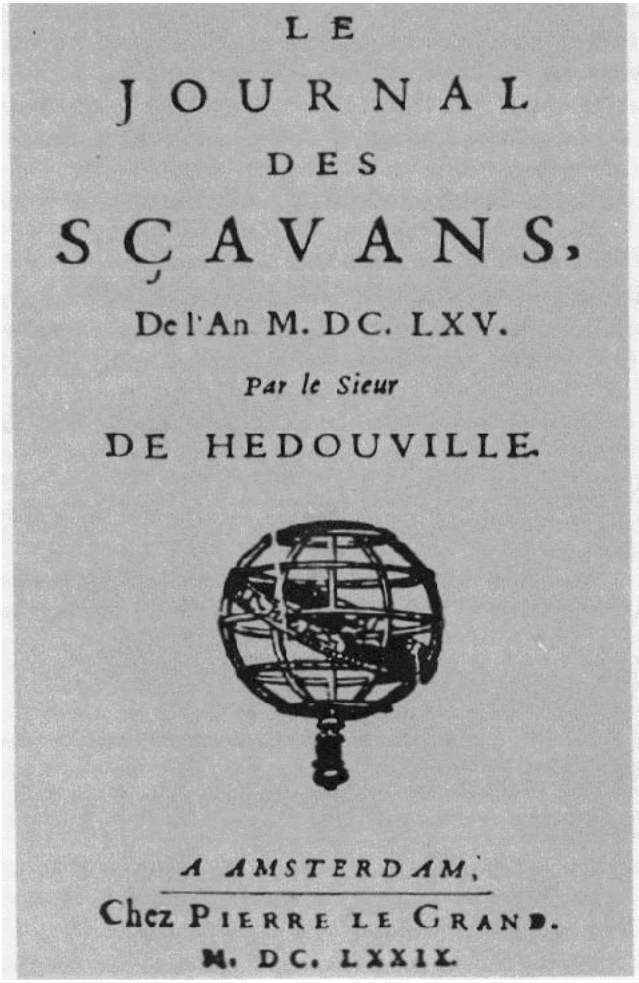


I sat up till two o'clock in my chamber reading of Mr. Hooke's Microscopicall Observations, the most ingenious book that ever I read in my life.

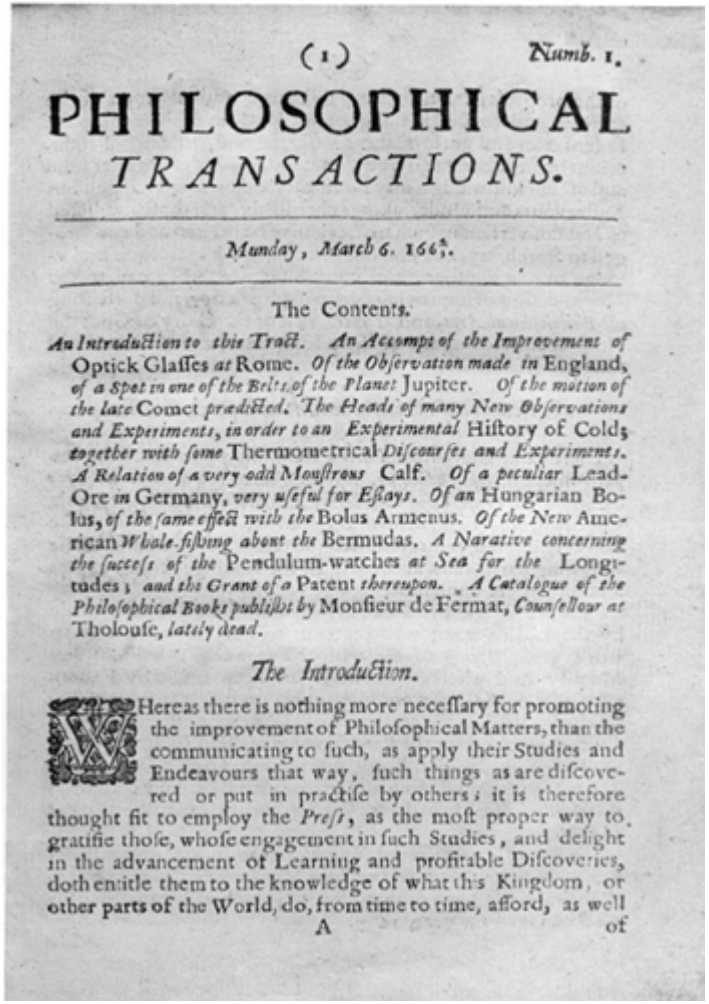
Samuel Pepys *Diary* 21 January 1665

First “Journal”

- 5th January 1665
  Le Journal des Sçavans
- Editor Denis de Sallo de la Coudraye
- First published in Paris
- A digest of book reviews, news and scholarly activity written by scriveners (journalists)
- Still in existence as *Le Journal des Savants*


LE
JOURNAL
DES
SÇAVANS,
De l'An M. DC. LXV.
Par le Sieur
DE HEDOUVILLE.
A AMSTERDAM,
Chez PIERRE LE GRAND.
M. DC. LXXIX.

First Scientific Journal



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PHILOSOPHICAL
TRANSACTIONS.

Munday, March 6. 166⅝.

The Contents.

An Introduction to this Tract. An Accompt 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 *praedicted. 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* Mousstrous 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 Narative 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.

WHereas 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

- 6th March 1665 *Philosophical Transactions*
- Editor and publisher, Henry Oldenburg Secretary of the Royal Society
- First true scholarly journal
- Published for profit at Oldenburg's expense

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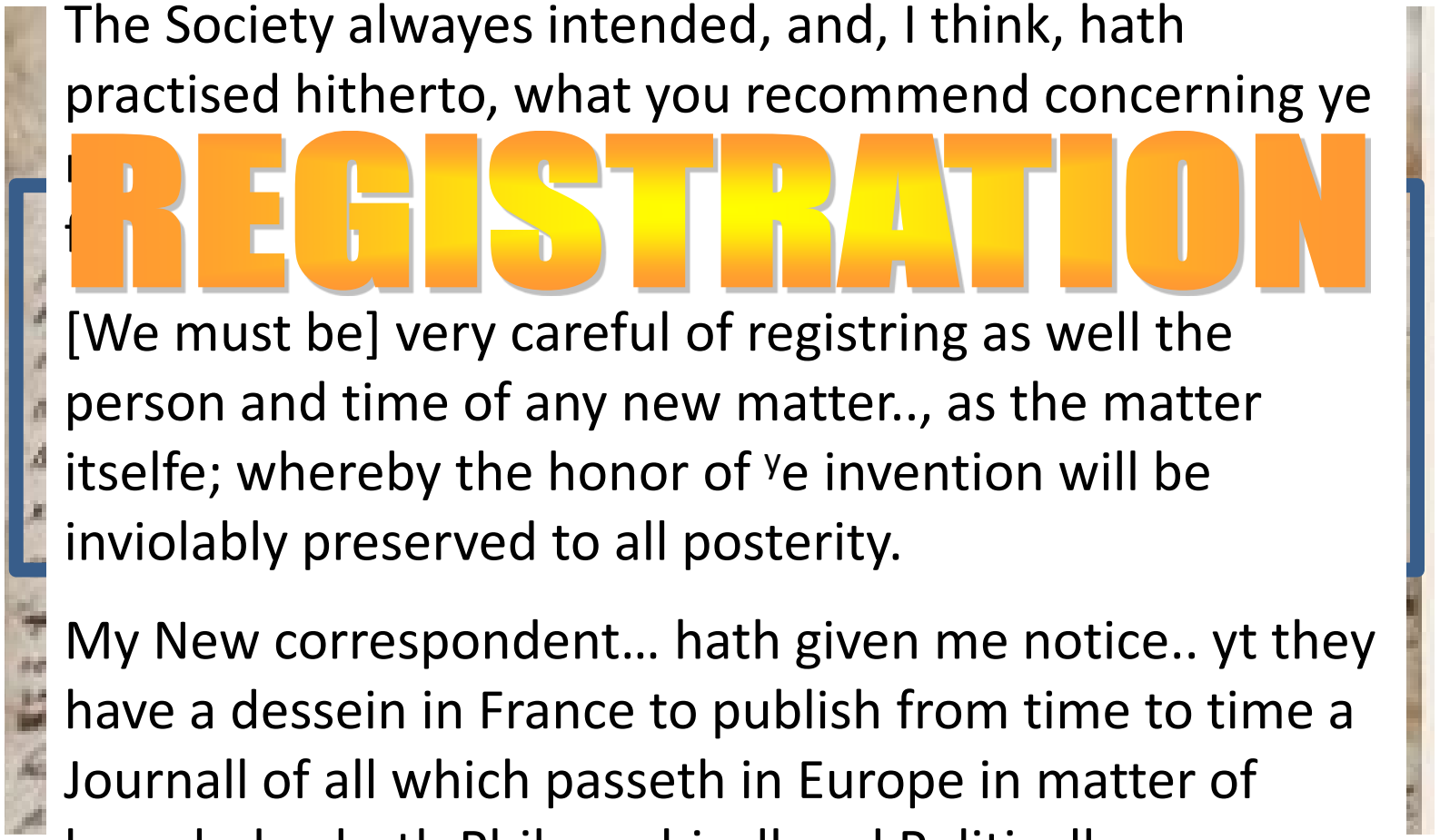
Countdown to *Philosophical Transactions*

- Oldenburg and Boyle exchange letters on how best to publish results 24 November to 3 December 1664
- November 1664 they find out about *J de Scavans*
- *J de Scavans* is published 5 January 1665
- Oldenburg reads an extract from it at Royal Society meeting on 11 January 1665
- Early February, a specimen of *Phil. Trans*. displayed at a meeting
- Approved by the Council on 1 March 1665
- First issue published, Monday 6 March 1665

Oldenburg to Boyle, 24 November 1664



The Society alwayes intended, and, I think, hath practised hitherto, what you recommend concerning ye

REGISTRATION

[We must be] very careful of registring as well the person and time of any new matter.., as the matter itselfe; whereby the honor of ye invention will be inviolably preserved to all posterity.

My New correspondent… hath given me notice.. yt they have a dessein in France to publish from time to time a Journall of all which passeth in Europe in matter of knowledge both Philosophicall and Politicall

Oldenburg to Boyle, 3 December 1664

- [By registering and giving due honour]
  I thence persuade myselfe, yt all Ingenious men will be thereby incouraged to impart their knowledge and discoveryes, as farre as they may, not doubting of ye Observance of ye Old Law, of Suum cuique tribuere .

DISSEMINATION

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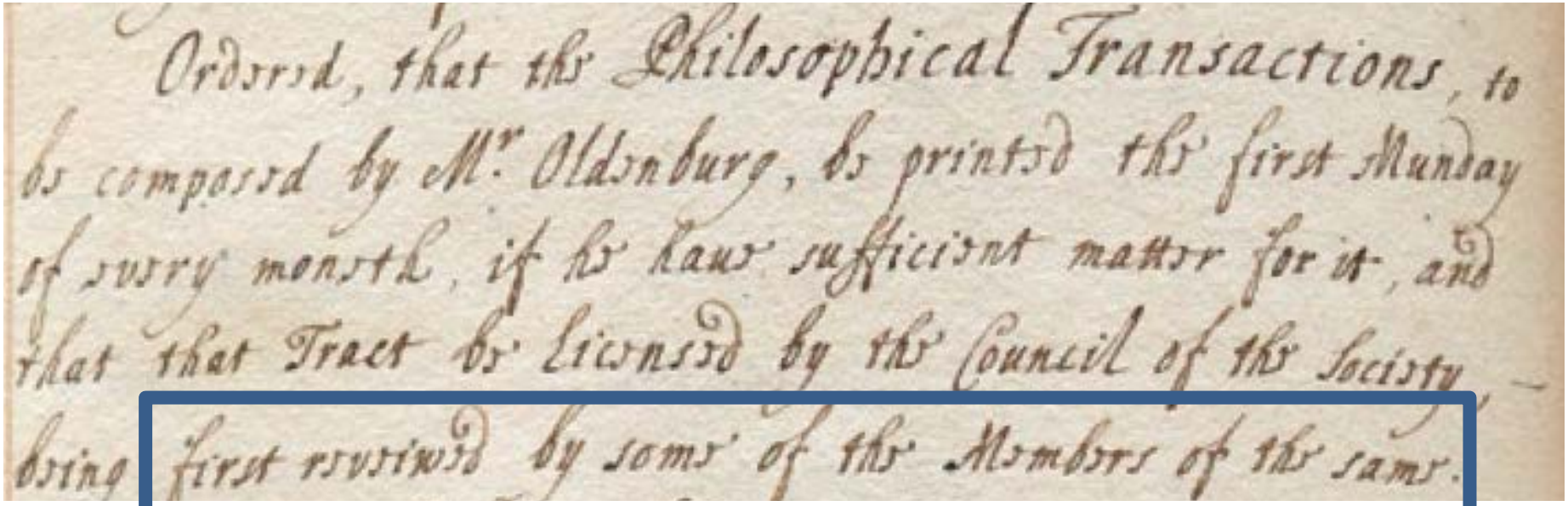
Boyle to Oldenburg, 1665

- [I should not] neglect the opportunity of having some of my Memoirs preserv'd, by being incorporated into a Collection [such as the continuing issues of *Phil. Trans.*], that is like to be as lasting as usefull

Royal Society Order in Council, 1 March 1665 – introduction of peer review


Ordered, that the Philosophical Transactions, to
be compared by Mr. Oldenburg, be printed the first Munday
of every month, if he have sufficient matter for it, and
that that Tract be licensed by the Council of the Society,
being first reviewed by some of the Members of the same.

CERTIFICATION

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Journal Publication as Author Protection

- **Robert Boyle** to Henry Oldenburg, 27 August 1665
  - **But some here [Oxford] are a little Jealous ʸt if our Expts be known elsewhere wthout being before hand registred by you together wth ʸe Time of their having been made or proposd, they may beget such claimes & disputes.**
- **Henry Oldenburg** to Robert Boyle, 29 August 1665
  - I acknowledge, ʸt **ʸt yealousy, about the first Authors of Experiments, wch you speak off, is not groundlesse. And therefore offer myselfe, to register all those, you or any person shall please to communicate**, as now, wth ʸt fidelity, wch both of ʸe honor of my relation to the R. Society (wch is highly concerned in such Experiments) and my owne inclinations doe strongly oblige me to.

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Oldenburg and the Invention of Journal Publishing

AFTERMATH

Philosophical Transactions after 1665

- Oldenburg remained editor (and for-profit publisher) until his death in 1677
  - publishing 136 issues at regular intervals (1st Monday of each month) with the exception of the Plague (July-November 1666) and his imprisonment for treason in the Tower (June and August 1667)
- Publication ceased 1678-1682 while Hooke published *Philosophical Collections*, and again from 1688-90
- Publication resumed in 1691 and has remained continuous ever since
- Royal Society assumed full financial responsibility in March 1752 and so it became finally *Philosophical Transactions of the Royal Society*

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Functions of the journal à la Oldenburg

- Date stamping or priority via **registration**
- Quality stamping (**certification**) through peer-review
- Recording the final, definitive, authorised versions of papers and **archiving** them
- **Dissemination** to targeted scholarly audience
- *[Added later] For readers, search and **navigation***
  - Achieved via creation and then management of the “journal brand”

Example from 19 February 1672

(3075) Numb. 80.

PHILOSOPHICAL
TRANSACTIONS.

February 19. 16⁷⁢.

The CONTENTS.

A Letter of Mr. Isaac Newton, *Professor of the Mathematicks in the University of Cambridge; containing his New Theory about* Light *and* Colors: *sent by the Author to the Publisher from Cambridge, Febr.* 6. 16⁷⁢; *in order to be communicated to the* R. Society.

SIR,

TO perform my late promise to you, I shall without further ceremony acquaint you, that in the beginning of the Year 1666 (at which time I applyed my self to the grinding of Optick glasses of other figures than *Spherical,*) I procured me a Triangular glass-Prisme, to try therewith the celebrated *Phænomena* of

 Colours.

A Letter of Mr. Isaac Newton, *Professor of the Mathematicks in the University of Cambridge; containing his New Theory about* Light *and* Colors: *sent by the Author to the Publisher from Cambridge, Febr.* 6. 16⁷⁢; *in order to be communicated to the* R. Society.

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G g g g *Colours.*

Example from 14 November 1985

C_{60}: Buckminsterfullerene

H. W. Kroto*, J. R. Heath, S. C. O'Brien, R. F. Curl & R. E. Smalley

Rice Quantum Institute and Departments of Chemistry and Electrical Engineering, Rice University, Houston, Texas 77251, USA

During experiments aimed at understanding the mechanisms by which long-chain carbon molecules are formed in interstellar space and circumstellar shells[1], graphite has been vaporized by laser irradiation, producing a remarkably stable cluster consisting of

Received 13 September; accepted 18 October 1985.

1. Heath, J. R. *et al. Astrophys. J.* (submitted).
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Example from 15 March 2012

OPEN ACCESS Freely available online

PLoS one

Cryptic Diversity in Indo-Pacific Coral-Reef Fishes Revealed by DNA-Barcoding Provides New Support to the Centre-of-Overlap Hypothesis

Nicolas Hubert[1,2]*, Christopher P. Meyer[3], Henrich J. Bruggemann[1], Fabien Guérin[4], Roberto J. L. Komeno[5], Benoit Espiau[2], Romain Causse[6], Jeffrey T. Williams[7], Serge Planes[2]

Perpignan Via Domitia, Perpignan, France, **3** Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., United States of America, **4** UMR PVBMT, Faculté des Sciences et Technologies, Université de La Réunion, Saint-Denis, Réunion, France, **5** Institut Halieutique et des Sciences Marines, Université de Toliara, Toliara, Madagascar, **6** Département Milieux et Peuplements Aquatiques, Muséum National d'Histoire Naturelle, Paris, France, **7** Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., United States of America

Abstract

Diversity in coral reef fishes is not evenly distributed and tends to accumulate in the Indo-Malay-Philippines Archipelago (IMPA). The comprehension of the mechanisms that initiated this pattern is in its infancy despite its importance for the conservation of coral reefs. Considering the IMPA either as an area of overlap or a cradle of marine biodiversity, the hypotheses proposed to account for this pattern rely on extant knowledge about taxonomy and species range distribution. The recent large-scale use of standard molecular data (DNA barcoding), however, has revealed the importance of taking into account cryptic diversity when assessing tropical biodiversity. We DNA barcoded 2276 specimens belonging to 668 coral reef fish species through a collaborative effort conducted concomitantly in both Indian and Pacific oceans to appraise the importance of cryptic diversity in species with an Indo-Pacific distribution range. Of the 141 species sampled on each side of the IMPA, 62 presented no spatial structure whereas 67 exhibited divergent lineages on each side of the IMPA with K2P distances ranging between 1% and 12%, and 12 presented several lineages with K2P distances ranging between 3% and 22%. Thus, from this initial pool of 141 nominal species with Indo-Pacific distribution, 79 dissolved into 165 biological units among which 162 were found in a single ocean. This result is consistent with the view that the IMPA accumulates diversity as a consequence of its geological history, its location on the junction between the two main tropical oceans and the presence of a land bridge during glacial times in the IMPA that fostered allopatric divergence and secondary contacts between the Indian and Pacific oceans.

Citation: Hubert N, Meyer CP, Bruggemann HJ, Guérin F, Komeno RJL, et al. (2012) Cryptic Diversity in Indo-Pacific Coral-Reef Fishes Revealed by DNA-Barcoding Provides New Support to the Centre-of-Overlap Hypothesis. PLoS ONE 7(3): e28987. doi:10.1371/journal.pone.0028987

Editor: Vincent Laudet, Ecole Normale Supérieure de Lyon, France

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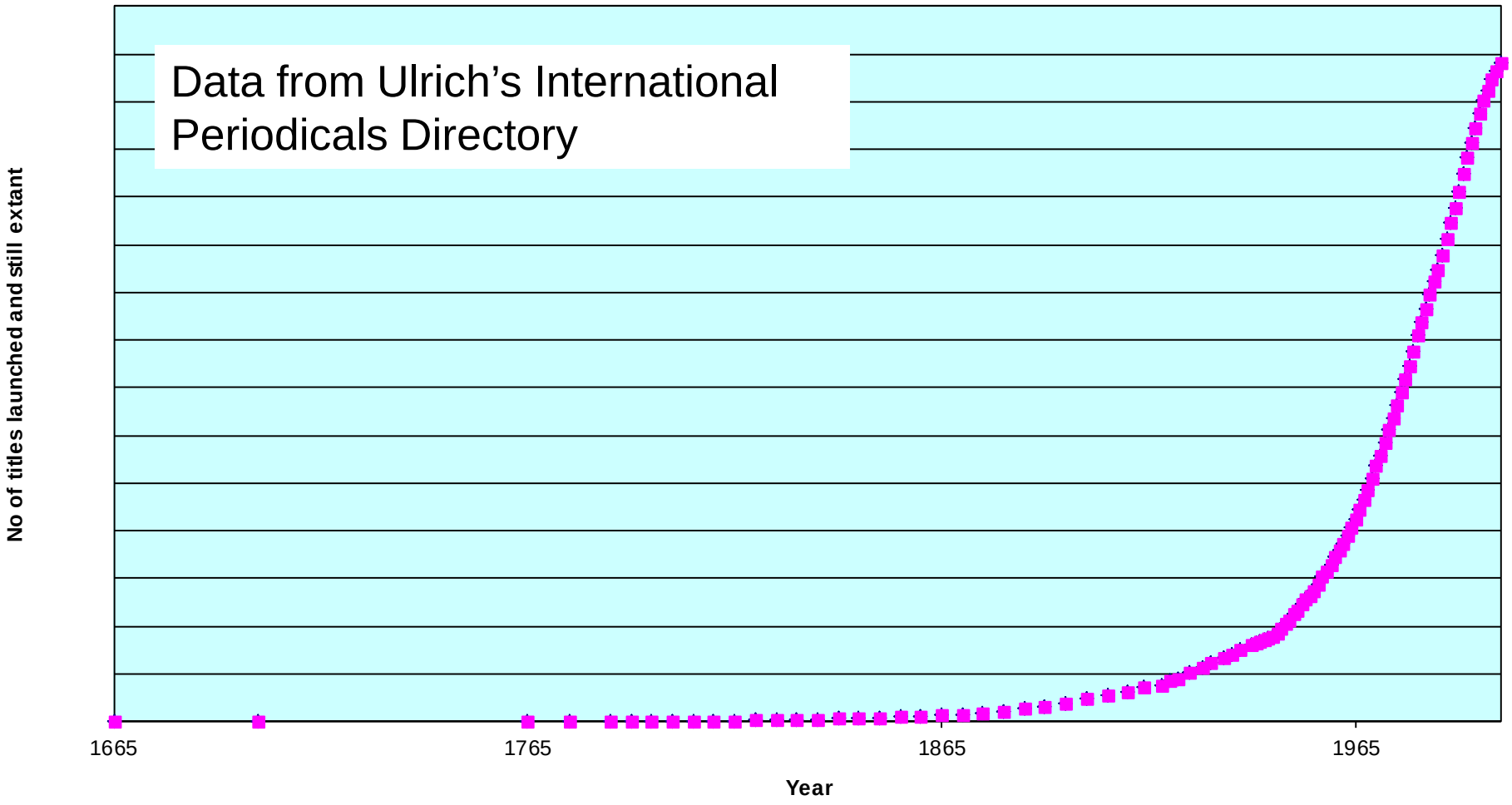
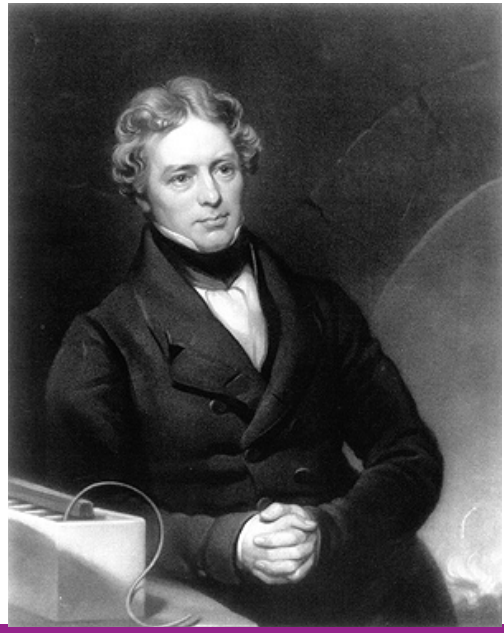
Journal Growth 1665-2014



Reactions to Journal Growth

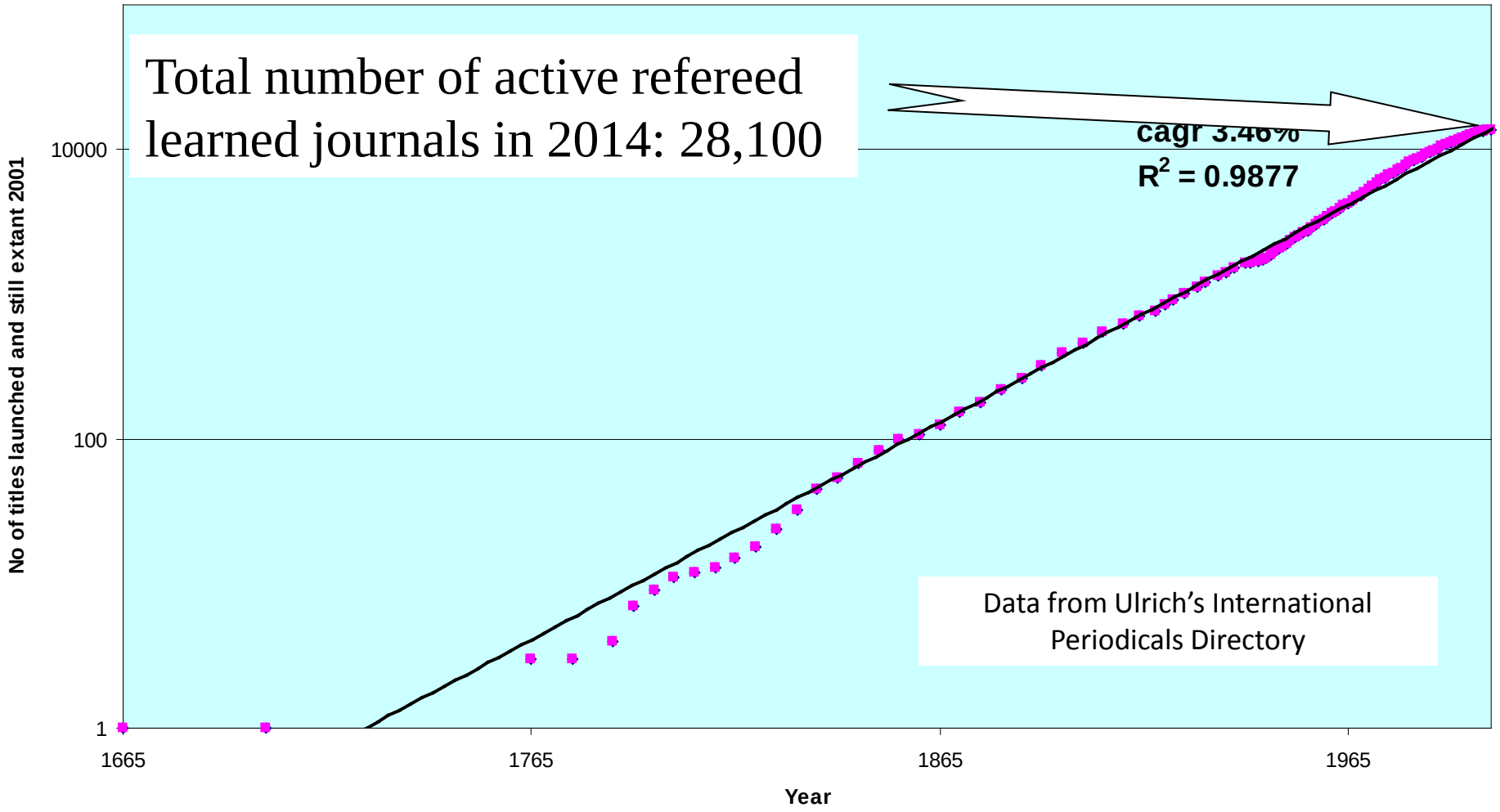
- "This is truly the decade of the journal, and one should seek to limit their number rather than to increase them, since there can also be too many periodicals."
  - review in *Neues med. Wochb. f. Aertzte*
  - published 1789
- It is certainly impossible for any person who wishes to devote a portion of his time to chemical experiment, to read all the books and papers that are published..; their number is immense, and the labour of winnowing out the few [of interest] .. is such, that most persons who try .., pass by what is really good.

  — Michael Faraday 1826

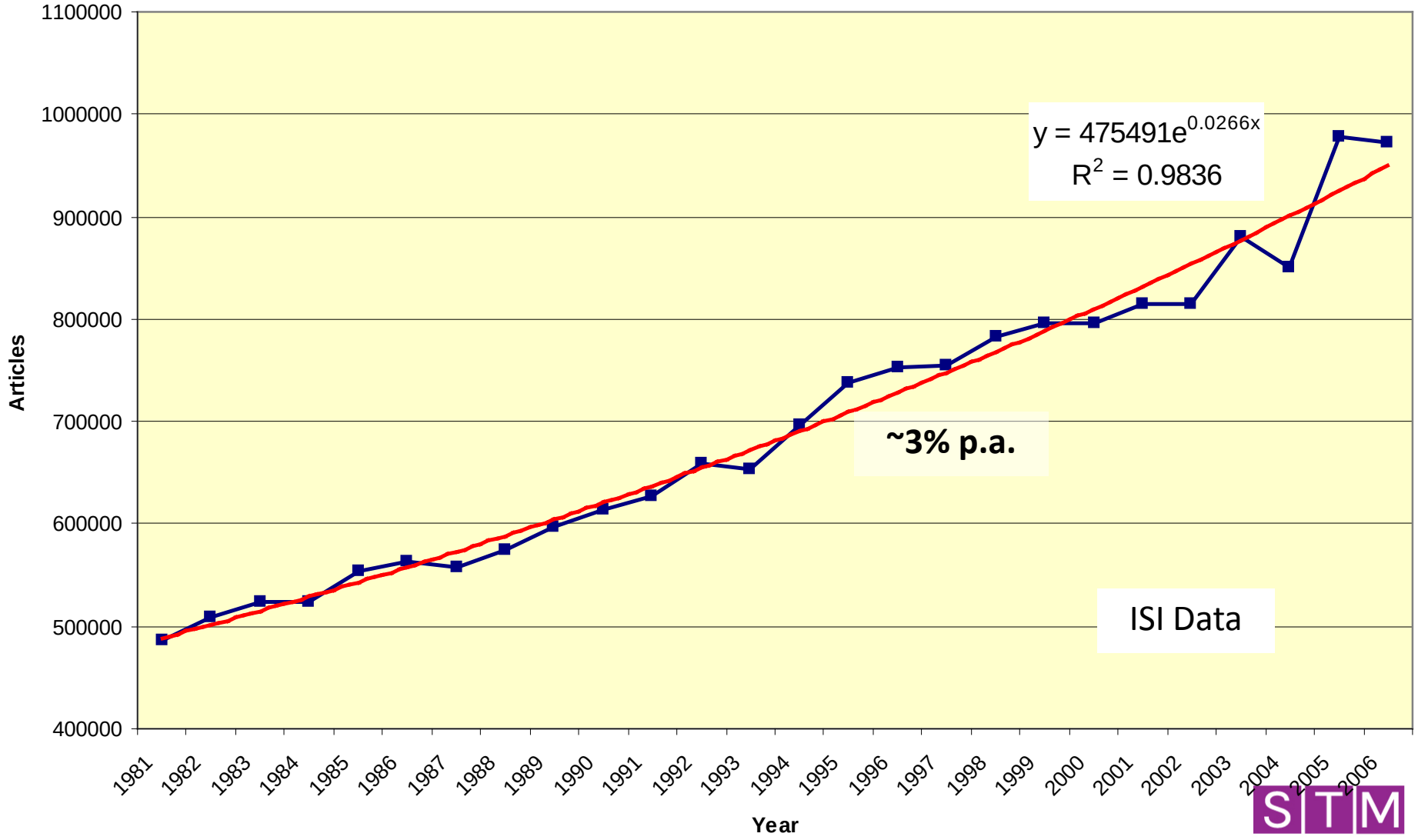


Journal Growth 1665-2014

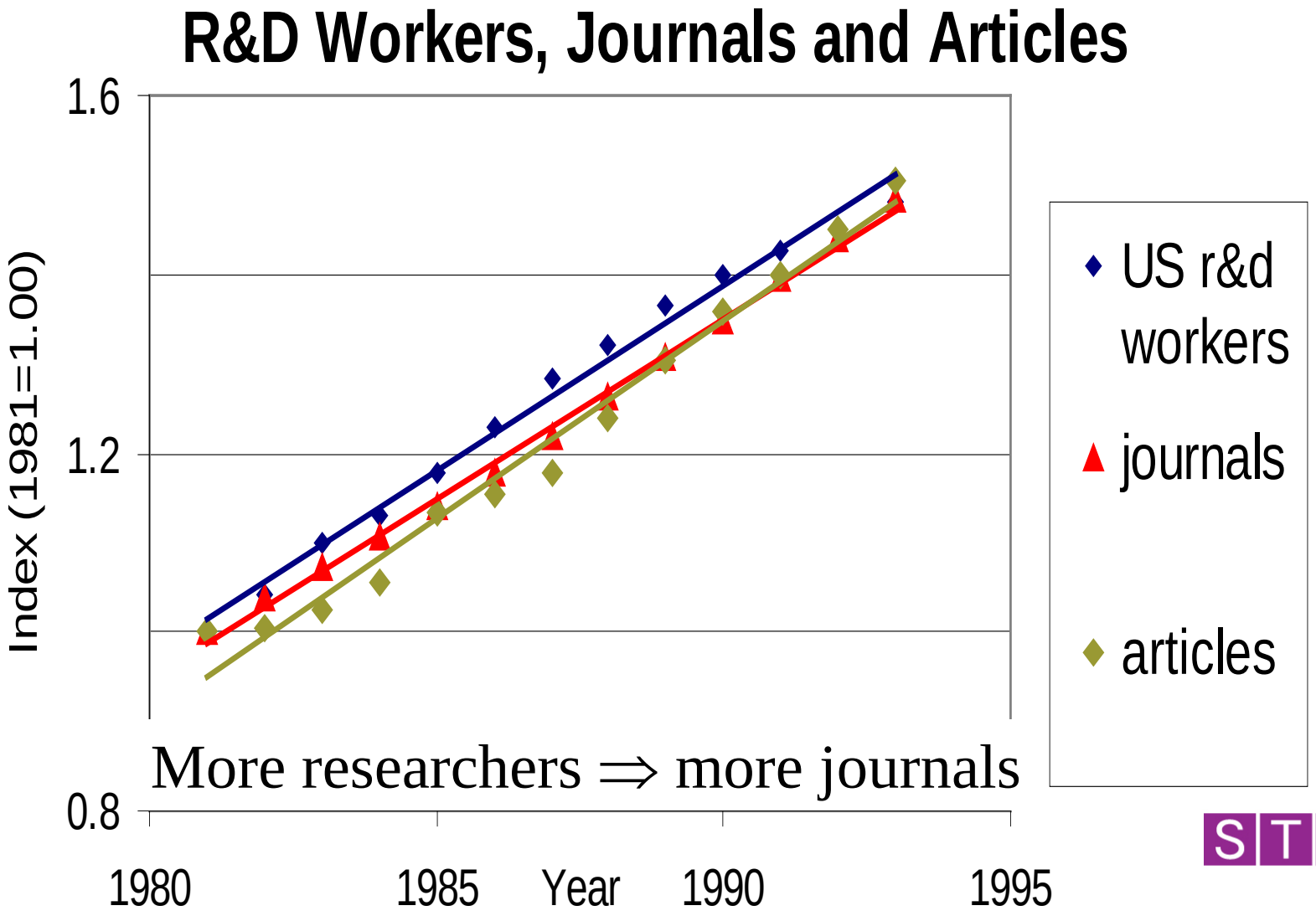
[Sources: M A Mabe The number and growth of journals *Serials* **16**(2).191-7, 2003; Mabe & Amin Growth Dynamics of Scholarly and Scientific Journals *Scientometrics* **51**(1) 147- 162, 2001]



Article Growth 1981-2006



Relationship of Journals & Researchers



Where are we now?

- About 28,100 peer reviewed English language journals
  - Growing by about 3.5% each year
- 2.5 million scholarly articles each year
  - Growing by about 3-4%
- All scientific, technical and medical titles are online, most arts and humanities too
- Multimedia, cross reference linking, 3D structures are the norm

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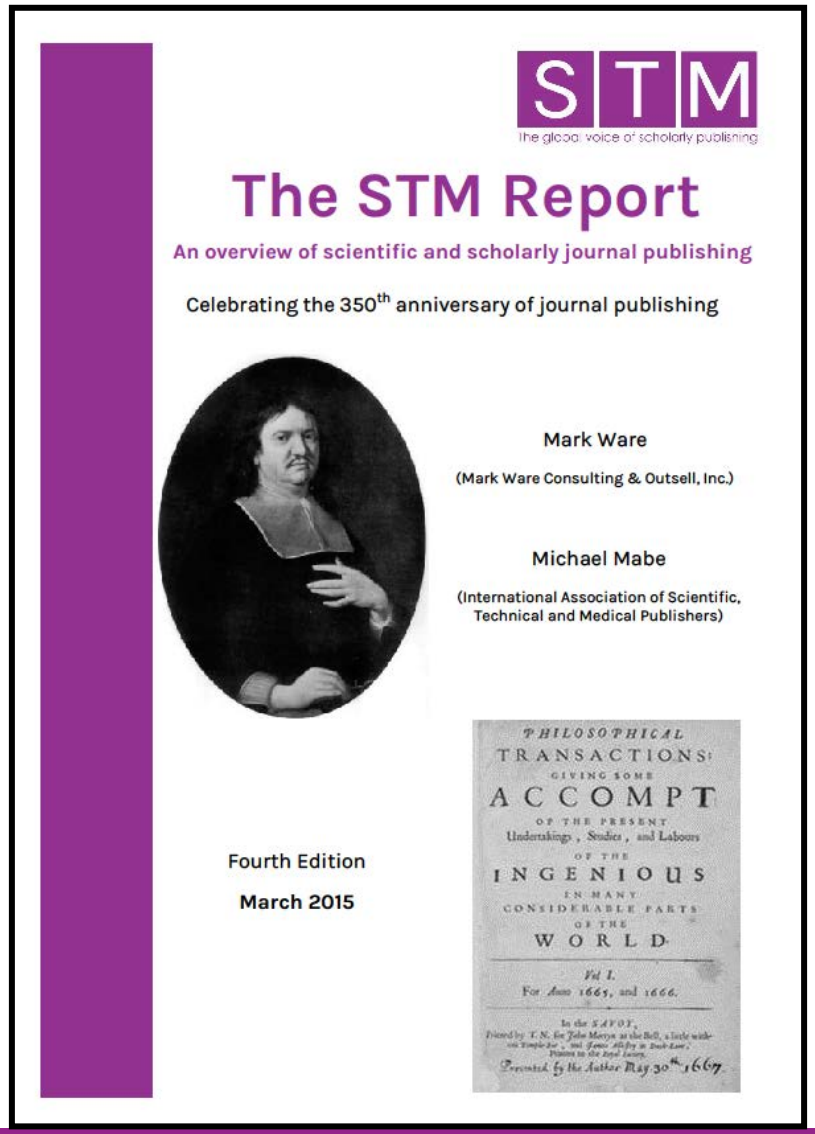
The STM Report, 2015



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