

Newsletter of The History of Philosophy of Science (HOPOS) Working Group

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The History of Philosophy of
Science (HOPOS)
Working Group
<http://scistud.umkc.edu/hopos>

From the Editor

The autumn brings on for most of us the delights of a new academic year and perhaps the pleasant onset of cool weather. Not all of our kindred scholarly souls are looking forward to a change in the temperature, though. As some three months have passed since the earthquake in Western Turkey, we might do well to recall the destruction wrought upon persons and properties—but also upon schools and universities. Stephen Voss (Bogazici University, Istanbul, voss@boun.edu.tr) has kindly put us in touch with representatives from Sakarya University, which was severely damaged in the earthquake. As the winter nears, those in the Sakarya community have a growing need for shelter. Their plea for assistance appears in this issue of the Newsletter, affording us an opportunity to help our fellow scholars in true need. Please do what you can.

This appeal is a natural extension of the distinctly international character the HOPOS Newsletter has taken on these past few issues. This reflects the international flavor of the HOPOS Working Group—rather fitting for a scholarly group whose formative transactions have been through an electronic mailing list. One sign of the flowering internationalism of our scholarly work is the upcoming HOPOS 2000 conference, to be hosted by the University of Vienna. A reminder concerning this exciting event appears on page two.

Looking backward, David Spurett offers a report on the annual Dubrovnik philosophy of science conference. This conference has resisted a great deal of manmade havoc and trouble in recent times, and

deserves the continued support of the philosophy of science community.

Yet another manifestation of our global focus is the ongoing series of HOPOS 'travelogues'. The installment for this issue features a guide to resources of Ireland. Charles Mollan has assembled a charming and useful overview of Ireland's intellectual assets in history and philosophy of science.

This issue closes with two reviews of books that address relations between early modern philosophy and science on one hand and mystical or hermetic traditions on the other. The first looks at recent works in translation of and commentary on Giordano Bruno, and the second looks at Lawrence Principe's recent view of Robert Boyle as not entirely divorced from alchemical thought.

Several announcements bear highlighting. HOPOI who have been concerned about the unavailability of classic HOPOS-related works should be cheered by a request from Thoemmes Press editor Kirsten Robertson for suggestions and proposals for publications in this area. Let us also take note of the semisequentennial of the HSS, and the PSA's selection of a new newsletter editor (Malcolm Forster)—and extend our congratulations.

Finally, let us not rest in our efforts to improve upon the Newsletter. The current format is apparently popular but why not consider other features for the future, such as notes and comments, bibliographic surveys, or syllabi? Please provide feedback!

Cheers,
Saul Fisher



1999 Dubrovnik Philosophy of Science Conference

A Report

Between April 12 and 17 of this year I attended the annual philosophy of science conference at the Inter-University Centre in Dubrovnik, Croatia, for the first time. The Inter-University Centre in Dubrovnik holds a range of conferences and courses in many fields every year, but the philosophy of science conference has a special place in the programme. It has been held every year without fail since 1974, making this year the 25th anniversary. The original conference was opened by Werner Heisenberg. There were times when it was the largest annual philosophy of science conference in Europe.

This year the themes of the conference were (1) Rationality, and (2) The Sciences: Natural and Social. Conference participants came from a wide range of countries and institutions, including Canada, the US, Sweden, Poland, Romania, Slovenia, Singapore, the Netherlands, Russia, South Africa, the UK and, of course, Croatia itself.

For those who haven't been, Dubrovnik is an astonishingly beautiful city, the old part of which is a charming stone haven with no vehicular traffic and a disarming charm. This year's conference fell near the beginning of the NATO bombardment of parts of former Yugoslavia, which resulted in a great deal of cancelled trips on the part of nervous tourists. In fact, at least at the beginning of the week it seemed like the conference was the only activity in town which involved visitors, except for journalists *en route* to or from other parts of the region. It takes more than a war two countries away to stop a conference which has been held with snipers and

mortar emplacements in action on hills overlooking Dubrovnik, though, and in any event the period passed without incident in Croatia.

The conference was a great success. The papers were generally of high quality and covered a wide range of problems and approaches. Further, in the all-too-rare absence of parallel sessions (even though it meant hearing two papers on Saturday morning) the level of discussion was also high, and in time took on the quality of a short intense seminar as we all got to know one another better, and had more and more common points of reference and shared debate. Finally, it was a pleasure to attend a conference where every single paper was heard in a full 90 minute session, allowing plenty of time for questions, discussion and debate.

Given my own interests and specializations, I found these papers to be especially stimulating and memorable: 'What's Right about Formalism' (James Robert Brown, Toronto), 'Balancing Acts: Rational Agency and Efficacious Action' (Mary Tiles, Hawaii), 'Nativism, Defeasability and A Priori Knowledge' (Ben Young, Edinburgh), 'Historicism and Philosophy of Science' (Andrew Reynolds, Harvard), 'Rational Mathematical Change' (Jean-Pierre Marquis, Montreal), and 'Living in the "Space of Reasons": The "Rationality Debate" Revisited' (David Davies, McGill). The majority of the papers focused, broadly, on rationality. A wider debate ensued over the course of conference regarding excesses of relativism and claims for rationality or realism. A selection of papers from the conference is forthcoming in the journal "International Studies in the Philosophy of Science".

I left with a firm resolve to attend next year, when the themes will be (1) Causality, Laws, and Explanation, (2) Philosophy of Biology and, given the timing, (3) 100 Years of Quanta.

For information concerning the conference, contact James Robert Brown (University of Toronto) at: jrbrown@chass.utoronto.ca.

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HOPOS 2000

University of Vienna

The History of Philosophy of Science Working Group will hold its Third International Conference at the University of Vienna, in July 2000. The conference is being organized together with the Institute Vienna Circle and the Center for International and Interdisciplinary Studies (ZIIS) of the University of Vienna.

For further information, contact Michael Heidelberger (Michael=Heidelberger@rz.hu-berlin.de) or Friedrich Stadler (Friedrich.Stadler@univie.ac.at). The conference website is at: <http://hhobel.phl.univie.ac.at/wk>



News of the profession.

Call for Reports.

The Newsletter features occasional, concise reports on conferences of interest to HOPOI. If you are interested in writing such reports, please contact the Editor.

Conference and Talk Calendar.

- October 1-2, 1999, University of Oklahoma

18th Annual Mephistos Conference. The annual MePHiSToS graduate student conference focuses on the history, philosophy, and sociology of science, technology, and medicine. For information on Mephistos conferences, follow these links:

1996—University of Toronto—
<http://www.chass.utoronto.ca/~mephisto/meph96/>

1997—UCLA—
http://scow.gslis.ucla.edu/students_m-z/mephisto/HTML/home.html

1998—University of Minnesota—
<http://home.att.net/~Olorin/mephistos/meph2.htm>

1999—Univ. of Oklahoma—
<http://aftermath.math.ou.edu/~jjwhite/Mephistos/index.html>

- October 31-November 2, 1999
Université de Genève,
Switzerland

International Colloquium on Bolzano and Frege. For information, contact Kevin Mulligan (Kevin.Mulligan@lettres.unige.ch).

- November 2-4, 1999, Florence, Italy

The Florence Center for the History and Philosophy of Science and the Pittsburgh Center for Philosophy of Science will hold an international workshop, Analytical And Continental Aspects Of Logical Empiricism: Historical And Contemporary Perspectives, in the Sala della Presidenza della Facoltà di Lettere e Filosofia, Piazza Brunelleschi 4. For information contact Elena Castellani (castella@philos.unifi.it).

- November 3-7, 1999, Pittsburgh, Pennsylvania

The History of Science Society Semisesquicentennial Anniversary 1999 Annual Meeting will be held at the Westin William Penn. For information go to <http://depts.washington.edu/hsexec/annual/hss99.html>.

- November 5-7, 1999, Rutgers University, New Brunswick, NJ

The Rutgers Center for Cognitive Science and the Hang Seng Centre for Cognitive Studies (University of Sheffield) will sponsor the first of 2 conferences on The Cognitive Basis of Science. For information go to <http://philosophy.rutgers.edu/cbs-conference> or contact Stephen Stich (stich@rucss.rutgers.edu) or Gary C. Bartlett (garybartru@netscape.net).

- November 26-27, 1999, Institut Henri Poincaré, Paris
“Journées Ernest Coumet: Histoire des jeux, jeux de l’histoire”. Organized by the Centre Alexandre Koyré, EHESS and Centre international de Synthèse. For information, contact Sophie Roux (Sophie.Roux@damesme.cnrs.fr).

- December 2-4, 1999, Max Planck Institute for the History of Science, Berlin

History of chemistry research group workshop: Types of Paper Tools and Traditions of Representation in the History of Chemistry. Wilhelmstrasse 44 (near U2 Underground station Mohrenstrasse) Berlin. To attend, please contact Gisela Marquardt (marq@mpiwg-berlin.mpg.de) by November 15.

- December 4-5, 1999, University of Wisconsin, Milwaukee
Midwest Seminar In The History Of Early Modern Philosophy, Autumn Meeting. Room 118, Curtin Hall, Downer Ave, University of Wisconsin, Milwaukee campus.

- December 6, 1999, Università di Roma Tre

Robert Clifton (University of Pittsburgh) will give a talk, “Suspended in Language: How Algebraic Quantum Theory Elucidates Bohr’s Copenhagen Interpretation”, sponsored by the philosophy department of Roma Tre, Via Magenta 5, Aula IV, 4th floor, 4 pm. For information, contact Mauro Dorato (dorato@uniroma.it).

- August 25-28, 2000, Cardiff University.

“The Demarcation Socialised: Or, How Can We Recognise Science When We See It?”. For information, go to

<http://www.cf.ac.uk/socsi/research/kes/milquin.html> or contact Robert Evans at EvansRJ1@Cardiff.ac.uk.

Colloquia, Symposia, and Seminars.

- Centre Alexandre Koyré
Research seminar “Formation des savoirs au début de l’époque moderne: Humanistes, Géomètres, Mécaniciens”. Pavillon Chevreul, 57, rue Cuvier 75231, Paris, France. For information, contact Sophie Roux (Sophie.Roux@damesme.cnrs.fr); or Héléne Verin (Helene.Verin@damesme.cnrs.fr).

- Centre Koyré and REHSEIS
1999-2000 Seminar “Histoire des sciences, histoire du texte”. The themes for the current academic year are “Figures Mathématiques, Objets et Outils de Recherche” and “Formes de Textes Scientifiques”. REHSEIS, 37 rue Jacob, 75005 Paris 3rd Floor, Salle 307. For information, contact Karine Chemla (chemla@paris7.jussieu.fr).

- Archives Poincaré (Université de Nancy 2).

1999-2000 Seminar of the Archives Poincaré, Room J 303, Campus Lettres-Sciences Humaines, 23 Boulevard Albert 1er, Nancy 54000 France. For information, contact Philippe Nabonnand (philippe.nabonnand@plg.univ-nancy2.fr).

- Università di Genova.
1999-2000 Lecture series, philosophy of science section, philosophy department. For information go to <http://www.lettere.unige.it/sif/strutturale/9/epi/index.htm> or contact Carlo Penco (penco@unige.it). Of particular note is a conference on realism (November 29-30). For

information, go to <http://www.lettere.unige.it/sif/struttur/e/9/risorse/ge99.htm>.

Competitions.

- Lakatos Prize, 1998
The 1998 winners of the Lakatos Prize were Jeffrey Bub ([Interpreting The Quantum World](#), Cambridge University Press) and Deborah Mayo ([Error and the Growth of Experimental Knowledge](#), University of Chicago Press). For the full announcement from the LSE (with acceptance lectures) go to <http://www.lse.ac.uk/events/philos-17-03-99.htm>.
- BSHS Dingle Prize
The 1999 British Society for the History of Science (BSHS) Dingle Prize will be awarded to the best book in history of science published in English between January 1996 and December 1998. For information, go to the BSHS website: http://www.man.ac.uk/Science_Engineering/CHSTM/bshs or contact Jeff Hughes at hughes@fs4.ma.man.ac.uk.

Calls For Papers/Proposals.

- October 12-15, 2000, St. Louis University, St. Louis, MO
Writing The Past, Claiming The Future: Women And Gender In Science, Medicine, And Technology. For information, contact Charlotte G. Borst (Department of History, Saint Louis University) at borstcg@slu.edu.
- A Century's Retrospective: The H-Ideas Year 2000 Book Review Project
The H-Ideas Editors invite contributions to a series of scholarly review essays of intellectual history and the history of ideas published in the 20th century. To nominate texts, send a list of titles to Mark Reger, H-Ideas Book Review Editor (MReger1301@aol.com) and to

Harry Marks (hmarks@jhmi.edu). Include the author, title, and complete citation with a brief description of the text's significance. To review texts, indicate titles you are interested in reviewing, respond to postings of unclaimed nominations, or send a note to Mark Reger indicating an interest in writing reviews (specifying your areas of expertise). Include institutional affiliation, mailing address, and phone number. Reviews must be between 750-1500 words and follow guidelines for H-Net Reviews. Nominations will be accepted through November 1, 1999.

- Thoemmes Press seeks ideas and proposals for book series. Thoemmes Press is a small publisher in Bristol, UK, specializing in primary source material in the history of ideas. They seek ideas and proposals for a series on the philosophy and history of science, which will focus on reprinting classic works in the field. Publishing plans include reprints of [Helmholtz's Treatise on Physiological Optics](#) (definitive 1924/5 edition) and [The Thirteen Books of Euclid's Elements](#) (Thomas Little Heath, trans., 1908). For information about Thoemmes Press go to <http://www.thoemmes.com>.

Electronic Resources.

- The upcoming XXI International History of Science Congress (Mexico 2001) has launched a website at www.smhct.org.
- The Institut d'Histoire et de Philosophie des Sciences et des Techniques (of the Université de Paris 1) has a new website at <http://panoramix.univ-paris1.fr/IHPST>.
- The Bibliothèque Nationale Française (BNF) website (<http://gallica.bnf.fr>) is useful for searching 19th c images and texts of books and journals from France.

- Malcolm Forster (University of Wisconsin) is the new editor of the PSA Newsletter. His homepage is at <http://philosophy.wisc.edu/forster>. Please send information for future issues of the PSA Newsletter to mforster@facstaff.wisc.edu.

Journals.

- [Alliage](#) (Issue 39, Summer 1999) Culture-Science-Technique.
The new issue features a newly translated text (in French) of Paul Feyerabend. For information, go to <http://www.tribunes.com/tribune/alliage/accueil.htm>.
- [Science & Education](#) (Volume 8, number 4).
A special issue commemorates the 20th anniversary of the publication of Alan Chalmers' book, [What Is This Thing Called Science](#). For information, contact Michael R. Matthews (m.matthews@unsw.edu.au).
- [Foundations of Chemistry](#) Volume 1, Issues 2 and 3 are now available.
Issue 1 can still be ordered from the publishers. Go to <http://www.wkap.nl/journals/foch> or <http://www.cco.caltech.edu/~scerri>
- [The Leibniz Review](#)
The 1999 issue (vol. 9) of The Leibniz Review honors the memory of Margaret Dauler Wilson, past president of the Society and a distinguished scholar in early modern studies. To obtain this special memorial issue contact Glenn Hartz (hartz.1@osu.edu) by December 1, 1999. For information, go to <http://orpheus-1.ucsd.edu/philo/leibniz/leibrev.htm>.

Books published.

- * Benoit, Lelita Oliveira, [Sociologia Comteana - Genese e devir](#). Discurso Editorial, Sao Paulo, Brasil, 1999, 428 p. For information, contact discurso@org.usp.br

* Imbert, Claude. Pour une histoire de la logique. PUF, 1999.

* Lecourt, Dominique (ed.). Dictionnaire d'histoire et philosophie des sciences. PUF, 2000.

* Maar, Juergen Heinrich, Pequena História da Química - Parte I – Dos Primórdios a Lavoisier, 848 pages. 50,00 Brazilian reals. For information, contact Juergen Heinrich Maar - Caixa Postal 5043 - 88040-970, Florianópolis, SC Brazil

* Paty, Michel and Emile Malet (ed.s), Aux frontières de la science, 1999, 222 p., Editions Passages, 17 rue Simone Weil, 75013 Paris.

* Vasconi, Paola, Sistema delle scienze naturali e unità della conoscenza nell'ultimo Kant, Florence, Olschki, 1999.

* Vinciguerra, Lucien, Langage, visibilité, différence. Histoire du discours mathématique de l'âge classique au 19e siècle, Vrin, "Mathesis", Paris 1999.

Jobs, Fellowships, Grants and Awards.

Note: These announcements are truncated in the interests of space and lack crucial application information. Please contact any relevant parties listed here *in advance* of actually applying, and be advised that these notices are not advertisements and do not meet the requirements of formal notification on the part of prospective employers.

- French University posts. *Maitre de conférence* - Sections 17 (Philosophy) and 72 (History and Philosophy of Science and Engineering). For information, go to: <http://www.education.gouv.fr/dpe/pu/b992.htm>.

- Mellon Fellow in History of Science, Technology, or Medicine, Swarthmore College.

The Department of History at Swarthmore College seeks a Mellon Postdoctoral Fellow specializing in the History of Science, Technology, or Medicine. Geographic field is open, but focus on the 19th and 20th centuries is preferred. Application deadline is February 1, 2000. For information contact Professor Robert Weinberg at rweinbel@swarthmore.edu.

- Université Catholique de Louvain, Belgium, post in philosophy of human sciences. Send applications to: Recteur de l'Université, Place de l'Université 1, 1348 Louvain-la-Neuve, Belgium, before December 15, 1999. Candidates must speak and write French. A detailed description of the post is available from the Doyen de la Faculté at: doyen.isp@sisp.ucl.ac.be.
- APS Slater Fellowship in History of 20th C Physical Sciences. The Slater fellowship is for doctoral candidates to spend the year at an American university or other appropriate research institution, and use the American Philosophical Society Library. The fellowship carries a stipend of \$12,000; tenure of the fellowship usually coincides with the academic year. Applications are due December 1. Forms are available at the website, www.amphilsoc.org.
- Assistant Professor, University of Kentucky, Lexington KY Joint appointment in the Philosophy Department and Honors Program, beginning August, 2000. Teaching responsibilities include philosophy and history of science but the research focus is on contemporary issues in the philosophy of science. Deadline is December 3. For information, contact Daniel Breazeale (Breazeal@pop.uky.edu).
- Chemical Heritage Foundation Fellowship 2000-2001. The Edelstein International Fellowship is open to established scholars; time will be divided

between CHF and the Edelstein Center for History and Philosophy of Science, Technology, and Medicine in Jerusalem.

Applicants must address the relevance of CHF and Edelstein Center resources to research plans, submit a cv and financial statement, and arrange for two letters of reference to be sent to the Foundation. The deadline is December 1, 1999, and all materials should be submitted to Leo Slater, Chemical Heritage Foundation (lslater@chemheritage.org).

- Philosophy Department, Universidade Estadual de Londrina (Brazil). Part-time professor (20 hours) in 'epistemologia' (philosophy of science). For information contact Eduardo Barra at barra@uel.br.
- Program Director for Science and Technology Studies, National Science Foundation. The Program Director provides leadership and is responsible for program administration and development, and represents STS to the NSF, other US Federal science agencies, and the Administration. The position will begin preferably in August, 2000. For information contact William P. Butz, Director of the Division of Social and Economic Sciences (wbutz@nsf.gov), Michael Sokal, Program Director, Science and Technology Studies (msokal@nsf.gov), or Rachele D. Hollander, coordinator of the cluster housing the STS program (rholland@nsf.gov).

Announcements.

- Alan Richardson offers these words on Burton Dreben, who died in July, 1999 at age 71: Dreben is known widely as the man whom W.V. Quine thanked in every important piece he ever wrote (at least post-1948 or so). Those of us who work in the history of analytic philosophy have another reason to

thank Dreben: He was the source of much of the philosophical and historical nuance in our work. Those of us who think about the importance of logic in analytic philosophy, especially, have found our task both deeper and richer thanks to ways of thinking that we owe ultimately to Dreben, and more proximally to his extraordinary students and colleagues (Michael Friedman, Warren Goldfarb, Thomas Ricketts, Dan Isaacson, Rick Creath, W.D. Hart, Peter Hylton, and many, many others among them) with whom he was so liberal with his time and mind. I, personally, was the recipient of such generosity when, at the CPA meetings in 1998, Dreben not only gave an already legendary three hour lecture (punctuated by far more positive references to my earlier talk than I deserved), followed by a five hour dinner, but also made a point of giving me a copy of every essay he had published.

Request for Assistance – Sakarya University of Turkey

A Call for Urgent Help

You have probably heard about the appalling extent of damage caused by the recent earthquake that took place in the Marmara region of Turkey. Our university is located in the city of Sakarya in this region where the damage was most devastating, so far leaving about four thousand inhabitants dead and thousands of others in the city homeless and jobless.

Our university—with about 18,000 students and 1300 staff—has also been extensively damaged from the disaster. Fortunately, the summer intercession prevented fatalities. Yet almost 70% of our university’s academic and administrative staff

have been left homeless and are now living in simple tents or shelters.

We are struggling to keep our university functioning and continue its education and other services, something which is extremely important for the future of the city and our students. But it is essential that we first provide our homeless personnel with proper accommodations before we enter the cold winter season. We have now started two projects to partially fulfill this urgent requirement:

- (1) On the university campus, 25 foundations for two-flat buildings are already finished. Each could accommodate 2 families. The cost to complete one of these flats is approximately \$20,000.
- (2) On the campus we also have a site to accommodate 500 prefabricated buildings, each having a living area of 30 m² (about 323 square feet), which could serve as a shelter to one family. The cost of each of these is approximately \$5,000.

We earnestly invite you to help our university by financially contributing to these projects or by any other means which will help meet this urgent need.

Prof. Dr. Ismail Calli, Rector
Prof. Dr. Mehmet Durman, Vice Rector (durman@esentepe.sau.edu.tr)
Sakarya University, Esentepe Campus, 54187 Adapazarı, TURKEY
<http://www.sau.edu.tr>

A suitable nonprofit is being sought as a vehicle for your donation. In the meantime, you may make urgently needed contributions directly to these bank accounts of Sakarya University: Yapi Kredi Bankasi Adapazari Branch, Account no.(for US dollars): 3010534-6 *or* Emlak Bankasi, Adapazari Branch, Account no. (for US dollars): 00547843

Please be advised that these bank accounts are not tax deductible

charities, and according to US law, a charity must be a US organization for US citizens to deduct donations to it. Your donation under this set of conditions is all the more generous.



Regional maps of HOPOS activity and infrastructure.

Ireland (No. 3).

Report on HOPOS-related resources in Ireland.

The recent economic boom in the “Celtic Tiger” has caught many people by surprise. The historical image of Ireland as generally projected at home and abroad is not one in which technology has played any significant part. The scenery, greenness, widespread literary and musical abilities, traditional religious devotion, stout and whiskey, *craic* (‘good fun’), horses, and gaelic games all contribute to Ireland’s image as lovely but rather quaint backwater.

Suddenly, Ireland is a world leader in computer development. There is a *frisson* in the air and a renewed confidence. Emigration is turning to immigration, house prices are soaring, and there are new cars and mobile phones everywhere (or nearly everywhere—some have still to enjoy the benefits of the boom). And, if peace in the North can be maintained, the future looks bright indeed. So how can a sleepy Ireland, traditionally with pigs and chickens in the kitchen (not to mention leprechauns and banshees), suddenly appear equipped as a fully fledged member of the international high tech society? A major reason is that Ireland has a surprisingly distinguished tradition of scientific and technological inventiveness, a

sub-culture which has survived for three centuries.

Of course, to some extent it depends on our definition of Irish. Many, though by no means all, of our historic scientific achievers and inventors have been from the Protestant tradition and/or have made their achievements abroad. It is strange that they are not always regarded as Irish, when many of our literary geniuses (like Yeats, Shaw, and Beckett) also came from this tradition and are wholeheartedly embraced.

If you visit the Science Museum in London, go to the Heat and Temperature Gallery, and you will find featured in a space of about 25 meters a substantial display on the work of Belfast-born William Thomson, Lord Kelvin (1824-1907), and a smaller display featuring another Belfast scientist, Thomas Andrews (1813-1885). In the main cases, the work of the son of yet another Belfast family, Joseph Black (1728-1799) is described. In addition to this impressive Belfast presence, aspects of the work of John Tyndall (1820-1890—from Leighlinbridge, County Carlow), and John Joly (1857-1933—from Clonbulloge, County Offaly) are featured. Further along the same gallery, there is a large display about the *Leviathan of Parsonstown*—the massive reflecting telescope—built in Birr, County Offaly, by William Parsons (1800-1867). The one surviving 72” diameter speculum metal mirror on display with this exhibit continues to amaze.

The Royal Society is arguably the scientific society with the most distinguished history of all. One of the key players in its foundation in 1660 was the Hon. Robert Boyle (1827-1691) from Lismore in County Waterford, “the son of the Earl of Cork and the Father of Chemistry”. The first woman to be admitted FRS (in 1945) was X-ray crystallographer Kathleen Lonsdale (1903-1971),

daughter of the postmaster at Newbridge, County Kildare. It had taken the Society 285 years to recognise that women could achieve in science (Marjorie Stephenson, the biochemist, was admitted on the same day but Lonsdale comes before Stephenson in the alphabet, so Kathleen was first!).

To be an FRS is indeed a distinction, but to be elected President of that Society in the 19th century was to have reached the pinnacle of international scientific recognition. From 1849 to 1895 no less than three Irish men held that post. Sir William Parsons, astronomer, engineer, and third Earl of Rosse, from Birr, County Offaly, was President from 1849 to 1854. Sir George Gabriel Stokes (1819-1903), mathematician and theoretical physicist from Skreen, County Sligo, was President from 1885 to 1890. And William Thomson, physicist, entrepreneur, and Baron Kelvin of Largs (hailing from Belfast), held the post from 1890 to 1895. In addition, G.G. Stokes was Secretary of the Society for no less than 31 years—from 1854 to 1885. His wife, Susannah Robinson, from Armagh, was daughter of Rev. Thomas Romney Robinson (1793-1882) inventor of the famous anemometer. The wife and close collaborator of Sir William Huggins (1824-1910) was Margaret Lindsay (1848-1915) of Dublin; together they were pioneers in astrophysics. Sir William was President of the Royal Society from 1900 to 1906. Sir Joseph Larmor (1857-1942), from Magheragall, County Antrim was Secretary to the Society from 1901-1912. There was thus a very distinct Irish flavor to the Society during the second half of the 19th century and the early years of the 20th—years of dramatic scientific advance in which Fellows of the Royal Society played such pivotal roles.

Indeed it is a remarkable fact that the Lucasian Professorship of Mathematics at Cambridge

University was held from 1849-1932 by two Irishmen—Sir George Gabriel Stokes and Sir Joseph Larmor—both of whom had achieved the “senior wrangler” distinction (top of the final-year Mathematics class) at Cambridge as students.

Such stories remain largely unknown to today’s Irish residents. Our scientific and technological history and achievements have not received any great attention—and very little has been done to show interested visitors and intelligent tourists that there is this aspect of Irish history and culture to be demonstrated and enjoyed.

So where do you go if you want to get some idea of the history of this richness? It is best to start in Dublin, capital of the Republic of Ireland (also conveniently close to Northern Ireland).

Trinity College Dublin
(<http://www.tcd.ie>)

Ireland’s oldest University—Dublin University—more generally known by the name of its only College, Trinity College Dublin (TCD), dates from 1591, and is located on a beautiful campus right in the heart of the city. Its graduates include: George Berkeley (1685-1753); the mathematician and erstwhile poet, William Rowan Hamilton (1805-1865), whose quaternions are used in the guidance systems of spacecraft; the theoretical physicist, George Johnstone Stoney (1826-1911), who introduced the term ‘electron’ in 1891; George Francis FitzGerald (1851-1901), of Lorentz-FitzGerald contraction fame, who encouraged the study of radio waves; John Joly (1857-1933), polymath, inventor of the steam calorimeter, and the first practical method of colour photography (also one of the first to appreciate the great age of the earth); Henry Horatio Dixon (1869-1953), the first to explain how sap rises in plants in defiance of gravity (evaporation from leaves and not capillary attraction as the driving

force); and physics Nobel prize winner (1951) Ernest Walton (1903-1995), who “split the atom” with John Cockcroft in Cambridge University in 1932.

TCD has a remarkable library, and the original library building, with its wonderful “Long Room” has also on display the famous illuminated manuscript *The Book of Kells*, a must for any tourist. A few instruments and apparatuses are displayed in the physics, mechanical engineering, and civil engineering departments.

TCD Department of Philosophy (<http://www.tcd.ie/Philosophy/index.htm>). Research interests include history of ideas (David Berman, dberman@tcd.ie); and philosophy of science (Paul O’Grady, pogrady@tcd.ie).

The Royal Irish Academy, 19 Dawson Street (<http://www.ria.ie>)
Close to TCD is the Royal Irish Academy (RIA), founded in 1785, and now housed in a fine restored building near the Mansion House (the official residence of the Lord Mayor). The Academy is the premier academic body for the island of Ireland, and most of Ireland’s achieving scientists have been Members (MRIA). Many of those, like Richard Kirwan (1733-1812) and William Rowan Hamilton, who rose to become President, have their portraits on display. The Academy has a fine library, part of it housed in an attractive Meeting Room.

Dublin Institute for Advanced Studies, 5 Merrion Square (<http://www.dias.ie>)

Near the back of TCD is the great Georgian Merrion Square. Here can be found part of Dublin Institute for Advanced Studies (DIAS), best remembered as the workplace of Erwin Schrödinger from 1940-1956 and Walter Heitler (1904-1981) from 1941-1949—although they actually worked in 65 Merrion Square, then home of the DIAS School of Theoretical Physics. That school has

now moved further out from the center of town (to 10 Burlington Road). Schrödinger, a Nobel prize winner (1933), became an Irish citizen in 1948. Dunsink Observatory (see below) is also now part of the DIAS.

The Natural History Museum, Merrion Square (<http://indigo.ie/~nmil/museum/nathist1.html>; under construction)

Moving round the corner from the DIAS (and advisedly calling into see the fine collections in the National Gallery of Ireland which you pass on the way) you will find the Natural History Museum. This makes no pretension to be an up-to-date state-of-the-art science center: Instead it prides itself on being a well preserved 19th century museum, and is well worth a visit. It occupies grounds with Leinster House, now home of Dail Eireann, the Irish parliament house, formerly headquarters of the Royal Dublin Society, although its main entrance is on the far side (on Kildare Street).

Government Buildings, Upper Merrion Street

Beside the Natural History Museum are the recently refurbished Government Buildings. These used to be the Royal College of Science and, more recently, the Faculty of Engineering of University College Dublin. At the sides of the main entrance are statues to Robert Boyle (1627-1691, born in Lismore Castle, County Waterford), and William Rowan Hamilton, born in Dublin “at the stroke of midnight” (so he claimed) on August 3-4, 1805.

The National Museum (<http://indigo.ie/~nmil/museum/kildare2.html>) and *The National Library* (<http://www.heanet.ie/natlib>), Kildare Street

The Natural History Museum is part of the National Museum, which has its main premises on Kildare Street. To get there, walk up Upper Merrion Street (away from TCD), turn right to St Stephen’s Green (a massive 22

acre central park—go see the flowers and ducks), and then right down Kildare Street. In the center of a fine complex of buildings is Leinster House, home of Dail Eireann, with the main building of the National Museum on one side, and that of the National Library on the other. You are almost back to TCD at this stage, and the two finest libraries in the country are within a few hundred yards of each other, so bibliophiles don’t have too far to move to get the best available. The National Museum has wonderful collections, most notably the National Treasury (craftwork of early christian Ireland), prehistoric gold, and artefacts of Viking Ireland. The collections in the “decorative arts” (ceramics, silver, glass, furniture, etc) have recently moved to the banks of the Liffey, to Collins Barracks, near the massive Phoenix Park. Of great interest is the collection of scientific instruments of the Museum—the finest collection in the island of Ireland—but unfortunately it is not at present on display, and only a few items are exhibited in other displays.

Zoological Gardens (“Dublin Zoo”) (<http://www.dublinzoo.ie>)

Those with more biologically-centered scientific interests might like to go on from Collins Barracks to visit the Zoological Gardens in the Phoenix Park (which also contains the residences of the President of Ireland and the Ambassador of the USA—not usually considered as items in the Zoo’s collections).

Dunsink Observatory (<http://www.dunsink.dias.ie>)

Further out from the city, near Castleknock, is Dunsink Observatory, which was founded in 1785, and was formerly part of Trinity College Dublin. It is now attached to the DIAS. It is best known as the home of Sir William Rowan Hamilton (1805-1865), Ireland’s most eminent mathematician. It was while walking from Dunsink to the RIA (of which he was then President) that the basic quaternion formula occurred to him,

and he scratched it on Brougham Bridge on the Royal Canal in case he should forget it. Other incumbents of the Directorship of the Observatory (for some of its history called ‘Royal Astronomer’ in distinction to the English ‘Astronomer Royal’) included Rev. John Brinkley, (from 1790 to 1827), Sir Robert Stawell Ball (from 1874 to 1892), and Sir Edmund Whittaker (from 1906 to 1912).

The Observatory is in the process of being refurbished. Close to the main building is a restored refracting telescope built in 1868 by Thomas Grubb (1800-1878) to house the Cauchoix 12” lens donated to the University of Dublin by Sir James South. The Dublin firm of Grubb and his son Sir Howard (1844-1931) became the most eminent of Ireland’s many instrument makers, exporting telescopes and other optical equipment all over the world. The firm became Grubb Parsons in 1925 when the taken over by Sir Charles Parsons (1854-1931), Ireland’s most famous engineer (see Birr below).

Royal Dublin Society
(<http://www.rds.ie/foundation/index.html>)

Back in the city, on an easy bus or DART ride from Trinity College, is the Royal Dublin Society (RDS), founded in 1731 “for the promotion of husbandry, manufactures and other useful arts and sciences”. It has a most distinguished history, being involved in the founding of many of the country’s cultural and scientific institutions—the National Library, National Museum, Botanic Gardens, College of Science (which evolved into part of University College Dublin) and Veterinary College.

For many years the RDS employed professors to give instruction outside the University system, and among its famous officers or employees were: the chemist, mineralogist, and meteorologist Richard Kirwan (1733-1812), who encouraged Antoine Lavoisier to publish his refutation of

the phlogiston theory (and so give birth to modern chemistry); the geologist and geological cartographer Sir Richard Griffith (1784-1878); and the chemist Sir Robert Kane (1809-1890). It was in the laboratories of the society that Edmund Davy (1785-1857—cousin of Humphrey) first prepared what is now called acetylene, and James Emerson Reynolds (1844-1920)—the world’s first Professor of Analytical Chemistry (1872)—prepared thiourea. In the Society’s *Scientific Transactions* in 1891, George Johnstone Stoney (1826-1911) introduced the term “electron”. The Society also pioneered the use of radon gas for the treatment of cancer through its Irish Radium Institute, founded in 1914.

The Society has recently extensively refurbished its premises, and its attractive members’ rooms contain its library (though most of the best books went to the National Library under an 1877 Act) and displays of historic scientific instruments. It also has some fine portraits, one of the best being of Stoney (in the Council Chamber).

University College Dublin
(www.ucd.ie)

Beyond the RDS, but still in the Dublin 4 district, is the spacious campus at Belfield of University College Dublin—successor to the Catholic University of Ireland, the Royal College of Science, and to some of the professorships of the RDS. Opening in its present form in 1908, it started to move from the city center to Belfield in 1964—Science being the first Faculty to transfer. The transfer is still incomplete (with medicine, veterinary medicine and civil engineering still to move from other locations). UCD is one of the constituent Colleges of the National University of Ireland (NUI), the others being in Cork, Galway, and Maynooth.

Perhaps UCD’s most famous scientific son was Thomas Preston

(1860-1900), author of *The Theory of Light* (1890) and *The Theory of Heat* (1894), and discoverer of the anomalous Zeeman effect in spectroscopy. Unfortunately he died at the age of 40—otherwise he would undoubtedly be better known.

The physics and electrical engineering departments have scientific instruments on display, with more (especially in physics) in storage.

UCD Department of Philosophy
(www.ucd.ie/~philosop/index.html).
Research interests include philosophy of science (Maria Baghramian, baghram@macollamh.ucd.ie).

The National Botanic Gardens
(http://www.visit.ie/dublin/top_at/21_nationalbotanic.htm)

Out in Glasnevin on the north side of the City are the Botanic Gardens (founded by the RDS in 1795), well known for its plants and its pioneering curvilinear glasshouses, built by Richard Turner (1798-1881, probably born in Leixlip). The largest of the glasshouses has recently been magnificently restored. Turner also built the Great Palm House at Kew Gardens in London.

Belfast and The Queen’s University Complex (QUB)
(<http://www.qub.ac.uk>)

Although well known to be under a different jurisdiction, Belfast is conveniently close (100 miles) to Dublin, easily accessible by a good rail service from Connolly Station near the center of the city. Belfast thrived due to its industrial heritage (shipbuilding [including the *Titanic*—the design, not the construction, was at fault], linen, and ropes) and has a fine scientific record.

Belfast’s most famous scientific son was Sir William Thomson, Baron Kelvin of Largs (1824-1907), son of James Thomson, Professor of Mathematics at the Royal Academical Institution there (the Queen’s College wasn’t founded until 1845).

William's family moved to Glasgow in 1832, and he received his education there and at Cambridge University, returning to Glasgow as Professor of Natural Philosophy for 53 years. Yet his Ulster family background was of profound influence to his personality, work ethic, and hands-on approach to science. For his conception of the successful transatlantic cable of 1866 (running from Valentia Island of County Kerry to Trinity Bay, Newfoundland) he won knighthood in that year. A keen yachtsman, he was actually aboard the *Great Eastern*, the ship which laid the cable. William's older brother, James (1822-1892), returned to Belfast and was Professor of Civil Engineering at the Queen's College, from 1857-1873. William is buried at Westminster Abbey in London—but a Statue in the Belfast Botanic Gardens states: "He elucidated the laws of nature for the service of man".

Queen's College is now The Queen's University of Belfast (QUB or "Queen's"), and is close to the center of the city in a fine complex, neighbor to the Botanic Gardens and Ulster Museum.

Belfast was the family home of Joseph Black (1728-1799), who also made his name in Scotland, holding professorships in Glasgow and Edinburgh Universities. He is credited as the founder of pneumatic chemistry and modern quantitative chemistry.

Perhaps the most famous of Queen's professors was Belfast-born Thomas Andrews (1813-1885), Vice-President of the newly formed Queen's College, and Professor of Chemistry there from 1849 until 1879. He is known above all for identifying a critical temperature for gases above which they cannot be liquefied by pressure alone. Andrews also demonstrated that ozone was a form of oxygen. Some of his apparatuses are on display in the Chemistry Department in the David

Keir Building across the road from the QUB main building.

Today, QUB is home to departments of philosophy and the history and philosophy of science:

QUB Department of Philosophy (Room G1, 15 University Square). Research interests include history of physics and psychology, and islamic intellectual history (Robert E. Hall, r.hall@qub.ac.uk); and philosophy of science and mathematics (Dr. Alan J. Weir, a.weir@qub.ac.uk). The Belfast branch of the Royal Institute of Philosophy works with the QUB department to host a speaker program. For information, contact the school secretary, Mary Emmerson (philosophy@qub.ac.uk).

QUB Department of HPS (<http://www.qub.ac.uk/pas/hps>). Research interests include history of environmental sciences and evolution studies (P J Bowler, Dept of Social Anthropology); ancient and medieval science (R E Hall, Dept of Philosophy); and history of medicine; 19th c physical sciences and technology (I R Morus, Dept of Social Anthropology).

Another Belfast-born scientist, who graduated at Queen's in 1948, was John S. Bell (1928-1990). Whereas EPR experiments are intended to demonstrate how predicted outcomes of QM experiments can be realized through a hidden variables theory that sustains locality, Bell's theorem demonstrates constraints on outcomes of such experiments, such that one cannot satisfy all the predictions of QM. Insofar as the motivation for EPR is sustaining realism, the choice is then forced between realism and locality, as Shimony and others have noted—that is, we can have realism without locality, or else non-locality. Much debate has ensued, to which HOPOI are no strangers.

The Ulster Museum (tel: +44-1232-383000)
(*National Museums & Galleries of Northern Ireland*)

The Ulster Museum, across the road from the David Keir Building, has on view collections in biology and geology. It has a good exhibit on 'industrial archaeology' but very few scientific instruments.

The Giant's Causeway
(<http://www.northerntrim.com/Giants.html>)

Rather far away (but a must if you can possibly make the time) is the amazing Giant's Causeway on the North Coast, near Bushmills, home of the famous whiskey (the use of which adds greatly to the visit experience). Bushmills, in turn, is not far from Coleraine, home of the main campus of Northern Ireland's other University, the University of Ulster (which also has campuses at Newtownabbey near Belfast, and at Magee in County Derry).

A major tourist attraction and geological mecca, the Causeway is reckoned to have some 40,000 polygonal basalt columns—a quite remarkable sight.

Armagh Observatory
(<http://web.arm.ac.uk>)

One may travel from Belfast to Dublin (or *vice versa*) via the historic city of Armagh, seat of the Primates of the Roman Catholic and Church of Ireland (Protestant Anglican) churches, each with his own Cathedral and "palace". An outpost of QUB has recently been established there also.

For historians of science, the Observatory, located on College Hill, is a prime site. Founded in 1791 by Richard Robinson (Protestant Archbishop of Armagh), its most famous Director was Dublin-born Rev. Thomas Romney Robinson (1793-1882—not related to Richard). The latter Robinson published *Places of 5,354 Stars* (1859) and invented the four cup anemometer for measuring wind speed which, in its more modern three cup form, is still seen everywhere (the details were published in 1850).

The Observatory has a small but very interesting collection of historic scientific instruments and clocks, some of which came from the private Observatory of King George III at Kew. The most impressive in the collection is the Equatorial by Troughton of London, acquired for Armagh in 1795. One of the first commissions (1833) for the firm of Thomas Grubb of Dublin was a 15” reflecting telescope. A planetarium was established near the Observatory in 1964.

St Patrick’s College, Maynooth
[National University of Ireland, Maynooth] (<http://www.may.ie>)

Most people visiting Ireland will want to go to the west coast to view its outstanding Atlantic scenery. If you are travelling from Dublin to the major city of the west, Galway, about 20 miles out of the city you will pass through Maynooth, location of the only Pontifical University in Ireland and Britain, and the major seminary for the training of Irish priests. Founded in 1795, the College has a fine historic scientific tradition.

Its most famous historical scientist was Rev. Nicholas Callan (1799-1864), Professor of Natural Philosophy from 1826-1864. His major claim to fame was as inventor in 1836 of the induction coil (it was *not* invented by Heinrich Ruhmkorff, although Ruhmkorff improved and commercialised it in the 1850s to his great financial advantage). Callan was a brilliant if unorthodox experimentalist, who also developed batteries and patented a means of preventing iron from rusting. Needing sensitive “voltmeters” he used “volunteer” seminarians, rendering unconscious a future Archbishop of Dublin, and sending a future President of the College to the infirmary in the process. His best showpieces were tugs-of-war between seminarians and his electromagnets (the latter would be winning until he turned off the power) and electrocuting a turkey.

To celebrate the 200th anniversary of Callan’s death, the present President, Monsignor Dermot Farrell (a graduate in Physics and Mathematics), has completely refurbished the College Museum, which now exhibits a small collection of ecclesiastical artefacts but also the finest public display of historic scientific instruments in the island of Ireland, some dating from Callan’s days, and many more acquired since. If you are there, enjoy also the wonderful ambience of buildings and shrubs, and see the Chapel (ideally when a music student is playing Bach on the organ).

St Patrick’s College, which was a constituent NUI College, bifurcated recently, and is now separately administered from NUI, Maynooth, which is developing a major campus on the other side of the old Dublin-Galway road (a highway now bypasses the town, so you could miss Maynooth if you don’t look out for the signs—but make sure you call in).

Maynooth Department of Philosophy.
Research interests include philosophy of science (John J. Cleary, john.cleary@may.ie).

National University of Ireland, Galway (<http://www.nuigalway.ie>)
One of the three Colleges of the old Queen’s University of Ireland founded in 1845 (the others were/are at Belfast and Cork), is now a constituent NUI College. Among the Physics Professors there have been George Johnstone Stoney (1826-1911—Professor from 1852 to 1857) and Sir Joseph Larmor (1857-1942—Professor from 1880 to 1885). The physics department and, to a lesser extent, the engineering faculty, have collections of historic scientific instruments, though few instruments are on display. The campus also has an attractive small 19th century geology museum, recently refurbished.

Birr Castle
(<http://www.birrcastle.com>)

Although not on the main roads between Ireland’s principal cities, Birr is an essential stop-off for anyone interested in the history of science. It is easy to go via Birr when *en route*, for example, from Dublin to Cork (it is about 90 miles from Dublin).

Right in the center of the Ireland, Birr has been the seat of the Parsons family since the 17th century. In this boggy place, where clear nights were the exception rather than the rule, William Parsons (1800-1867) constructed what was for over 70 years the largest telescope in the world, a 72” reflector known as the *Leviathan of Parsonstown* (the old name for Birr). An amazing engineering feat that used only local labor, this telescope was designed to resolve all the fuzzy bits in the sky into discrete stars. That it did not do so was the fault not of the telescope but of variety in the universe, in the form of unresolvable nebulae. Anyway, its users *did* discover the spiral shape of some of what are now known as galaxies. Birr became a center of pilgrimage for many scientists, and the fame of the third Earl was such that he became President of the London Royal Society (from 1848-1854). The *Leviathan* has recently been magnificently restored. The one surviving speculum metal mirror, of four tons weight, is in the Science Museum in London, but a new aluminium mirror has just been installed, and the telescope is now working for the first time since the early 1900s.

The eldest son of the third Earl, Laurence (1840-1908)—who in due course became the fourth Earl—continued the astronomical work at the Birr Observatory, being best known for his work on the heat of the moon. The youngest son of William became Ireland’s greatest engineer—this was Sir Charles Parsons (1854-1931), inventor of the steam turbine engine, which transformed [*sic*]

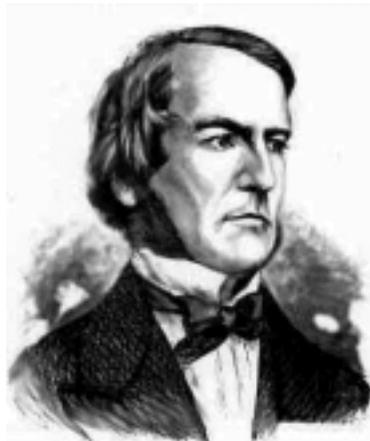
electricity generation and marine transport.

At Birr Castle new exhibition galleries demonstrate and illustrate the tradition at Birr in astronomy, engineering, photography and botany (the demesne has a fine collection of trees and shrubs). They also feature an exhibit on a cousin of William Parsons, Mary Ward (née King 1827-1869), author of popular books on the telescope and microscope in the 1850s and 1860s.

Although you won't detect much trace there, it was at Nenagh, not far from Birr, that J.D. Bernal (1901-1971), "Sage", was born. An extensive account of Bernal's life and political and philosophical thought has been developed by Helena Sheehan and can be found at <http://www.dcu.ie/~comms/hsheehan/bernal.htm>.

University College Cork
(<http://www.ucc.ie>)

The second city in the Republic of Ireland is Cork (reckoned as the first city by all Corkonians). It has another of the recognised Colleges of the National University of Ireland,



George Boole

although it chooses to retain its older name—University College Cork.

One of UCC's most famous Professors was George Boole (1815-1864), the first Professor of Mathematics at what was then

Queen's College Cork. He held this position from 1849 until his death in 1864. At Cork he published *An Investigation of the Laws of Thought* (1854). For a web-based biographical sketch of Boole, go to <http://www.maths.tcd.ie/pub/HistMath/People/Boole>.

Arguably the most attractive part of a generally attractive campus, is the gem of an observatory, the Crawford Observatory, a purpose built tiny building housing telescopes and optical instruments made by the Dublin firm of Grubb. At last the building and instruments are in the process of being restored. The physics department also has a interesting collection of historic scientific instruments, and it is anticipated that some at least of these will be displayed in the refurbished observatory.

Blarney Castle

No visitor to Ireland from anywhere should miss the opportunity to visit a key Irish scientific and philosophical site, Blarney Castle, very close to Cork city. Many carefully controlled double-blind scientific experiments have established beyond doubt that kissing the Blarney stone will add enormously to the quality and content of speech of anyone brave enough to do so. You can quite easily prove this for yourself.

Further information

This article has focused on only some of the best and easily accessible sights and sites. There are many more possibilities for the dedicated searcher: places like Lismore Castle in County Waterford, birthplace of Robert Boyle; the various locations used by Marconi (whose mother and first wife were Irish) in his early radio work; and the Burren in County Clare with its remarkable flora. Here are assorted other resources:

Other academic departments.

- Dublin City University (www.dcu.ie). Research interests include STS and philosophy of science (Helena

Sheehan,

<http://www.dcu.ie/~comms/hsheehan/sheehan.htm>).

- University College Galway (www.ucg.ie). Research interests include philosophy of science (Paschal F. O'Gorman).

Bookstores.

- Fred Hanna's Bookshop. 27/29 Nassau Street, Dublin (<http://www.hannas.ie>).
- Eason & Son Ltd (chain), O'Connell Street, Dublin (<http://www.eason.ie>) *Antiquarian*
- Bantry Bookstore, Bantry, County Cork (<http://www.irelandbooks.com>).

Libraries and archives.

- The National Library of Ireland (<http://www.heanet.ie/natlib>). The national library is the official repository of all Irish publications.
- The Royal Irish Academy Library has a large collection of manuscripts and books on the history and philosophy of science in Ireland. For information, contact the Librarian, Siobhan O'Rafferty (library@ria.ie).
- Marsh's Library, Dublin (www.kst.dit.ie/marsh/library.html). This is the oldest public library in Ireland (built in 1701). One fifth of its collection dates before 1700, and Stillingfleet's library has found its way here.
- The National Archives of Ireland (<http://www.nationalarchives.ie>).
- The UCC Library (<http://booleweb.ucc.ie/search/subject/archives/boole.htm>) has a collection of Boole's papers.

Publishers.

No Irish publishers specialize in history of science or philosophy, but some have relevant items in their catalogues:

- Four Courts Press (<http://www.four-courts-press.ie>).
- Publishers Group South West (73581.655@compuserve.com).
- Cork University Press (<http://www.ucc.ie/corkunip>).
- The Royal Irish Academy is the country's largest scholarly publisher.

For information, contact the Publications Officer, Hugh Shiels (h.shiels@ria.ie).

Publications and Electronic Resources.

These volumes describe interesting sites (and include bibliographies):

- *Irish National Inventory of Historic Scientific Instruments*, Charles Mollan, Samton Limited, Dublin.
- *Royal Irish Academy - a bicentennial history 1785-1985*, Royal Irish Academy.
- *Irish Innovators in Science & Technology*, Charles Mollan, Bill Davis and Brendan Finucane (ed.s), Royal Irish Academy, Spring, 2000.

History of Mathematics: Mathematicians and Philosophers of Mathematics

(www.maths.tcd.ie/pub/HistMath/)

This electronic archive—maintained by David Wilkins (School of Mathematics, TCD, dwilkins@maths.tcd.ie)--contains writings of mathematicians (and philosophers writing about mathematics), including Berkeley, Boole, and Hamilton.

Societies.

In 1683, William Molyneux (1656-1698) founded the Dublin Philosophical Society as an affiliate of the Royal Society. The Dublin affiliate did not last more than a generation, but it was emblematic of an Irish presence in scientific and philosophical inquiry of the day. No one was more representative of this spirit of inquiry than Molyneux himself (a web-based biography is at <http://es.rice.edu/ES/humsoc/Galileo/Catalog/Files/molyneux.html>).

Today, there are numerous Irish scientific societies but none have interests that map neatly onto those of HOPOS. Related activities are pursued by the Royal Irish Academy and the Belfast branch of the Royal Institute of Philosophy (see above). To contact the National Committee for Philosophy of the RIA, write to:

m.carolan@ria.ie. The Science Section of the Royal Dublin Society (Ballsbridge, Dublin 4, [01] 6680866) is also of note.

Journals and other publications.

- Berkeley Newsletter. Editors: David Berman and Paul O'Grady (pograd@tcd.ie). Philosophy Department, Trinity College, Dublin.
- International Journal of Philosophical Studies (<http://www.ucd.ie/~philosop/moran/jps.htm>). Editor: Dermot Moran (dermot.moran@ucd.ie). Philosophy Department, University College Dublin. The Journal is currently planning an issue with papers from the 1999 philosophy conference at the Royal Irish Academy, which was devoted to the Vienna Circle.

Dr Charles Mollan
Irish National Committee for the History and Philosophy of Science
Editor of *The Irish Scientist Year Book*



Book Reviews

Giordano Bruno. Cause, Principle and Unity; and Essays on Magic.

Cause, Principle, and Unity. Trans. and Ed. Robert de Lucca. Essays on Magic. Trans. and Ed. Richard J. Blackwell. Intro. Alfonso Ingegno. Cambridge: Cambridge University Press, 1998, xxxvi + 186.

Hilary Gatti. Giordano Bruno and Renaissance Science.

Ithaca & London: Cornell University Press, 1999, x + 257 pp.

The Bruno works appearing in the recently-inaugurated Cambridge Texts in the History of Philosophy Series extends the reach of that series

and adds to the growing number of accessible editions of Bruno's principal works. This carefully edited volume includes De Lucca's edition of *Cause, Principle and Unity*—the second English translation (the first was published by Greenwood Press in 1976), and Blackwell's edition of *On Magic* and *A General Account of Bonding*—the first English translation of these two short works. To some degree, these translations and Gatti's book are part of the resurgence of interest in Renaissance Philosophy over the past three decades. In particular, many recent works by and about Bruno are oriented towards a rebuttal, or at least a more balanced assessment, of Frances Yates' landmark work, *Giordano Bruno and the Hermetic Tradition* (1964). It is to Yates' immense credit that she brought Bruno and other late Medieval and Renaissance 'heterodox' figures to the attention of the scholarly community in early modern philosophy and the history of ideas. However, Yates insisted on seeing Bruno (almost) entirely as the last great exponent of the Hermetic or Occult tradition of *prisca scientia*, and, for the most part, relegated his natural-scientific, metaphysical and ethical theses to the status of eclectic rhetorical devices and digressions. The recent 'trend' by Bruno scholars, such as Ramon Mendoza, G. Aquilecchia, and Rita Sturlese (whose excellent research remains mostly untranslated), has reversed this interpretation, stressing the importance of his forward-looking picture of the cosmos and bracketing his magical and occult literary allusions.

Bruno's lasting claims to fame are well-known and hardly in need of further discussion here. He was one of the first serious proponents of Copernicus' heliocentric hypothesis, argued for an infinite universe, unbound by celestial 'orbs', considered the stars to be other suns around which earth-like planets revolved, and rejected the church as an authority on issues of natural

reason. His second Italian dialogue, *Cause, Principle and Unity* follows immediately after his first, *La Cena de le Ceneri* (*The Ash Wednesday Supper*), which, with four other Italian titles, were first published in London after his visit to England in 1584-85. Bruno's Copernican arguments had an unfriendly, even contemptuous reception at Oxford University, and the *Supper* is to some extent an account of that confrontation, filtered through the Nolan's savage and clever parodies of English Scholastics and Neo-Aristotelians. He continues this line of argument through his spokesman Filoteo in the five dialogues of *Cause, Principle and Unity*, of which the first is an apology and synopsis of the *Supper*. In the brief, highly incisive Introduction, the excellent Italian scholar Alfonso Ingegno comments that Bruno had attempted to reunify terrestrial with celestial physics on the basis of a principle of universal becoming. From this metaphysical basis, he moves on to derive a new concept of the divinity which was to assume a radically anti-Christian character. This doctrine led in some measure to his condemnation and eventual execution at the hands of the Inquisition in 1600, when he had been found to be "an impenitent, stubborn and obstinate heretic".

Blackwell's translation of *On Magic and A General Account of Bonding* (*De Vinculis in Genera*) are especially welcome, since there are no other easily accessible editions. They were composed during Bruno's visit to Prague and Helmstedt in 1588-90 and copied by an admirer named Besler; the manuscripts remained in the Noroff collection in Moscow until they were printed for the first time in the third volume of the Tocco edition of the Latin works in 1891. In these two short works, the Nolan focuses his attention on the notion of cognitive or spiritual 'contraction' through which the magus can realize certain powers. But, he says, this can have an opposite effect if this power is

directed towards a higher level or if it is carried out so as to render the agent no longer master but servant of his imagination. Bruno's concept of bonding refers to a spiritual linkage which the magus establishes between himself and another soul. Ingegno remarks that "...the magus is



Giordano Bruno

acquainted with the dynamics not only of magic but also of demonic action, and knows how demons can take possession of us through unguarded avenues, and this opens up to him a new field of action, permitting him to link other men to himself and, in fact, to establish a whole series of magical bonds between himself and others." This much reaffirms the vision of Bruno as Hermetic.

A more expansive picture of Bruno emerges in Hilary Gatti's *Giordano Bruno and Renaissance Science*. In her Preface, she concisely blocks out the two principal orientations which Bruno studies have taken in the past half-century and carefully situates her own reaction to the Yates-inspired reading of Bruno as an Hermetic and Magical thinker. She writes:

"It appeared to me that [Bruno's] attention was more often directed elsewhere, to subjects such as the new cosmology and the revival of ancient atomism, to number theory and the possibility of investigating,

measuring, and mapping out anew the shape of the natural world. To stress these aspects of his thought could well seem a simple return to earlier readings of Bruno, which tended to treat with distaste his references to magic, astrology and the art of memory....But was it really necessary to denigrate those aspects of Bruno's thought? I became convinced that Bruno's concern with such subjects...could be seen as surrounding and complementing his concern with the new science."

The main task which Gatti sets herself in this book is to explain what it means for Hermetic and Magical thought to 'surround' and 'complement' his concerns with natural-scientific hypotheses about terrestrial and celestial physics.

Dr. Gatti considers in detail several components of a picture of Bruno as a philosopher of science concerned with issues of theoretical integrity. She offers an overview of recent studies on Bruno's Pythagorean tendencies, and his well-informed understanding of Copernicus. Her careful reading of the Copernican elements in several Bruno texts—especially the *Supper* and *De Immenso*—show that Bruno was able to appreciate some of the grander implications of the heliocentric theory, including most importantly the insight that the physics of matter most closely associated with pre-Copernican cosmology would have to be abandoned. Despite the fact that Bruno himself never made any astronomical observations, and seemed to genuinely disparage experimental observation, he was able to make some improvements (as well as some mistakes) in the celestial model. Before discussing Bruno's pivotal doctrine about the infinite universe, the author conducts a brief inquiry into Bruno's relation with William Gilbert's magnetic studies. (Here is an opportunity for Renaissance scholars; an accessible edition of Gilbert's posthumous *De*

mundo nostro sublunari (1651) is badly needed.)

The real strength of Gatti's book appears in five well-argued and persuasive chapters on the doctrine of an infinite universe, an order of infinite worlds, the concept of a minimal unit, an idiosyncratic understanding of mathematics, and a visual or pictorial logic. The proposed convergence of the two lines of thinking about Bruno, first mentioned in the Preface, receives a clear statement in this context:

“Bruno uses both neo-Platonic and Hermetic sources and vocabulary express his sense of the divinity of his infinite universe [and] questions such as the nature of the problem of time, and the immortality of the soul. It is a mistake, however, to separate the consideration such aspects of his thought from his natural philosophy. Precisely because Bruno sees the infinite in substance as rationally ordered by the divine intelligence, its infinite extension must necessarily assume a coherent physical ontology which he expresses as an infinite number of worlds.” (p. 122)

My criticisms of Gatti's book are rather minor and focus only on some isolated points. It stretches my credulity to think that some of Bruno's conclusions, despite his undoubted genius and eclecticism, could cogently stand comparison with Relativity Theory, Quantum Mechanics, negative energy states, elusive quarks (pp. 138, 142). Bruno's exposition of an ordered series of ciphers in several key works does not in any way play upon the paradoxes of self-reference—and there is no need to bring in Douglas Hofstadter's preciously clever brainteasers (p. 183). On the whole Gatti's book is lucidly written and carefully presented, with an even-handed, judicious consultation of primary and secondary sources. It dexterously avoids any arbitrary strictures which would confine Bruno

either to the status of an Hermetic magus who dabbled in the new science, or to the status of a rationalist who merely dressed up his natural science in strange occult garments. This work goes a long way towards achieving the author's ambition: to show how this great Renaissance thinker was in a serious debate about the epistemological status of modern science, and that the 20th century discussion to which his work is most relevant is the conflict over the status of scientific theory.

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The Aspiring Adept: Robert Boyle and His Alchemical Quest. Including Boyle's "Lost" Dialogue on the Transmutation of Metals.

Lawrence M. Principe.
Princeton: Princeton University Press, 1998. Pp. xiv + 339.

We have here a comprehensive (and much-needed) treatment of Robert Boyle's involvement with alchemy—one that enables us finally to make sense of the many references to alchemical processes and activities in his works and papers. Until now, Boyle has been almost universally portrayed as the one who purged chemistry of its mystical and alchemical components, and thus as the one who set chemistry on the path along which it ought (and did) develop. *Aspiring Adept* consigns that interpretation to the oblivion it deserves: The 'Father of Modern Chemistry' was up to his Philosopher's Stone in transmutational alchemy throughout his career as a natural philosopher. As Principe rightly explains, there is no reason to believe that the path to modern chemistry involved some clear-cut and linear progression from

wrongheaded alchemy to right-minded modernity.

Principe begins the work by presenting the historical context (along with a helpful description of the meaning of alchemical terms), followed by an account of how it happened that Boyle's alchemical activities got lost in the shuffle of historical interpretations. Next comes an in-depth analysis of Boyle's *Sceptical Chymist*, identifying precisely the objects of Boyle's scepticism (rather than alchemists *per se*, the work was aimed at textbook writers and technicians). Then comes a discussion of Boyle's unpublished *Dialogue on Transmutation* (which Principe has painstakingly reconstructed insofar as is possible out of the twenty-three extant fragments, some of which are later revisions of earlier jottings). The final three chapters deal with topics such as Boyle's actual contacts with adepts (alchemists), his witnessing of alleged transmutations, the secrecy associated with alchemy, the role of alchemy in medicine, and Boyle's views on alchemical processes as evidence of spiritual activity in the world. These three chapters, especially, provide a fascinating insight into seventeenth-century alchemical thought in general and into Boyle's specific alchemical concerns in particular. The sections dealing with Boyle's belief that transmutational alchemy might serve to link the physical world and spiritual agencies serve as a reminder that theology was foremost in Boyle's thought and that it was always intimately connected with his explorations of the natural world. Principe's research has been thorough and complete, and his writing is clear and easy to read—a major accomplishment given the technical nature of some aspects of the work. There is a bibliography, as well as an index.

There are three appendixes: The first (and longest) is the reconstructed *Dialogue on the Transmutation and*

Melioration of Metals (along with a seventeenth-century Latin translation of some of the original English fragments). The second consists of a number of interview accounts of transmutation, as well as prefaces to Boyle's other chrysopoetic (transmutation) writings. The third consists of a Boylean dialogue on conversing with angels. Principe has done a masterful job of editing these texts. He has placed all deletions and



Robert Boyle

interlineations in endnotes, where they may be pursued by readers interested in development of the text, without distracting the eye of readers interested in an uncluttered text. The editorial annotations, retained as footnotes, are helpful and range from the identification of historical figures to explanations in modern terminology of chemical processes referred to in the text.

Principe is highly qualified to have written this work, holding a joint appointment in both the Department of Chemistry and the Institute for the History of Science, Medicine, and Technology at The Johns Hopkins University. Thus he has a background most helpful for understanding the descriptions of experiments and processes found in the works of Boyle and others. Further, by the time his interest in the history of alchemy led him to Boyle

he had himself become adept at deciphering the allegorical and enigmatic discourse of alchemy. As a result, he came to the study of Boyle as a chemist specially trained in the history of alchemy, and hence was open to whatever he might discover about Boyle. And what he discovered ought to serve as a warning against interpretations that impose twentieth-century values on historical figures.

In fact, this work teaches us as much about productive ways to pursue the history of the philosophy of science as it teaches us about Boyle's alchemical concerns. In addition to laying to rest Whiggish interpretations of Boyle, Principe also deflates recent social constructivist interpretations. While recognizing that older interpretations usually ignored the significance of social networks, Principe warns against losing sight of the fact that historical figures in natural philosophy often considered themselves to be more involved in discerning the truth about God and nature than in seeing themselves as part of a complex social network. Certainly where Boyle is concerned this is true, and Principe's work (especially his discussion of active disputes and vehement disagreements in the Dialogue on Transmutation) emphasizes Boyle's commitment to ascertaining the truth. One of Principe's many strengths in fashioning a history of seventeenth-century natural philosophy is his reading of characters in their own terms, and avoiding overly strong sociological interpretations.

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HOPOS, The History of Philosophy of Science Working Group, is an informal, international society of scholars who share an interest in promoting serious, scholarly research on the history of the philosophy of science and related topics in the history of the natural and social sciences, logic, philosophy, and mathematics. We interpret this statement of shared interest broadly, to include all historical periods and diverse methods. We aim to promote historical work in a variety of ways, including the sponsorship of meetings and conference sessions, the publication of books and special issues of journals, the dissemination of information about libraries, archives and collections, and the preparation of bibliographies and research guides.

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