



International History, Philosophy and Science Teaching Group

NEWSLETTER

December 2006

www.ihpst.org

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Dewitt, R.: 2004, *Worldviews: An Introduction to the History and Philosophy of Science*, Blackwell Publishing.

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1. 2007 IHPST Conference, Calgary

(a) *Organisation and Paper Submission*

The International History, Philosophy and Science Teaching Group will hold its *Ninth* Conference, at the University of Calgary, June 24 (evening) – 28 (noon), 2007

Conference Chair: Professor Ian Winchester (winchest@ucalgary.ca)

Conference Secretary: Linda Lentz

Programme Chair: HsingChi von Bergmann (ihpst07@ucalgary.ca)

The Conference Theme is: *Contextual Approaches to Science and Mathematics Teaching*

Calgary is about a two-hour drive from the Rocky Mountains and the delightful towns of Banff and Lake Louise. More details, including registration, travel, accommodation, and tourism options will shortly be available at the conference web site: www.ucalgary.ca/ihpst07.

Proposals (max.1,000 words) and Abstract (max. 150 words) need to be submitted as attachments to programme chair by **15th April 2007**. The files should be named: SURNAME_proposal.doc and SURNAME_abstract.doc.

(b) *Springer Distinguished Lecture*

The Springer Distinguished Lecture will be given by Professor Garland Allen, School of Biology, Washington University, St Louis. He has published on topics in the history and philosophy of biology, and on the history of eugenics. The lecture will be concerned with how the history and philosophy of biology can assist pedagogical efforts to cultivate process skills in science and to illuminate science as a way of knowing.

(c) *Scholarship Support*

The IHPST Group and the journal *Science & Education* have some small amount of money available to support the conference attendance of scholars from depressed economies. It is anticipated that this will be a flat USD1,500 from which the recipient will need to fund all their own travel, registration and lodging expenses.

Applicants are required to send one file as Word attachments to the IHPST secretary by April 15, 2007. It should be labelled SURNAME_scholarship.doc.

This document should contain the following information:

NAME

INSTITUTIONAL ADDRESS (in full, for mail purposes)

EMAIL ADDRESS

BRIEF VITAE (list educational qualifications, teaching experience, publications or conference presentations, prior engagement with IHPST conferences)

CURRENT POSITION

SCHOLARSHIP IMPACT (give an account of how participation in the IHPST Calgary conference might be beneficial for the applicants own work and what flow-on effects it might have on their colleagues or local teachers.)

CALGARY CONFERENCE PROPOSAL (please insert, beginning on new page, the proposal that is being submitted to the Calgary Conference. Only those applicants whose proposals are accepted

by the Conference Committee will be considered for scholarships. This scholarship application is to be submitted in parallel with the conference submission, it does not replace the need to submit to the conference by the closing date of April 15)

(d) Anticipated Contributors

It is expected that about 200-250 educators, historians, philosophers, teachers, scientists and cognitive scientists from about 30 countries will engage with theoretical, curricular and pedagogical issues in contemporary science education.

Prospective participants are encouraged to contact colleagues and put together panels or symposia on these issues.

Among those that have indicated that they are preparing submissions for the conference are:

Jonathan Osborne, King's College London	Steve Alsop, York University
Ian Winchester, University of Calgary	Susan Barker, University of Alberta
William McComas, University of Arkansas	Larry Bencze, University of Toronto
Igal Galili, The Hebrew University of Jerusalem	Michael Bowen, University of New Brunswick
Samson Nashon, University of British Columbia	Karen Goodnough, Memorial University
Steven Norris, University of Alberta	Samia Khan, University of British Columbia
Jesús Vázquez-Abad, Université de Montréal	Jolie Mayer-Smith, University of British Columbia
David Rudge, Western Michigan University	Barbara McMillan, University of Manitoba
Zoubeida Dagher, University of Delaware	Olive Chapman, University of Calgary
Robert Nola, University of Auckland	Bonnie Shapiro, University of Calgary
Gurol Irzik, Bogazici University	HsingChi von Bergmann, University of Calgary
Andreas Quale, University of Oslo	Ronald G. Good, Louisiana State University
Ismo T. Koponen, University of Helsinki	Mick Nott, Kings College London
Mansoor Niaz, Universidad de Oriente	Bharath Sriraman, University of Montana
Michael Ford, University of Pittsburgh	Clark Chinn, Rutgers University
Peter Slezak, University of New South Wales	Don Howard, University of Notre Dame
Colin Gauld, University of New South Wales	Robert Carson, Montana State University
Norman Lederman, Illinois Institute of Technology	Calvin Kalman, Concordia College
Judith Lederman, Illinois Institute of Technology	Stuart Rowlands, University of Plymouth
Michael Clough, Iowa State University	Eric Scerri, University of California – Los Angeles
Michael Matthews, University of New South Wales	Andoni Garritz, Universidad Nacional Autónoma de México
Joanne Olson, Iowa State University	Mariana Hagberg, Karlstad University
Dana Zeidler, University of South Florida	Niklas Gericke, Karlstad University
Arthur Stinner, University of Manitoba	Patrice Potvin, Université du Québec à Montréal
Don Metz, University of Winnipeg	Kostas Skordoulis, University of Athens
Stephen Klassen, University of Winnipeg	Wendy Sherman, Iowa State University
Peter Heering, University of Oldenburg	

2. Science & Education Report

(a) Volume 16, Number 1, 2007

The first issue of *Science & Education* for 2007 will shortly be published and mailed to subscribers. Its Contents are:

ERIC MICHAEL HOWE / Untangling Sickle-cell Anemia and the Discovery of Heterozygote Protection

STUART ROWLANDS, TED GRAHAM, JOHN BERRY & PETER MCWILLIAM / Conceptual Change through the Lens of Newtonian Mechanics

JOSEP LUIS DOMÉNECH, DANIEL GIL-PÉREZ, ALBERT GRAS-MARTÍ, JENARO GUIASOLA, JOAQUÍN MARTÍNEZ-TORREGROSA, JULIA SALINAS, RICARDO TRUMPER, PABLO VALDÉS & AMPARO VILCHES / Teaching of Energy Issues: A Proposal for a Global Reorientation

IRENE ARRIASSECQ & ILEANA MARÍA GRECA / Approaches to the Teaching of Special Relativity in High School and University Textbooks of Argentina

T. V. VENKATESWARAN / Science and Imperialism: Content and Character of Natural Sciences in the Vernacular School Education in the Madras Presidency (1820-1900)

As explained below, the individual papers are available at the Springer web site for individuals whose institutions subscribe to the electronic version of the journal.

Subscription renewals for printed journals and new subscriptions (USD95 pa, with discount for students, retired faculty and scholars from depressed economies), can be effected at the IHPST web site: www.ihpst.org

(b) Journal on the Web

The journal *Science & Education* is now available on the web at: <http://www.springerlink.com/> (then PUBLICATIONS, then S, then ‘Science & Education’), or more directly at:

<http://www.springerlink.com/content/1573-1901/?p=ea43556135f34210851bcde4ef9fdb6f&pi=1>

Approximately 3,000 institutions around the world have subscribed to the on-line version of the journal, while many institutions have subscriptions to both print and on-line versions.

The on-line version is heavily used. In 2005 there were 22,262 article-downloads, in 2004 there were 21,373 article-downloads. These figures make *Science & Education* the most down-loaded of all Springer education journals.

The web site provides many services to researchers:

- # The ‘On Line First’ section allows access to all accepted, forthcoming articles in the journal. As soon as an article is accepted for publication, a typeset pdf version of it is posted on the web and can be accessed by individual journal subscribers or by individuals whose institutions subscribe to a Springer package that includes ‘*Science & Education*’.
- # The Contents of each issue of the journal, back to Volume 1 Number 1 in 1992, are available. These can be downloaded by subscribers and individuals whose institutions subscribe to the journal. They are also available, at a cost, to non-subscribers.
- # Full details of the Editorial Board and Submission process are posted.

Scholars can submit manuscripts in file form direct to the journal at:

www.editorialmanager.com/sced/

(c) Increased Numbers for 2007

Science & Education commenced publication in 1992 with four numbers (100pp) per volume. In 1997 this was increased to six numbers per volume, and in 2003 to eight numbers. Because of the quantity and quality of manuscripts continuing to be submitted to the journal, the numbers per volume will increase to ten, effective 2007 (volume 16). This will decrease the ‘time-to-publication’ of accepted manuscripts. It will also allow the journal to continue promoting special thematic issues without unduly impinging on time to publication for routine issues. But, as noted above, ‘time-to-publication’ is not so critical now that accepted articles are available for perusal and citation on-line prior to hardcopy publication.

There will be a slight increase in subscription cost to USD95 for personal subscribers. Current subscriptions for 2007 and beyond will not be affected. The subscription rate is halved for students, retired faculty and scholars from depressed economies.

(d) Thematic Issues

Since its inception in 1992 *Science & Education* has published thematic issues that bring together research articles on particular themes. These thematic issues have made a considerable contribution to advancing research in science education; a number of them have been overprinted and made available to non-subscribers, and some of them have been published as separate anthologies.

During 2007 and 2008 more thematic issues will be published, these include:

Science Learning and Entertainment: From the 18th to the 20th Century Jürgen Teichmann, Arthur Stinner & Falk Riess (editors)

Social and Ethical Issues in Science Education, Dana Zeidler & Troy Sadler (editors)

Issues in Nature of Science (NOS) Research, Michael Clough & Joanne Olson (editors)

Women, Feminist Theory and Science Education, Cassandra Pinnick (editor)

Models in Science and Science Education

Additionally there will be a thematic issue on the very topical subject of: *Science, Worldviews and Education*. A ‘position paper’ has been written for this issue by Hugh Gauch Jrn., Professor of Agriculture at Cornell University and author of *Scientific Method in Practice*, Cambridge University Press (2003). Full text of the paper is available courtesy of the Springer ‘Open Access’ scheme at: <http://dx.doi.org/10.1007/s11191-006-9059-1>.

The special issue will include reviewed papers from ten scholars from different backgrounds: philosophy, history, biology, physics, theology and education that will take the Gauch paper as common background.

Previous thematic issues have included:

1994, ‘Science and Culture’, *Science & Education* **3**(1).

1995, ‘Hermeneutics and Science Education’, *Science & Education* **4**(2).

1996, ‘Religion and Science Education’, *Science & Education* **5**(2).

1997, ‘Philosophy and Constructivism in Science Education’, *Science & Education* **6**(1-2).

1997 ‘The Nature of Science and Science Education’, *Science & Education* **6**(4).

1999, ‘Values in Science and in Science Education’, *Science & Education* **8**(1).

1999, ‘Galileo and Science Education’, *Science & Education* **8**(2).

1999, ‘Children’s Theories and Scientific Theories’, *Science & Education* **8**(5).

2000, ‘Thomas Kuhn and Science Education’, *Science & Education* **9**(1-2).

- 2000, 'Constructivism and Science Education', *Science & Education* **9**(6).
 2003, 'History, Philosophy and the Teaching of Quantum Theory', *Science & Education* **12**(2-3)
 2004, 'Science Education and Positivism: A Re-evaluation', *Science & Education* **13**(1-2)
 2004, 'Pendulum Motion: Historical, Methodological and Pedagogical Aspects', *Science & Education* **13**(1-2, 7-8)
 2005, 'Science Education in Early Modern Europe', *Science & Education* **14**(2-4)

The Contents of these issues can be viewed at the journal's Springer site, and articles can be downloaded by individuals whose institutions subscribe to the electronic version of the journal.

(e) Journal Reviewers

The quality of any journal is only as good as the quality of its reviews. Manuscripts submitted to *Science & Education* are usually reviewed by three scholars, with these being drawn from different fields - education, history, philosophy, cognitive science – depending upon the subject matter of the manuscript. At the end of the review process, and after an editorial decision is made, the reviews and the editor's decision letter are exchanged between reviewers. This process assists with building up a sense of what different disciplines look for in judging research writing.

Over the past two years the following scholars have reviewed manuscripts for the journal. The publisher, editor and authors greatly appreciate the expertise they bring to the task and the time they expend upon it.

Harvey Siegel, University of Miami
 James Garrison, VPI&SU
 Richard Duschl, Rutgers University
 Stephen G. Brush, University of Maryland
 Fabio Bevilacqua, Università di Pavia
 Peter Davson-Galle, University of Tasmania
 Peter Machamer, University of Pittsburgh
 Peter Slezak, University of New South Wales
 James H. Wandersee, Louisiana State University
 Norman G. Lederman, Illinois Institute of Technology
 Stephen P. Norris, University of Alberta
 Robert Nola, University of Auckland
 Colin Gauld, University of New South Wales
 Gürol Irzik, Bogazici University
 Arthur O. Stinner, University of Manitoba
 Igal Galili, The Hebrew University of Jerusalem
 Constantine D. Skordoulis, University of Athens
 Allan Franklin, University of Colorado
 Richard E. Grandy, Rice University
 Mansoor Niaz, Universidad de Oriente
 Jonathon Osborne, King's College London
 Ibrahim A. Halloun, Lebanon University
 Robert T. Pennock, Michigan State University
 Fouad Abd-El-Khalick, University of Illinois
 Anton E. Lawson, Arizona State University
 Kai Hakkarainen, University of Helsinki
 Jim MacKenzie, University of Sydney
 Alberto Cordero, Queen's College
 Cathleen C. Loving, Texas A&M University
 James R. Brown, University of Toronto
 David Rudge, Western Michigan University

William McComas, University of Arkansas
 Robert N. Carson, Montana State University
 Zoubeida Dagher, University of Delaware
 HsingChi A. Wang, University of Calgary
 Hugh Lacey, Swarthmore College
 Kevin de Berg, Avondale College
 Jonathan Osborne, King's College London
 Andre Koch Torres Assis, State University of Campinas
 J.Mitch O'Toole, University of Newcastle
 Mario Bunge, McGill University
 Nahum Kipnis, Private Scholar
 Ileana Maria Greca, UFRGS
 Stuart Rowlands, University of Plymouth
 John Staver, Kansas State University
 Peter Heering, Carl-von-Ossietyk Universitaet, Oldenburg
 Mike Smith, Mercer University
 Pierre J. Boulos, University of Windsor
 G. Donald Allen, Texas A&M University
 William W. Cobern, Western Michigan University
 Ivan A. Shibley Jr., Penn State University
 G. Krishna Vemulapalli, University of Arizona
 Dana L Zeidler, University of South Florida
 Michael E. Beeth, University of Western Michigan
 Jongwon Park, Chonnam National University
 Jenaro Guisasola, Escuela Universitaria de Ingeniería Técnica Industrial, Valencia
 Brian P. Coppola, The University of Michigan
 Jeff Babb, University of Winnipeg

Michael P. Clough, Iowa State University
 Joanne Olson, Iowa State University
 Sherry A. Southerland, Florida State University
 Efthymios Nicolaidis, Hellenic Research Council
 Pavlos Mihas, Democritus University of Thrace
 Dimitris Koliopoulos, University of Patras
 Fanny Seroglou, Aristotle University of Thessaloniki
 Constantine D. Skordoulis, University of Athens
 Piotr Szybek, Lund University
 Don Metz, University of Winnipeg
 Zofia Golab-Meyer, Jagiellonian University
 Michael Ford, University of Pittsburgh
 Dennis Lomas, Private Scholar
 Igal Galili, The Hebrew University of Jerusalem
 Anthony Coronos, The University of New South Wales
 Louis B. Rosenblatt, The Park School
 Amir D. Aczel, Private Scholar
 Andreas Redfors, Kristianstad University
 Alice Wong, University of Hong Kong
 Gerald Skoog, Texas Tech University
 Carl Chung, University of Minnesota
 Gábor Zemlén, Max-Planck-Institut für Wissenschaftsgeschichte
 Mordechai Ben-Ari, Weizmann Institute of Science
 C. K. Raju, MCRP University
 Richard Grandy, Rice University
 Cassandra Pinnick, Western Kentucky University
 Hasok Chang, London School of Economics
 James Donnelly, University of Leeds
 Ron Good, Louisiana State University
 Lawrence Scharmann, Kansas State University
 Keith Sheppard, Teachers College, Columbia University
 Paul Narguizian, California State University, Los Angeles
 Robert Kruckeberg, Pace University
 Alan Colburn, California State University, Long Beach
 Michael Reiss, London Institute of Education
 Per-Olof Wickman, Stockholm Institute of Education
 Maria Develaki, University of Thessaloniki
 Demetris P Portides, University of Cyprus
 Mariana Hagberg, Karlstad University
 Keith S. Taber, Cambridge University
 Paul A. Wagner, University of Houston – Clear Lake,
 Wendy Sherman, Kent State University
 Tom Børsen Hansen, University of Copenhagen
 Ana C. Couló, University of Buenos Aires
 Harry L. Shipman, University of Delaware
 Jim Ryder, University of Leeds
 Robert Crease, SUNY
 Mark Lattery, University of Wisconsin-Oshkosh
 Gert Schubring, Universität Bielefeld
 Dimitris P. Papayannakos, National Technical University of Athens
 Andreas Quale, University of Oslo
 Troy Sadler, University of Florida
 Trond Harkjerr, Lillehammer High School
 M. Cecilia Pocovi, Universidad Nacional de Salta
 Marina Ville, Private Scholar

3. Current Research

Apart from contributions to *Science & Education* the following are some papers published in recent years that bear upon the research concerns of the IHPST Group. Suggestions for up-dating this list should be sent to the Editor at m.matthews@unsw.edu.au

- Mamlok-Naaman, R., Ben-Zvi, R. & Hofstein, A., Menis, J., & Erduran, S.: 2005, 'Influencing Students' Attitudes towards Science by exposing them to a Historical Approach', *International Journal of Science and Mathematics Education* **3**(3)
- Niaz, M.: 2005, 'The Quantitative Imperative vs the Imperative of Presuppositions', *Theory & Psychology* **15** (2), 247-256.
- Niaz, M.: 2005, 'Do General Chemistry Textbooks Facilitate Conceptual Understanding?', *Química Nova* **28**(2), 335-336.
- Niaz, M.: 2005, 'An appraisal of the controversial nature of the oil drop experiment: Is closure possible?', *British Journal for the Philosophy of Science*, **56**(4), 681-702.
- Brito, A., Rodríguez, M.A. & Niaz, M.: 2005, 'A Reconstruction of Development of the Periodic Table Based on History and Philosophy of Science and its Implications for General Chemistry Textbooks', *Journal of Research in Science Teaching* **42**(1), 84-111.

- Abd-El-Khalick, F. 2005, 'Developing Deeper Understanding of Nature of Science: The Impact of a Philosophy of Science Course on Preservice Science Teachers' Views and Instructional Planning', *International Journal of Science Education* **27**(1), 15-42.
- Lawson, A.E.: 2005, 'William Harvey, Predicting Capillaries, and the Nature of Science: One More Time', *The American Biology Teacher* **67**(4), 202-203.
- Lawson, A.E.: 2005, 'Conducting High Quality Research', *International Journal of Science and Mathematics Education*, **3**(1), 1-5.
- Lawson, A.E.: 2005, 'What is the Role of Induction and Deduction in Reasoning and Scientific Inquiry?' *Journal of Research in Science Teaching* **42**(6), 716-740.
- Dagher, Z., & BouJaoude, S.: 2005, 'Students' Perceptions of the Nature of Evolutionary Theory', *Science Education* **89**(3), 378-391.
- Nola, R. & Irzik, G.: 2005, *Philosophy, Science, Education and Culture*, Springer, Dordrecht.
- Ben-Ari, M.: 2006, 'Whose Final Hour? The Problem of Naive Egocentric Catastrophism in Doomsayers and Catastrophists', *Skeptic* **12**(3), 2006, 40-49.
- Waters-Adams, S.: 2006, 'The Relationship between Understanding the Nature of Science and Practice: The Influence of Teachers' Beliefs about Education, Teaching and Learning', *International Journal of Science Education* **28**(8), 919-944.

4. Booknotes

- Bunge, M.: 2005, *Chasing Reality: Strife over Realism*, University of Toronto Press, Toronto. ISBN: 13-978-08020-9075-1, 342pp

This ten-chapter, 342-page book is the most recent of nearly 50 books that Mario Bunge has edited or authored in a publishing career that began in 1943 with *Temas de Educación Popular* a book published in Argentina that dealt with the principles and practice of workers education. Along with books he has published nearly 500 scientific and philosophical articles (two accounts of his life and work are given at the conclusion of this Note). He says of this book that it is:

... part of a lifelong effort to update philosophy with the help of science, and to unmask unsound philosophy posing as science. What started me on this road, as I was finishing high school, were some of the best-selling popular science books in the 1930s – those of the famous astrophysicists Sir Arthur Eddington and Sir James Jeans. Eddington, the first to confirm Einstein's theory of gravitation, was a subjective idealist: He claimed that we only find out what is already in our minds. And Jeans was an objective idealist: He taught that the universe is a mathematical text written by God. I wished to refute them but was unable to for lack of requisite knowledge: this is why I decided to study physics. However, at the beginning of my research work in quantum physics, in the early 1940s, I swallowed the standard or Copenhagen interpretation, which is operationist, hence semi-subjectivist. My realist epiphany came only a decade later, during a break of a meeting of the Argentine Physical Society: I suddenly realized that, when describing a free electron, or calculating the energy levels of an atom, one uses exclusively variables describing properties of a thing that is not being observed by anyone – that is, a thing-in-itself. That experience suggested to me that much of what passes for the philosophical output of science is actually stale philosophy that plays only a decorative role in scientific research. (p.xiv)

In the Introduction Bunge itemises some of the antirealist positions that are 'alive and well in academia' and that prompt the arguments of the book. These include:

- # van Fraassen's influential 'constructive empiricist' view that the aim of science is 'to save the phenomena' and not to account for an independently existing reality;
- # David Lewis's restatement of Hume's view that there are no objective connections between events nor laws of nature;

Nelson Goodman's 'fantasies' about worldmaking; the still lingering Copenhagen subjectivist interpretation of quantum theory;

Bayesian statisticians and philosophers who believe that all probability assignments must be subjective and that a probability value is a measure of the strength of someone's belief in something;

social constructivists who deny the difference between thing and idea, empirical test and 'horse-trading' with colleagues;

radical relativists and conventionalists who deny the existence of objective and therefore cross-cultural truths, such as those of mathematics, chemistry and genetics.

What guides Bunge's arguments in this book, and indeed in all of his work, is the conviction that serious philosophical argument depends upon the articulation of an ontological position and of an epistemological theory – contrary to Putnam's once held view that 'the time has come for a moratorium on Ontology and a moratorium on Epistemology'. In contrast, Bunge writes that a 'philosophy without them is like a body with neither trunk nor head' (p.6). Thus the first chapter begins with the claim that 'In a scientific worldview, then, the world is constituted by things. This was also the view of the ancient Greek and Indian atomists, the medieval nominalists, and the Enlightenment materialists' (p.9). He says that 'a reasonable ontology must start with the concepts of thing and its properties' (p.15). But our idea of 'thing' is not clear and distinct and it is often confused with 'object'. Objects can be material (birds, schools) or immaterial (concepts, theories). Bunge rejects the 'vulgar characterization of "material" in terms of shape, mass and solidity ... because solids are exceptional in the universe' (p.10) – a view prefigured by Joseph Priestly in the eighteenth century who conjectured that all the solid matter in the universe might be 'aggregated into a tennis ball'. Both Bunge and Priestley are materialists, but not of the vulgar or what might be called 'solidist' kind. Bunge settles on a definition of material as 'having energy'; thus energy is not just one property among many, it is the 'universal *par excellence*' (p.12). He further, as did Priestley, makes it a postulate of his ontology that 'all the constituents of the world (or universe) are material' (p.27). The next step of his argument is to connect Realism with materialism thus understood.

His early ontological discussion might seem otiose but it has some immediate implications, one of them is his rejection of the entire Wittgensteinian programme in which 'The world is the totality of facts, not things' (*Tractatus*, 1922). The elaborated ontology does bring consistency to discussion and prevents Idealism 'sneaking' into a scientific worldview as it does with Steven Weinberg and Paul Davies. For example, photons which have no mass, are nevertheless material in Bunge's ontology. For Weinberg, and others, they become 'immaterial' factors, which in other hands can easily slide into various kinds of spiritual or idealist factors, and then, as with adherents of Stephen Gould's NOMA argument, be shielded from scientific investigation.

Bunge of course recognises that one can be a realistic Idealist (Plato and Descartes are examples), but Bunge argues that:

Realism can only stay sober, testable, and effective, as well as open to new ideas, provided it is combined with materialism and scientism. Materialism without realism and scientism is dogmatic because only the investigation of reality can corroborate it. Worse, vulgar materialism can be obnoxious: think of Nietzsche's joint adoption of vulgar materialism (physicalism), pragmatism (in particular fictionism and vitalism), anti-scientism, and immoralism.... which paved the way to postmodernism and fascism. (p.280).

With an ontological system and an epistemological theory elaborated Bunge, in 300-odd pages, discusses numerous current issues in philosophy of science and philosophy of social science: Phenomenalism, Mechanism, the Fact/Value distinction, Idealisations, Dispositions, Ethics, and Laws of Nature. This discussion involves about 500 separate references, including 65 of his own publications. In none of the many issues discussed, does Bunge 'muddy the waters'. He prizes clarity of meaning, transparency of argument, and avoidance of jargon. The book well deserves, and will reward, careful reading.

For accounts of Bunge's life and writings see:

- Bunge, M.: 2003, 'Philosophy of Science and Technology: A Personal Report'. In G. Fløistad (ed.) *Philosophy of Latin America*, Kluwer Academic Publishers, Dordrecht, pp.245-272.
- Matthews, M.R.: 2003, 'Mario Bunge: Physicist and Philosopher', *Science & Education* **12**(4-5), 431-444.

Koertge, N. (ed.): 2005, *Scientific Values and Civic Virtues*, Oxford University Press, New York. ISBN: 13 9768-0-19-517225-6; 246pps.

There are 14 chapters in this anthology contributed to by historians and philosophers of science (Frederick Churchill, Edward Grant, Gerald Holton, Noretta Koertge, Michael Ruse, Meera Nanda), scientists (Philip Sullivan, Pervez Hoodbhoy, Allan Franklin, Paul Gross), political theorists (Steven DeLue, Barbara Forrest) and philosophers (Keith Parsons, Rose-Mary Sargent). As Koertge says in the Introduction, the collection 'explores the positive relationship that exists between science and a liberal democracy', it is a 'response to widespread concern about the declining quality of deliberations intended to promote the common good' (p.3). The contributors do not rehearse the importance of having a populace that understands the rudiments of science, rather they 'describe the basic value system of organised science – its devices for encouraging systematic public criticism ...its communitarian tradition of sharing its findings freely and openly – and show how these can serve as a resource to reinvigorate our dedication to public reason' (p.4). All contributors endorse Karl Popper's restating of the Enlightenment's linkage of scientific inquiry and an 'Open Society'.

Koertge gives an account of scientific values that is anchored in Robert Merton's classic 1942 statement of: Universalism, Disinterestedness, Communitarian and Skepticism. She goes on to address the fact that Science sometimes falls short of these ideals, but her recommendation is not to abandon or reject the ideals, as Sandra Harding does, but to recognise the failures or corruptions and to rectify them by stronger adherence to the ideals. As many have pointed out, the very fact of identifying 'bad' science or corrupt science is dependent upon some normative account of what constitutes 'good' science; and once the Mertonian norms, or something very much like them, are abandoned, then finger-pointing and complaining becomes difficult, if not completely impossible.

Sargent writes on the role of social and scholarly virtues in the Scientific Revolution, and rescues Francis Bacon from his too-frequent detractors. Bacon does write of the 'power' and 'utility' of knowledge, but Sargent rightly says that 'It would be a mistake, however, to conflate Bacon's ideas with the type of utilitarianism developed in the nineteenth century' (p.72). Only an ahistoric reading of Bacon can support Sandra Harding's influential opinion that his view of scientific inquiry is 'modeled on rape and torture' (*The Science Question in Feminism*, 1986, p.116). Sargent goes to some length to point out that the natural philosophers of the seventeenth century were very public and explicit about the 'political, moral, and social implications of their scientific proposals and did not attempt to disguise covert motives behind a disinterested language of "objectivity"' (p.77). The latter charge comes from 'social historians [who] typically betray an anachronistic imposition of twentieth-century categories onto seventeenth-century concerns' (p.77).

Parsons chapter is titled 'Defending the Radical Center'. He argues that 'both the left-wing and right-wing critics present a distorted picture of science and that the adoption of their recommendations would result in a less rational and, in fact, less democratic science' (p.159). On the Left, his target is a version of popular Feminism that maintains that interests (gender, economic, class, political) are irredeemably constitutive of science and thus cannot be eliminated; on the Right, his target is anti-Darwinian Christian philosophers such as Alvin Plantinga who maintains that antecedent Christian knowledge should be used to judge putative scientific claims, and that Christians should 'pursue science in [their] own way, *starting from* and taking for granted what we

know as Christians' (p.165). Parsons rightly points out that the programme of both the Left and the Right lead directly to the Balkanisation of science: If feminists can appeal to feminist interests, and Christians to Christian interests, then Mormons, Jehovah Witnesses, Southern Baptists, Stalinists, Nazis, Islamists, Hindus and every other religious, social or political group can appeal to their interests to decide the 'truth of the matter'. In contrast to proponents of Special Interest Sciences, Parsons concludes that 'The true service of science to democracy is that it provides the best example of how sectarian bias can be overcome, and how a highly heterogeneous group of people can agree to be led by a set of common standards' (p.169).

Sullivan's chapter well documents the impact that anti-scientific and special interest epistemology has already had in university departments of anthropology, history, education, psychology, politics and literature. He quotes a Chicago professor of education who asserts that 'Narrow canons of proof, evidence, logical consistency and clarity of expression have to go. To insist upon them imposes a drag on progress.' (p.181).

People familiar with even well regarded writings in all these fields can add their own examples to Sullivan's depressing list. Let me add one from my own highly rated Australian university. A graduate thesis contained countless completely meaningless sentences of which just two, on the one page, were:

Intersubjectivity and reciprocity reveals the outlines of the system, which are constantly remodulated as labels of repression become symbols of liberty becoming co-opted into the systems parameters of social animosity.

Consequently the realization of change is truth evident throughout reality, insinuating morality in its inertia, despite the disruption of acquired reason and its knowledge.

My colleagues awarded First Class honours to the thesis. The candidate is now, presumably, out there somewhere teaching this stuff to students – maybe at the above mentioned Chicago university where clarity of expression is regarded as a drag on progress. If the foregoing sentences represent argument, articulation and expression of a first class honour's standard at a major university, then what hope is there in a democracy for citizens to challenge political ideologues and popular-media hucksters who rant and rave in a comparably nonsensical manner? The Sokal hoax showed that even pages and pages of such unintelligible gibberish can be published in a major academic journal!

The book's final chapter, titled 'When Science Teaching Becomes a Subversive Activity', is by the Pakistani physicist Pervez Hoodbhoy. He decries the situation 'In countries such as Pakistan, where Islam is the state religion and declared to be above the constitution, religion is considered the source of all wisdom and knowledge, including scientific knowledge.' (p.216) This tragic situation flows from the belief of Muslims that 'the Qur'an is the literal word of God – unchanged, undistorted, and pure. ... The integrity of the Qur'an cannot be challenged except upon pain of death.' (p.217)

Hoodbhoy outlines three common responses of Islamic fundamentalists to science. One, the outright rejection of scientific explanations and material causes, as when earthquakes are seen as divinely caused due to the immorality of the region. Two, the creation of Islamic science which, utilising the arguments of Thomas Kuhn and Western postmodernists, is elevated to the rank of the equal of orthodox science. Three, and the most popular, is to claim ownership of *all* scientific discovery for Islam: 'Provided one learns one's Arabic properly, and does a correct exegesis of the Qur'an, then out will pop the Big Bang theory, black holes, quantum mechanics... and whatever your heart desires' (p.218). This third strategy is funded with millions of dollars by the Pakistani state.

Hoodbhoy laments the political, religious, cultural and educational situation of his own country, and of other such Islamic states, and concludes that 'To my mind, the answer lies in silent subversion, subversion through the teaching of science.' (p.216) He, of course, maintains that science teaching can only be subversive if it is founded on ontological realism and epistemological universalism.

Eger, M.: 2006, *Science, Understanding and Justice: The Philosophical Essays of Martin Eger*, (Abner Shimony, ed.), Open Court, Chicago. ISBN 13-978-0-8126-9461-1, 538pp +xxix

Martin Eger (1936-2002) was a founding member of the IHPST group, he contributed to its first conference in 1989 and served on the Editorial Committee of *Science & Education* in its first few years. This collection of 30 philosophical and educational essays has been put together and edited by his friend, and fellow physicist and philosopher, Abner Shimony. The collection includes four essays on 'hermeneutics, science and education' that were published in *Science & Education* in 1992, 1993, 1995; and one essay on 'The "Interests" of Science and Problems of Education', that was presented at the 1989 IHPST Tallahassee conference and subsequently published in a special issue of *Synthese* journal dedicated to conference papers.

Shimony has grouped the essays into four parts: Hermeneutics and Natural Science, Philosophy and Education, Morality, and Life, Death and Dialogue. He has written a most informative 30 page Introduction to the collection, and has provided a full chronology of Eger's published and unpublished papers in physics, philosophy and education.

Eger was born in Poland in 1936 into a comfortable Jewish family; his father was killed by Nazis but his mother and he survived with his mother pretending to be a Polish peasant and working as a maid for a German officer; he began school in New York in 1946, graduating, and going to MIT for undergraduate physics and Brandeis for his PhD; his life-long interest in the conceptual and philosophical dimensions of physics was awakened in classes of Victor Weisskopf and Laszlo Tisza and by reading textbooks such as Max Born's *Atomic Physics* and David Bohm's *Quantum Theory*; whilst on an early academic leave at the Max Planck Institute he studied the philosophical works of Heidegger, Habermas and Gadamer, and these left an indelible impression on his intellectual makeup. All of Eger's subsequent work recognised and dealt with the role of subjectivity in science and the conditions for genuine dialogue in education.

Contrary to some fashionable versions of Constructivism, Eger asserts that dialogue requires knowledge, and he makes this point in an essay on 'Values Clarification' asking: 'Can the average teacher with the average training be a "teacher" – or "facilitator" – in such deep waters without comprehensive additional education in ethics, moral history, theory of knowledge, and the like?' His answer, of course, is No. And he rightly bemoans the flight from Foundational Disciplines to Practical Skills in Education programmes; without the former, classrooms become places where mutual ignorance is exchanged. This essay appeared in what was the first anthology ever published that bore the title *History, Philosophy and Science Teaching* (Matthews edited, Teachers College Press, 1991). Abner Shimony's comment on the essay is also in the same anthology.

Included in the collection is Eger's response (1995) to Cushing, Crease, Bevilacqua and Giannetto all of whom commented upon Eger's trilogy of Hermeneutical articles published in *Science & Education* in 1992-93. But there was also another published response to Eger in the same journal issue by Wallis Suchting. Unfortunately Eger did not see fit at the time to respond to the latter, so Suchting's very critical arguments against the intelligibility and utility of hermeneutics are not addressed; and readers of Shimony's collection are not made aware of their existence. For Suchting's arguments see *Science & Education* vol.4 no.2, 1995.

Suchting begins by probing Eger's and the hermeneutical tradition's, claim that the meaning of a text 'arises' or 'emerges' from the act of its interpretation. Suchting argues that if the meaning is not there, then interpretation must amount to 'the assignment of meanings to marks that have no prior meanings.' (1995, p.163) He comments that this use of 'interpretation' entails 'a wholesale relativism: a "text" can now mean anything an "interpreter" takes it to mean.' (ibid). Suchting is critical of Eger's talk of 'a "bare" text is to be thought of as an ontological core, around which potential meanings hover, so to speak in a space of all possible meanings.' Suchting rightly asks how, given hermeneutical principles, can one possibly judge the correct interpretation from all the potential ones? The only alternative is to say there are no correct interpretations, which again amounts to Relativism. Once we give up on the possibility of correct interpretations, then we

quickly move to ‘interpretations that advance our interest, or interpretations that are condoned by authority’. This is indeed a comforting thought for religious and ideological zealots.

Suchting is also critical of Eger’s, and the hermeneutical tradition’s, talk of objects, or the world, being a text and thus having meaning. This is now absolutely a common place in science education given encouragement not just by Hermeneutics but also by Foucault and those influenced by him. In his *The Order of Things* the second chapter is titled ‘The Prose of the World’. Eger writes that: “‘Things’ are not ‘dead’... they have a meaning that is *theirs*, a part of *their being* (in relation to us)’. Suchting observes that Eger, on the face of it, is not talking about things but only of ‘things’. But despite the scare quotes, Eger does go on to, perhaps in a moment of unguarded hermeneutical enthusiasm, say that ‘things’ so understood include natural things like trees, molecules, or stars’. That is that natural objects have meaning and thus are texts. Eger adds that this is ‘a challenging thought’. Suchting agrees that it is challenging, ‘not, however, as to truth or suggestiveness, but as to intelligibility’ (1995, p.165).

The Shimony collection contains further hermeneutical studies by Eger, and further applications of hermeneutical principles to issues in science studies and in philosophy of science, the most substantial being ‘Language and the Double Hermeneutic in Natural Science’. In this Eger argues, as he did in the *Science & Education* ‘Quadrilogy’, that hermeneutics is applicable to both the social and the natural sciences because the language of science is not ‘about such things as stars and atoms exclusively’, rather it is about ‘the interaction of stars and atoms with humans or their relation to humans’ (p.87); thus science studies becomes ‘a study of the *understanding* we have of our relation as *human* beings to these and other kinds of beings, which, *intere alia*, is a study of the self-understanding of science as a mode of being in the world.’ (p.88)

Although not derived from, or inspired by, Eger’s analysis one recent publication in the *Journal of Research in Science Teaching* advocating Queer Science can be seen an embodiment of his argument. Two researchers claimed that: ‘Using the lens of queer theory, we can view the hegemonic matrix, interrupt heteronormative thinking, and broaden all students’ potential for interpreting, representing, and perceiving experiences’ (Snyder & Broadway 2004, p.621). The meaning of this sentence is completely opaque but the authors press on and maintain that Queer theory ‘is both ontological and epistemological as it questions knowing and the nature of being’ (Snyder & Broadway 2004, p.619). The researchers further claim that: ‘Language limits our ability to see truths of nature thus the search for truths should be abandoned for the search of understanding the descriptors that shape our lives’ (Snyder & Broadway 2004, p.620).

One is tempted to ask that if language limits our ability to see truths, will descriptors (whatever they might be) be any better? If meaning cannot be said, then it surely cannot be whistled either. On the face of it, the authors’ claim means abandoning science and solely pursuing hermeneutical studies. Indeed, the authors do endorse just such a position when later they write: ‘Truth of nature, then, becomes cultural interpretations of meaning’ (p.623). So much for science teaching being the investigation of things, their properties and their interrelations; and all this in the world’s most cited science education research journal! Eger would probably be embarrassed by this application of hermeneutical theory, but it is a commonplace in education that philosophical and psychological theories that might have some original merit become debauched by educationalists who do not have the requisite learning to understand them or to apply them meaningfully.

Readers of the Collection will certainly be impressed with Eger’s breadth of knowledge, his engagement with philosophical issues in science, and his serious concern with the improvement of science teaching. It can only be regretted that someone who took Dialogue in science, philosophy and education so seriously did not engage with Suchting’s clearly stated critique of the entire hermeneutical programme. To have done so, and especially to have satisfactorily defended his arguments, would surely have made his subsequent arguments clearer and stronger.

Dewitt, R.: 2004, *Worldviews: An Introduction to the History and Philosophy of Science*, Blackwell Publishing, Oxford. ISBN 1-4051-1620-X, 330 pps

This is a very good introduction to contemporary history and philosophy of physical science. It is meant for 'those coming to the history and philosophy of science for the first time' (p.x). The book is based on the premise that 'worldviews' enter into scientific ontology, methodology and epistemology. One of the book's many strengths is that it elaborates this premise using clear and well illustrated examples from the history of science: Classical Greek Science, The Scientific Revolution, Newtonianism, Relativity Theory, Quantum Theory. In each case the constellation of worldview elements – ontological, epistemological, methodological and ethical – are identified. These are seen as bearing upon the standard philosophical investigations into Truth, Confirmation, Induction, Falsification, Instrumentalism, Realism, and so on.

Dewitt does provide a useful 10 page guide to further readings for each of the book's chapters. One clear defect of the book is its complete neglect of the Darwinian and Mendelian episodes, and of issues in modern biological sciences that manifest worldview commitments.

Dilworth, C.: 2006, *The Metaphysics of Science. An Account of Modern Science in Terms of Principles, Laws and Theories*, 2nd Edition, Springer, Dordrecht. ISBN 978-1-4020-3837-2; 334pps.

The first edition of this well written and comprehensive book appeared in 1996. The second edition differs only in having three appendixes, totalling 100 pages, added. The book's central claim is contained in the title, namely the view that science *has* a metaphysics. Dilworth uses Kant's distinction between the *transcendent* and the *transcendental* in order to elaborate his meaning of 'metaphysics'. He says that the transcendental 'may be seen as consisting of a person's most fundamental convictions or beliefs about the nature of reality. These are beliefs – such as, for example, belief in the existence of God – which affect the whole of a person's conception of reality, and which, psychologically speaking, are the most difficult to give up' (p.1). But unlike Kant, Dilworth does not believe that the transcendental, or presuppositions of science, are given *a priori* and thus independent of experience and of scientific investigation. It is of course a complex story, but Dilworth shows that the presuppositions of science do indeed change with the on-going history of science; he is not an essentialist about science. The arguments between rationalists and empiricists figure prominently in this complex story.

Kant's transcendent is that which lies beyond the limit of some generally accessible realm, whether it be, for example, experience, knowledge, understanding, language or thought. When applied to science, Kant's metaphysical category is argued out in terms of the possibility of extra-empirical knowledge. Here the debate has been between realists and empiricists; the former saying we can have knowledge beyond experience (theoretical entities that are not experienced), the latter saying that knowledge is limited to what can be seen, touched, smelt, in other words limited to the experiential facts of existence. Dilworth takes a more pragmatic view of the transcendent than does Kant: 'what is transcendent at one point in time need not remain so, what is at one time hypothetical may become factual' (p.2).

Dilworth acknowledges his debt to Rom Harré, and it is clear that the latter's idea of changing General Conceptual Schemes in science is reflected in the former's grouping together of principles, laws and theories in science. Dilworth says of this grouping that it 'functions as ... conceptual paradigms' (p.5).

6. Publications for Sale

The following publications can be ordered from the IHPST Group at www.ihpst.org :

- #1 *CD Proceedings of the 6th IHPST Conference, Denver, 2001*, 100 papers, W. McComas (ed.), USD10.
- #2 *CD Proceedings of the 7th IHPST Conference, Winnipeg, 2003*, 100+ papers, D. Metz (ed.), USD10.
- #3 *Science Education and Culture*, F. Bevilacqua, E. Giannetto & M.R. Matthews (eds.), Kluwer, 2001, 362pp, USD20.
- #4 *Science & Education* journal Volume 2, 1993, 382pp, USD10.
- #6 *Science & Education* journal Volume 12, 2003, 808 pps, USD20.
- #7 *Science & Education* journal Volume 13, 2004, 820 pps, USD20.
- #8 *The Pendulum: Scientific, Historical, Philosophical & Educational Perspectives* (Michael R. Matthews, Colin Gauld & Arthur Stinner (eds.), Springer, 2005, USD20

7. Coming Conferences

February 12-17, 2007. EPISTEME-2, Second International Conference to Review Research in Science, Mathematics and Technology Education, Homi Bhabha Centre, Mumbai. Details at: <http://www.hbcse.tifr.res.in/episteme/>

March 15-19, 2007. Philosophy of Education Society (PES) Conference, Atlanta. Details at: <http://philosophyofeducation.org/>

April 9-13, 2007. American Educational Research Association (AERA) Conference, Chicago. Details at: <http://www.aera.net/>

April 14-17, 2007. National Association for Research in Science Teaching (NARST) Conference, New Orleans. Details at: <http://www.narst.org/>

June 24-28, 2007. 9th IHPST Conference, Calgary. Details at: www.ucalgary.ca/ihpst07

October 5-7, 2007. 4th Hellenic HPS&ST conference, Patras. Details from: Dr Dimitris Koliopoulos, dkoliop@upatras.gr

8. Future Newsletter Items

This IHPST Electronic *Newsletter* goes to 1,300 email addresses on the IHPST list, and it is also posted to various science education, philosophy of education and HPS lists. Items for inclusion in the *Newsletter* are appreciated. These can be items for the 'Recent Research', 'Recent Books', 'Books' or 'Conferences' sections. Brief Book Notes are especially welcomed.

Please email newsletter material as an attachment (or journal subscriptions or publication orders) to:

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9. IHPST Email List

The email list is used sparingly, perhaps once a month, to send group information such as contained in this Newsletter. It is a closed list, not an open discussion list.

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