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The Scimat Program: Towards a Better Humanity

Maria Burguete and Lui Lam

Scimat (Science Matters) is a new term coined by Lui Lam in 2007/2008. *Conceptually*, Scimat represents the four tenets that (1) Science is humans' effort to understand Nature without bringing in God or any supernatural; (2) Science covers everything in Nature; (3) Nature includes humans and all nonhuman systems; (4) all research on human matters, humanities in particular, are part of science. *Disciplinarily*, Scimat represents the collection of research disciplines that deal with humans; thus, Scimat is the sum of the humanities, social science and medical science. In particular, scimat aims to raise the scientific level of the humanities which, *not* "natural science", cover the arts and decision making that determine the well-being of the human race. Thus, the ultimate aim of scimat is not just for a unified knowledge, but for a better humanity. Towards this end, The Scimat Program was started by Maria Burguete and Lui Lam in 2007, which is the latest international effort to revive the Aristotelian tradition of a unified knowledge. It has (1) established a biennial international scimat conference series; (2) formed an international committee (ISMC) to advocate the scimat concept and oversee scimat activities; (3) established a Science Matters Series of books (World Scientific). The Scimat Program is in the midst of establishing a number of scimat centers around the world. Additionally, a scimat general-education course for students of any major and any level is under construction and test-teaching. In this chapter, the motivation, significance and progress of The Scimat Program are outlined.

1.1 Introduction

The tradition of treating everything in the universe (consisting of human and non-human systems) from a unified perspective—starting with

Aristotle and continued until the Renaissance—was broken with the rise of modern science in the last 400 years. Concerted efforts to revive this tradition happened from time to time and failed, except that the Enlightenment succeeded partially (see Section 1.4).

The Scimat Program is the latest international effort to revive the Aristotelian tradition of a unified perspective of knowledge that treats research on humans and nonhuman systems as equally important and on the same footing, for a better humanity. In a certain sense, the Scimat Program can be seen as *Enlightenment 2*, but smarter. In this chapter, the motivation, significance and progress of The Scimat Program are outlined.

1.2 Prehistory

The story began with Thales (c. 624-c. 546 BC) who proposed the first “theory of everything”: Everything is made of water. Subsequently and more prominently, Aristotle (384-322 BC) studied all aspects of the universe on equal footing, including astronomy, physics, biology, logic, ethics and politics. That is, he was interested in all the subjects now covered in various departments in the modern universities. This was not by accident at all.

There is a material basis underlying the fundamental unity of knowledge. Knowledge about our world/universe can be divided into two categories: those on nonhuman systems and those on humans. The former is what is called “natural science”; the latter, the humanities and social science. But this is misleading. Humans are *Homo sapiens*—a material system made up of atoms, just like those studied in “natural science”. And since science is to understand Nature which includes all material systems, the inescapable conclusion is that humanities and social science are or should be part of science. In short, *everything in Nature is part of science* [Lam, 2008a]. If this point is not yet clear to everybody, it is due to the misconception or misuse of the word “science” in our daily language [Lam, 2014].

In fact, in the last 400 years or so since Galileo (1564-1642), modern “science”¹ has progressed rapidly because of three factors: scientists pick the simple systems to study; they make a lot of simplifications; they use external detectors and information processors (e.g., computers). Partly due to the great successes of these studies, these days for many people, the word “science” is implicitly and incorrectly identified with the “science of simple systems”, while the “science of complex systems” to which all human-dependent knowledge belongs is often neglected.

1.3 Scimat

Scimat (Science Matters) is a new term coined by Lui Lam in 2007/2008 [Lam, 2008a]. *Conceptually*, Scimat represents the four tenets that (1) Science is humans’ effort to understand Nature without bringing in God or any supernatural; (2) Science covers everything in Nature; (3) Nature includes humans and all nonhuman systems; (4) all research on human matters, humanities in particular, are part of science. (If the humanities do not look like science to many people, it is because they are mostly still done at the empirical level, one of the three research levels in any discipline—empirical, phenomenological and bottom-up levels.)

Disciplinarily, Scimat represents the collection of research disciplines that deal with humans; thus, as a branch of science,

Scimat = Humanities + Social Science + Medical Science

And

Science = Scimat + “Natural Science”

where “Natural Science” means the science of nonhuman systems.

Scimat’s tenets result from two recognitions: (1) Humans are a material system (made up of atoms); (2) Science is the study of Nature which includes all material systems. The first recognition follows from Darwin’s evolutionary theory (1859) and Einstein’s work on Brownian motion (1905). (For more see [Lam, 2014].)

¹ In this chapter “science” with double-quotation marks means science in the conventional sense, which is the sum of “natural science” and social science but excludes the humanities (see [Lam, 2014]).

The viability of scimat has been demonstrated in these four areas: history, arts, philosophy, and science studies. In particular,

- Human history is shown to be a science, too (confirming the historian Robin Collingwood (1889-1943) [1922]). Different scientific approaches/techniques to do history, apart from the usual narrative approach, are pointed out with examples. A historical law is discovered in the lifetime of Chinese dynasties [Lam, 2008b].
- The origin and nature of arts—a 2,400-years-old puzzle since Plato—is solved [Lam, 2011].
- “Philosophy”, the discipline in humanities today, is shown to be a science matter [Lam, 2015].
- The confusion and misconceptions about Science is clarified by a historical examination of its development. A historically correct definition of science is offered, viz., Science is humans’ pursuit of knowledge about all things in Nature *without* bringing in God or any supernatural, guarded by the reality check; Science thus has two components: scientific process and scientific results [Lam, 2014].

1.4 The Scimat Program

The Aristotelian tradition of treating everything in the universe as equally important and from the same footing was broken after the Renaissance. The rapid and tremendous success of modern science, largely in the “natural sciences”, led to the specializations of the professionals. The compartmentalization of knowledge into different disciplines occurred just a few centuries ago [Turner, 2014], more by convenience than by the intrinsic nature of the knowledge involved.

Concerted efforts to revive this tradition all failed with one exception: the *Enlightenment* (1688-1789) [Porter, 2001]. The Enlightenment succeeded in ushering in social science (by establishing Economics through the effort of Adam Smith) but failed in turning the humanities into a science, due to its insufficient understanding of the human system which is an open, complex system. It thus succeeded only

partially with its aim of creating a “science of man”, or, a Human Science. It was a movement interrupted and unfinished.

Individually, the book *Consilience* by Edward O. Wilson [1998], a Harvard biologist, advocates the revival of the Enlightenment spirit, based on other considerations. Apparently, it has failed to turn the tide, due partly to the lack of an action plan.

The Scimat Program, started by Maria Burguete and Lui Lam in 2007, is the latest international effort to revive the Aristotelian tradition of a unified knowledge and a continuation of the Enlightenment movement, working towards a Human Science. It is an *action plan* and is the “only game in town”. Its emphasis is on raising the scientific level of the humanities (by encouraging the collaboration between humanists and “natural scientists”) because decision making, a branch of humanities, is what determines the well-being of the human race. Thus, the ultimate aim of the Scimat Program is for a better humanity (Fig. 1.1). The Scimat Program consists of six steps.

Step 1: A biennial international scimat conference series was set up. Four conferences have been held so far, all in Portugal; the first three cochaired by Burguete and Lam; the fourth by Burguete and Nigel Sanitt; the fifth one to be held in 2015 (Fig. 1.2).



Fig. 1.1. The ultimate aim of the Scimat Program: Let the Earth be peaceful forever!

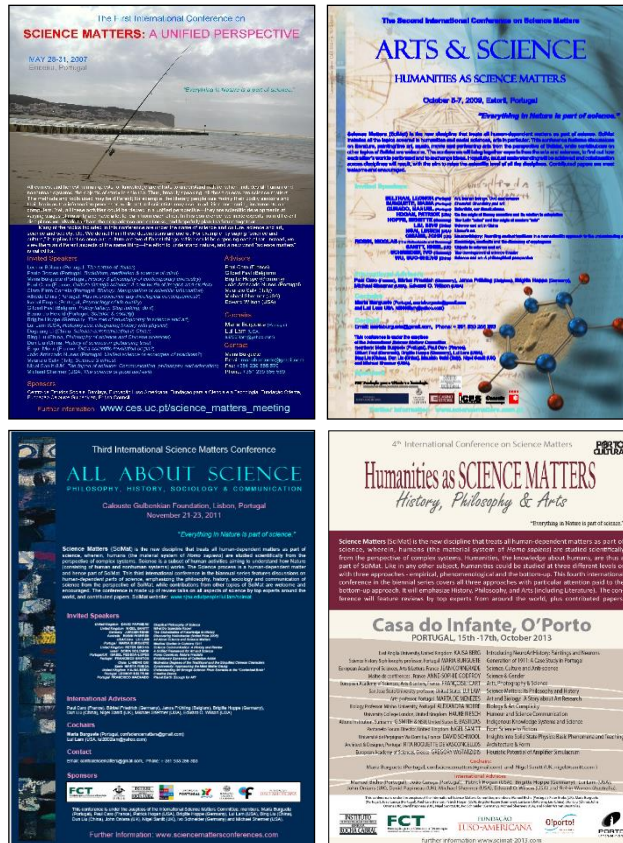


Fig. 1.2. Posters of the first four international scimat conferences, held all in Portugal, in the years, respectively, 2007, 2009, 2011 and 2013 (from left to right, top to bottom).

Step 2: International Science Matters Committee (ISMC) was set up. The ISMC was established in 2007 to promote the scimat idea and oversee the international Scimat Program (Fig. 1.3).

Step 3: The Science Matters book series was set up. Publisher: World Scientific; Founder and Editor: Lui Lam; three books are published (Fig. 1.4).

Step 4: Scimat Centers being established. We are in the process of establishing a number of scimat centers (100 eventually) around the world (which would be independent from but collaborating with and reinforcing each other). The Center is:

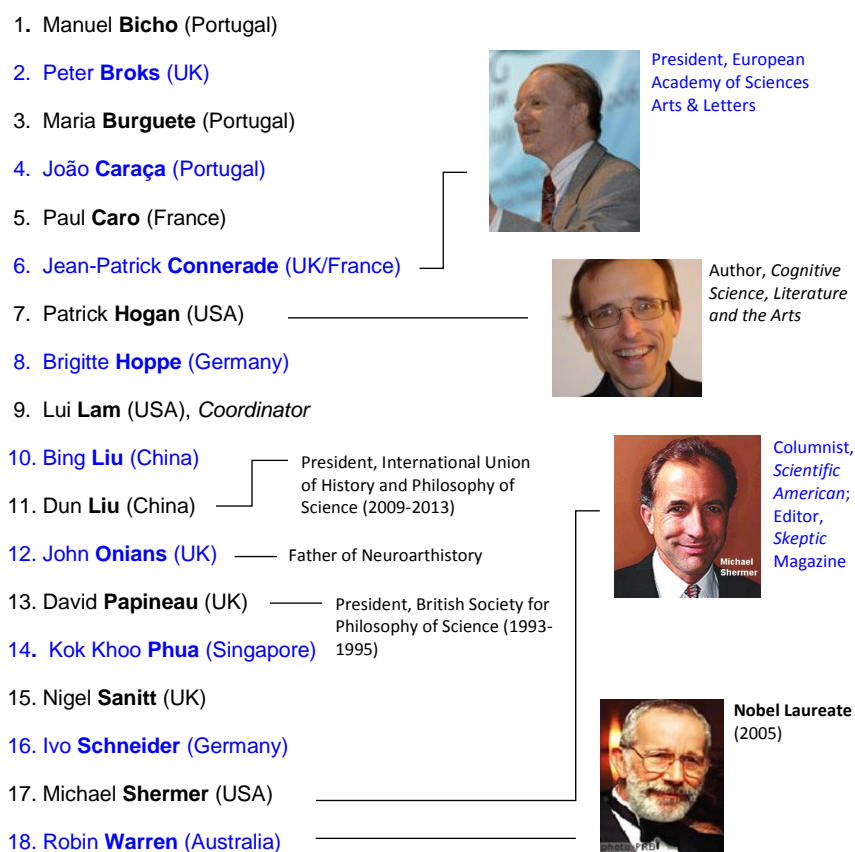


Fig. 1.3. Members of the International Science Matters Committee (ISMC). Presently, there are 18 members coming from five countries, which include a Nobelist, president of a European Academy, research institute directors, prominent magazine columnist and publisher, and eminent professors who are pioneers in their research fields. See Appendix 1.1 for their biographies.

1. To do fundraising to support the Center financially.
2. To organize international workshops/conferences and summer/winter schools.
3. To communicate the scimat ideas to the public.
4. To give out an Award every two years, in the donor's name perhaps, for an individual who contributes significantly in the advancement of scimat.


 <p style="text-align: center;">Humanities, Science, Scimat A 21st-Century General Education Course for All Students and Everybody Else</p> <p style="text-align: right;">Lui Lam</p>	<p>Contents</p> <p>Prolog</p> <p>1 Introduction</p> <hr/> <p>PART I BASIC</p> <p>2 Humans</p> <p>3 Knowledge, Nature, Science and Scimat</p> <p>4 Science and Scimat, Again</p> <p>5 History</p> <p>6 Arts</p> <p>7 Philosophy</p> <hr/> <p>PART II EXTRA</p> <p>8 The Two Cultures Problem</p> <p>9 Philosophy and Sociology of Science</p> <p>10 History of Science</p> <p>11 Science Communication</p> <hr/> <p>PART III EXTRAORDINARY</p> <p>12 Why the World Is So Complex</p> <p>13 Does God Exist?</p> <p>14 Su Dong-Po's Bamboo and Paul Cézanne's Apple</p> <hr/> <p>PART IV BONUS</p> <p>15 How to Do (Good) Research</p> <p>16 On Intuition and Innovation</p> <hr/> <p>Epilog</p> <p>Index</p>
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Fig. 1.5. The new general-education course for all majors and everybody else [Lam, 2016].

Step 5: Establish an international scimat society.

Step 6: Publish an international scimat journal.

We are now working on step 4; steps 5 and 6 are for the future, hopefully the near future. For more see website: www.sjsu.edu/people/lui.lam/scimat.

1.5 Conclusion

Scimat's motto is "Everything in Nature is part of science". Scimat's key insight is that we have "*One culture, two systems, three levels*"—science culture, simple and complex systems, three research levels [Lam, 2016]. What we are witnessing here is the initial stage in the birth of a new "multidiscipline"—more precisely, a new paradigm—called Scimat. It is similar to the case of History of Science (initiated by George Sarton early

last century) and of Artificial Life (by Christopher Langton in 1986), but not quite. Scimat is much larger in scope since it incorporates the research of everything related to humans, and thus will be more far reaching in its influences. In particular,

- It provides a unified perspective for all the disciplines in the humanities, social science and “natural science”.
- It is a rally point to raise the *scientificity* (i.e., scientific level) of the humanities, making the world a better place (since many large-scale human tragedies can be traced to the underdevelopment of the humanities in the last 2,400 years since Plato).
- It is the foundation behind the “synthesis” of the humanities and “science”, solving the so-called two-culture problem at the basic level.
- It provides the basic rationale for general education and a route to make it successful.
- It provides the broadest framework in interdisciplinary learning/teaching, and science teaching [Matthews, 2015].
- It is the most interesting and important multidiscipline in the 21st century.

In short, Scimat advocates the understanding of our world through science and rational thinking, whereas humanities are recognized as part of science. Let us work together for a better humanity and make the world a peaceful place forever, for us and our children!

Appendix 1.1: The International Science Matters Committee

On May 30, 2007, in Ericeira, Portugal at the end of the First International Conference on Science Matters, an International Science Matters Committee (ISMC) was formed; it consisted of 9 members. Since then the ISMC was expanded. After the first four scimat conferences in the biennial series, at this point, there are 18 members in the ISMC (see Fig. 1.3). Here are their brief biographies.

Manuel Bicho obtained his PhD in Medicine (Physiology and Biochemistry) in 1985 and MD in 1975, both from Lisbon Medical School, University of Lisbon. He is Director of Rocha Cabral Institute, and Director of Genetics Laboratory (since 1995) and Professor of Genetics, Faculty of Medicine of Lisbon (since 1990). His main research area is Biochemical and Molecular Genetics. He was awarded the Ernesto Roma Prize in Diabetes Research (1996) and the Bial Prize of Clinical Medicine (1994).

Peter Broks obtained his BA and PhD from the University of Lancaster. In 1990 he was a specialist appointment at the University of the West of England, Bristol, to design, develop and teach a new undergraduate programme in “Science, Society and the Media” jointly run by the Faculty of Humanities and the Faculty of Applied Sciences. He has published extensively in the history of science especially as it relates to popular culture and is the author of *Understanding Popular Science* (2006). In August 2011 he left UWE so that he could devote more time to research and writing.

Maria Burguete got her PhD in History of Science (contemporary chemistry) from Ludwig Maximilians University at Munich, Germany (2000). She is a scientist and a university lecturer with teaching and research experience in a wide variety of scientific fields. She is a scientific researcher at Scientific Research Institute Bento da Rocha Cabral in Portugal since 2007. She has published 11 books in the scientific field (and seven books in poetry) and over 25 scientific papers. She is a corresponding member of European Academy of Sciences, Arts & Letters since 2010.

João Caraça obtained the D. Phil. in Nuclear Physics at the University of Oxford (1973). He is the Director of Calouste Gulbenkian Foundation’s Delegation in France, and Full Professor of Science and Technology Policy at the Instituto Superior de Economia e Gestão of the Universidade Técnica de Lisboa. He is member of the Governing Board of the European Institute of Innovation and Technology (EIT). He also integrates the Steering Group of the European Forum on Philanthropy and Research Funding and is President of the Advisory Board of the

Portuguese Business Association for Innovation (COTEC). Caraça was Science Adviser of the President of the Portuguese Republic (1996-2006) and has published over 150 scientific papers. His main interests are science and technology policy and prospective studies. His recent books include *Limits to Competition* (1995), *Science et Communication* (1999), *Entre a Ciência e a Consciência* (2002), *Le Printemps du Politique* (2007), and *Ideias Perigosas para Portugal* (2010).

Paul Caro is a former (retired) Director of Research at CNRS who has worked for many years in inorganic chemistry. He is a rare earths specialist. In the 1980s he became interested in science popularization through newspaper articles (in “Le Monde” and magazines), radio broadcasts (France Culture, Radio Classique, mostly), television shows (TF1), exhibitions in Museums and some books. He was until 2001 in charge of “scientific affairs” at the Cité des Sciences et de l’Industrie in Paris. He is a Corresponding Member of the French Academy of Sciences and a Member of the French Academy of Technology.

Jean-Patrick Connerade Educated Lycée Charles de Gaulle and Imperial College D.Sc. University of London 1976. Lockyer Professor of Physics for many years, now Emeritus Professor and Distinguished Research Fellow Imperial College London, Hon Prof Physics East China University Shanghai and Permanent Visiting Prof. WIPM Chinese Academy of Sciences. President of the European Academy of Sciences Arts and Letters, Honorary President of Euroscience. Some 250 published papers. He is also a published poet in the French language, recipient of several literary prizes (prix Jose-Maria de Heredia de l’Académie Française, prix Paul Verlaine de la Maison de Poésie de Paris, Grand Prix de Poésie de la Société des Poètes Français).

Patrick Colm Hogan received his BA in Philosophy from Santa Clara University, his MA in Philosophy from the University of Chicago, and his PhD in English from the State University of New York at Buffalo. He is the author of 14 books, including *The Mind and Its Stories: Narrative Universals and Human Emotion*; *Cognitive Science, Literature, and the Arts: A Guide for Humanists*; and *Understanding Indian Movies*:

Culture, Cognition, and Cinematic Imagination. He recently edited *The Cambridge Encyclopedia of the Language Sciences*.

Brigitte Hoppe obtained her state diploma in pharmaceutical and biological sciences from the University of Freiburg im Breisgau, her degree of Dr. phil. nat. from the University of Frankfurt am Main (1964), finished the habilitation in History of Science at the University of Muenchen (1972) and became Associate Professor of the Ludwig-Maximilians-University of Muenchen in 1980, where she developed a working group in the history of life sciences and chemistry. She published 7 books and more than 200 papers on the history of sciences. She was a member of the editorial board of *History and Philosophy of Life Sciences* for 10 years and is now a member of the editorial board of *Archives Internationales d'Histoire des Sciences*. She is an Effective Member of the *International Academy for History of Science* and member of several national and international Societies for History of Sciences.

Lui Lam, humanist and physicist, obtained his BS (First Class Honors) from University of Hong Kong; MS., University of British Columbia; PhD, Columbia University. He did his PhD thesis at Bell Labs. Lam invented Bowlic liquid crystals (1982), Active Walks (1992), and two new disciplines: Histophysics (2002) and Scimat (Science Matters) (2007/2008). He has published 16 books and over 180 scientific papers; the books include *Introduction to Nonlinear Physics* (1997), *Arts: A Science Matter* (2011) and *All About Science* (2014). He is the founder of the International Liquid Crystal Society (1990); cofounder of the Chinese Liquid Crystal Society (1980); founder and editor of two book series, "Science Matters" (World Scientific) and "Partially Ordered Systems" (Springer). Lam is an editor of *Physics* and *Science Popularization*. His current research is in scimat and complex systems; scimat website: www.sjsu.edu/people/lui.lam/scimat.

Bing Liu obtained his BS from Peking University (physics department) and M.Sc. from the Graduate School of Chinese Academy of Sciences. Now he is a professor of history of science at Tsinghua University, vice director of the Center for Science Communication and Popularization of

CAST and Tsinghua University, and a Guest Professor at some universities in China, such as Shanghai Jiaotong University. His current research include history of physics, historiography of science, philosophy of science, and science communication. He published 17 books (and translated 7 books, edited more than 30 books), over 130 academic papers, and many notes.

Dun Liu, former Director of the Institute for the History of Natural Science, Chinese Academy of Sciences (1997-2005) and past President of the International Union of History and Philosophy of Science (2009-2013), is currently Professor Emeritus of the Institute and Professor of Tsinghua University at Beijing. His main research field is Chinese mathematics/astronomy and its interaction with the social context, especially in the Ming-Qing transitional period (c. 17th century). Also serving as editor-in-chief of the bimonthly journal, *Science & Culture Review*, he currently focuses on such historiographic and cultural topics as the “Needham question” and the “C. P. Snow thesis”.

John Onians, studied Classics at Cambridge University and Art History at the Courtauld and Warburg Institutes, London University, before being appointed Lecturer, Senior Lecturer and Professor at the University of East Anglia. He was founding editor of the journal *Art History* and founding Director of Research and Academic Programs at the Clark Art Institute, Williamstown, Mass and has been a Getty Scholar and held Fellowships at the Center for the Advanced Study of the Visual Arts, Washington, and the Wissenschaftskolleg, Berlin. He has published numerous books including, *Art and thought in the Hellenistic Age: The Greek World View 350-50BC* (1979), *Bearers of Meaning: The Classical Orders in Antiquity, the Middle Ages and the Renaissance* (1988) and *Classical Art and the Cultures of Greece and Rome* (1999), and he edited the first *Atlas of World Art* (2004). He is now writing *European Art: A Neuroarthistory*.

David Papineau, professor of Philosophy of Science in the Department of Philosophy at King's College London, has a B.Sc. in Mathematics from the University of KwaZulu-Natal, and a B.A. and a Ph.D. in Philosophy from Cambridge University. He was President of the British

Society for the Philosophy of Science (1993-1995) and President of the Mind Association for 2010. He was editor of the British Journal for the Philosophy of Science (1993-1998), a Leverhulme Research Fellow (1999-2000), and a Mind Fellow (2007). His books include *Theory and Meaning* (1980), *Philosophical Naturalism* (1993), and *Thinking about Consciousness* (2002).

Kok Khoo Phua was born in 1942 in Singapore. He obtained his BSc DIC from Imperial College, London and PhD in Mathematical Physics from the University of Birmingham, UK in 1970. He is a Fellow of American Physical Society. He is currently the Chairman and Editor-in-Chief of World Scientific Publishing Company. He is the Founding Director, Institute of Advanced Studies (IAS), Nanyang Technological University (NTU) Singapore and Adjunct Professor, Department of Physics, National University of Singapore (NUS).

Nigel Sanitt obtained his BS from Imperial College London and Part III of the Mathematics Tripos and PhD from Cambridge University. He trained as an astrophysicist at the Institute of Astronomy, Cambridge, before becoming a lecturer at University College, London University. He is founder and editor of *The Pantaneto Forum*. The journal aims to promote debate on how scientists communicate, with particular emphasis on how such communication and research skills can be improved through a better philosophical understanding of science.

Ivo Schneider is Professor emeritus for the history of science of the Universität der Bundeswehr München. He was professor and visiting professor at the universities of Munich, Princeton, Bielefeld, the university of Minnesota in Minneapolis and the technical university of Budapest. He is cofounder, editor, coeditor and reviewer of several journals and series of the history of science and the history of mathematics. Special research interests concern the history of classical probability theory, mathematical practitioners and reckoningmasters in the 16th and 17th centuries, scientific instruments in the 17th and 18th centuries, biographies of scientists, science theater and the origins of Bavarian optical industry in the first half of the 19th century. His books

comprise a source book of the history of probability theory up to Kolmogorov and biographies of Archimedes, Johannes Faulhaber and Isaac Newton. He is a member of different national and international societies for the history of science and ever since 1995 membre effectif of the Académie Internationale d'Histoire des Sciences. His autobiography was published in 2004 in a volume devoted to his 65th birthday. In the same year he was honored with the degree of a Doctor honoris causa by the technical university of Budapest.

Michael Shermer is the founder and editor of *Skeptic* magazine, a contributing editor and monthly columnist for *Scientific American*, and the host of the Skeptics Distinguished Lecture Series at Caltech. He is the author of *Science Friction*, *The Science of Good and Evil*, *Why People Believe Weird Things*, *How We Believe*, *In Darwin's Shadow*, *The Borderlands of Science*, and *Denying History*. Shermer received his PhD in the history of science from Claremont Graduate School.

Robin Warren was born in 1937, in Adelaide, South Australia. He graduated MB, B. from the University of Adelaide in 1961. After training at the Royal Melbourne Hospital, he was admitted to the Royal College of Pathologists of Australasia in 1967. Since then, he was a senior consultant pathologist at the Royal Perth Hospital in Western Australia, becoming emeritus consultant pathologist in 1998. In 2005 he (together with Barry Marshall) was awarded the Nobel Prize in Physiology or Medicine for the “discovery of the bacterium *Helicobacter pylori* and its role in gastritis and peptic ulcer disease.”

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Lui Lam, humanist and physicist, obtained his BS (First Class Honors) from University of Hong Kong, MS from University of British Columbia, and PhD from Columbia University. He is a physics professor at San Jose State University, California, and Adjunct Professor at Chinese Academy of Sciences *and* the China Association for Science and Technology. Lam invented Bowlics (1982), one of three existing types of liquid crystals in the world; Active Walks (1992), a new paradigm in complex systems; and two new disciplines: Histophysics (2002) and Scimat (Science Matters, 2007/2008). He published 15 books and over 180 scientific papers. He is the founder of the International Liquid Crystal Society (1990); cofounder of the Chinese Liquid Crystal Society (1980); founder and editor of two book series: Science Matters (World Scientific) and Partially Ordered Systems (Springer). His current research is in scimat, histophysics and complex systems. *Email: lui2002lam@yahoo.com*