

**International Study Group on the Relations Between
HISTORY and PEDAGOGY of MATHEMATICS
NEWSLETTER**

AN AFFILIATE OF THE INTERNATIONAL COMMISSION ON MATHEMATICS
INSTRUCTION

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Calendar

1996 April 12 - 14 Lancaster, England
HIMED 96, the annual History in Mathematics Education meeting sponsored by the British Society
for the History of Mathematics. (See inside for more details.)

1996 April 25 - 28 San Diego
Annual meeting of the National Council of Teachers of Mathematics and of the Americas Section of
HPM. (See inside for more details.)

1996 May 30 - June 1 Niagara Falls, Canada
Annual meeting of the Canadian Society for the History and Philosophy of Mathematics. (See
inside for more details.)

1996 June 1 London
Second International Conference on the history of recreational mathematics. For information,
contact Professor David Singmaster, Dept. of Computing and Mathematics, South Bank University,
London SE1 0AA, UK; email: zingmast@vax.sbu.ac.uk

1996 July 14 - 21 Seville

ICME - 8. (Eighth International Congress on Mathematical Education) To receive the first and second announcements, send your name and address to ICME-8, Apartado de Correos 4172, E-41080 Sevilla, SPAIN. ICME-8 can also be accessed on the World Wide Web: <http://icme8.us.es/ICME8.html>. (See inside for more details.)

1996 July 24 - 30 Braga, Portugal

Quadrennial International HPM meeting in connection with ICME, also including the Second European Summer University on History and Epistemology in Mathematics Education. (See inside for more details.)

1996 September 20-22 Cambridge, England

Autumn residential meeting of the British Society for the History of Mathematics. The topic is Modelling the World: A Prehistory of Applied Mathematics. For more information, contact Steve Russ, Department of Computer Science, Warwick University, Warwick CV4 7AZ, UK; email: sbr@dcs.warwick.ac.uk

1996 November 7 - 10 Atlanta

Annual meeting of the History of Science Society. This meeting will include several sessions on the history of mathematics. For more information on the program, contact the program chair, Karen Parshall, Department of Mathematics, University of Virginia, Charlottesville, VA 22903-3199; email: khp3k@virginia.edu.

1997 January 8 - 11 San Diego

Annual meeting of the American Mathematical Society and the Mathematical Association of America. There will be sessions dealing with the history of mathematics and its use in teaching. Details will be forthcoming in a future Newsletter.

1997 July 25 - 30 Liège, Belgium

Twentieth International Congress of the History of Science. The main theme of the congress will be Science, Technology and Industry, but there will be sessions devoted to the history of mathematics. For more information, contact XXth International Congress of History of Science Congress Office, Centre d'Histoire des Sciences et des Techniques, Université de Liège, Avenue des Tilleuls 15, B-4000 Liège, BELGIUM; tel: 32 41 66 94 79; fax: 32 41 66 95 47.

From the Editor

Victor J. Katz

Since I have been editing this *Newsletter* for close to eight years (two four-year terms), it is now time for me to pass on this task to someone else. I have very much enjoyed the editing and the chance it gave me to meet so many people from all over the world interested in using history in the teaching of mathematics. But the time has come to pass on the editorship so that I can concentrate on other matters. I would be happy to talk to anyone who is interested in taking over the position, to explain what has to be done and what costs your school or university might be requested to bear. Although the *Newsletter* could be edited by someone from abroad, it would probably be simpler to have an editor in the United States, primarily because the U.S. mailing list of about 1500 is approximately equal to the total for the rest of the world. And I assume that the only way a school or university would agree to cover at least part of the costs of printing and mailing those 1500 copies would be for a faculty member to be serving as editor. As you all know, we are raising limited funds to support the *Newsletter*, but so far these funds are not sufficient to pay commercial rates for printing and mailing.

Please think about volunteering to become the next editor of the *Newsletter*. I can promise you a most exciting experience. If you need more information or would like to talk about the position, please contact me by email at vkatz@udcvax.bitnet or by phone at 202-274-5374.

Scotland's Mathematical Heritage: Napier to Clerk Maxwell

Neil Bibby

This meeting, cosponsored by the British Society for the History of Mathematics and the Edinburgh Mathematical Society, was held at the Royal Society of Edinburgh on July 20 and 21, 1995. It was a great treat to be able to enjoy the conference in such a splendid environment, with fascinating portraits of Edinburgh scientific figures, including some of those whose work was under discussion.

The talks themselves provided us with interestingly varied content, and were presented in stimulatingly varied styles. On the first day, Antoni Malet, our visitor from Barcelona, bravely led off with an account of recent researches on James Gregorie, while John Fauvel treated us to a hilarious discussion of Sir Thomas Urquhart's loquacious and long-forgotten *Trissotetras* (1645). This was followed by a splendidly clear account of the work of James Stirling by Ian Tweddle, including a particularly interesting discussion of the formula for $n!$ now known as "Stirling's formula" (1730). After tea Ivor Grattan-Guinness discussed Scottish reactions to French mathematics in the early nineteenth century, and Alex Craik introduced us to the talented but little-known figure of John West, who worked as a pastor in Jamaica for the second half of his life after failing to find paying mathematical employment in Scotland.

The first day ended with a comprehensive survey of the life and work of James Clerk Maxwell by D. Forfar, setting Maxwell's innovations within the intellectual climate of his time. This was perfectly complemented for many of us by a visit immediately afterwards to Maxwell's birthplace, 14 India Street, nearby in the New Town. Here Professor Richie shoed us round the splendid recently-restored house, which now functions as the International Centre for Mathematical Sciences (ICMS) in addition to housing a small museum containing various items of Maxwelliana.

The meeting was delighted to welcome the distinguished American Maclaurin scholar Judith Grabiner. Her Friday morning talk was for me an overwhelmingly satisfying synthesis of mathematics, social history, and the contemporary economic and political context. She described Maclaurin's work of 1735 on calculating the volumes of barrels in relation to the background of British colonial interests in the Caribbean (sugar plantations, slave labour, &c.) and the concomitant domestic increase in alcohol consumption (particularly rum, which is molasses-based). These events, over about fifty years, led to duty on alcohol being an important source of income for the Customs and Excise, and hence to the need for simple and accurate ways of determining the volumes of barrels.

Other talks in the morning were Robert Rankin's elegant and lucid account of the life and work of Robert Simson, and two nineteenth-century contributions: June Barrow-Green on the mathematical scene in Edinburgh 1860-1901, and closely related, Chris Pritchard's very comprehensive account of the life and work of P. G. Tait.

Following a generous buffet lunch, there were further contrasting talks. Crosbie Smith spoke on the ideology and motivation of Thomson and Tait's natural philosophy, while John Amson discussed Kelvin's development of analogue devices for tidal calculations. In a final brief contribution before tea, Edmund Robertson demonstrated that historians of mathematics need not be technological

retrogressives if they resort through the Internet to the MacTutor History of Mathematics Archive. There was not time, alas, to have an open discussion of the more contentious aspects of this ambitious project.

After tea, the gathered ensemble trooped off in minibus and taxis to Napier University, built around the splendid Merchiston Tower, birthplace (in 1550) and home of John Napier. Here we were treated to two fascinating talks on Napier. The first, from Tom Whiteside, dramatically revised the commonly-held "Napier invented logarithms" thesis by pointing out that the idea was not startlingly novel; that the anciently-known pairing of numbers in arithmetical and geometrical progression had proliferated from the middle of the previous century; that such a pairing, for base number 1.0001, was calculated by Jost Bürgi before 1610; that Napier certainly moves beyond Bürgi's work by using ideas of instantaneous motion (in effect, a differential equation, though such concepts go back to the work of medieval calculators such as Heytesbury and Oresme); but that an error in calculation put out the last of his 7 places. Neither his definition nor his way of calculating logarithms were in use ten years later, his books being rendered instantly obsolete by Henry Briggs's 14-place tables of 1624. The talk was illuminated by showing the use Napier might have made of a programmable calculator of the 1970s, a Texas TI 66.

The discussion after Tom's talk, stimulated by BSHM president Steve Russ, concluded that mathematical history is too complex for the simple ascription of particular pieces of mathematics to unique historical figures. Nobody, however, doubted Napier's importance in the development and marketing of the concept of logarithm. The president himself ended the meeting with a stimulating discussion of Napier's *Rabdologia* (1617), with practical demonstrations of the prophetic (essentially binary) calculations on a chessboard which it describes. The Napier celebration concluded fittingly with a very pleasant reception in the Tower itself, generously provided by Napier University.

Annual Joint Mathematics Meetings in Orlando

There was much of interest to readers of this *Newsletter* at the annual joint meetings of the American Mathematical Society and the Mathematical Association of America, held in Orlando January 10-13, 1996. In particular, there was a special evening session of presentations by participants in the Institute in the History of Mathematics and Its Use in Teaching. Some of the presenters were reporting on the projects they had begun at the Institute and others were reporting on other work they had done dealing with the use of history in the teaching of mathematics. Gary Stoudt (Indiana University of Pennsylvania) reported on "Using original sources in class"; Fredric J. Zerla (University of South Florida) showed how "Galileo and Maria Gaetana Agnesi examined infinitesimals;" and C. Edward Sandifer (Western Connecticut State University) discussed "De Beaune's proof of the Pythagorean theorem." We also heard from Stacy Langton (University of San Diego) on how to use "Euler's discovery of the gamma function in a math history course;" from Kim Plofker (Brown University) on "Problems and puzzles in history of mathematics research," with most of her examples coming from her own work in the history of Indian mathematics; and from Gary Cochell (Culver-Stockton College) on "The early history of the Cornell University Mathematics Department."

There were two joint presentations. First, Leon Cohen (Hampden-Sydney College), Joyce Janiga (Paradise Valley Community College), and Marian W. Smith (Florida A&M University) reported on "Benjamin Banneker and double position." Kristen Haring (University of North Carolina, Chapel Hill), Kenneth L. Jones (American University), and Laura B. Smith (North Carolina Central University) had also contributed to his work. Second, Steve Butcher (University of Central Arkansas), Charles B. Pierre (Clark Atlanta University), and Harry B. Coonce (Mankato State

University) discussed "The report of the Committee of Fifteen in 1912: How it affected the secondary curriculum." Finally, Agnes Tuska (California State University, Fresno) outlined "The historical development of mathematics examinations," her report being on joint work with Lilian Metlitzky (California Polytechnic State University).

This special MAA session on The Uses of History in the Teaching of Mathematics drew an enthusiastic standing-room only crowd. It bodes well for the future of mathematics instruction that there are a growing number of college teachers using history and that more and more teachers are becoming interested.

Among other sessions of interest at the meeting were the AMS Special Sessions on the History of Mathematics, organized by Victor J. Katz (University of the District of Columbia) and Tom Archibald (Acadia University), and the MAA minicourse "The historical development of the foundations of mathematics," organized by Robert Brabenec (Wheaton College).

Ethnomathematics at the 1996 AERA Meeting

"Ethnomathematics: Yup'ik, Navajo, and Yoruba Examples" is the title of a poster session and symposium, to be presented in Section 2 of Division K (Teaching and Teacher Education), at the annual meeting of the American Educational Research Association (AERA) April 8 - 12, 1996 in New York City. The principal presenter, Jerry Lipka of the University of Alaska at Fairbanks, is director of a project to bring Yup'ik mathematics and science into the curriculum of the Yup'ik schools of southwest Alaska, a model for the integration of indigenous perspectives with schooling. He will discuss "The Centrality of the Body in Yup'ik Conceptions of Numeration, Orientation, and Patterns."

Claudia Zaslavsky, author of *Africa Counts* and *The Multicultural Math Classroom*, will elaborate on "numeration Systems Based on Grouping by Twenties," with examples drawn from the Yup'ik, Maya, and Yoruba (Nigeria) languages. University of Alaska professor Claudette Bradley will discuss "Symmetry and Tessellations in American Indian and Alaskan Native Designs." Yup'ik teacher-educator Esther Ilutski will illustrate applications in the classroom in her talk on "Yup'ik Patterns and Teaching Elementary School Children."

The session, #35.43, will take place on Thursday, April 11, 8:15-9:45 am, at the Hotel Sheraton, Versailles Ballroom, second floor.

HIMED 96

This fourth in the series of residential and international conferences on the value and use of history in mathematics education organized by the British Society for the History of Mathematics will be held at St. Martin's College, Lancaster, England on April 12-14, 1996. The aim of HIMED is to bring together researchers and teachers at all levels of education, to promote the use and awareness of historical sources in mathematics education, and explore in an exciting way issues around the educational use of history of mathematics. Past meetings in this series have established a fruitful interaction between those interested in the history of mathematics from a wide range of perspectives, including the research historian and the classroom teacher.

The format of the meeting is a mixture of talks, from teachers in England and elsewhere who have developed historical perspectives in their mathematics teaching, and workshop sessions to consolidate and develop the ideas further. These workshops, usually led by teachers, will develop ways of using history to help teach mathematics more effectively in the classroom.

The particular themes which HIMED 96 will focus on include

- viewing mathematics as a social and cultural development
- the use of historical material in the training of mathematics teachers
- specific attention to curriculum areas of number, algebra, shape, space and measure, data handling, and using and applying mathematics
- uses of technology for accessing, appreciating and using historical mathematical sources
- promoting cooperation between researchers in the history of mathematics and teachers of mathematics

Among the contributors to HIMED 96 are the following: Johnny Ball and David Singmaster (England): "Mathematics after dinner;" Evelyne Barbin (France): "The geometry of René Descartes;" Sue Burns (England): "Arab mathematicians solve quadratics and cubics by conic sections -- we use cabri & graphics calculators;" Jan Dangerfield (England): "Data handling;" John Fauvel (England): "History and the future;" J. V. Field (England): "Art and mathematics: Piero della Francesca;" Dédé de Haan (Netherlands): "Logarithms;" Torkil Heide (Denmark): "Shape, space and measures;" Ivan Tafteberg Jakobsen (Denmark): "Galileo's sector: a forgotten mathematical instrument;" Marjolein Kool (Netherlands): "Thinking twice about number;" David Lingard (England): "Interactive learning in ITT;" Jan van Maanen (Netherlands): "Power without powder, and joy without a stick: the force and fun of mathematics through the ages;" Kate Mackrell (England): "Strategies for the ignorant teacher: how to stay one step ahead of the students;" Robert Mitchell (USA): "Lewis Carroll's contributions to mathematics;" Irith Shillor (England): "Historical experiments in physics contribute to the development of mathematics;" David Singmaster (England): "Diophantine recreations;" Chris Weeks (England): "History of mathematics as a unifying tool;" Peter Wilder (England): "Using history of mathematics in ITT;" and Frances Willmoth (England): "Development of maths textbooks from late 16th to late 17th centuries."

For more information, or to register, contact John Earle, Maynard School, Denmark Road, Exeter EX1 1SJ, ENGLAND (email: c.j.earle@exeter.ac.uk). The full board and conference fee is £120 (£110 for BSHM members).

História e Educação Matemática: Deuxième Université d'Été Européen sur Histoire et Épistémologie dan l'Éducation Mathématique; ICME-8 Satellite Meeting of the International Study Group on the Relations Between History and Pedagogy of Mathematics

General Information

From 24 to 30 July 1996 the city of Braga, in northern Portugal, will host a major international conference on mathematics education. The main purpose of this conference is to bring together mathematics teachers and educational researchers from all over the world, to share their insights and experiences in using history of mathematics in the mathematics classroom. This meeting is timed to follow the International Congress on Mathematics Education, ICME-8, which is being held in Seville, Spain, July 14-21, 1996, so that many possible international participants will already be in Europe. Thanks to the generosity of the University of Minho, the costs are set at a very low level

to try to ensure that no participant is unable to attend on financial grounds. In addition, it is hoped that further funding can be found to support the attendance of teachers from the Third World.

More than 500 teachers and researchers have declared their intention to participate in this meeting, and the second announcement has been mailed to all of those people. This announcement has full details concerning the outline of the scientific program, the call for papers, registration fees, and information on accommodations in and near Braga. The second announcement also contains application forms to present papers, organize workshops, or suggest themes for panels. The abstracts of papers must be sent before March 31, 1996.

Braga-96 has two particular dimensions:

- It is the second European Summer University - the first was organized by the Instituts de Recherche sur l'Enseignement des Mathématiques (IREM) and held in Montpellier, France, in 1993 - which is a movement to bring together teachers from many countries to develop their knowledge and share their experiences of history and epistemology in mathematics education.
- It is the principal quadrennial meeting of the International Study Group on the Relations Between History and Pedagogy of Mathematics. The previous one was held in Toronto, Canada, in 1992. This study group is devoted to understanding and promoting the use of history of mathematics in mathematics teaching.

The HEM Braga 96 meeting is organized by the Portuguese Associação de Professores de Matemática (APM) and by the Department of Mathematics of the University of Minho and is supported by the Portuguese Society of Mathematics and by the Rector of the University of Minho.

Conference Themes

There will be two major themes:

- **MATHEMATICAL CULTURES ALL OVER THE WORLD.** It is the birthright of every young world-citizen to learn about mathematical ideas developed in each part of the world, and, depending on local conditions, this can be a significant dimension of mathematics education. It is hoped and intended that teachers from all parts of the world will be able both to contribute from their own knowledge and to take away new knowledge about the mathematics of other cultures to explore with their pupils back home.
- **MATHEMATICS, ARTS AND TECHNICS.** Mathematics has usually grown alongside and contributed towards the development of other arts, sciences and technologies. The connections can be explored historically both from the arts and sciences themselves and from the direction of applying mathematics in "mathematical modelling". Either way, it is immensely fruitful for students and teachers, leading to a fuller understanding of mathematics and increased enthusiasm for it.

Participants are encouraged to present papers and organize workshops on these two themes, but presentations in accordance with the general objectives of the Summer University and of the HPM Study Group are also welcome.

Types of sessions

- **Introductory lectures:** These lectures are one of the components of the Summer University and are addressed mainly to the great number of secondary teachers who will participate in this conference. The duration of these lectures will be 45 minutes in order to accommodate a reasonable number of topics. Due to these time limitations, these lectures will give only a very general panorama on each subject, so it is expected that presentations of papers and workshops on the same topic will add depth to the lectures.

There will be three streams in the subjects of the introductory lectures. Those subjects with confirmed speakers are listed below. Others will be added later.

Stream A - Mathematics in cultures: History of mathematics in Africa: Paulus Gerdes; China: Man Keung Siu; Islam: Ahmed Djebbar; Babylon: Eleanor Robson; Egypt: Victor J. Katz; pre-colonial Central and South America: Eduardo Sebastiani Ferreira; post-colonial Central and South America: Ubiratan d'Ambrosio.

Stream B - Mathematics as a science: Histories of trigonometry: Victor J. Katz; geometry: Evelyne Barbin; proof: Jesus Hernandez; logic and set theory: Alejandro Garciadiego.

Stream C - The connections between Mathematics, Arts and Technics: Mathematics & Technics: Ubiratan d'Ambrosio; Mathematics & Music: John Fauvel; Mathematics & Art: Florence Fasanelli; Mathematics & Culture: J. L. Montesinos; Algorithms: Steve Russ; Measuring instruments: Patrice Johan.

- **Practical workshops:** In these sessions, teachers and researchers with experience in using history will share their knowledge and expertise on classroom activities with other teachers. These sessions complement the introductory history lecture series by showing what can be achieved for pupils in the classroom by a historically informed and enriched teacher. It is expected that these sessions will assume a practical character, and many of them will include the reading and study of original mathematical texts. There will be two durations for workshops, 90 minutes and 3 hours. Proposals to organize a workshop must be sent to the Program Committee, via a form in the second announcement, no later than March 31, 1996.

- **Paper presentations:** Participants are encouraged to present papers on themes that they are keen to explore and share with others. These might be in connection with poster sessions, or might be free-standing, and are a very good way for delegates to find others with common interests and enthusiasms. Paper presentations will be 25 minutes in length, followed by 10 minutes for questions. Applications to present a paper or a poster session must be sent to the Program Committee, via a form in the second announcement, no later than March 31, 1996.

- **Panels:** Panels are opportunities for group discussion and working together on a theme. They are designed to address themes and topics through exploration of participants' views and experiences. Among the panels being organized are: History and Didactics: Luis Radford; Mathematical Proof in History: Jesus Hernandez and Victor J. Katz; History of Mathematics Education: Fulvia Furinghetti; "History of mathematics" as a University Subject: Jan van Maanen; History of Mathematics on the Internet: Jan van Maanen.

Language Policy

English, French and Portuguese will be the official languages of the meeting. If possible, there will be simultaneous translation in the plenary sessions. For the introductory lectures, paper presentations, and workshops, speakers must speak slowly and clearly, and are requested

- to speak in one of the official languages and have two sets of transparencies.
- to send to the Organizing Committee, not later than April 30, 1996, the transparencies to be translated into Portuguese.

Every room will have two overhead projectors. The speaking language and transparency languages of every session will be announced in the final program.

Other Information

The meeting will be held at the University of Minho, in Braga, an old imperial Roman city, situated in the north of Portugal, in the province of Minho. The river Minho, which has given its name to the region, is the natural border between the provinces of Minho in Portugal and Galicia in Spain. The population is slightly over one million. The climate in the region is mild and temperate; spring and autumn are very mild and pleasant; in winter the temperature rarely drops to 0°C and summers are not excessively hot. Travel and accommodation details are included in the second announcement. Most of the accommodations will be in Braga hotels; a limited number of rooms in university residences and in religious guest houses will also be available on a "first come, first served" basis.

Braga can be reached by train or taxi from Oporto (about 60 km distant). Oporto is served by daily flights from major European cities as well as from Brazil. Alternatively, one can fly to Lisbon and take one of several trains daily to Oporto and Braga. If you are coming from Seville, you can drive to Lisbon and on to Braga or take the special coach from Seville to Lisbon on July 21 and then take a train to Braga. (It is difficult to make direct train connections from Seville to Braga.)

Registration fees (18 000 Portuguese escudos - around US\$ 120 - if paid by May 31) will include conference proceedings, daily lunch, conference dinner, and one excursion in the vicinity of Braga, to be chosen from among a few possibilities.

There will be a WWW Home Page for this meeting. The URL is <http://www.math.uminho.pt/hem/hem-braga96.html>.

If you wish to receive the second announcement, please send a note to Eduardo Veloso, APM, Escola Superior de Educação de Lisboa, Rua Carolina Michaelis de Vasconcelos, 1500 Lisboa, PORTUGAL with your name, address, phone, fax, and e-mail. Please specify the language of your preference (English, French, or Portuguese). You may also send the information by fax to 351 1 7166424 or by e-mail to veloso@telepac.pt. In any case, to register you must send a completed registration form, included in the second announcement, to the address indicated in the form.

ICME-8 in Seville

The Eighth International Congress on Mathematical Education will be held in Seville from July 14 to 21, 1996. There will be much of interest to readers of this *Newsletter*, including three two-hour sessions conducted by HPM itself. These sessions will have two speakers each, plus a respondent. To reflect the international character of the meeting, the nine participants will be drawn from nine different countries. The sessions will address the following themes: The History of Mathematics and Pedagogical Problems; The History of Mathematics as a Cultural Approach to Solving

Problems; and Historical Problems in the Classroom. Some of the speakers will address these themes from the point of view of secondary teaching while others will deal with college level teaching. The final selection of speakers has not been made as of this writing, but these will be very exciting and stimulating sessions. There is plenty of time built into the schedule for discussion, so we invite all to attend and contribute their ideas.

In addition to the HPM sessions, Topic Group 16, History of mathematics and the teaching of mathematics, will have two ninety-minute sessions. Each of the two sessions will have a panel discussion considering one of the two following poles relative to the use of history in mathematics education: the use of history in the classroom and the use of history in mathematics education research. The principal aim is to get some perspective on how history has been used; thus the material at the sessions will be based on actual experiments and/or research.

- The use of history in the classroom: an overview of the different approaches actually experimented with; methodological implications of each approach; positive and negative aspects. Among the panelists in this session are Victor Katz (USA), John Fauvel (England), and Man Keung Siu (Hong Kong).
- The use of history in mathematics education research: fields in which history has been actually used; methodological constraints; evaluation of the effective contribution of history. Among the panelists in this session are Jena-Pierre Dorier (France), Niels Jahnke (Germany), Anna Sfard (Israel), and Maguy Schneider (Belgium).

For more information about the Topic Group, please contact Louis Charbonneau, Département de mathématiques, Université du Québec à Montréal, C. P. 8000, Succ. Centre-Ville, Montréal, QC H3C 3P8, CANADA; email: charbonneau.louis@uqam.ca.

Annual Meeting of Americas Section of HPM

The annual meeting of the Americas Section of HPM will take place on Friday, April 26 from 5:00 to 7:30 pm in connection with the annual meeting of the National Council of Teachers of Mathematics in San Diego. The session will be held in the Convention Center in Room 17B. There will be a short business meeting to elect officers for the next four years. A nominating committee is currently working on developing a slate for possible approval by those attending.

As of this writing, there are seven confirmed speakers at the scientific session. They are Shawnee L. McMurrin, "Women and the Educational Times;" James Tattersall, "Women and the Tripos Exam;" Barnabas Hughes, "Ratios of Points;" Karen Dee Michalowicz, "A Math Tour in England with Middle School Students;" Charles V. Jones, "Descartes' Pedagogy;" Art Johnson, "Math History in the Media;" and Michael H. Millar, "A New Way of Motivating the Operations and Properties of Fractions."

Discussions will as usual continue at dinner after the formal session ends. Come to San Diego and participate. We need input from everyone to insure that the Americas Section of HPM continues to have a strong influence in American mathematics education.

There are many talks in the regular NCTM session which will also be of interest to readers of this *Newsletter*. Among them are #169, "Calculating Women: 1600 Years of Beating the Odds," by Beverly W. Nichols (Thursday, 12:00-1:00); #174, "Making Connections through Mathematics History," by Barnabas Hughes (Thursday, 12:00-1:00); #248, "Mathematics from Different Cultures: Examples from the History of Mathematics," by Siegfried Haenisch (Thursday, 1:30-

2:30); #257, "The Mathematics of Codes through Literature and History: Tales from De-Crypt," by David Knee and William J. McKeough (Thursday, 1:30-2:30); #387, "The History of Mathematics: Hands-on Activities to Help Students Experience It," by Jay Greenwood (Friday, 8:30-11:30); #457, "Fractal Structures in Traditional African Culture," by Ron Eglash (Friday, 10:30-11:30); "Prealgebra with Pascal's Triangle -- Discrete Topics," by Erica Voolich (Friday, 12:00-1:00); #582, "African Cultural Materials: A Bridge to Mathematics," by Patricia Poole and Beatrice Lumpkin (Friday, 1:00-4:00); #668, "Come Meet Mersenne, Kovalevsky, Newton, and Pythagoras: History Comes Alive," by Kenneth L. Shaw, Doug Jones, Patricia S. Wilson, and Robert C. Moore (Friday, 3:00-4:00); #685, "Mathematics History as an Enthusiasm Generator for Students," by Sanderson M. Smith (Friday, 3:00-4:00); #775, "Making Connections between Ethnomathematics and the History of Mathematics," a panel discussion with Gloria Gilmer, Karen Dee Michalowicz, Ubiratan D'Ambrosio, Felix Browder, James Rauff, and Jolene Schillinger (Saturday, 9:00-10:00); #885, "Using the History of Mathematics to Build Cultural Bridges," by Lawrence Shirley (Saturday, 12:30-1:30); and #993, "Celebrating Native American Mathematics: The Anasazi, the Mayas, and the Incas," by Karen Dee Michalowicz (Saturday, 3:00-4:00).

Annual Meeting of the Canadian Society for History and Philosophy of Mathematics

The annual meeting of the CSHPM will take place at Brock University in Niagara Falls, Ontario from May 30 - June 1, 1996 in connection with annual Learned Societies Conference. As usual, there will be a special session, this year on the topic of Ancient Mathematics, which is being organized by J. Lennart Berggren of Simon Fraser University in Vancouver. The keynote address will be given by Alexander Jones of the University of Toronto. For more information on the meeting, contact the president of the Society, Tom Archibald at tom.archibald@acadiau.ca or the secretary of the Society, Glen Van Brummelen at gvanbrum@kingsu.ab.ca. The CSHPM home page on the World Wide Web will also provide up-to-date information on the meeting: <http://www.kingsu.ab.ca/~glen/cshpm/home.htm>.

Vita Mathematica: Historical Research and Integration with Teaching

This new volume, edited by Ronald Caliniger and just published by the Mathematical Association of America, provides another proof that the use of the history of mathematics in the teaching of mathematics at all levels is an idea whose time has come. V. Frederick Rickey demonstrates this in his article "The Necessity of History in Teaching Mathematics," and Reinhard Laubenbacher and David Pengelley give further details in their report on their courses taught entirely using original sources.

But to use history in the teaching of undergraduate mathematics, the instructor must be familiar with the history as well as the mathematics. *Vita Mathematica* will enable college teachers to learn the relevant history of various topics in the undergraduate curriculum and help them incorporate this history in their teaching.

For example, should calculus be approached from a geometric or an algebraic point of view? Judith Grabiner shows us how two important eighteenth century mathematicians, Colin Maclaurin and Joseph-Louis Lagrange, understood the calculus from these different standpoints and how their legacy is still important in teaching calculus today. We learn from Hans Niels Jahnke why Lagrange's algebraic approach dominated teaching in Germany in the nineteenth century. Some of the reasons for this are related to the appropriate foundations of the calculus, and so Wilbur Knorr traces the ancient history of one of the possible foundations, the concept of indivisibles. Even

though we generally do not use this concept formally today, many ideas for a heuristic approach to the calculus can be developed out of his study.

Have your students ever asked how you can tell that the antiderivative of $\exp(x^2)$ is not an elementary function and why even their computer algebra package doesn't produce a nice result? Man Keung Siu can help you answer this question as he develops the history of integration in finite terms so that your students can understand why some elementary functions have elementary antiderivatives while others do not.

Vita Mathematica contains numerous other articles dealing not only with calculus, but also with algebra, combinatorics, graph theory, and geometry, as well as more general articles on teaching courses for prospective teachers. In fact, the article of Gavin Hitchcock develops some important ideas for students through the dramatization of their history in two mathematical plays which you can produce in your classroom.

This volume, then, demonstrates that the history of mathematics is no longer tangential to the mathematics curriculum, but in fact deserves a central role. To order your copy of *Vita Mathematica* (ISBN 0-88385-097-4), call the MAA at 1-800-331-1622 (in the U.S.). The price is \$29.00 for MAA members and \$34.95 for non-members. To order from other countries, write to the MAA at 1529 18th St., N.W., Washington, DC 20036, USA and include credit card information.

Histoire et épistémologie dans l'histoire des mathématiques; Actes de la première université d'été européenne, Montpellier, 19 au 23 juillet 1993

L'Université d'été de Montpellier a rassemblé 244 participants: 132 participants français et 112 participants venus de 29 pays (Europe, Afrique et Amériques). Les apports de la dimension internationale de cette Université d'été doivent être resitués dans l'intérêt général d'une rencontre européenne d'enseignants et dans l'intérêt particulier présenté par le thème de l'Université d'été. D'une part, cette rencontre a confirmé qu'une approche culturelle des mathématiques et une approche historique de leur enseignement constituent des moyens efficaces pour établir des échanges, à un niveau international, sur l'enseignement des mathématiques. D'autre part, les mathématiques semblent "par nature" universelles: les enseignants en déduisent parfois assez vite que la manière de les enseigner est unique. Une approche historique et culturelle, en introduisant le temps et l'espace, permet de questionner ces présupposés et de s'interroger sur ses propres pratiques.

The *Proceedings* of the First European Summer University are now available in a new volume produced by IREM de Montpellier. Articles appear in either French and English, depending on the wishes of the contributor. They are grouped into seven themes:

1. The historical construction of mathematical knowledge
2. Introducing a historical perspective into the teaching of mathematics
3. The relationship between mathematics education and the culture
4. Epistemology and its relationship to didactics and pedagogy
5. History of mathematics in initial teacher training and in-service courses
6. Mediterranean Mathematics
7. Ethnomathematics

The articles under theme 1 are historical in nature, tracing the development of a particular topic. In particular, this section includes the plenary address "Géométrie non-euclidienne et naissance de l'axiomatique moderne," by Jean-Claude Pont. Under theme 2, many of the articles give explicit details on how a historical approach to a particular topic has been used in a mathematics class.

There is also the summary of a panel discussion on the role of history in mathematics education in various European countries.

Section 3 contain, among other articles, the plenary address by Leo Rogers entitled "The mathematical curriculum and pedagogy in England 1780-1900: social and cultural origins." Section 4 contains articles dealing specifically with didactics, including the role of constructivism in mathematics classes, while section 5 contains articles on the use of history of mathematics in teacher training and a report of a panel discussion on this issue comparing the role of history in France, Denmark, and the Netherlands.

Section 6 contains an article on medieval Bougie (where Leonardo of Pisa received much of his mathematical education) as well as the plenary address of Jens Hoyrup: "'Les quatre côtes et l'aire' -- sur une tradition anonyme et oubliée qui a engendré ou influencé trois grandes mathématiques savantes." Finally, section 7 contains articles on ethnomathematics in Colombia, the Ivory Coast, and Chile as well as the plenary address of Ubiratan D'Ambrosio: "Ethnomathematics, history of mathematics and the basin metaphor."

This very worthwhile volume can be ordered for 100 FF (plus shipping) from IREM de Montpellier, Université Montpellier II, Sciences et Techniques du Languedoc, Place Eugène Bataillon, 34095 Montpellier Cedex 5, FRANCE (tel: 67 14 33 83; fax: 67 14 39 09; email: irem@math.univ-montp2.fr.).

The Multicultural Math Classroom: Bringing in the World

All over the world, in all eras of history, people have developed mathematical ideas to meet their needs and interests. They count objects, measure quantities, invent calendars, plan buildings, design works of art, and even play games involving math. Although each society solves these problems in its own way, the concepts are common to all.

Claudia Zaslavsky's new book introduces a multicultural perspective to the elementary and middle-grade math curriculum, revealing how such a perspective can enrich the learning of all students, whatever their gender, ethnic/racial heritage, or socioeconomic status. Students learn that mathematics was created by real people attempting to solve real problems. They're asked to solve the same kinds of problems and to extend their problem-solving skills to issues within their communities.

Zaslavsky begins by presenting a rationale for multicultural math education and describing the work of several educators. Then, she focuses on the activities themselves, providing practical suggestions and real-life applications. Children have the opportunity to learn counting words in different languages and locations of the societies under discussion. The book provides background information on each topic's history and development, as well as references for both teachers and students.

The Multicultural Math Classroom inspires cooperation, creativity, and critical thinking. Students of diverse interests and achievement levels will take pride in the contributions of their people and learn to appreciate the accomplishments of others.

The book can be ordered from Heinemann Publishers, 361 Hanover Street, Portsmouth, NH 03801-3912, USA for \$23.50 plus \$3.50 for shipping and handling in the U.S; you can also phone 1-800-541-2086 or fax 1-800-847-0938 with credit card information.

Mathematics in Africa

Until recently, it was extremely difficult to find reliable information on the history of mathematics in Africa other than in Egypt. In recent years, however, many researchers both in Africa and elsewhere have begun to fill in this major gap in our knowledge of mathematical history. A long article by Paulus Gerdes, "On Mathematics in the History of Sub-Saharan Africa," accompanied by an extensive bibliography, appeared in *Historia Mathematica* in August, 1994 (Vol. 21, 345-376). Gerdes had written a similar report in the *Newsletter* of the African Mathematical Union Commission on the History of Mathematics in Africa (No. 9 (1992), 3-32). In the *AMUCHMA Newsletter* 15 (1995, 3-41), there appears a complementary article by Ahmed Djebbar entitled "On Mathematical Activities in North Africa Since the 9th Century." We include here the first part of that article. Those interested in reading the entire article and in receiving the *Newsletter* regularly are urged to contact AMUCHMA in care of Paulus Gerdes, P.O. Box 915, Maputo, Mozambique; fax: 258-1-422113).

ON MATHEMATICAL ACTIVITIES IN NORTH AFRICA SINCE THE 9TH CENTURY: BIRTH AND FIRST DEVELOPMENTS OF MATHEMATICAL ACTIVITIES IN THE MAGHREB (9TH-11TH C.)

Ahmed Djebbar

Taking into account the very close economical, political and cultural links which were woven between the Maghreb and Moslem Spain throughout the Middle Ages, and taking into account the quantitative and qualitative importance of the transmission of the scientific production of each of these regions to the other, it seemed necessary for us to briefly recall the genesis and the most important aspects of the development of mathematical activity in the cities of Moslem Spain. This could also help the reader to better appreciate the strong lines of orientation of mathematical activity in the Maghreb by placing them into a larger -- but more natural for the epoch -- cultural and scientific context, that is that of the Moslem West.

In fact, the period that extends from the end of the 8th century to the end of the 11th century is characterized by the development, in the Maghreb and in Moslem Spain, of two more-or-less linked scientific traditions encouraged by scholars who, beyond the social contradictions and the differences of statute or of religion, were relatively united both by the way of life of the Islamic city and by the cultural and scientific environment that had been established favouring different human contributions and multiple contacts with scientific foyers of the Moslem East.

Having said this, we have to note immediately that the birth and the first steps of scientific activities in Moslem Spain and the Maghreb are not well known. In fact, and to limit ourselves to our discipline, one has to recognize that testimonies concerning the beginning of mathematical activities in these two regions of the Moslem West are rare and not very specific. Speaking of the scientific activities during the period that follows the Moslem conquests in Spain, the bio-bibliographer of the 11th century, Sa'id al-Andalusi, says that "the country remains indifferent to all sciences, with the exception of those of Law and the Arabic language, until the day that the power passes definitely to the Umayyads," that is, around the middle of the 8th century. For his part, Ibn Juljull, another Andalusian bio-bibliographer who lived in the 10th century, leaves us to understand that, until the epoch of the fourth Omeyyad caliph, 'Abd ar-Rahman II (826-852), the medical, philosophical and mathematical sciences did not have eminent representatives. But, in saying so, this author confirms implicitly the existence of men of science, understanding maybe that they had still not achieved the level of their colleagues of the East.

However that may be, it seems reasonable to us to think that, during the period of installation and consolidation of Moslem power in the first cities of Spain and of the Maghreb, that Medicine and Calculation were the first scientific disciplines to have benefited from teaching followed by the publication of works, and this to respond to the needs of certain well-to-do ranks of society of the cities, or to the solicitations of lawyers for the solution of certain problems such as those involved in land measurement or in the partitioning of inheritance.

THE ANDALUSIAN TRADITION

For what concerns Moslem Spain, it seems that since the beginning of the 9th century, the children of princes, of dignitaries or of well-to-do persons, have benefited from scientific teaching using the first copies of translations of Greek and Indian works, made in the foyers of the centre of the empire, and maybe even copies of the first Arabic teaching books that started to appear in Baghdad, from the end of the 8th century. This might have been the case of the children of the merchant and royal families, in particular those of 'Abd ar-Rahman II. One knows also that the last one, after becoming caliph, participated in his turn in the support and the dynamization of scientific activities by financing the establishment of an important library, and by providing it with books bought in the East. These caliphal initiatives, and probably other private initiatives, of which no precise testimonies have come to us, could only have favored the quantitative and qualitative development of scientific activities in the principal cities of Moslem Spain. However that may be, it seems that it is in this period, that is around the middle of the 11th century, that consequent scientific foyers started to exist on their own, in Cordoba and in other cities such as Toledo, Seville, Zaragoza and Valencia, which already knew relative economic prosperity. It is also in this period that one meets the first scholars whose names were transmitted by bio-bibliographers, together sometimes with some information on their profile or on their activities.

During the last third of the 9th century and throughout the 10th, teaching and research, in the different fields of mathematics, were given greater importance due to the patronage of the two great Omeyyad caliphs of the 10th century, 'Abd ar-Rahman III (912-961) and his son al-Hakam II (961-976). One sees thus a real research tradition being established around high level professors like Maslama al-Majriti (d. 1007), who wrote works of mathematics and astronomy rivalling those that were produced in the East in the same epoch, and one sees a greater and greater number of young researchers emerge, like Ibn as-Samh and az-Zahrawi, who dominated the scientific activities of the first half of the 11th century and whose books were an authority both in Spain and in the Maghreb.

At the internal level of scientific tradition, one does not always have direct and precise testimonies on the nature and content of the exchanges that took place, during this period, between, on the one hand, the East and the West, and, on the other hand, between Moslem Spain and the Maghreb. But the analysis of the mathematical texts that came to us allows us to say that students, teachers, and researchers had at their disposal initially translations of fundamental Greek texts, such as Euclid's *Elements*, Ptolemy's *Almagest*, Apollonius' *Conic Sections*, and Archimedes' *On the Sphere and the Cylinder*, and other works of less importance but essential to the training of a future mathematician or a future astronomer, such as Euclid's *Data*, Archimedes' *Lemmas*, and Menelaus' *Sphaerica*. Later (or maybe simultaneously in the case of Algebra), one studied certain works of Arabic scholars from the East, like the *Book on Indian calculation* and the *Book of Algebra* by al-Khwarizmi (d. 850), the *Treatise of the secant figure* and the *Treatise on amicable numbers* by Thabit Ibn Qurra (d. 901), the book of Banu Musa (9th c.) on *The measure of plane and spherical figures*, the *Book of Algebra* of the Egyptian Abu Kamil (d. 930), as well as other writings of the same epoch, like the *Epistle on proportion and proportionality* and *Epistle on similar arcs* by Ahmad Ibn ad-Daya (d. 944), another mathematician from Egypt.

THE MAGHREBIAN TRADITION

Concerning the Maghreb we may say that the testimonies which have come to us on scientific activities between the 9th and the 11th century allow us to think that the beginning of mathematics, in this region of North Africa, took place in Ifriqiya and more precisely at Kairouan, from the end of the 8th century and that these activities have remained confined within the limits of this region for a long time. Some names of scholars have come to us, like that of Yahya al-Kharraz and that of his pupil Yahya al-Kinani (828-901), author of the first Maghrebian book of Hisba (which deals with the rules of commercial transactions at the market places). Maghrebian sources cite also Shuqran Ibn 'Ali who was a specialist in Calculation and in the Science of Inheritance and who is perhaps the first Maghrebian to have written a book on the partitioning of successions. According to the testimony of Ibn Khays (12th c.), the content of this book was still taught in the 12th century, at Bougie, a scientific metropolis of the Central Maghreb.

For the 9th century, the name of only one mathematician has survived. It is that of Abu Sahl al-Qayrawani, whose parents were natives of Baghdad. He is also the first known Maghrebian mathematician of whom the title of one of his treatises has come to us. It is called *Book on Indian calculation*. As its title clearly indicates, this book belongs to the new Arabic arithmetical tradition, of Indian origin, which started at the end of the 8th or at the beginning of the 9th century, in the handbooks of the mathematicians of the East.

It seems that it was the eminent role played by Kairouan in the theological debates, at the Aghlabid epoch (800-910), that attracted numerous intellectuals from the East to Ifriqiya, such as Abu Sahl and, among them, of men of science educated in arithmetical and geometrical techniques that could serve, in particular, to solve problems of land measurement or inheritance.

As in the other regions of the countries of Islam, the patronage in favor of scientific activities existed in the Maghreb between the 9th and the 11th century, and functioned in the image of that of the great metropolis of the East: buying of books, financing of copies of manuscripts, remuneration of scholars, construction of schools or institutions. This is not surprising if one knows the links which are woven between the caliphate of Baghdad and the Aghlabid dynasty that had governed Ifriqiya until the beginning of the 10th century, and when one knows that the kings of this dynasty imitated both the model of government of the caliphs and their initiatives in favor of science and culture in general.

However, the only information we have, with respect to this patronage, concerns the House of Wisdom founded by Ibrahim II (875-902) and that bears indeed the same name as of that famous institution created by the Abbassid caliph Harun ar-Rashid (786-809), who has played a great role in the phenomenon of translation of Greek and Indian scientific works. This institution, which survived its founder as a scientific center until the arrival of the Fatimid dynasty would have received mathematicians, astronomers and astrologers, such as at-Talla and 'Uthman as-Sayqal.

The mathematical activities in the Maghreb during the 10th century are very little known. It seems that the patronage started by the Aghlabids, in the 9th century, was continued and profited Mathematics and Astronomy, in particular in the course of the first two decades of the government of the Fatimid caliph al-Mu'izz. However, nothing has come to us in the form of scientific documents which might inform us about the content of that which was produced or taught at that time. The biographers have only retained some names of persons who made themselves known by their activity in mathematics or by their interest in this discipline. As examples, one may cite al-'Utaqi al-Ifriqi, Ya'qub Ibn Killis (d. 990), and al-Huwari (d. 1023).

We are relatively better informed on the mathematical activities of the 11th century. But our knowledge remains still very fragmentary. Certain scholars of this period are better known. This is the case of Ibn Abi ar-Rijal (d. 1035), who published works in Mathematics and Astronomy, which have not come down to us, and who was equally interested in Astrology. It is indeed due to this last discipline that he has been known in Europe since the 12th century, as his book *The brilliant book on the judgments of the stars* was translated by Constantine the African. This is also the case of Abu s-Salt (d. 1134), a native Spanish scholar, who spent most of his life in Egypt and then in Ifriqiya, and who published works concerning Geometry, Astronomy and Logic. Other mathematicians are less well known, such as 'Abd al-Mun'im al-Kindi (d. 1043) and Ibn 'Atiya al-Katib (c. 1016). We know that they occupied themselves with Geometry and Arithmetic, but we are still ignorant of their links with the different scientific foyers of their epoch and, in particular, about the circulation and the impact of their mathematical writings in the cities of the Maghreb.

Have You Read?

Ronald Calinger, ed.

This column welcomes references from across the history or pedagogy of mathematics, as well as other works with sections that have potential for encouraging and motivating students to learn mathematics better or that enrich courses. Please send citations with complete bibliographic information to the section editor c/o Department of History, Catholic University of America, Washington, DC 20064, U.S.A.

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