

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

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Calendar

- 1992 July 13-15 Göttingen
Third Annual Göttingen Workshop on the History of Modern Mathematics. This workshop, sponsored by the Mathematics and History of Science Institutes at the University of Göttingen will deal with four themes: Probability and Statistics, Connections between Mathematics and Physics, Historiographic Issues in the History of Mathematics, and the Genesis of Mathematical Ideas. For more information, contact Hans Becker, Niedersächsische Staats- und Universitätsbibliothek, Prinzenstrasse 1, D-3400 Göttingen, GERMANY.
- 1992 August 12-14 Toronto
International meeting of HPM preceding ICME-7. (See inside for more details.)
- 1992 August 17-23 Quebec
Seventh International Congress on Mathematical Education (ICME-7). Contact Congrès ICME-7 Congress, Université Laval, Québec, QC, G1K 7P4, CANADA or via fax to (418) 656-2000. (See inside for more details.)
- 1992 August 18-29 Kazan
Lobachevsky and Modern Geometry. For details, contact V. Vishnevsky, Department of Mathematics, University of Kazan, ul. Lenina 18, 420108 Kazan, RUSSIA
- 1992 September 11-13 Cambridge
Annual Residential Meeting of the British Society for the History of Mathematics. The theme of the meeting will be European mathematics. Contact the Secretary, J. Helen Gardner, 25 Hollow Croft Road, Willenhall, West Midlands WV12 5YS, U.K. for information on the meeting and on membership.
- 1992 October 2-3 Oxford, Ohio
Fourth Midwest Conference on the History of Mathematics, sponsored by the Department of Mathematics and Statistics, Miami University. Contact David E. Kullman, Department of Mathematics and Statistics, Miami University, Oxford, OH 45056.
- 1992 October 24 London
History of Recreational Mathematics, organized by David Singmaster for the British Society for the History of Mathematics. (See inside for more details.)
- 1992 November 1-6 Tikal, Guatemala
Pan-American Conference on Pre-Columbian Mathematics, Astronomy and Modes of Thought. Contact Dr. Leonel Morales Aldana, FISICC, Universidad Francisco Marroquin, Apartado Postal 532-A, Guatemala, GUATEMALA.
- 1993 January 13-16 San Antonio
Joint Annual Meeting of the American Mathematical Society and the Mathematical Association of America. There will again be a Special Session in the History of Mathematics organized by Victor J. Katz (address

on first page) and Tom Archibald (Acadia University, Wolfville, Nova Scotia B0P 1X0, CANADA). The talks are by invitation, but contact one of the organizers if you are interested in making a presentation. Contact Hope Daly, AMS, P.O. Box 6887, Providence, RI 02940, U.S.A. for information on the meeting itself.

- 1993 August 22-29 Zaragosa
Nineteenth International Congress of History of Science. The Congress will consist of Symposia, which will address themes of special interest, Scientific Sections devoted to the various branches and periods of the history of science and technology, and Poster Sessions. The Director of the Program Committee is Prof. Jean Dhombres, Centre National de la Recherche Scientifique, Unité no. 21, 49 rue Mirabeau, F-75016 Paris, FRANCE. Contact either Prof. Dhombres or the Congress Office, Facultad de Ciencias (Matemáticas), Ciudad Universitaria, E-50009 Zaragosa, SPAIN; phone (76) 357-180; fax (76) 565-852; e-mail ichts@cc.unizar.es.
- 1994 October Newcastle, Australia
Third Australian History of Mathematics Conference. Details will be forthcoming at a later date.

HPM in Toronto

The quadrennial international HPM meeting will take place from August 12 to 14, 1992 at Victoria College of the University of Toronto. The scientific program will consist of six plenary talks of one hour each and approximately fifty shorter talks, arranged in parallel sessions, making this the largest international HPM meeting ever held. Most of the speakers were listed in the last two Newsletters, but a few additional ones have been added. A complete schedule will be mailed to all who have registered for the meeting by the end of June. The schedule will include the location where registration materials can be picked up. In

addition to the talks, there will also be a business meeting of HPM at which a new Chair will be selected and a new advisory board chosen. Please send your suggestions for new people to join the board and/or new countries who should be represented to Florence Fasanelli at the address on the front cover.

The social program at the meeting includes a guided tour to the Rare Book Room of the University of Toronto Library at 3:00pm on August 11, a banquet on the evening of August 12, a trip to Niagara Falls with lunch on the afternoon of August 13, coffee and tea breaks as well as lunch on August 12 and August 14, and a wine and cheese gathering on August 12 and probably also on August 14. There will also be book displays by several publishers. The registration fee to cover all of this is \$100 (Canadian). The fee for an accompanying guest is \$75 (Canadian). You can still register by using the registration form at the back of the Newsletter. You will even be able to register at the meeting. (Come to the Institute for the History and Philosophy of Science in Victoria College at 73 Queens Park Crescent, Toronto.) For last minute information, please contact Israel Kleiner, Department of Mathematics and Statistics, York University, 4700 Keele, North York, Ontario, CANADA M3J 1P3, or by phone at (416) 736-5250.

Accommodations will be provided at Victoria College. The room rates are \$42 (single) and \$60 (twin) (Canadian funds) and include breakfast each morning. The rooms are equipped as study bedrooms. Each room is provided with fresh linen, towels and soap. The washrooms are shared amongst the guests and are located a few steps from each room. Tennis courts on the premises are available upon request. One night's nonrefundable deposit is required to make a reservation. Reservations can still be made by calling Victoria College at (416) 585-4524 and using your credit card. Be sure you mention that you are attending the HPM meeting.

If you wish to stay at a hotel, you will need to make your own arrangements. Nearby ho-

tels, with approximate rates for doubles and telephone numbers, all with area code 416, include the Venture Inn (\$104; 964-1220), the Brownstone Hotel (\$61; 924-7381), the Carlton Inn Hotel (\$65; 977-6655), the Delta Chelsea Inn (\$95; 595-1975), and the Park Plaza Hotel (\$165; 924-5471).

HPM in Quebec

HPM will participate in ICME-7 itself in Quebec. We have been allotted four 90-minute sessions. There will be three themes of the sessions:

- History of Mathematics and Pedagogical Problems
- History of Mathematics as a Cultural Approach to Solving Problems
- Historical Problems in the Classroom

There will be two speakers in each session. The speakers and their topics (if available) are

- Otto Bekken (Agder College, Norway) *Abel and Uniform Convergence*
- John Fauvel (Open University, United Kingdom) *Empowerment Through Modelling: the Abolition of the Slave Trade*
- Paulus Gerdes (Higher Pedagogical Institute, Mozambique)
- Michèle Gregoire (Lycée Lavoisier, France) *History of Mathematics for the Classroom: the Volume of a Pyramid with Pupils*
- V. Frederick Rickey (Bowling Green State University, U.S.A.) *The Necessity of History in Teaching Mathematics*
- Maggy Schneider (Faculté Universitaire de Namur, Belgium) *Reactions of pupils facing the concept of "indivisible" and paradoxes resulting from undue use of this concept*
- Man-Keung Siu (University of Hong Kong, Hong Kong) *Integration in Finite Terms, from Liouville's Work to the Calculus Classroom of Today*

- Jan van Maanen (Rijksuniversiteit Utrecht, Netherlands) *New Maths May Profit from Old Methods*

Each of these speakers will speak for 35 minutes. For each of the four sessions, there will be a respondent to comment on the talks. The respondents are Frank Swetz (Pennsylvania State University, U.S.A.), Evelyn Barbin (Université Paris XIII, France), Hans-Niels Jaänke (University of Bielefeld, Germany), and Israel Kleiner (York University, Canada). The speakers will be introduced by Florence Fasanelli (SUMMA/MAA, U.S.A.), Victor J. Katz (University of the District of Columbia, U.S.A.), and Ubiratan D'Ambrosio (UNICAMP, Brazil). Each day, speakers will address the three levels of instruction, elementary, secondary and tertiary. Negotiations are underway with a publisher to publish these eight talks as well as some of the talks given in Toronto.

Put Toronto and Quebec on your calendar for August, 1992. There is much to see and do in both Toronto and Quebec, so bring your families and enjoy an exciting and stimulating twelve days.

HPM in Nashville

V. Frederick Rickey

The Americas Section of HPM held its annual meeting in Nashville, Tennessee on April 2 and 4, 1992, in conjunction with the annual NCTM meeting.

Joe Albree (Auburn University at Montgomery) described "Antebellum Reform in Geometric Instruction and the *Mathematical Monthly*." Thomas Hill (1818-1891) had a quasi-religious experience in 1843 that led to an educational reform program, especially the reform of geometry. His *First Lessons in Geometry* is (poorly) written in a linear didactic style but contains many diagrams and describes numerous geometrical objects omitted from our elementary books today, e.g., mathematics of the dandelion, curvature, evolutes, the cycloid, catenary, and the cows foot or caustic. One of Hill's books was

serialized in the *Mathematical Monthly* (1858–1861) of John D. Runkel (1822–1908). This was a research journal elastic enough to appeal to teachers. A third book, *Puzzles to Teach Geometry*, contains a version of the Chinese tangram of 1817. The pedagogical applications of this work were of great interest to the audience; several pages of it are reproduced in Karpinski's *Bibliography*.

Duane Deal (Ball State University) conducted a show and tell on his life as "Mathematical Bibliophile," by bringing along several of the books in his collection and describing their mathematical import. Recently he purchased a copy of Vince's *Fluxions*, the first calculus book published in this country (but written in England). It is described in Niccolò Guicciardini, *The Development of Newtonian Calculus in Britain, 1700–1800*. Maclaurin's *Treatise on Fluxions* (1742) was the first treasure that Deal purchased — quite inexpensively at a library sale. It is very important in the history of the calculus as a reply to Berkeley's *The Analyst*. Several other books were passed around, but undoubtedly the most interesting was a reprint of the manuscript of Calandri's 1491 *Arithmetic*. When HPM met in Ann Arbor in 1982, we examined a printed copy of this work, so it was most interesting to see this reproduction. Photocopies of several pages from these works were distributed, and we shall definitely be using them in class.

Karen Dee Michalowicz (Langley School, Mclean) gave an illustrated lecture on "Using Classroom Displays and Decorations in Middle School in Order to Enhance Mathematics through the History of Mathematics." She showed slides of her classroom, which was covered with laminated pictures of mathematicians (including, especially, women and minorities), posters on the history of mathematics, a history timeline which she made herself, and enough digits of π to reach around the room. If students share a birthday with a famous mathematician, then they are encouraged to present a report on 'My Mathematician' on their common birthday—and receive a little prize, such as

a tangram. Pascal really lives in "Mrs. Mikey's" classroom. She has a floor to ceiling white board and she starts Pascal's triangle at the top. Then the students add to it all year. This talk was loaded with ideas for using history in the classroom.

V. Frederick Rickey (Bowling Green State University) presented "Gauss and Wantzei on Constructing Regular Polygons." Carl Friedrich Gauss (1777–1855) is often credited with proving that a regular n -gon is constructible with straightedge and compass if and only if n is a product of distinct Fermat primes times a power of two. In Chapter VII of his *Disquisitiones arithmeticae* (1801), Gauss did prove the constructive "if" part of the result. He claimed the converse there — you can read it in the English translation published by Springer-Verlag, but it is tough going — but gave no proof and none has been found in his Nachlass. In fact, there is no evidence that Gauss gave a geometric construction of the 17-gon; he only proved algebraically that it could be constructed geometrically. The person who proved which regular polygons cannot be constructed was Pierre Laurent Wantzel (1814–1848) in a paper in 1837 entitled "Recherches sur le moyens de rennaitre si un Problème de Géométrie peut se résoudre avec le règle et le compas," *Journal de Mathématiques Pures et Appliquées* 2, 366–372. His proof is quite elementary and certainly uses no Galois Theory. In the same paper, Wantzel proved that the classical problems of duplication of the cube and trisection of the angle are impossible. These results should be presented to every high school geometry class. It is a good example of how history can be used to discuss advanced mathematics.

Karye O. Sowell (East Carolina University) discussed "Hamilton's Icosian Calculus." Her interest in this topic began in 1987 when she traveled to Ireland to conduct some genealogical research. One of her husband's ancestors was Richard Edgeworth, founder of the Irish Royal Academy. When she visited the Academy she learned that Edgeworth and William Rowan

Hamilton (1805–1865) were good friends. She saw a copy of Hamilton's Icosian game of 1856, and it was this that she described to us. It is played on the net of a dodecahedron (which has 20 edges, hence the name): One player chooses five adjacent vertices and the other then must complete (what we now call) the Hamiltonian path. The associated Icosian Calculus provides a nice example of a non-commutative algebraic system. Since it has a very intuitive geometric representation, the algebra provides a very nice classroom example. If you wish to know more, see the papers of Hamilton which have been reprinted in *Graph Theory, 1736–1936*, by N. L. Biggs, et. al.

HIMED 92

David Kullman

HIMED 92 (History in Mathematics Education) was held April 10–12, 1992, at Nottingham University, under the sponsorship of the British Society for the History of Mathematics. This sequel to HIMED 90 and HIMED 91 consisted of lectures and workshops exploring historical topics in mathematics teaching at all levels – primary through university. Some seventy persons, representing a dozen countries, attended.

The opening session featured five British teachers describing their experiences using history in the mathematics classroom. Paul Garcia (Harlow College) told of using historical topics such as the Mayan calendar or John Colson's "negative-affirmative arithmetic" in teaching adults preparing to become elementary school teachers. He also described a field trip for 11-year-olds to the mathematics section of the Science Museum. David Kaye (Paddington College) told how his numeracy course for a multicultural clientele was "saved by history of maths," as the latter helped bridge the gap from words to symbols. Nick Lord (Tonbridge School) advocated making use of "recent" mathematical history, citing Josiah Willard Gibbs and triple products in vector analysis as an example. Kathleen Shaw (Richmond Curriculum and Teachers

Centre) spoke about "maths in the Bible," including measurements of Noah's ark, the Ark of the Covenant, and the Temple. Paul Thornley (Hereford Cathedral School) summarized a teaching unit, "making algebra work for you," that focuses on the role of completing the square in solving quadratic equations from the Babylonians to Cardano.

Historical mathematics problems can be used to motivate modern students. Marjolein Kool (Schalkwijk, Netherlands) spoke about "New mathematics education in an old jacket." Kool teaches in a secondary school for unmotivated students, with a new curriculum that focuses on applications and problem solving. To provide more variety, she includes "unrealistic" problems from 16th century Dutch textbooks, illustrated with pictures from Calandri's arithmetic of 1491. She also assigns laboratory experiments in which her students replicate Archimedes' test of King Hiero's crown and find the height of a tower by the medieval method of using a mirror.

Anne Michel-Pajus and Evelyne Barbin (IREM - Université Paris) considered "The role of problems in the history and teaching of mathematics." Using concepts of linear algebra as an example, they noted that, historically, the passage to an axiomatic approach was very slow; that the role of solving systems of linear equations was fundamental; and that geometry was a favored field. Based on this historical approach, they designed a course that starts with linear systems, generalizes the concepts to other objects, then applies linear methods in different fields, and finally presents the axiomatic view as a unifying development.

Barbin and Michel-Pajus also gave a sneak preview of *Stories and Problems in the History of Mathematics* that is being produced by the Inter-IREM Committee. It will be a book on "the great problems" in the history of mathematics, designed to introduce mathematics by using history and give the reader a "taste for intellectual adventure." (Look for it at ICME-7 this summer.)

Torkil Heide (Royal Danish School of Educa-

tional Studies) spoke about "History of mathematics in the education of teachers." He referred to "winds of change" in the Danish system of education, due to a recent law that explicitly requires history of mathematics, along with mathematical structure and modeling, to be taught in Danish gymnasia. Textbook authors and teacher training programs are already responding, but some unresolved questions include: What is the goal of teaching history of mathematics? Who can and should do it? What are the pitfalls to be aware of?

Continuing to focus on curricular concerns, Janet Burt and Irith Shillor (King Alfred's College) described a historical component, intended as a humanizing factor, in their school's newly-validated curriculum for the B.Ed. degree. Patricia Perkins (City of London School for Girls), speaking on "The dilemmas of using history," noted that, although there is not lack of reasons why we should be doing it, the problems of when to find time to include history of mathematics in an already overcrowded curriculum and where to find historical materials suitable for students of various ages (especially 10 to 13 year-olds) remain. Kate Mackrell (Brighton Polytechnic) and Viggo Hartz (Vejlby School, Denmark) challenged conference participants to build on what has been done by taking ideas and materials back to their classrooms and using them.

Interspersed among the lectures were a dozen workshops that provided opportunities for an in-depth look at various topics from the history of mathematics. Workshop presenters and their topics were:

- Peter Ransom (Prudhoe County High School): "Sundials: from the Saxons to the Schoolroom"
- Jan van Maanen (Christelijk Gymnasium, Utrecht): "Using ruler and compasses to do justice: back to the middle ages"
- Jan Dangerfield (Penwith College): "Probability: divine justice or chance?"
- Evelyne Barbin (IREM - Université Paris): "Bolzano and the concept of function"
- Susan Tebby (Lutterworth): "Roman surveying: mathematics and art via Roman mosaic pavements"
- George Gheverghese Joseph (University of Manchester): "Vedic mathematics: algorithms for arithmetic in the work of the Indian scholar Tirthaji (1884-1960)"
- Frédéric Mètan (Lycée Val de Murigny, Reims): "Introducing probability to non-specialists with texts by Huygens, DeMoivre, and Montmort"
- Nick MacKinnon (Winchester College): "The binomial theorem as seen in the manuscripts of Newton and Leibniz"
- Helen Gardner (Bentley Drive Primary School): "Problems from history for the primary classroom"
- Sue Burns (Kings College, London) and Peter Wilder (William Ellis School): "Statistics: communication or dehumanization [as seen in the work of Florence Nightingale and Charles Dickens]"
- Anne Michel-Pajus (IREM - Université Paris): "Practical work with the Euler-Maclaurin formula [using original texts]"
- David Kullman (Miami University, Ohio): "Logarithms and exponents from Archimedes to modern times: some historical ideas for the classroom"

The conference featured two special events. A Saturday afternoon excursion to Green's Mill offered a visit to the home and workplace of Nottingham's miller-mathematician, George Green, founder of the 19th-century Cambridge school of applied mathematics. Green's biographer, Mary Cannell, gave a talk about his life and work.

Saturday evening Sir Christopher Zeeman (Hertford College, Oxford) gave an illustrated lecture on "Gears from the Greeks." The Antikythera mechanism, constructed at Rhodes about 50 B.C., represented the apparent motion of sun and moon to an accuracy of one part in 40,000. It gave a picture of the sky in which the

sun appears to move clockwise, and it may well have been the origin of our "clockwise" sense of direction.

Mathematics Resource Library at California State University, Northridge

Elena Anne Marchisotto

We have introduced a resource library at California State University, Northridge to provide an opportunity for faculty and students to learn about the history of mathematics and its applications and to help students broaden their conception of what mathematics is and how mathematics evolves. This library has also been useful to mathematics faculty who want to integrate writing into their classes.

The library was created in 1987 and has been growing ever since. It includes books, videotapes, journals, and newsletters that span many topics in mathematics. The holdings are eclectic, encompassing mathematically challenging expository works like the *Chauvenet Papers*, to books more suited to the general population, like *The Mathematical Tourist*. The library has several goals: to show historical and recent results in mathematics (with books like *Studies in the History of Mathematics* and *Mathematics: People, Problems, Results*); to provide guidelines for teaching (by including the writings of mathematics educators like Polya); to illustrate the scope of mathematics (using popular books like *Recent Revolutions in Mathematics* and *Journey Through Genius*); to demonstrate applications of mathematics to other fields (with books like *The Role of Mathematics in Science* and *The Fourth Dimension and Non-Euclidean Geometry in Modern Art*); to publicize the lives and works of mathematicians (with biographical works and anthologies).

The library has assisted professors in integrating writing in courses from the remedial to the graduate level. Instructors of remedial, pre-calculus, and calculus courses typically assign videotapes for students to view. The students then write an essay describing major concepts of

the video for a specific audience (for example, a fellow student who missed class, a high school sister, etc.). In mathematics classes for liberal arts students, instructors often make certain selections from the library and ask students to write "reactions to the readings." Students are also asked to write essays responding to questions posed by the instructor regarding specific books or articles. Term papers are also assigned to liberal arts students. They are invited to select a topic of interest (for example, art, literature, photography, contributions of women, etc.) and show the role mathematics plays in its history or in specific applications. In graduate courses, students select a topic related to the course but not covered in class and write a short paper on it. For example, students in an algebra class write about an area in algebra, describing it and relating it to other areas. They are told to include in their paper a discussion of mathematicians who have worked in the field, interesting results, unsolved problems, and applications to other parts of mathematics or different disciplines.

The reaction of faculty and students to the availability of this specialized library has been extremely positive. The effects of the writing assignments extend beyond the expected benefits of "writing to learn mathematics" that have been documented in the literature. Student attitudes improve when they discover that mathematics is a "human" endeavor, with a complex history and a promising future. For faculty and students alike, the library is a vehicle for exposure to the richness of what mathematics is and the significance of what mathematicians do.

Readers can write to Professor Marchisotto for more information on the library holdings. Her address is Department of Mathematics, California State University Northridge, Northridge, CA 91330.

CSHPM in Charlottetown

Tom Archibald

The eighteenth annual meeting of the Canadian Society for the History and Philosophy of Mathematics was held on May 28 and 29 in Char-

lottetown, Prince Edward Island. The following talks were of particular interest to HPM readers.

Michael P. Closs, University of Ottawa: "The Ancient Maya: Mathematics and Mathematicians." Closs's investigations of a number of texts and decorated pots permit an assessment both of the nature of Maya mathematics (primarily calendrical) and of the social status of the mathematician. Closs argues that mathematicians belonged to the scribal class, a group which had permeable boundaries with the minor aristocracy; and that mathematical scribes and literary scribes formed distinct subgroups, at least in some periods and places. There is solid evidence that both women and men acted as mathematicians in Maya society.

Sharon Kunoff, Long Island University: "Some Inheritance Problems in Ancient Hebrew Literature." Kunoff discussed what are more usually termed medieval Hebrew writings, notably the works of Saadia Gaon. Several inheritance problems were discussed illustrating the difference between the Muslim "proportional division" model and the Jewish "probabilistic" approach to resolving paradoxes in legacies. Some of the problems mentioned are sufficiently non-realistic to transcend legal rules of thumb.

Israel Kleiner, York University: "Aspects of the Evolution of Commutative Algebra." Kleiner discussed the progressive generalizations of the number concept associated with attempts to solve the Fermat problem, and with the study of quadratic residues and quadratic forms. He emphasized the development of the notion of ideals by Dedekind, tracing the development from Gauss via Kummer to Dedekind.

Hardy Grant, York University: "The Certainty of Mathematics: A Minority View." The minority view in question regards the certainty of mathematics as proceeding from the fact that human beings make mathematical objects, in quite a literal sense. Grant discussed this view in the forms presented by Thomas Hobbes and Giambattista Vico, both of whom had a strongly concrete view of mathematical objects.

Abe Shenitzer, York University: "Examples of

Teaching Mathematical Ideas." Shenitzer spoke on the necessity of emphasizing the fundamental ideas underlying mathematical concepts, which he argues are far more important for the student than technical proofs. He illustrated his views with a discussion of the development of harmonic analysis from the vibrating string problem to Sturm-Liouville methods.

The full text of the papers will be published in the Society's Proceedings, which will appear in May, 1993 or thereabouts.

Learn From The Masters!

Frank Swetz

In August of 1988, following the close of ICME-6, an international conference/workshop on the History of Mathematics was held in Kristiansand, Norway. The "Kristiansand Conference" was conceived and organized by Otto Bekken of Agder College, Norway and Bengt Johansson of Göteborg University, Sweden. Financial support for the conference was principally supplied by ABACUS publishers, Mölndal, Sweden. The invited participants, mathematicians and mathematical educators, from twelve countries spanning four continents were drawn together by their mutual interest in the history of mathematics and, particularly, its use as a pedagogical tool in the teaching of mathematics. Conference organizers planned an environment that allowed for "a sharing of our interests to improve the teaching of mathematics by the use of materials from the history of mathematics." Obscure research talks were to be avoided, and presentations were to stress the classroom use of ideas, topics, concrete materials, and problems from the history of mathematics. In brief, this week-long gathering was intended as an exchange of ideas and sharpening of thoughts on the historical enrichment of the mathematics curriculum.

The proceedings of this conference, entitled *Learn from the Masters* have now been published by Pennsylvania State University. The authors of the papers collected in the proceedings include

Eric Aiton (England) (d. 1991), Shmuel Avital (Israel), Otto Bekken (Norway), John Fauvel (England), Tony Gardiner (England), Michael Helfgott (Peru), Victor Katz (U.S.A.), Israel Kleiner (Canada), Joel Lehmann (U.S.A.), Jan van Maanen (Netherlands), Lars Mejlbo (Denmark), Donovan Van Osdol (U.S.A.), Karin Reich (Germany), V. Frederick Rickey (U.S.A.), Abe Shenitzer (Canada), Man-Keung Siu (Hong Kong), Frank Swetz (U.S.A.), and Steinar Thorvaldsen (Norway). The papers include many details on how to use history in teaching such varying topics as logarithms, trigonometry, calculus, abstract algebra, ring theory, conic sections, linear algebra, vector analysis, and the concept of infinity. Each essay is informative in conveying both information on the history of mathematics and the use of that history in classroom teaching. You will find the book invaluable as a resource in preparing your own materials for use in the classroom.

To order your copy, make your check of \$25 (U.S.) in North America or \$28 (U.S.) elsewhere payable to Pennsylvania State University, and send the order to *Learn from the Masters!*, Office of Research and Graduate Studies, The Pennsylvania State University, Middletown, PA 17057, U.S.A.

The Mathematical Gazette

The March, 1992 issue of *The Mathematical Gazette*, a journal of the Mathematical Association (Great Britain), was a special issue devoted to the use of the history of mathematics in teaching mathematics, with guest editor Neil Bibby. The articles are wide-ranging. They include, among others, "Homage to Babylonia," by Nick MacKinnon; "The Remarkable Ibn al-Haytham," by John D. Smith; "An Historical Approach to Maximum and Minimum Problems," by Peter Ransom; "Teaching Geometry to 11 Year Old 'Medieval Lawyers'," by Jan van Maanen; and "Problems to Sharpen the Young," by John Hadley and David Singmaster. This issue will be a very rich source of inspiration for teach-

ers in using history in the mathematics classroom. It can be ordered by writing directly to the editor of the *Gazette*, Nick MacKinnon, at Winchester College, Winchester SO23 9NA, ENGLAND, and enclosing a large addressed envelope and 4.50 pounds per copy. Readers outside of the United Kingdom should enclose sufficient funds for overseas postage as well.

The Colorful Characters of Mathematics

Carolina Biological Supply Company has recently issued a set of fifteen posters on great mathematicians, with notes by Isaac Asimov and full-color illustrations by Harry Blair. The notes emphasize how such forces as disappointment, ingenuity, intrigue, and sometimes even violence influenced some of the most notable mathematicians and their extraordinary accomplishments. Each anecdote provides a base for students to assemble a more complete knowledge of the people and their careers. The posters include such mathematicians as al-Khwarizmi, Tartaglia, Kowalevsky, Chiu-Shao, Hilbert, and Turing. They are 11 x 14" in size and provide a stimulating decoration for your classroom or mathematics lounge. They can be ordered from CABISCO for \$24.94 (U.S.) by calling (800) 227-1150.

Mathesis

Mathesis is a new collection of books in epistemology and history of science edited by Hourya Sinaceur and Michel Blay and published by the Librairie Philosophique J. Vrin. The titles that are probably of most interest to readers of this *Newsletter* are G. W. Leibniz, *La naissance du calcul différentiel: 26 articles des Acta Eruditorum*, translated with introduction and commentary by M. Parmentier; A. Michel, *Etude sur la constitution et les développements de la théorie moderne de l'intégration*; and H. Sinaceur, *Corps et modèles. Essai sur l'histoire de l'algèbre réelle*. For more information, write to Librairie Philosophique J. Vrin at 6, Place de la Sorbonne,

75005 Paris, FRANCE, call at 43 54 03 47, or fax to 43 54 48 18.

La Figure et L'espace: Actes du 8ème Colloque Inter-IREM Epistemologie et Histoire des Mathematiques

Le thème du 8ème Colloque inter-IREM "Epistémologie et Histoire des Mathématiques" a été choisi en l'honneur du quatrième centenaire du géomètre Desargues, né à Lyon en 1591. Le lieu du Colloque nous y invitait également, puisque le Colloque était organisé par l'IREM de l'Académie de Lyon.

Les travaux de Desargues ont joué un rôle décisif dans la définition de l'objet de la géométrie. En effet, dans la géométrie grecque classique de l'Antiquité, le géomètre travaille sur des figures sans référence à leur contenant, alors que les méthodes projectives conduisent le géomètre à situer les figures dans l'espace. Ceci permet à Pascal, initié aux méthodes de Desargues, d'écrire dans son *Introduction à la géométrie*: "L'objet de la pure géométrie est l'espace." En fait, ce n'est qu'au 19ème siècle que l'espace devient, en tant que tel, l'objet d'une pratique géométrique. Les méthodes projectives concernent des transformations opérant sur des figures. Tandis que, après la naissance des géométries non euclidiennes et le développement des géométries projectives, Félix Klein, dans son *Programme d'Erlangen* de 1872, fait opérer les transformations sur l'espace lui-même.

La longue histoire de ce passage de la figure à l'espace, en passant par la figure dans l'espace, est fort instructive pour l'enseignant de mathématiques. Plusieurs articles de ces Actes présentent une étude historique et épistémologique de certaines étapes de cette histoire. Le thème du Colloque de Lyon invitait à une réflexion sur d'autres aspects de l'histoire de la géométrie et de leur enseignement: le rôle de la figure dans la pratique géométrique ou dans la démonstration, la place du mouvement dans la géométrie, et l'apport de la méthode cartésienne. Deux grands sujets ont également été abordés

pendant ces deux journées et figurent au sommaire de ces Actes, la géométrie et le calcul, et l'étude des courbes.

Cet ouvrage d'environ 500 pages est en vente à l'IREM de Lyon, Université de Lyon I, 43 bd du 11 Novembre 1918, 69622 VILLEURBANNE Cedex, FRANCE.

Mathematical Tradition in the North of England

The sixteen chapters of this lavishly illustrated booklet by Peter and Ruth Wallis, Peter Ransom, and John Fauvel, draw attention to the wealth of printed material that brings to life the popular and practical nature of mathematics in years past. The story intertwines local and national figures, from the parish teacher to the university professor, and focuses in particular on the eighteenth century, revealing the mathematical climate underpinning the development of trade, shipbuilding, railway engineering, and mining.

Mathematical activity was widespread throughout the region in many different branches of pure and applied mathematics. The popular tradition is evident throughout the period, from the early construction of almanacs and serials onwards, and can be seen in Charles Hutton's important local and national role in the developments of the Industrial Revolution. One chapter relates the role of female philomaths, while another returns to the classroom in exploring manuscript exercise books worked in schools.

Many hints are included in this well-designed booklet to help in similar projects for other areas, and there are suggestions for further exploration, and a useful list of further sources.

To order, send a check for 5 pounds to NEBMA, 12 Annaside Mews, Leadgate, Consett, Co Durham DH8 5HL, UNITED KINGDOM.

The Sea Island Mathematical Manual

The *Haidao Suanjing*, or *Sea Island Mathematical Manual*, is one of the "Ten Classics" of

traditional Chinese mathematics, and its contents demonstrate the high standards of theoretical and mathematical sophistication present in early Chinese surveying theory. The *Haidao* established the mathematical procedures for much of East Asian surveying activity for a thousand years after it was written in A.D. 263. The contents of the *Haidao* also testify to the ability of the Chinese to systematize mathematics and hint at the use of proof in Chinese mathematics, a concept usually associated with Greek mathematical thought.

Frank Swetz has now produced and edited a translation of the *Haidao*. In particular, he details surveying techniques and undertakes a mathematical exposition of the Chinese *chongcha* solution procedures. The *Haidao* is a testimony to the ingenuity and skill of China's early surveyors and its author, Liu Hui. Copies may be ordered for \$25.00 (U.S.) in cloth or \$9.95 (U.S.) in paper from Pennsylvania State University Press or from your book dealer.

Second International History, Philosophy, and Science Teaching Conference

Robert Thomas and Paul Ernest

With fourteen ninety-minute plenary sessions and sixty sessions of contributed papers, this conference, held at Queen's University, Kingston, Ontario, from May 11-15, 1992, made a very busy week. There was a clear emphasis on the mobilization of history and philosophy of science, however, rather than mathematics. The modest band of mathematics educators from four continents turned up together at the sessions that had to do with mathematics, which were conveniently grouped not to conflict with one another (not automatic with up to ten sessions in parallel). In this, as in other respects, the conference was very well organized.

At a plenary session entitled "HPS & ST and teacher education," it was pointed out from the chair that a session later in the day, "The problems of conveying philosophy of science to science teachers," appeared to suggest a one-way street.

This was a call for two-way traffic, more relevant to philosophy than to history, but it is sufficiently relevant to historians to be mentioned. Usefulness to teachers and teacher teachers ought to be a motivation to historical work and presentation. A vehicle for such presentation is the new Kluwer journal *Science and Education*, edited by Michael Matthews, the first three issues of which were devoted to papers being presented at the conference. Most of the other papers were included in two volumes of pre-published proceedings (1,218 pages), a very limited number of which are available from Professor Skip Hills, Faculty of Education, Queen's University, Kingston, Ontario, K7L 3N6 CANADA for \$75 (U.S.) or \$88 (Canadian), postage included.

One thing that became clear at the conference was the broad range of issues common to both science and mathematics education, including constructivist epistemology and learning theory; race, sex, and deep social issues and values; teacher and student beliefs and personal philosophies; exciting new theoretical approaches such as hermeneutics, post-structuralism and post-modernism; ethnomathematics/ethnoscience; a "certainty culture" in the subjects. Another interesting aspect of the conference, specifically to do with mathematics, was that history and philosophy tended to be treated as a unity. Historical matters were reflected upon philosophically and philosophical material was from the "maverick" school that bases itself on history. But in number of contributors and in the integration of history and philosophy, it was clear to the mathematical participants that, while the science people are very kind to us, we are definitely the younger sibling.

Query

James Bidwell, Professor of Mathematics at Central Michigan University, (Mount Pleasant, Michigan 48559, U.S.A.) writes that his department is planning a graduate course in the history of mathematics covering the development of mathematics since roughly 1700. He is inter-

ested in the syllabi of other similar courses that are being offered in the U.S. or elsewhere. If any of you teach or are aware of such a course, please write to him with information.

Meeting on the History of Recreational Mathematics

The first UK meeting on the history of Recreational Mathematics will be held on Saturday, October 24, 1992 at the South Bank University, Borough Road, London SE1 0AA. It is being organized by David Singmaster and is sponsored by the British Society for the History of Mathematics in association with the School of Computing, Information Systems and Mathematics, South Bank University. The talks include Angela Newing, "The life and works of H. E. Dudeney"; Chris Lewin, "Early war games"; R. C. Bell, "Early gambling"; John Beasley, "C18 recreational mathematics"; Edward Hordern, "Puzzles in history"; Irving Finkel, "Ancient games"; and David Singmaster, "The centenary of Rouse Ball's *Mathematical Recreations and Essays*". There will also be an exhibition of historical books and puzzles. For more information, contact David Singmaster at South Bank University or call 031-928-8989 #2050.

Have You Read?

Ronald Cainger, 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, D.C. 20064, U.S.A.

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REGISTRATION FORM FOR HPM MEETING
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