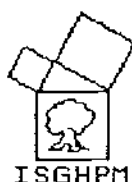


International Study Group On the Relations Between
HISTORY and PEDAGOGY of MATHEMATICS



ISGHPM

AN AFFILIATE OF THE INTERNATIONAL COMMISSION ON MATHEMATICAL INSTRUCTION

NEWSLETTER

NORTH AMERICAN EDITION

No. 6

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Distributed in Canada, Mexico, and the United States and sent to selected individuals overseas. Send new requests and address changes to the Editor.

Calendar of Coming Events

1984 April 23-25 San Francisco
ISGHPM Workshop and Meeting: San
Francisco University High School. Con-
tact: **Registration and Program**, V.
Frederick Rickey, Dept Math & Stat,
Bowling Green State University, Bowling
Green, Ohio 43403; **Local Arrange-**
ments, Craig McGarvey, SFU High
School, 3065 Jackson St, San Francisco,
CA 94115. [Details inside.]

1984 April 26-28 San Francisco
Annual meeting of the National Council of
Teachers of Mathematics. Contact: NCTM, 1906
Association Dr, Reston, VA 22091.

1984 June 5,6 Guelph, Ontario
Annual meeting of Canadian Society For History
and Philosophy of Mathematics. Contact: Louis
Charbonneau, Dept de Math, Univ de Québec,
C.P. 8888, Montréal, Québec H3C 1R6.

1984 Aug 24-30 Adelaide
Fifth International Congress on Mathematical
Education (ICME 5). Contact: ICME 5 Travel
Planners, P.O. Box 32366, San Antonio, Texas
78216 (512/341-8131) [Details inside.]

1984 Sept 26-30. Oxford
Conference on Renaissance mathematics.
Contact: Dr. Cynthia Hay, Conference
Secretary, Faculty of Mathematics, The Open
University, Walton Hall, Milton Keynes. MK7 6AA.
England. [Details inside.]

1984 December 27-30 Chicago
History of Science Society annual meeting.
Contact: HSS, 215 S. 34th St/D6, Univ Penn,
Philadelphia, Penn. 19104

1985 April 17-20 San Antonio
1986 April 2-5 Washington, D.C.
National Council of Teachers of Mathematics.
Suggestions are invited for ISGHPM meetings
in conjunction with the NCTM annual meeting.
Contact: Bruce Meserve, Dept of Mathematics,
The University of Vermont, Burlington, Vt.
05405. □

From the Editor

■The *Newsletter* has become de facto international. We have heard from readers on every continent seeking more information, asking to be included on the mailing list, commenting on something that appeared in the *Newsletter*, providing reports, and the like. In matters of communications nature abhors a vacuum, and at present there is no international newsletter of the ISGHPM. Approaching pedagogy through history is a rather specific use of the history of mathematics, and one not served well in the literature. A central resource to focus our collective interests is essential in order to draw together information on research and expository articles, on conferences and reports, to provide course descriptions, a forum for opinion—even advice. ISGHPM should have a newsletter with a mandate to serve these international interests.

A moderate degree of urgency exists for deciding about an international newsletter. This issue of the *Newsletter* was circulated to around 400 individuals² in forty countries by relying on key people to duplicate and mail it. (See "Thanks to Special Friends" below.) This spreads the costs, which are probably in the range of \$175 to \$275 U.S. per issue or \$525 to \$1100 each year depending on whether there are three or four issues. Production costs are actually quite low. The *Newsletter* is composed and produced with an Apple computer and printer and a text formatting program, 'Gutenberg'; a mailing list is also maintained with the same system. Still we are feeling the pressure of sustaining the distribution costs.

The ICME 5 meeting in Adelaide provides an opportunity to address the question of an official international newsletter (See "ISGHPM Plans Participation in ICME 5 at Adelaide"). The representation present should ensure regional and national interests are served in providing (a) a mandate for a newsletter's existence and (b) a method of underwriting its production and distribution costs. If you have views on this and will not be at Adelaide, make them known to either co-chairman: Dr. Bruce E. Meserve (The University of Vermont, Burlington, Vermont 05405-9094) or Dr. Roland J.K. Stowasser (Technische Universität, Straße des 17 Juni 135, D-1000 Berlin 12, Federal Repub-

lic of Germany).

■Computers are the subject of a couple of items in this issue and part of the April meeting of ISGHPM. Apropos of Clark Kimberling's timely contribution, the Mathematical Association of America announced in the Jan-Feb 1984 issue of *Focus* that a Committee on Computers In Mathematics Education has been appointed. We would hope that Professor Kimberling's message will be available to this group.

■A new masthead for the *Newsletter* has been added with this issue. Like the text material, it is produced with an Apple computer and the Gutenberg text formatting program. The very recognizable Bride's Chair diagram of the Pythagorean theorem represents 'history', and the tree, 'knowledge' or 'learning'. □

Editorial

Does History Aid Pedagogy? (*David Wheeler*)—In his editorial in the October 1983 issue of the *Newsletter*, Charles Jones raises an interesting question, or batch of questions, about connections between the mathematics curriculum, the historical contexts of the topics in it, and the success of students in learning mathematics. He suggests that recent curriculum changes and pedagogical developments, by removing topics from their historical contexts, may be accountable for our diminished success in teaching mathematics to general audiences.

It is difficult to be certain of the facts, though, let alone the interpretation of them. We try to teach mathematics to more students in schools and universities than ever before, so we might expect some drop in overall standards of achievement. That the actual drop is larger than simple statistical assumptions would imply seems to be generally agreed, but at least one study of high school algebra achievement in the U.S. shows that the fall in recent years can be accounted for by the changes in the population taking a first algebra course. That there is unlikely to be a simple causal connection between curriculum and achievement emerges from international studies showing that national differences in achievement levels are not obviously correlated with differences between national curricula. And when I think of the relation of all this to the

presence or absence of historical content in the mathematics curriculum, I recall that my own formal education, about forty years ago, gave no more attention to the history of what I was taught than presentday instruction normally does.

I say this not to demolish the point that Jones made, but to suggest that it may need qualification, and to open it out into other considerations. If we want to argue for teaching mathematics in a way that does not neglect its history, we may find ways to make our case stronger if we first acknowledge that the case is not overwhelming.

Back in 1900 D.E. Smith wrote a book about the teaching of mathematics that gives a most persuasive account of elementary mathematics and the school curriculum as seen through the eyes of a historian. Anyone reading it would, one supposes, find the historical approach illuminating and highly stimulating. Yet as far as one can tell, this book and the many subsequent recommendations to a similar effect from other distinguished educators, have failed to influence school teaching in the slightest. (We may compare the impact of the 1926 *Psychology of Teaching Arithmetic* by R.L. Thorndike. Although no one now reads the book, and most teachers will not know the author's name, the residue of its effects on the teaching of computation are still with us.) The hypothesis of "genetic recapitulation" is also nearly as old as this century. Borrowed by the American psychologist Stanley Hall from the biologist Haeckel, in its strong form it says that the history of the individual recapitulates the history of the species. In a weaker form, adapted to education, it proposes that the historical development of a subject shows the stages through which the learning of the individual must pass. Some version of this hypothesis has been supported by a great many educators, including Georg Polya and Jean Piaget in recent times.

If the case for attention to mathematical history is so strong, why has it had so little effect? At the risk of oversimplifying, let me lay most of the blame (if that is the appropriate word) on the social groups having an interest in the results of institutionalised education. I suggest that these groups consis-

tently value skill above understanding, and knowledge above cultural awareness. This is as true for the professional mathematicians interested in finding future researchers as for the employers interested in filling vacancies with "skilled" workers. Now it is the case that there is no conflict in principle between skill and understanding, or knowledge and culture. Nevertheless if priority is *always* given to the first member of each pair, their partners will be correspondingly neglected. The school system is too cumbersome to adapt easily to complex goals, and the college and university systems, in their lower reaches at least, not much less so. In any case the educational system delivers what society wants—or, more accurately, it tries to deliver what it is most often asked to deliver.

If there is substance to this view, we can expect little advance in the adoption of historical approaches to teaching mathematics until either it is convincingly demonstrated that a historical approach actually improves the chances of reaching current educational goals, or there is a shift in the goals themselves. I don't myself see any future in the first alternative, though others may. I am not much more optimistic about the second, though there are *some* signs to suggest that goals may change. Technological advances have already begun to make mathematical skills less useful than mathematical know-how (a form of understanding). And perhaps the increasingly vocal concern with the concept of social responsibility (given considerable impetus by the ecology movement) will eventually turn into a public demand for an education which is imbued with a sense of social history, though a shift of such magnitude is barely conceivable. Most North Americans, including most teachers and administrators, are inclined to go along with Sam Goldwyn in reaching for their guns when they hear the word "culture".

Any attempt to look at the prospects *grosso modo* must end in gloom, it seems to me. But if we don't take the whole universe of mathematics teaching and look at particularities, including the existence of ISGHPM, we can be encouraged to think that there is some small progress and plenty of jobs to be done. We need many more empirical trials of teaching history to mathematics teachers and

enriching mathematical topics in the classroom with historical information and insights. We need to examine history carefully to see what epistemological messages it carries—about the nature of mathematical activity, the way its concepts develop, the choices that mathematicians have made and those they have not yet made. We need a history of mathematics education itself—not at all the same thing as a history of mathematics. And (flying a rather more controversial kite) we need to develop a better history of mathematics: most of our present history is long on knowledge and short on awareness, just like the results of our mathematical education. I cannot believe that these tasks are not worth doing even if the larger educational world remains largely untouched. [David Wheeler, in addition to being a member of the Editorial Committee and a member of the Department of Mathematics of Concordia University, is editor of *For the Learning of Mathematics*.] □

ISGHPM To Meet April 25-27

ISGHPM will meet immediately prior to the National Council of Teachers of Mathematics (NCTM) annual meeting in San Francisco, just as in Toronto in 1982 and Detroit in 1983. The meeting will be at the San Francisco University High School, Monday afternoon through Wednesday morning; the NCTM sessions begin Wednesday morning.

Special Features The need for classroom resources will again be the focus of this year's meeting. In addition to sources for teachers, there is an interest in developing an annotated list of sources suitable for students. Contributions to such a list (regardless of whether you will be attending) may be sent to Fred Rickey (see below). A complete list should be available after the meeting.

Students will be invited to one of the presentations, which will be a lecture-discussion lesson demonstrating historical materials. In turn, ISGHPM participants are invited to observe some activities of the host school.

One half-day session will be devoted to presentations of classroom historical material by participants. Hand-outs are solicited for

this session. Those interested in making a presentation should contact Fred Rickey (see below).

Program and Registration The program will consist of prepared presentations followed by ample discussion periods. Six speakers will discuss topics from how to get started in historical research to preparing historical classroom material for mathematics and computer science. Scheduled speakers are Barnabus B. Hughes, H.S. Tropp, Otto Bekken, Florence Fasanelli, and Charles V. Jones. A detailed program will be sent to all registrants.

Preregistration is required in order to facilitate planning. (ISGHPM has no funds of its own and functions entirely through the good graces of individuals and institutions, so advance planning is essential.) The registration fee, which includes a catered lunch on Tuesday, is \$15.00. A group (no-host) dinner will be arranged for Monday evening. ☞ You may register by sending a cheque to the Program and Registration Co-chairman, *Prof. V. F. Rickey, Dept of Mathematics and Statistics, Bowling Green State University, Bowling Green, Ohio 43403*. (Make cheques payable to V. Frederick Rickey/ISGHPM)

Local Arrangements Two hotels are near SFU High School. The El Drisco Hotel (2901 Pacific Ave, San Francisco, CA 94115; 415/346-2880) rates are \$49 to \$80 for single occupancy, and add \$5 for double. The Laurel Motor Inn (Presidio & California, San Francisco, CA 94115; 415/567-8467) charges are \$45 to \$55 for single occupancy and \$7 more for double. (There is an additional tax.) ☞ Hotel accommodations are the responsibility of each participant, so contact the hotel directly.

To get to San Francisco University High School area from the airport, take the "Downtowner" bus from the airport to downtown San Francisco (the cost is \$4.00 one way). Then use the municipal railway to the hotels near SFU High School. More detailed instructions will be provided to all registrants.

Special needs and information may be requested from the Local Arrangements Co-chairman, *Craig McGarvey, San Francisco University High School, 3065 Jackson St,*

San Francisco, CA. 94115 (415/348-8400). □

ISGHPM Plans Participation in ICME 5 at Adelaide

The International Commission of Mathematical Instruction (ICMI) will hold the Fifth International Congress on Mathematical Education (ICME 5) in Adelaide from August 24 to 30, 1984. ISGHPM became an affiliate of ICMI in 1977, and it will be sponsoring sessions at ICME 5 on August 25, 26, 28, and 29. These are being organized by George Booker (Australia), Roland Stowasser (Germany), Jean Dhombres (France), and Phillip S. Jones (USA). Bruce Meserve (USA) is overall coordinator. A special meeting of ISGHPM will precede ICME 5 on August 23 and 24.

The ICME 5 program includes the following sessions: Evaluation, Examination and Assessment; Theory of Mathematical Education; Research and Teaching; Language and Mathematics; Women and Mathematics; Competitions; Teaching of Geometry; and Teaching of Probability and Statistics. Additional sessions have been organized by study groups associated with ICMI, such as History and Pedagogy of Mathematics (ISGHPM) and Psychology of Mathematics Education. Two workshops will be ongoing throughout the Congress, one on primary level instruction and the other on lower secondary level. A series of working group sessions dealing with curriculum development will meet during the Congress, with one session on Curriculum Development as a Historical Process. Those interested in participating in this latter session should contact the session chairman, Jean Dhombres (Université de Nantes, Institut de Mathématiques, BP 1044, 44072 Nantes Cedex, France).

Those interested in ISGHPM and planning to attend ICME 5—especially those from North America—are urged to contact Dr. Bruce E. Meserve (Box 108, Fairfax, Vermont 05454 USA), who is organizing and coordinating much of the ISGHPM participation. Also sharing in the planning and in charge of local arrangements is George Booker (Brisbane College of Advanced Education, 130 Victoria Park Road, Kelvin Grove, Queensland 4059 Australia). North American participants should also contact ICME 5 Travel Planners; see "Calendar of Coming

Events" on first page. Travel grants are available through the National Council of Teachers of Mathematics (details are in September 1983 issue of *NCTM News Bulletin*; enquiries and applications to NCTM, Dept. E, 1906 Association Drive, Reston, Virginia 22091) and the Mathematical Association of America (details in January-February 1984 issue of *MAA Focus*; enquiries and applications to ICME-5 Travel Grants, MAA, 1529 Eighteenth St. N.W., Washington, D.C. 20036). □ Deadline for travel grant applications: March 1st. □

Renaissance Mathematics at Oxford

The British Society for the History of Mathematics in conjunction with The Open University is organizing a conference on Renaissance mathematics to be held September 26 to 30, 1984. Conference themes include Pedagogic Aspects of Renaissance Mathematics; National Traditions in Mathematics; The Vernacular Tradition; The Work of Nicholas Chuquet; Mathematics and Other Sciences; Mathematics and Society. Speakers include Hervé L'Huillier, Michael Mahoney, Paul L. Rose, Ivo Schneider, Jacques Sesiano, Warren Van Egmond, and The Open University Chuquet Research Team. Workshop sessions are planned. English and French are the languages of the conference.

Enquiries should be directed to Dr. Cynthia Hay, Conference Secretary, Faculty of Mathematics, The Open University, Walton Hall, Milton Keynes MK7 6AA, England. □

Lectures On History of Algebra Presented In Peru

(Luis Romero G.—) On January 9-11 the Peruvian Mathematical Society sponsored a series of lectures by Dr. Otto B. Bekken, Agder College, Kristiansand, Norway, entitled "The Historical Development of Algebra". The lectures covered the history of equations from Ahmes via Cardano to Abel with emphasis on the development of the number concept. About 200 high school and university mathematicians from all over Peru participated.

The Society has published a book based on the lecture series, *Una historia breve del Algebra*, containing thirteen chapters: 1. El cálculo del "aha" ¿Algebra Egipcia?; 2. ¿El

Algebra retórica Babilónica?; 3. El Algebra geométrica Griega; 4. El Algebra Hindú; 5. El Algebra de los Arabes; 6. La entrada del Algebra en Europa/América; 7. *Ars Magna* de Cardano (1545); 8. Vienen los símbolos; 9. La Geometría se hace Algebraica; 10. Los números complejos; 11. Caspar Wessel y los números complejos; 12. ¿Cuántas raíces tenemos?; 13. Y ¿Qué hacemos con ecuaciones del quinto grado? The history of mathematics as a resource for teaching is stressed, with 33 exercises (hints and solutions). Copies may be obtained for \$5.00 (US) by writing to Professor Tomás Nuñez Lay, Sociedad Matemática Peruana, Casilla Postal 11646, Lima 11, Peru. [Dr. Luis Romero G. is the President of Sociedad Matemática Peruana.] □

Training Mathematicians to Teach Mathematics In Mexico

(Alejandro R. Garciadiego) The shortage of trained mathematics teachers is so acute in Mexico that almost all students receive their mathematical education from non-mathematicians. This condition even extends into undergraduate programs: if there is a need for an economics student to learn mathematics, then an economist will teach him or her, and the same is true for architecture, engineering, medicine, and so on. It seems that only mathematics students are trained by professional mathematicians at the undergraduate level, and the situation is even worse at earlier levels of education. At the mathematics department of the Faculty of Sciences of the Mexican National University (UNAM), mathematicians have been working on these problems at several different levels of pedagogy and a variety of viewpoints are present.

One group of mathematically trained pedagogues have concentrated their efforts on the better teaching of mathematics at the primary and secondary levels by lecturing the primary and secondary teachers, and teachers in technical programs, on developments in mathematics (such as theory of sets or mathematical logic) and providing instruction in higher or more advanced topics (such as abstract algebra, differential equations, or topology). In this approach the students remain once removed from the mathematician. Moreover, although better mathematical training for

teachers is desirable, some pedagogues challenge the need for teachers with very high qualifications in advanced mathematics. Is it necessary to know functional analysis to lecture on factorization, trigonometry, linear equations, or plane geometry? These critics would claim that it is better to have a deeper acquaintance with elementary mathematics.

Another major mistake in the teaching of mathematics, many of these same pedagogues would say, is the extreme formalism nowadays in vogue. Students are learning too much axiomatics, they claim, and not acquiring the skills to do mathematics. That is to say, the students are not being prepared to solve mathematical problems. Here they suggest that the rôle of the history of mathematics is fundamental for the better teaching of the different mathematical disciplines. The use of historical examples might be useful to show how mathematics has benefited from practical problems, how concepts are created and modified, and how a mathematical branch evolves and transforms. The adoption of historical problems might help the students to be critical towards the ways mathematical knowledge is taught and introduced.

There is also the complaint that often mathematicians are not prepared to teach. Mathematicians, in general, simply repeat what they have learned—sometimes exactly in the same order and with the same examples as used in their training—without attempting to improve the didactical process. If most students of mathematics teach, why are they not instructed in pedagogy? There are subjects that might enrich the whole mechanism of didactics, such as psychology of the process of teaching and learning, didactical resources, and the like.

As teachers of mathematics at any level, we must consider the objectives or purposes of each course. What do we expect the student to learn and, most important, why? Having found these answers, we then need to ask how best to accomplish our goals. There is not one single simple solution to this complex question, but surely a better way to proceed would consist in a balance among better training in elementary mathematics, less formalism with more historical material, and instruction in the principles of pedagogy. (Alejandro

García Diego D. is in the Department of Mathematics, Faculty of Science, UNAM, México, D.F. México. □

Don't Forget History In Your Mathematics Computer Software

(Clark Kimberling—) I would like to point to some 'present history' in mathematics pedagogy: the microcomputer revolution. Much widely used mathematics-instruction software is written by authors who are not knowledgeable about or interested in mathematics *for its own sake*, let alone its *history*. Consequently, mathematical content gets squeezed down to the barest minimum needed to get answers. One need only read Gene Maier's warning, "We Have a Choice", in the September 1983 issue of *The Mathematics Teacher* to see that mathematics educators are sitting on a historical knife-edge: some standard topics will soon go the way of log tables, and who is going to decide what takes their places?

If we allow others to develop mathematics-instruction software, then we will be employed to teach more and more 'applications' to students who know less and less what they are expected to 'apply'. There will be a deepening of an already deep problem, namely, that mathematics is studied as a means for doing other things; this fragmented and noncommitted sense of purpose makes mathematics all the more difficult to study.

To combat this fragmented and noncommitted sense of purpose among students, one of the strongest medicines is mathematics history. I have in mind not only mathematics history courses and seminars, for these reach only a minority of students, but rather, such far-reaching measures as a historical paragraph or two during runs of high-school level mathematical microcomputer programs.

Imagine, for example, the difference between a program that illustrates successive cases of Goldbach's Conjecture without any mention of "Goldbox" (that's what students think you're saying) and the same program with a remark that "in 1742, Christian Goldbach wrote ... and to this day, no one knows the answer!"

I know that some readers of the *Newsletter* write programs for students. Perhaps they will

keep in mind the value of historical comments. [Clark Kimberling, University of Evansville, writes "Microcomputer-assisted Discoveries", a regular feature in *The Mathematics Teacher*. The programs published in the journal are available on disk. *MATHDISK ONE* consists of 43 Applesoft BASIC programs, many with historical paragraphs, together with a workbook of program listings, documentations, sample runs, and 161 exercises. For a table of contents and order sheet, write to the University of Evansville Press, Box 329-A, Evansville, Indiana 47702.] □

Inter-American Committee on Mathematical Education

(Ubiratan D'Ambrosio—) The Comité Interamericano de Educación Matemática (CIAEM)/Inter-American Committee on Mathematical Education (IACME) was founded in 1961 in Bogotá. It has been presided over by Marshall Stone, by Luis Santaló, and presently by Ubiratan D'Ambrosio. Five Interamerican Conferences on Mathematics Education have been organized: Bogotá (1961); Lima (1966); Bahia Blanca (1972); Caracas (1975); and Campinas (1979). The conference scheduled for 1983 in Mexico was postponed because of a lack of resources. CIAEM/IACME is affiliated with the International Commission of Mathematical Instruction. National delegates convene and elect an executive board which remains in office until the next general assembly. General assemblies usually take place during the Interamerican Conferences. CIAEM/IACME regularly published a "Boletín Informativo" until 1979 when a lack of funds forced it to suspend publication. [Ubiratan D'Ambrosio is President of CIAEM-IACME. Secretário of Sociedade Brasileira de História da Ciência, Coordenador Geral dos Institutos Universidade Estadual de Campinas (Caixa Postal 1170, 13.100 Campinas - SP - Brasil).] □

Two Day Meeting On History and Pedagogy Held At Thessaloniki

(Nikos Kastanis—) A group of mathematicians interested in the history of mathematics in relation to its pedagogical use met in April 1983 as part of the Greek Mathematical Association, Thessaloniki section. The subjects for

discussion were: 1. The meaning of the history of mathematics and its rôle in the teaching of mathematics; 2. The history of mathematics and the axiomatic method of teaching; 3. The use of biographies of outstanding mathematicians in the classroom; 4. The history of mathematics as a way for popularization; 5. The historic evolution of mathematics and the teaching of it; 6. The historical conception of mathematics versus the axiomatic conception. In addition two lectures were presented during the meeting: "Institutionalization of mathematics teaching and the character of mathematical scientific discourse: observations from the perspective of pre-modern history", by Jens Høyrup (Roskilde Universitetscenter, Postbox 260, 4000 Roskilde, Denmark) and "Die Mathematik als Wissenschaft und als Schulfach im Frühen 19. Jahrhundert" by Hans Niels Jahnke (Institut für Didaktik der Mathematik, Universität Bielefeld, D-4800 Bielefeld, West Germany). For copies write the authors. [Nikos Kastanis is in the mathematics department at Aristotle University of Thessaloniki, Greece.] □

Thanks to Special Friends

Duplicating and distributing the *Newsletter* depends on a few key volunteers who deserve our gratitude. The *Newsletter* Editorial Committee wish to acknowledge our indebtedness to the following who helped with issue #5 and issue #6: Ubiratan D'Ambrosio (Brazil); Duane Deal (USA); Jean Dhombres (France); Graham Flegg (UK); Alejandro Garcíadiego D. (Mexico); Torkil Heiede (Denmark); Yoshimasa Michiwaki (Japan); Leo Rogers (UK); Gert Schubring (Fed. Rep. Germany); Roland Stowasser (Fed. Rep. Germany); Graham Tilly (Australia). □

Have You Read?

Readers are encouraged to submit contributions to "Have You Read?". References need not deal exclusively or explicitly with history in the mathematics classroom, but should have the potential for motivating or enriching. N.B. Supply complete bibliographic information: names of author(s); complete titles of books or of both the article and journal; for journals include both the volume and date; for books, edition, copyright date,

publisher and place of publication. Accuracy in spelling and wording is critical. Please provide concise annotations whenever possible. —Ed.

Arcavi, Abraham, Maxim Bruckheimer, and Ruth Ben-Zvi. 1982. "Maybe a mathematics teacher can profit from the study of the history of mathematics." *For the Learning of Mathematics* 3:1 (July) 30-37.

A challenge to a statement by Hans Freudenthal that a knowledge of the history of mathematics does not help understand mathematics. [Cf. Freudenthal.]

Arndt, A.B. 1983. "Al-Khwarizmi." *Mathematics Teacher* 76:9 (Dec) 668-70.

Brown, Stephen I. 1976. "From the golden rectangle and Fibonacci to pedagogy and problem solving." *Mathematics Teacher* 69, 180-88.

Bulletin of the Missouri Council of Teachers of Mathematics. 1983. An interview with William Campbell (University of Wisconsin-Platteville). *MCTM Bulletin* 8:6 (Oct) 1-2.

Using history in the mathematics classroom; follow-up to talk given at the Detroit meetings of NCTM. [See Campbell.]

Campbell, William. 1983. "Historical topics in the classroom: unit fractions." *Bulletin of Missouri Council of Teachers of Mathematics* 8:7 (Nov) 4-5.

Middle school introduction to fractions. [Contact MCTM Bulletin, c/o Bob Buss, 752 Village Wood Court, Ballwin, MO 63011.]

Dhombres, Jean. 1981. "Pédagogie et utilisation de l'histoire: des tensions contradictoires." *For the Learning of Mathematics* 2:2 (Nov) 10-15.

Estes, Paul L. 1983. "Medieval mathematics." *New England Mathematics Journal* 16:1, 29-34.

Hindu-arabic numeration system.

Fierz, Markus. *Girolamo Cardano (1501 - 1576)*. Translated by Helga Niman. Boston: Birkhäuser.

Biographical study which focuses less on the mathematician and more on the philosopher.

Flegg, Graham. [1983.] *Numbers. Their History and Meaning*. Glasgow: Andrew Deutsch Ltd. (New York: Schocken Books, 200 Madison Ave. 200 pp. \$14.95.)

A history for the general reader stressing signification and manipulation as the way to understanding what numbers are.

Freudenthal, Hans. 1981. "Should a mathematics teacher know something about the history of mathematics?" *For the Learning of Mathematics* 2:1 (July) 30-33.

In the author's words: "This to my view is the use of the history of mathematics and adjacent areas: serving history rather than mathematics; rather than the comprehension of mathematics promoting that of history." Cf. Arcavi, et al.

Friberg, Jöran. 1984. "Numbers and measures in the earliest written records." *Scientific American* 250:2 (Feb) 110-18.

Fourth century B.C. precursor of decimal system used by proto-Sumerian and -Elamite scribes.

Grattan-Guinness, I. 1978. "On the relevance of the history of mathematics to mathematical education." *International Journal of Mathematics Education in Science & Technology* 9, 275-85.

Jones, P.S. 1969. "The history of mathematics as a teaching tool." In *Historical Topics for the Mathematics Classroom*, 31st Yearbook of the NCTM. Washington, D.C.: National Council of Teachers of Mathematics.

Kennedy, Hubert. 1983. "New England's first mathematical family." *New England Mathematics Journal* 16:1, 26-28.

The Peirce family: Benjamin and two sons, Charles and James Mills.

Kimberling, Clark. 1983. "Euclidean algorithm and continued fractions." *The Mathematics Teacher* 76:7 (Oct) 510-12, 548.

[Cf. Professor Kimberling's item elsewhere in this issue.]

Lumpkin, Beatrice. 1983. *Senefer and Hatshepsut: A Novel of Egyptian Genius*. Chicago: DuSable Museum Press (740 E. 56th Place, Chicago, Illinois 60637. 130 pp. \$13.00/paper \$5.00.)

Historical novel intended for young adults with interest in mathematics, science, and black history; some Egyptian mathematics.

McMillan, Robert D. 1984. "Babylonian quadratics." *The Mathematics Teacher* 77:1 (Jan) 63-65.

Using Babylonian techniques for classroom presentations.

Mohr, Georg. 1673. *Compendium Euclidis Curiosi: Dat is, Keetkonstigh Passerwerck (Or Geometrical Operations)*. 1982. Copenhagen: University Library (40 Noerre allé, DK-2200 Copenhagen N, Denmark. xiii + 26 + vi + 28 pp. Paper.)

Photographic reproduction; shows Euclid's constructions can be done with a ruler and compass of fixed opening. Paperback edition of both the Amsterdam (1673) and London (1677) translations with English introduction.

Open University (England) texts: P. Dedron and J. Itard, *Mathematics and Mathematicians*; Walter Popp, *History of Mathematics, Topics for Schools*; Raymond L. Wilder, *Evolution of Mathematical Concepts*. Now available in paperback editions from Taylor and Francis Inc., 114 E. 32nd Street, New York, NY 10016.

Pimm, David. "Why the history and philosophy of mathematics should be rated X." *For the Learning of Mathematics* 3:1 (July) 12-15.

History and philosophy can reveal what polished proofs hide and can present challenges to students. Revised from ICME-IV congress in Berkeley, 1980.

Posamentier, Alfred S., and Noam Gordan. 1984. "An astounding revelation on the history of π ." *The Mathematics Teacher* 77:1 (Jan) 52, 47.

Eighteenth century application of numerology to Biblical passages yields value of 3.1416 for π . [Not a sound historical argument, but should stimulate students. Ed.]

Richards, Stephen P. 1982. *A Number for Your Thoughts*. New Providence, New Jersey. (207 pp., \$7.95 paper.)

[Given a very negative review in the December 1983 *American Mathematical Monthly*.]

Smillie, K.W. 1981. "A service course in computing science presented from a historical point of view." *SIGCSE Bulletin* 13:2 (June) 27-33.

University of Alberta first-year course for arts and science students using APL.

Swetz, Frank J. 1984. "Seeking relevance? Try the history of mathematics." *The Mathematics Teacher* 77:1 (Jan) 54-62, 47.

Using history to develop topics in the mathematics classroom: numeration, calculation, Pythagorean theorem. [Speaks directly to ISGHPM interests.]

Van der Waerden, B.L. 1983. *Geometry and Algebra in Ancient Civilizations*. Berlin/New York: Springer Verlag (xii + 223 pp. \$29.50.)

A reconstruction of Neolithic Age mathematics—which van der Waerden argues spread from Central Europe to other parts of world—along with Greek, Chinese, and Indian mathematics.

Zaslavsky, Claudia. 1973. *Africa Counts*. Boston: Prindle, Weber, & Schmidt.

Sub-Saharan African mathematics; games.

Theses and Extended Research *This section of "Have You Read?" is a file of research dealing with history and teaching. Old and new sources are invited.* N.B. Supply complete bibliographic information. For theses, supply name of author; complete title; university; date; *Dissertation Abstracts International* abstract identifier and page number, thesis order number, or similar data for theses not in DAI.

Barwell, M. 1913. "The advisability of including some instruction in the school course on the history of mathematics." *The Mathematical Gazette* 7, 72-79.

Holden, Lyman Sanford. 1966. "Motivation for certain theorems in the calculus." Ph.D. thesis, Ohio State University. (125 pp). DAI 27/09-B, p 3184; # 67-02458.

Suggestions for increasing the intuitive appeal of l'Hôpital's rule, Cauchy's formula, chain rule, formula for curvature in the plane.

McBride, Cecil Charles. 1974. "The effects of history of mathematics on attitudes toward mathematics of college algebra students." Ph.D., Texas A and M University, DAI 35/04-A, p 1963; #DCJ74-21208.

Comparisons of attitudes and achievements between classes taught with and without historical enrichment (significant difference favored enrichment).

McBride, C.C., and Rollins, J.H. 1977. "The effects of history of mathematics on attitudes towards mathematics of college algebra students." *Journal of Research in Mathematics Education* 8, 57-61.

Shevchenko, I.N. 1975. "Elements of the historical approach in teaching mathematics." *Soviet Studies in Mathematical Education* 12, 91-139.

Showers, Frederick Mansfield. 1973. "A survey of the status of instruction in the history of mathematics." Ed.D., The University of Florida (156 pp). DAI 34/1f-A, p 7092; #DCJ74-10090.

Survey showing history of mathematics recommended for pre-service teacher training; most instructors not trained in history, do not publish in it; no continuing graduate courses; general agreement that secondary level teachers should be informed in field.

Stander, Derek. [n.d.] "The use of the history of mathematics in universities." Part of a larger research project on the history of mathematics courses offered by the British universities. Contact the author: 23 Beacon Down Ave, Beacon Park, Plymouth PL2 2RU, Devon, England.

Concludes that little use of history of mathematics being made in universities; similar conclusions reached on primary and secondary education in Britain.

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