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

NEWSLETTER

AN AFFILIATE OF THE INTERNATIONAL COMMISSION ON MATHEMATICAL INSTRUCTION

No. 12 May 1986

HPM Advisory Board

The *Newsletter* is the communication of the International Study Group On the Relations Between History and Pedagogy of Mathematics, an affiliate of the International Commission on Mathematical Instruction. Edited and produced in the Dept of Mathematical Sciences, Ball State Univ, Muncie, Ind. 47306 U.S.A. The *Newsletter* is available free of charge upon request. Distributors: U.S., Editorial OFFice; Canada, David Wheeler (Concordia Univ, Montréal, Qué H4B 1R6); Mexico, Alejandro Garciadiego (UNAM-contact at: José M. Velasco 71, Del. Benito Juárez 03900, Mexico, D.F.); South America, Ubiratan D'Ambrosio (address above); Australia, George Booker (Brisbane Coll Adv Educ, 130 Victoria Park Rd, Kelvin Grove, Queensland 4059); New Zealand, Andy Begg, Math Curr OFF, Dept Educ, Private Bag, Wellington; elsewhere, Edw. Jacobsen (Div Sci Tech & Envrmtl Educ, UNESCO, B.P. 307 Paris). Send requests and address changes to the Editor.

Calendar

Meetings with HPM components are highlighted.

1986 May 26-28 . . . . . Winnipeg
Annual Meeting of Canadian Society for History and Philosophy of Mathematics. Contact: Louis Charbonneau, Dept Math, U du Québec, CP 8888, Montréal, Qué H3C 3P8

1986 July 6-13 . . . . . Toulouse
Deuxième Université d'Eté sur l'histoire des mathématiques. Contact: M. Guillemot, IREM de Toulouse, Univ P. Sabatier, 118 route de Narbonne, F-31062, Toulouse Cedex, France.

1986 August 3-11 . . . . . Berkeley, Calif
HPM with International Congress of Mathematicians (Details inside.)

1986 October 23-26 . . . . . Pittsburgh
History of Science Society. Contact: Edith Sylla, Secy., North Carolina State Univ., Raleigh, NC 27607.

1986 Nov 9-15. . . . . Neuhofen an der Ybbs
Austrian Symposium on History of Mathematics. Contact: Ch. Binder, Inst für Techn. Mathematik, Technische Universität Wien, Wiedner Hauptstrasse 6-10, A-1040 Wien, Austria.

1986 Nov 18-22 . . . . . Marseille
Didactique des mathématiques. Contact: A. Zeller Meier, CIRM, Luminy Case 916, route Léon-Lachamp 70, F-13288, Marseille Cedex 9, France.

1987 April 8-11. . . . . Anaheim
Meeting of Americas Section HPM in conjunction with annual meeting of National Council of Teachers of Mathematics. (Information inside.)

1987 April 23-25 . . . . . Washington, D.C.
A tercentenary symposium celebrating the publication of Newton's Principia. Contact: Stephen G. Brush, Center Renaissance & Baroque Studies, Univ Maryland, College Park, MD 20742, USA.

1987 August 7-10 . . . . . Gunma, Japan International Symposium for History of Mathematics and Mathematical Education Using Chinese Characters. Contact: Prof Y. Michiwaki, Fac Technology, Gunma Univ, Tenjin-chō, Kiryu 376, Japan. (Details below.)

1988 April 6-9 . . . . . Chicago Meeting of Americas Section HPM in conjunction with annual meeting of National Council of Teachers of Mathematics.

1988 July 27-Aug 3 . . . . . Budapest International Commission on Mathematics Education (ICME 6). Contact: A.G. Howson, Secy. ICMI, Univ Southhampton, Centre for Mathematics Education, Southampton, SO9 5NH, U.K. HPM will participate; watch for details.

From the Editor

The need for an HPM journal is perceived differently in different constituencies. Derek Stander writes from England stating that a journal is needed and offers some very good evidence. He has surveyed several journals and reports the following percentages of historical articles for 1981, 1982, 1983, 1984, 1985. Arithmetic Teacher: 0, 0, 0, 0, 0; Bulletin of the Institute of Mathematics and Its Applications: 4.0, 8.7, 5.9, 12.8, 14.2; Educational Studies in Mathematics: 0, 0, 0, 0, 0; Eureka: 0, 0, 0, 0, not published; For the Learning of Mathematics: 9.4, 8.3, 0, 0, 0; International Journal of Mathematics Education in Science and Technology: 0, 1, 1.3, 0.7, 0; Mathematical Education for Teaching: 0, –, 0, –, –; Mathematical Gazette: 1.8, 2.1, 0.3, 1.4, 0; Mathematics in Schools: 3.5, 2.0, 0, 1.0, 0; Mathematical Spectrum: 15.6, 8.3, 4.0, 4.0, 3.1; Mathematics Teacher: 0.3, 0.5, 1.1, 1.9, 0; Mathematics Teaching: 0, 0, 0, 0, 0.4; School Science & Mathematics: 0, 0.3, 0, 0, 0; Struggle: 0, 0, 0, 0, 0, Teaching Mathematics and Its Applications: –, 6.1, 7.6, 0, 7.5. Mr Stander concludes that there is not that much historical material available in the journals.

I have not verified the data presented by Mr Stander. But I believe he has a good point: journals being read by teachers often do not carry enough historical material —in spite of evidence indicating that teachers very much want historical materials. At most meetings in the U.S. and Canada that I have attended, historically oriented presentations draw large crowds. Those attending are not only interested in history for their own satisfaction, but many are looking for materials and ideas that can be used in the classroom.

I reported in the last issue of the *Newsletter* that opinions about HPM launching a journal tended to favor HPM investing its energies in producing materials for the classroom. These opinions were for the most from North America. Perhaps this issue will be discussed at the ICM-86 (Berkeley; see items below) meeting where opinion from a wider geographic range should be represented. If it is, I will report it in these pages. □

HPM Will Meet At the International Congress of Mathematicians in Berkeley

Ubiratan D'Ambrosio, chair of HPM, has organized an international meeting of HPM for August 8, 1986, as part of the International Congress of Mathematicians (ICM-86), August 3-11, University of California, Berkeley. ICM-86 has provided a room for the HPM meeting, Lewis 100, from 1900 h to 2200 h. (This is one hour after the International Commission on Mathematical Instruction session.)

Two panels of speakers will address the theme, "The Time Lag Between Advances in Mathematics and Their Incorporation Into Collegiate and University Curricula: A Historical Perspective and Implications". A short business meeting will be included.

Latest details are available from Professor Ubiratan D'Ambrosio, UNICAMP, Caixa Postal 6063, 13081-Campinas-SP, Brazil. (Information about ICM-86 is in the following item.) □

ICM-86 Has Several Sessions On History and Pedagogy

The 'Tentative Schedule' of the program of the International Congress of Mathematicians (ICM-86) shows several sessions on historical and pedagogical topics. The International Commission on Mathematical

Instruction, of which HPM is an affiliate, is scheduled to meet each day (except Thursday, August 7th) from Sunday, August 3rd, to Sunday, August 10th, from 1700 h to 1800 h. At the time of writing this, the content of the sessions is not known.

Several historical talks are also scheduled, but unfortunately for HPM participants, all but one are scheduled in conflict with the ICMI sessions. Thomas Hawkins speaks on "The origins of the representation theory of semisimple Lie algebras" on Monday, August 4, 1700-1745 h. Judith V. Grabiner's talk, "The centrality of mathematics in the history of Western thought" is scheduled for Tuesday, August 5 at 1500-1545 h. On Friday, August 8 at 1700-1745 h, W.-T. Wu speaks on "Recent studies on the history of Chinese mathematics". Henk J. Bos will talk on Saturday, August 9, 1700-1745 h, on "The concept of construction and the representation of curves in seventeenth century mathematics". The last history talk scheduled is by I. Bashmakova, "Équations diophantiennes et l'évolution de algèbre", set for Sunday, August 10, 1700-1745 h. Two pedagogical talks are listed: Zbigniew Semadeni (Sunday, 8/3, 1700-1745 h) "Verbal problems in arithmetic teaching", and Jean-Pierre Kahane (Tuesday, 8/5, 1400-1445 h) "Mathematical teaching, computers, and calculators". Room has been left on the 'Tentative Schedule' for other talks in these general categories. The final form of the schedule will be distributed to participants at the time of registration.

The San Francisco Bay area, which includes Berkeley, is considered by many to be a top choice for visiting and vacationing. In addition to the benefit of socializing with fellow mathematicians and educators, attending ICM-86 affords an opportunity to see one of America's great metropolitan areas as well as unusual natural beauty (including the unique giant redwood trees in nearby Muir Woods). Information is available from ICM-86, P.O. Box 6887, Providence, Rhode Island 02940, U.S.A. □

Second Circular Available For History and Education Symposium In Japan

The Second Circular has been mailed for the International Symposium for History of Mathematics and Mathematical Education Using Chinese Characters (ISHME), 7-10 August 1987, at Gunma University, Kiryu, Japan. Important deadlines listed are: 1 December 1986 for receiving intentions to attend or to speak; 1 March 1987 for pre-registration ($150 US for regular participants, $65 for each accompanying person —after 1 March: $170 and $75, respectively; cancellations before 6 June 1987 will receive 50% refund —after, no refund); 1 May 1987 for receiving abstracts of talks (in a form prescribed in the Second Circular). Each registrant will receive a copy of the Symposium Book of Abstracts. Arrival will be through the Tokyo International Airport. On the ground, a combination of subway and taxis take you to Kiryu in about 3½ hours at a cost of around $31 (depending on the yen-dollar exchange rate and on tipping). Hotel charges will be about $25 US per night.

Registration for the Symposium begins on Friday, 7 August, at 1300 h, and the opening ceremony is at 1530 h, with a reception and dinner to follow. The main part of the symposium presentations will be Saturday morning and afternoon and Sunday morning (8 and 9 August) with a farewell party and a trip to Kusatsu Spa scheduled for Sunday afternoon, and sightseeing at Maebashi on Monday morning (10 August).

The president of the organizing committee is Yoshimasa Michiwaki (Gunma University), president of the Gunma Ken Wasan Study Association; vice presidents are: Kazuo Shimodaira (Kokushikan Univ), president of The History of Mathematics Society of Japan; Yong-Woon Kim (Hanyang Univ), president of The Society of Korean Mathematical History; Shi-Ran Du (Institute of History of Natural Science, Academia Sinica), president of The Society of Chinese Mathematical History; Yoshitomo Matsuo (Science Univ of Tokyo), president of Japan Society of Mathematical Education; and Masaaki Iizuka (Jōbu Univ). The symposium Secretary-General is Shigeo Ohtake, secretary-general of the Gunma Ken Wasan Study Association. Direct correspondence to ISHME Organizing Committee, Gunma University, 1-5-1 Tenjin-chō, Kiryu, Gunma 376, Japan. [Additional information was in *Newsletter* # 11.] □

History and Ethnomathematics Themes Are Discussed At Pan-African Congress

(Lawrence Shirley—) The Second Pan-African Congress of Mathematicians of the African Mathematical Union was held at the University of Jos in Jos, Nigeria, March 23-29, 1986. At the last minute, the organizing committee agreed to add a section on "History of Mathematics in Africa" to the Congress program. The late approval caused difficulty in publicity, which probably reduced attendance, especially from outside Nigeria. However, five papers were presented and steps were taken for further action in the area of history of mathematics in Africa.

The organizer of the history section, L.H. Shirley of Ahmadu Bello University, Zaria, Nigeria, presented a paper to set the theme of the gathering. "Ethnomathematics and the History of African Mathematics" pointed out that the Euro-centerness of so much of the history of mathematics only reflects history of academic mathematics —the formal topics of most research and school studies. However, by taking the broader view of ethnomathematics, historians can find many mathematical achievements from Africa —in art, recreation, local engineering, trade, and everyday logic and mathematical thinking. Not only does this approach lead to history of mathematics which is more relevant to African students, but also to more relevant mathematics.

The other papers fitted well into this theme. P. Gerdes of Universidade Eduardo Mondlane, Maputo, Mozambique, gave a graphic demonstration of how Mozambican basket-weaving patterns relate to geometry and even to a proof of the Pythagorean theorem. I.O. Enukoha of the University of Calabar, Calabar, Nigeria, considered the counting words and some concepts of geometry of the Efik-Ibibio people of southeastern Nigeria. J.O. Ojoade, a Folklorist from the host University, spoke on the cultural significance of the number 'three' in Africa and elsewhere. Finally, A.M. Kani, a historian from Ahmadu Bello University, described the mathematics of the Islamic scholars of the West African Sahel area in pre-colonial times, notably the work of the eighteenth century Nigerian mathematician, Muhammed bin Muhammed al-Katsinavi.

Paulus Gerdes was elected to the Executive Council of the African Mathematical Union, where he will be working to establish a Commission on the History of Mathematics in Africa, under the A.M.U. The immediate project will be establishing a newsletter. If you would like to receive the newsletter or desire more information or can contribute news or findings on the history of mathematics in Africa, you are invited to contact Dr L.H. Shirley, Mathematics Education Section, Dept of Education, Ahmadu Bello University, Zaria, Nigeria, or Prof P. Gerdes, Dean, Faculty of Education, Universidade Eduardo Mondlane, C.P. 915, Maputo, Mozambique. (Professor Shirley uses history in mathematics education courses at the Ahmadu Bello University, and was the organizer of the meeting reported here.) □

Americas Section Will Meet At Anaheim, California In April 1987

Preliminary plans for the April 1987 meeting of the Americas Section of HPM call for a day and a half meeting, beginning Tuesday morning, April 7th, and ending Wednesday midday, April 8th. As in the past several years, this meeting is immediately preceeding the Annual Meeting of the National Council of Teachers of Mathematics (NCTM), which begins April 8th and ends April 11th. The meeting location will be either in one of the NCTM convention hotels —the Marrriot or Anaheim Hilton— or in an immdediately adjacent hotel.

Organizers are Leland Webb (California State Coll, Bakersfield, California 93309) and Barnabas B. Hughes (California State Univ, Northridge, California 91330). A call for papers has been issued on the topic of using history in the mathematics classroom. 50 word abstracts may be sent to V. Frederick Rickey (Dept Mathematics & Statistics, Bowling Green State Univ, Bowling Green, Ohio 43403, U.S.A.) or Charles V. Jones (Dept Mathematical Sciences, Ball State Univ, Muncie, Indiana 47306, U.S.A.) Further information is in the Americas Section Supplement (available from the Editor). (Additional NCTM information: write, NCTM, 1906 Association Drive, Reston, Virginia 22091, U.S.A.) □

Program Announced for Canadian Society

The Canadian Society for History and Philosophy of Mathematics/Société canadienne d'histoire et de philosophie des mathématiques announced a tentative program of speakers for their annual meeting, scheduled for May 26-28, at the University of Manitoba. Speakers on Monday, May 26th: Victor J. Katz (Univ District of Columbia), "Trigonometric functions and the calculus"; M.A. Malik (Concordia Univ), "A history of the proofs of Bernstein's theorem"; Irving H. Anellis (Philosophia Mathematica), "The heritage of S.A. Janovskaja"; Israel Kleiner (York Univ), "Evolution of (noncommutative) ring theory"; Alejandro Garciadiego (Universidad Nacional Autonoma de México), "On the need to revrite the history of the foundations of mathematics"; N.S. Mendelsohn (Univ Manitoba), "The unusual teaching methods of Samuel Beatty". Speakers scheduled for Tuesday, May 27th are: Len Berggren (Simon Fraser Univ), "The early history of the science of spherics"; A.K. Ray (Fundamental Research Institute), "Some reminiscences of post-war Göttingen in mathematics and its applications"; Mark Reimers (Univ British Columbia), "An experimental course for the first-year Arts students"; Erwin Kreyszig (Carleton Univ), "On the development of the concept of function and its influence on contemporary mathematics"; Edward Barbeau (Univ Toronto), "Lagrange multipliers: then and now"; Gregory H. Moore (Mount Allison Univ), "From Frege to Skolem: the rise of first-order logic"; Louis Charbonneau (Univ Québec à Montréal), "Fonction et tangente: reflexions historico-didactiques"; Roger Herz-Fischler (Carleton Univ), "Theorem XIV, ** of the *Elements* —the case of the missing theorem; or, when should we prove 'obvious' theorems?".

Program chair for the meeting is Ross Willard, Pure Mathematics Department, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada (phone: 519/885-1211, ext 5712).

Where Do We Get Portraits Of Mathematicians?

"It's always nice to tie a face to a name." How often have each of us expressed this feeling? Our students are no different from us: they would find a portrait of the person whom they are studying interesting. Portraits of famous mathematicians are a natural way to introduce history into the mathematics classroom. The problem for all of us is finding suitable portraits [see *Newsletter* # 11, "Classroom materials: portraits"].

In response to an enquiry from a colleague, Fred Rickey of Bowling Green State University (Bowling Green, Ohio 43403) provided some information and hints on possible sources. The David Eugene Smith Collection at Columbia University is reported to contain over 3000 portraits [*Scripta Mathematica* 4(1936)315-16]. The Smithsonian Institution has a collection of slides and prints [information from Customer Services Branch, Office of Printing & Photographic Services, Smithsonian Institution, Washington, D.C. 20560; phone 202/357-1933]. J. Weston Walch, Publisher (of Portland, Maine) sold poster series in the past. The Science Museum Library (London) has an index of portraits in secondary sources with about 15,000 references [*British Journal for the History of Science* 18(1985)71-76]. The *Mathematical Intelligencer* publishes photographs and portraits [publisher: Springer-Verlag, 175 Fifth Ave, New York, NY 10010, U.S.A.]. Louis Charbonneau (Secretary of the Canadian Society for History and Philosophy of Mathematics) is collecting photographs of people, mathematical instruments, and documents which he plans to make available to teachers at a minimum cost; his address is Dept Mathématiques et Informatiques, U.Q.A.M., C.P. 8888, Succ 'A', Montréal, Québec H3C 3P8, Canada.

Garry J. Tee (The University of Auckland) has sent a copy of a brochure for a set of nine posters about Napier, available from the Department of Mathematics at the University of Edinburgh. Writing to the department may produce results.

Interest in photographs and portraits may be great enough for the *Newsletter* to routinely solicit information about them. For example, journals publish photographs and reproductions of portraits, some occasionally and some consistently, but indexing services do not usually index portraits. We could provide a new 'department' in the *Newsletter* called

"Have You Seen?" which would list such sources of pictures and portraits, as they are made known to the editor. If you are interested in this service, send your contributions and suggestions. N.B. Be sure to send complete information -especially addresses- that will enable the reader to write directly to the appropriate agent. □

Motivating Interesting Biographies

The "Reader Reflections" department of the *Mathematics Teacher* has very interesting letters from its readers. The March 1985 issue contained a letter from Erica Voolich and Betsy Dudley (Cambridge Friends School, Cambridge, Massachusetts 02140) describing their success with getting students to do biographical research on mathematicians and then to present it in an interesting form. Taking their lead from a news commentator, the biographies were presented by telling about a little known event in the person's life and then telling why the person was famous. The last thing mentioned was the name of the person. The teachers report that their students found the format a challenge to work within. Moreover, it provided an opportunity to teach a variety of disciplines along with mathematics: history, writing, and biography. □

The Treviso Arithmetic Revisited, I
A Translation Just Published

Frank J. Swetz has written *Capitalism and Arithmetic: The New Math of the Fifteenth Century* which will be available in August 1986 from Open Court Press (315 Fifth Street, Peru, Illinois 61354; phone toll free in U.S.: 800/435-6850). It contains a complete translation of the *Treviso Arithmetic* along with Professor Swetz's analysis and annotations. In the book he attempts to associate the development of arithmetic and its teaching with the social, political and economic life of the fifteenth century.

The appearance of Duane Deal's piece on the *Treviso Arithmetic* in *Newsletter* #9 (May 1985) prompted Professor Swetz to call to the attention of HPM readers his own book, now complete after five years of work. □

The Treviso Arithmetic Revisited, II
The Earliest Mathematical Printings

(*Garry J. Tee—*) In *Newsletter* #9 (May 1985), Duane E. Deal's article on the *Treviso Arithmetic* starts with the sentence, "Although there are a few mathematical references in printed books as early as 1472 and perhaps even as early as 1469, the first printed book devoted entirely to mathematics is the *Treviso Arithmetic.*" But in China, the collection of mathematical books, *Suan Ching Shih Shu* (The Ten Mathematical Manuals), which had been edited in 656, was first printed in 1084. [Joseph Needham 1959 *Science and Civilisation in China* Vol 3, Cambridge Univ Press, p 18] That collection includes the two earliest surviving Chinese mathematical books, *Chou Pei Suan Ching* (Arithmetical Classic of the Gnomon and the Circular Path) and *Chiu Chang Suan Ching* (Nine Chapters on the Mathematical Art).

Chou Pei appears to have been compiled from earlier sources in about the first century before the present era, and deals with astronomical measurements in a rational mathematical manner. Traditional Chinese mathematical texts rarely provided proofs, but *Chou Pei* proves that the 3,4,5-triangle is right-angled in a manner which readily could be adapted to prove the Pythagorean theorem generally.

Chiu Chang was probably compiled in about the first century of the current era, incorporating earlier material, and treats arithmetic of fractions, proportions, areas of various figures, volumes of various solids, computation of square and cube roots, solution of quadratic equations and the regula falsi method for solving equations. The highlight of *Chiu Chang* is the treatment of linear algebraic equations, solving them by an algorithm closely equivalent to matrix triangulation (Gaussian elimination). The earliest known use of negative numbers occurs in the same chapter, along with a problem with four equations and five unknowns.

Specimens of paper dating from the second century BC have been found in China, and by the third century AD paper had become the standard material for writing in China. From the eighth century, Chinese books were mostly printed by block printing, in which a wooden

block was carved for each double page of text. Movable type printing was invented by the Chinese workman, Pi Sheng (c. 990-1051), and from the thirteenth century a small but significant fraction of Chinese books were printed from movable type. However, the tens of thousands of characters used in written Chinese make movable type printing very much less convenient than it is for alphabetic writing. [Ibid, Vol 5, Part 1, pp 293-319]

Since 1908, when David Eugene Smith discussed the *Treviso Arithmetic* at length in his revised edition of Augustus De Morgan's *Rara Arithmetica* [4th Edition, 1970; NY: Chelsea Publishing Co], bibliographers have identified thirteen books with substantial mathematical content which were printed in Europe before 1478, beginning with Sacrobosco's *Sphere of the World* and Gerard of Cremona's *Theory of the Planets* —both in 1472- and continuing to Orême's *Tractate on Money* and the anonymous *Algorithm* in 1477. [S.S. Glushkov 1985 "The relation between algebra and geometry in mathematics of the epoch of the Renaissance" (in Russian) *Istoriko-matematicheskiye issledovaniya* 29, Moscow: Nauka, pp 55-68]

It is interesting to note that Regiomontanus's *Ephemerides* (1474) was twice used by Christopher Columbus to compute the longitudes in the New World, by observation of lunar eclipses. On 14 September 1494, when Columbus's ships were anchored off Saona Island at the southeastern tip of Hispañola, the difference between the local time of the eclipse and that predicted by Regiomontanus for Nuremberg led Columbus to an estimate of the longitude, equivalent to 91° west of Greenvich (instead of 68½°). On 29 February 1504, when Columbus was at Santa Gloria in Jamaica, the local Taino people were unwilling to sell further food to the Spaniards, whereupon Columbus told the Taino that the moon would rise bloody and inflamed, marking the wrath of God against the Taino. When the Taino saw that the moon was dark and red, then "they came running from every direction to the ships laden with provisions, prayirg the Admiral to intercede by all means with God on their behalf." Columbus, meanvhile, was observing the local time of that eclipse from which he estimated the longitude equivalent to 115¼° west of Greenvich (instead of 77¼°). [Cf, S.E. Morrison 1942 *Admiral of the Ocean Sea, A Life of Christopher Columbus* Boston: Little, Brown & Co, pp 478, 553, 554]

[Professor Tee is in the Department of Computer Science, The University of Auckland, Private Bag, Auckland, New Zealand. Included in his communication were materials for two courses: History of Differential and Integral Calculus; and History of Computing.] □

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, articles and journals; 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.

Box, Joan Fisher 1978 *R.A. Fisher: The Life of a Scientist* John Wiley & Sons [ISBN 0-471-09300-9]
Re-issued as a paperback.

Boyer, Carl B. 1968 *A History of Mathematics* Princeton University Press.
Re-issued as a paperback; one of the best general histories in English. [Ed.]

Brown, Gary 1986 "Writing mathematical dialogues" *American Mathematical Monthly* 93:4 (Apr) 296-98.
Specific ideas on how to incorporate history by having students write and act out plays on mathematical themes.

Dauben, Joseph W. 1986 "Historical notes: March of the months — mathematically speaking" *Consortium* (Newsletter of COMAP) (n.d.) [March or June 1986], p 6.
Discusses the naming of the months.

Harnik, Victor 1986 "Infinitesimals from Leibniz to Robinson, time to bring them back to school" *Mathematical Intelligencer* 8:2, 41-47, 63.
Historical survey with specific suggestions for use in introductory calculus.

Jurascheck, Bill, and Nancy S. Angle 1986 "The binomial grid" *Mathematics Teacher* 79:5 (May) 337-39.
Uses Euclid's proposition II.4 with its geometric interpretation as a basis for generalizing multiplying binomials.

Kimberling, Clark 1986 "Microcomputer assisted mathematics: Lagrange polynomials" *Mathematics Teacher* 79:5 (May) 368-73.
Another in an excellent series on use of the computer, here with a historical dimension.

Missouri Council of Teachers of Mathematics 1986 'Interview' with John Napier. MCTM *Bulletin* 11:3 (Apr) 1-2.
A short biographical sketch of Napier (1550-1617), inventor of logarithms, cast as an interview in the present. [Write: 752 Village Wood Ct, Ballwin, Missouri 63021.]

Mitchell, Charles E. 1986 "Astronomy, geometry, and the ancient Greeks" *Arithmetic Teacher* 33:9 (May) 39-41
Suggestions on how to use Greek astronomy to show the practical applications of mathematics to elementary students.

MacHale, Desmond 1985 *George Boole: His Life and Work* Dublin: Boole Press [ISBN 0-906783-05-4]
Only book length biography of the creator of analytic logic.

O'Donnell, Sean 1983 *William Rowan Hamilton: Portrait of a Prodigy* Dublin: Boole Press [ISBN 0-906783-06-2]
Readable biography covering Hamilton's mathematical career.

Olivastro, Dominic 1986 "In pursuit of pi" *The Sciences-New York Academy of Sciences* (May-June) 58-60.
Short antecdotal historical account.

Robertson, Jack M. 1986 "Geometric constructions using hinged mirrors" *Mathematics Teacher* 79:5 (May) 380-86.
Explains and compares constructions with hinged mirrors and classical Greek constructions with compass and unmarked straight-edge. Good bibliography.

Ronan, Colin, and Mayo Mohs 1986 "A sage for all seasons" *Discover* 7:1 (Jan) 52-62.
Biography of Edmund Halley, important in Newton's career as well as comet theory. Portraits (color).

Seitz, Donald T., Sr. 1986 "A geometric figure relating the golden ratio and pi" *Mathematics Teacher* 79:5 (May) 340-41.
Starting from Euclid's proposition II.11, shows the ratio of the surface area of the golden cuboid to its circumscribing sphere is $\phi:\pi$.

Swetz, Frank J. 1986 *Capitalism & Arithmetic. The New Math of the 15th Century* Peru, Illinois: Open Court. [ISBN: 0-87548-438-7 (cloth), 0-8126-9014-1 (paper)]
Contains analysis of social, political and economic influences on teaching and development of arithmetic; also translation of *Treviso Arithmetic. Paper and cloth.*

Tee, Garry J. 1977 "Sof'ya Vasil'yevna Kovalevskaya" *Mathematics Chronicle* 5, 113-39.

_____ 1981 "Two New Zealand mathematicians", in *History of Mathematics* Proceedings of the First Australian Conference. John N. Crossley, Editor. Clayton, Victoria, Australia: Monash University, Department of Mathematics. Pp 180-199.
Biographies of Leslie John Comrie (1893-1950) and Alexander Craig Aitken (1895-1967).

_____ 1983 "The heritage of Charles Babbage in Australasia" *Annals of the History of Computing* 5:1 (Jan) 45-59.
Descendants of Babbage in Australia and New Zealand have many letters and manuscripts, as well as parts of his difference and analytic engines.

Williams, Richard H., and Roy D. Mazzagatti 1986 "Mathematical Firsts — who done it?" *Mathematics Teacher* 79:5 (May) 387-91.
Examples of theorems and results named for the wrong persons.