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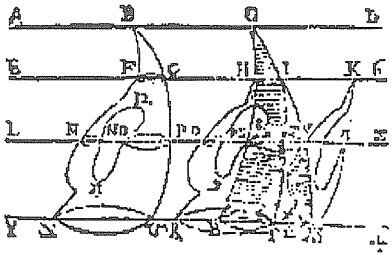
WHAT'S INSIDE



Canadian Society for History and Philosophy of Mathematics

Société canadienne d'histoire et de philosophie des mathématiques

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ABOUT THE SOCIETY

Founded in 1974, the Canadian Society for the History and Philosophy of Mathematics/ Société canadienne d'histoire et de philosophie des mathématiques (CSHPM/SCHPM) promotes research and teaching in the history and philosophy of mathematics. Officers of the Society are:

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The Society's Web page, designed and maintained by Rob Bradley, is at **<www.adelphi.edu/cshpm>**

New members are most cordially welcome; please contact the Secretary.

http://www.adelphi.edu/cshpm

Our website has moved!! Rob Bradley has agreed to manage our site as webmaster, taking over from Glen Van Brummelen, who has been at the helm since its inception. Until recently the site was housed at Kings University, Edmonton, where Glen was the mathematics department. Since his move to Bennington College in Vermont this fall, Glen has been looking for a new webmaster. Rob is an Associate Professor of Mathematics at Adelphi University in Garden City, NY and has moved the site there. He would like to set up a permanent home for our webpage which will be independent of the location of the webmaster. This will be discussed at the annual meeting in June since it will entail a minimal cost. The current address of our webpage is <http://www.adelphi.edu/cshpm>. Check it out!

The President's Message
Spring 2000

Now that most millennium bugs have been worked out and Spring is on its way the time has come for my final report. I want to begin by thanking you for your support and encouragement. I would also like to single out the Executive Committee for their wise counsel (in particular Glen Van Brummelen and Robert Thomas for working out all the details that were necessary in separating the offices of Secretary and Treasurer), the Nominating Committee for their fine efforts in presenting an impressive slate of nominees, The Editors of the Bulletin and Tom Archibald for his work as liaison with the CMS for the Hamilton meeting this summer. I am deeply indebted to all the above and many others for their assistance during my two-year tenure in office.

I again urge members to attend our annual meeting June 10-13 at McMaster University in Hamilton, Ontario, which will be held jointly with the Canadian Mathematical Society and other Canadian scientific organizations. This meeting provides a unique opportunity to attend lectures on topics in pure and applied mathematics as well as on the history and philosophy of mathematics and to socialize with colleagues in related organizations. Tom Archibald of Acadia University has a stellar line up of speakers in his special session on mathematics of the new millennium. Pat Allaire and Rob Bradley are organizing the general contributed paper session and Greg Moore is handling the local arrangements. If you haven't been to an annual meeting lately, this meeting will provide you with a great occasion to renew old acquaintances and make new friends.

Since our meeting last July at the University of Toronto, I have visited nearly twenty colleges or universities. In March, I had the pleasure of speaking in the Frederick V. Pohle Colloquium Series on the History of Mathematics and the Exact Sciences at Adelphi University. The colloquium, organized by Rob Bradley and Pat Allaire, provided a chance for me to meet a number of CSHPM members on an informal basis. If you live in the greater New York area I highly recommend this series to you.

Before the equinoctial gales set in, I attended a special session on history of mathematics at the spring meeting of the Western Section of the American Mathematical Society at the University of California at Santa Barbara. At the special session on history of mathematics Chris Arney of the USMA at West Point spoke on mathematics at West Point, Betty Mayfield of Hood College spoke about her seminar on the history of mathematics, Jen Beineke of Trinity College (Hartford) spoke on the development of the Riemann zeta-function, Adrian Rice of Randolph-Macon College spoke on the prehistory of quaternions, Bob Stein of Cal State San Bernardino spoke on the history of logarithms, Victor Shapiro of UC Riverside spoke on the history of quasi-linear boundary value problems, Harriet Lord of Cal Poly Pomona spoke on surface area, Shirley Gray spoke on Maria Gaetana Agnesi, Barnabas Hughes of Cal State Northridge spoke on the conics of Gilles Persone de Roberval, Francine Abeles of Kean University spoke on Dodgson's approach to proportional representation, and I spoke on Gerbert's mathematics.

(See **President** p.14)

The Chord Tables (?) of Hipparchus of Rhodes

Barnabas Hughes, O.F.M.

Centuries before astronomers used trigonometric functions and tables to plot their way about the heavens, ancient Greek astronomers established the locations of the stars with tables of chords. The oldest surviving table, albeit in Indian form, was constructed by Hipparchus of Rhodes (*ca.* 180 – *ca.* 125 B.C.). Contemporary histories of mathematics[1] describe his table of chords as rising in 7.5° increments from 7.5° to 180°. Knowingly or not, their description was based on the developmental research of C.J. Toomer. In two significant articles[2] he established the benchmark for any discussion about the work of Hipparchus. Relevant to the theme of this article, the following quotation[3] from Toomer is crucial (R is the radius of a circle):

> *Hipparchus computed [his table] only at intervals of 1/48 of a circle (7-1/2°), using linear interpolation between the computed points for other values. Thus he was able to construct the whole table on a very simple geometric basis: it can be computed from the values of Crd 60° (= R), Crd 90°(=$\sqrt{2R}$), and the following two formulas (in which d is the diameter of the base circle and s is the chord of angle α):*
>
> *(1)* $Crd\,(180° - \alpha) = \sqrt{d^2 - s^2}$.
>
> *(2)* $Crd\,\frac{1}{2}\alpha = \sqrt{d^2 - d\sqrt{d^2 - s^2}}$.

Using the foregoing information together with R = 3438' (a discovery of Toomer), he constructed a most plausible Hipparchic table of chords[4], from 7.5° to 180°. Further, he evaluated the above listed tools for constructing the table with the remark[5] that the half-angle formula (2) is "the sole non-trivial element in the computation of his [Hipparchus'] chord table."

This last statement puzzled me. How could Toomer have written it in an analysis of the work of Hipparchus that shows the Greek to have been an outstanding scholar? More to the point: an accomplished geometer, as Hipparchus certainly was, could not have overlooked using the chord of 72°, the half-angle formula, and R = 3438' to construct a chord table with more entries than the 24 created by Toomer. Using Euclid's method for constructing the chord of a pentagon[6] I computed the chord of 72° to be 4041.6'. Thereafter using the half-angle formula, the Pythagorean Theorem, complementary angles, and supplementary angles, I constructed a table of 34 entries from 4.5° to 175.5° with six vacancies each lying 4.5° from its nearest neighbor. Interestingly enough, five of the six vacancies belonged to common multiples of 4.5° and 7.5°, the latter derived from 90 degrees. The sixth vacancy was filled with the chord of 180° equal to twice the radius. On the face of it, there appears no reason why Hipparchus might not have composed such a table almost as easily as I did (*almost*, because I used a TI-83 to do the computing). Hence, I am led to speculate that the 7.5° table reported by many was an earlier effort of Hipparchus. It would be so obvious to begin with the chords of 90° and 60° to see where these values might lead. A larger table

developed from the chord of 72°and the half-angle formula might have been a more mature accomplishment, although it seems not to have survived except in my wonderment.

At this juncture it must be noted that the chord table of Hipparchus apparently does not exist in its original or a copied Greek form. That he computed such a table is demonstrated quite convincingly from the existence of Indian chord tables.[7] The scholars there changed the chords to half-chords, with a consequent changing of the *terminus ad quem* from 7.5° to 3.75° , by using the formula

$$\tfrac{1}{2}\,\mathrm{Crd}\,\alpha = \sin\tfrac{\alpha}{2} \quad .$$

Neugebauer outlined the sequence of reasons:

> In his **Commentary on Aratus** [Hipparchus] measures arcs in 'sections' (τμηματα) of 1/24 of the circumference, units which are well known in certain sources of a more practical and elementary level. . . . These units of 15° and their parts seem to have been the units on which Hipparchus' trigonometry tables were built and which also underlie the Indian sine tables. . ."[8]

Elsewhere he was more succinct: "I have very little doubt that these [Indian] tables are nothing but the transformation of the Hipparchic tables of chords to a table of sines."[9]

Accompanying the issue of the composition of the chord table is an understanding of a remark made by Theon of Alexandria (*ca.* 390) in his commentary on the *Almagest* of Ptolemy: "Hipparchus completed a work on the chords of a circle in 12 books," as the statement from the Greek[10] is usually translated. Thomas L. Heath accepted the remark without qualification in *A Manual of Greek Mathematics.*[11] Otto Neugebauer was not so neutral: "It is obvious nonsense that Pliny ascribes to Hipparchus a work on chords in 12 books."[12] Toomer's approach was proactive. Having shown how the chord table could be arranged in twelve *sections,*[13] he considered Theon's statement "incredible[14]. Toomer was closer to the truth than he may have suspected.

Two dictionaries of the Greek language, that by Sophocles and that by Liddell-Scott, recognize an equivalent of *section,* namely "subdivision of a literary work[15] or "the division of a work"[16], as an acceptable meaning of ΒΙΒΛΟΣ. Finally, let it be noted that the most recent critical edition of Euclid's *Elements* (in Greek, of course, with a French translation[17]) identifes "the Books" only by Greek alphanumeric letters; the word ΒΙΒΛΟΣ or variation on it does not appear at sectional breaks.

Historians of mathematics are certain that Hipparchus of Rhodes constructed and used a chord table. There is adequate evidence to conclude that he calculated a table of 24 chord lengths from 7.5° to 180° . Knowing the tools that Hipparchus had at his disposal, it is certainly reasonable to argue that he also constructed a table of another 34 chord lengths for angles from 4.5° to 175.5°. Consequently, a chord table of twelve sections becomes quite plausible under the following plan. Allow two sections for the 7.5° table and the tools that generated it, much as Ptolemy introduced his chord table with the theorems he used to construct it. Similarly, assign the 4.5° table to another two sections. A third table containing a combination of the

(See **Hipparchus** p.11)

Web Review: The Cornell Digital Collection http://cdl.library.cornell.edu/

Rob Bradley

The World Wide Web has made historical research easier. Although only a tiny fraction of the international archive of printed material has yet been digitized, with each passing year the amount of material that can be accessed without the need of airline tickets, hotel accommodations and letters of introduction grows by leaps and bounds.

One of the many sites on the web contributing to the digital archive is Cornell University. The Cornell Digital Collection (CDL) is on-line at http://cdl.library.cornell.edu/. As the full title of the site is The Cornell University Prototype Digital Library, it's probably best to judge the site as a work in progress, rather than a finished product. Although it promises yet greater things to come, it is already impressive by any standard.

The flagship of the CDL is the Making of America Collection, a "multi-institutional initiative to create and make accessible over the internet a distributed digital library of important materials on the history of the United States." There are additional archives available, with digital versions of founder Ezra Cornell's papers, agricultural resources reflecting the University's roots as a land-grant institution, and other topics. But most important for our readers is the Math Book Collection, which receives second billing in the CDL.

Cornell University Library Math Book Collection can be accessed directly at http://moa.cit.cornell.edu/dienst-data/cdl-math-browse.html. It consists of 571 books scanned from the disbound originals in the Cornell University Library. The collection is indexed so that it may be browsed by author and title, but I recommend browsing the collection with the newer Hunter & Dienst 5.1 viewer (the first link on the menu), which does not support a title index.

A casual perusal of their title pages suggests that most of the books in this collection were published in the last two decades of the nineteenth century and the first two of the twentieth, with a particular clustering in the 1910s. This does not mean that older authors are absent from the collection; for example, I enjoyed skimming through a copy of The Geometrical Lectures of Isaac Barrow, translated with notes, proofs and historical narrative by one J. M. Child, B.A. (Cantab.), B.Sc. (London) and published in 1916. Similarly, there is an 1885 edition of the first six books of Euclid, with "Copious Annotations and Numerous Exercises," by a certain John Casey, Ll. D., F. R. S., at the Royal University of Ireland.

The collection also includes works by the towering figures of the turn of the last century, in their original languages. Hilbert has only one entry, whereas Borel and Poincare are each represented by seven monographs in the collection. The case of Peano highlights one of the limitations of a collection like this: since only book-length material is included, important discoveries published only in the journals will be missing or at least represented only in secondary sources. Peano's one entry here is his 1887 book, *Applicazione Geometriche del Calcolo Infinitisemale*, which is too early to make mention of his great contributions to mathematics: the vector

(See **Web Review** p.14)

Book Review: *A Station Favorable to the Pursuits of Science: Primary Materials in the History of Mathematics at the United States Military Academy.*

By Joe Albree, David C. Arney, and V. Frederick Rickey. History of Mathematics Volume 18. Providence, RI (American Mathematical Society and London Mathematical Society). 2000. xii + 272 pp. [ISBN: 0-8218-2059-1]

Reviewed by Amy Ackerberg-Hastings

While the mathematicians and historians I have come across usually express interest in the histories of mathematics education, textbooks, and institutions, there are still too few recent scholarly works available on these subjects. At the same time, there is not much information in the literature on mathematics in the United States before the last quarter of the nineteenth century. With its strong ties to history, the United States Military Academy is a reasonable place to look to in starting to fill the gaps.

This new book, then, is both welcome and well-done. The majority of the work contains a catalog of historical mathematics books in the Academy's collection, compiled by Albree, Arney, and Rickey. The authors, though, devote the first forty pages to an exposition of the origin of the United States Military Academy, the history of the library, and the history of the mathematics and mechanics departments. They are especially interested in Sylvanus Thayer, who turned the Academy curriculum toward French mathematics and civil engineering. Readers also learn about the professors who became prolific textbook authors, Charles Davies and William H. C. Bartlett. Albree, Arney, and Rickey close their introduction with a statement on the scope of the Academy's collection of historical mathematics books and an explanation of how to use the catalog.

The catalog lists 1195 books by 798 authors, not counting multiple copies or editions. These works are predominantly nineteenth century publications from French, English, and American presses and in the French and English languages. The list is organized by author and provides bibliographical information according to the *Chicago Manual of Style*. Especially valuable are two types of annotations, general information about each book and information specific to the volume in the Academy collection. Although there are no noticeable errors of fact in the introduction, there are several pesky typos in the catalog.

Finally, the appendices contain enough photographs to make anyone a bibliophile, yearning to hold the books themselves. This work as a whole ought to inspire readers to study the collection of the Academy, which I have found to be a cozy place in which to conduct research, or to delve into the collections at their own institutions. Ask your library to purchase it. If you have any interest in mathematics education, the history of American mathematics, or rare mathematics books, add it to your own shelves. *Station* is an enjoyable read, helpful reference, and reasonably priced for AMS members ($35).

Mathematicians do not study objects, but relations between objects; thus they are free to replace some objects by others as long as the relations remain unchanged. Content to them is irrelevant: they are interested in form only. Henri Poincaré

How I Learned to Love the History of Mathematics/Comment je suis venu à travailler en et à aimer l'histoire des Mathématiques

This is a continuation of a series started a year ago. If you would like to submit a similar piece for the next issue, we would be happy to hear from you.

Amy Ackerberg-Hastings

I'm competent at a variety of things, but I've never had one area in which I truly excelled. I was probably fortunate, then, to grow up in a farming town where most of the kids had to be jacks- and jills-of-all-trades in order to keep all the high school activities in existence. When I headed off to North Park College in Chicago, while I cut down my extracurriculars to a few essentials, academically I remained unable to choose between the humanities camp or that of the sciences. So, I tried to have it both ways and decided to double-major in mathematics and history.

The revelation came when I took the history of mathematics course in my sophomore year. Maybe I wouldn't have to give up one of the disciplines I most enjoyed for the other. A liberal arts college best at producing schoolteachers and pre-med students, North Park in 1989 wasn't necessarily equipped to point people toward a field which appeared obscure. What the school offered, however, were professors who inspired and challenged me . . . and patiently followed along as I researched subjects outside of their areas of expertise for the rest of my college career. For example, I produced (admittedly rather conjectural) biographies of Ahmes, scribe of the Rhind Papyrus, and Euclid for Zenos Hawkinson, himself a great storyteller and lecturer, in a course on Ancient Mediterranean history.

In the mathematics department, I soaked up everything I could from my history of mathematics (and differential equations, linear algebra, and advanced calculus) professor. John Wicks had just joined the faculty then, and he is one of those teachers who demonstrates genuine enthusiasm for every subject he teaches. I hope you know the type—he gets so excited writing on the board that he slides across the floor on his knees. I also took a geometry course from Alan Iliff, who chose Euclid and Hilbert as the authors of our textbooks.

Although none of my undergraduate professors are well-known to the best of my knowledge, they played a vital role in my academic life by helping me lay the foundation for becoming a historian of mathematics. There were still some twists and turns before I found my way into a graduate program in the history of technology and science, met more professorial role models, and took up various aspects of mathematical teaching and culture around 1800, but North Park started me on a path of trying to combine my diverse interests.

Roger Godard

D'abord, au tout début, et ce, à partir de mon jeune âge, j'ai toujours spontanément aimé l'Histoire, par le biais et la lecture de nombreux romans historiques. Je me rappelle que Walter Scott et Alexandre Dumas étaient

mes auteurs préférés. Puis, plus tard au Lycée, j'ai immanquablement toujours remporté les prix d'Histoire. Mais ce n'est qu'à l'Université que j'ai posé mon choix. Comme à l'époque, le professorat était l'unique débouché pour les historiens, je me suis donc tourné vers les Sciences.

Puis, ultérieurement embauché au RMC au département de Mathématiques, j'enseignais surtout l'Analyse Numérique ainsi que la théorie des Probabilités, tous deux enseignés avec beaucoup d'enthousiasme. D'ores et déjà, l'Histoire devait sombrer dans l'oubli.

Cependant, ce n'est qu'en 1987-1988 lorsque j' enseignais à des étudiants de 2e année, un cours sur les séries et les équations différentielles ordinaires, où, bien sûr s'y retrouvaient bon nombre de noms illustres: d'Alembert, Cauchy, Lagrange, Clairaut etc., que je décidais de mettre quelques dates importantes pour les situer davantage dans leurs époques respectives. C'était une approche bien naïve. J'achetais alors le petit livre de Rouse Ball: *A Short Account of the History of Mathematics* que l'on pouvait trouver facilement à Kingston.

Pour revenir à la question personnelle, à savoir, comment je suis venu à aimer et à travailler en Histoire et en Philosophie des Mathématiques, je dois dire que c'est un peu par hasard.

En 1991, la réunion annuelle de SCHPM eut lieu à Kingston, et au RMC je fus sollicité d'y participer. C'est alors que j'écrivis mon premier article sur *Condorcet et les Mathématiques Sociales*. La bibliothèque de Queen's University est très bien équipée et je lus alors les *Oeuvres* au complet. Je me sentis plus riche de ces connaissances, et ceci réussit à réveiller, et à épanouir les vieilles racines d'Histoire longtemps enfouies en moi. Lors de la réunion de SCHPM à Kingston, je fus touché par l'atmosphère amicale et chaleureuse de la conférence, et depuis, j'ai participé régulièrement aux différents "meetings". Je suis d'ailleurs membre aussi de SCHPS. J'ai finalement réussi cette symbiose à combiner à la fois, les Sciences et l'Histoire.

Au RMC, on avait *L'Histoire des Mathématiques* de Dieudonné dont j'appréciais déjà le style. Quant à ma culture en Histoire des Statistiques, je la dois à Stigler. Mon intérêt pour la philosophie des Mathématiques vient des livres de Poincaré. Et j'ai maintenant beaucoup de plaisir à lire les mémoires ou les biographies des grands Mathématiciens. Lire les mémoires de Laurent Schwartz fut pour moi un sujet d'enchantement.

La source de mes sujets en Histoire des Mathématiques provient surtout de l'enseignement et des problèmes d'Éducation. Tant et si bien que j'ai souvent du mal être publié parce que les arbitres trouvent mes idées comme relevant plutôt de la vulgarisation. Pour le moment, j'ai plus d'idées que de temps, et j'empile les dossiers que je garnis peu à peu. Comme disait Condorcet, on a pour nous *le temps*. Puisqu'à présent, j'ai été sollicité à participer au bulletin, j'essaierai de développer quelques idées une autre fois sur des concepts qui me semblent importants en Histoire des Sciences et en Mathématiques, et aussi la nécessité de développer quelques disciplines nouvelles comme l'Histoire de l'Informatique, l'apport de réseaux en Histoire in Informatique, et la possibilité d'utiliser des cédéroms. Peut-on

(See **How I Learned to Love** ... p.10)

How I Learned to Love ... (cont from p. 9)

imaginer qu'on peut maintenant acheter l'Encyclopédie de Diderot du XVIIIe siècle sur cédérom, et l'avoir maintenant chez soi!

Sharon Kunoff

As with most of us, before I learned to love history of mathematics, I learned to love mathematics although, as I think back, it was all intertwined. As far as I can remember I loved doing the type of puzzles which we today call "Mathematical Recreations", and I was especially fascinated when my father made me a Möbius strip and encouraged me to cut it. However, I was certainly not enamored of elementary school arithmetic. The first formal mathematical study that intrigued me was beginning high school algebra. I found the derivation of the quadratic formula amazing. High school geometry was fascinating as well, especially when I discovered that there were many proofs of the Pythagorian Theorem and that several were known before the start of the common era. Moreover most of what we were learning had been developed by the time of Euclid, more than 2000 years before we were studying it! I was a member of our high school math team and most of the members prided themselves on reading popular books of mathematics, E.T. Bell's *Men of Mathematics*, Newman's *Mathematics and the Imagination* and Courant and Robbins' *What is Mathematics?*, all of which incorporated some history.

My college studies of mathematics continued the interest that had started in high school. We learned a bit about Newton and Leibniz in our calculus courses, and the elementary number theory contained problems that had been posed centuries before. I was particularly interested in Applied Mathematics, especially Differential Equations and Calculus of Variations, both at that time and when I studied for a masters degree immediately following graduation. The names of Sturm, Liouville, Euler, Gauss and the Bernoullis came up often and stimulated my interest.

After receiving the Masters Degree I worked in industry for about 2 ½ years. Shortly after our first child was born I decided that the best way to raise a family and continue my interest in mathematics was to join the ranks of the academics. I naively decided that I was best off doing adjunct teaching which I then continued for just over 20 years. Most of my teaching was in elementary courses but I always gave my students a smattering of history, especially when I taught Linear Programming to non mathematics majors and I could tell them all about the allocation problems that were important in the second world war and why George Dantzig developed the simplex method.

About 15 years after I started teaching I noticed an advertisement for a new Ph.D. program at Adelphi University sponsored by the Sloan Foundation with an emphasis on expository mathematics and its history. I was accepted into the program and continued to learn more mathematics, this time paying especial interest to historical developments. I wrote my thesis on asymptotic solutions of Airy type equations giving an exposition of what had been done until that time. It was interesting to see how a slight difference is one person's thinking would have led to certain results about 50 years earlier than they were found. It made me see how important it (See **How I Learned to Love** ... p.12)

Hipparchus (Cont. from p. 5)

two earlier tables occupies two more sections. Finally and allowing one section to explain linear interpolation, a table of 360 entries for chord lengths ranging from .5° to 180° can be spread over the remaining five sections, in two columns of 72 entries to each section. Only the first two sections containing the chord lengths of 7.5° to 180° survived, these in Indian guise.

END NOTES

1. E.g., Victor Katz, *A History of Mathematics, an Introduction* (New York: Harper Colllins, 1st ed.-1993), 136. Neither Howard Eves [*An Introduction to the History of Mathematics,* 5th ed.-1983] nor Morris Kline [*Mathematical Thought from Ancient to Modern Times*, 1st ed.-1972] detailed the table of chords. David Burton [*The History of Mathematics An Introduction*, 1st ed.-1985] simply ignored Hipparchus.

2. "The Chord Table of Hipparchus and the Early History of Greek Trigonometry," in *Centaurus* (1974) 18:6-28, and "Hipparchus", in C.C. Gillispie (ed.), *Dictionary of Scientific Biography* XV, Sup. I (New York: Chas. Scribner's Sons, 1978), 208-9.

3. Toomer (1978), 208-9

4. Toomer (1974), 8.

5. *ibid.* 14.

6. *Elements* IV, 11.

7. For details on the derivation of the twelve R sines at intervals of 7.5° in the circle of radius R (= 3438'), *see* B.V. Subbarayappa and K.V. Sarwa (edd.), *Indian Astronomy A Source Book* (Bombay: Nehru Center 1985), 300-1. For tables at intervals of 3.75°, see *ibid.* 62-65.

8. *History of Ancient Mathematical Astronomy* II (New York: Springer Verlag, 1975), 299.

9."On Some Aspects of Early Greek Astronomy ", *Proceedings of the American Philosophical Society* (1972) 116(3):251.

10. A. Rome (ed.), *Commentaires de Pappus et de Théon d'Alexandrie sur l'Almageste* I, 10 in *Studi et Testi* II (Bibliotheca Apostolica Vaticana 1936), 451.

11. (Oxford: Clarendon Press, 1931), 398.

12. Neugebauer (1972), 249; repeated in Neugebauer (1975), 299. Unfortunately he credited the statement to Pliny's *Natural History*, without giving any paginal reference. Having read Book II which discusses the work of Hipparchus, I found no reference there, nor did the indices of the other books refer me to any location mentioning Hipparchus and his chord table. Finally, the *Natural History* is apparently the only surviving work of Pliny.

13. Toomer (1974), 19.

14. Toomer (1978), 221.

15. E.A. Sophocles, *Greek Lexicon of the Roman and Byzantine Periods (From B.C. 146 to A.D. 1100)* I (New York: Frederick Ungar Pub. Co., 1957), 308.

16. H.G. Liddell and R. Scott, *A Greek-English Lexicon* (Oxford: Clarendon Press, 1940), 315.

17. C.J. Kayas (ed. trans.) *Euckleidou stoicheia = Les éléments.* Paris: Êditions du CNRS, 1978.

(Barnabas Hughes teaches and writes about the History of Mathematics at the University of California Northridge.)

In most sciences one generation tears down what another has built and what one has established another undoes. In Mathematics alone each generation builds a new story to an old structure.
Hermann Henkel

Report: January 2000 Joint Meetings of the AMS/MAA

The winter joint meetings, as usual, featured many sessions designed appeal to practitioners in all branches of mathematics. Our president, Jim Tattersall, is now serving as the Associate Secretary of the Mathematical Association of America, and much of his job involved designing the program for the meeting. It is therefore not surprising that there were many sessions dealing with the History of Mathematics, some invited talks and others set up by the organizers. Members of our society were involved in several of these. Karen Parshall gave an MAA invited address, *Looking back: An historian's perspective on American mathematics* and Robin Wilson gave an MAA special presentation entitled *Stamping through the millennium* which dealt with mathematical achievements that had been recognized on stamps. Robin was also the organizer for an MAA video presentation, *The Four Color Conjecture Theorem.*

There was a moving special presentation of the MAA in memory of Willbur Knorr entitled *A metaphorical unveiling of Archimedes' palimpsest on the method.* Other MAA special presentations which dealt with the history of Mathematics were: *Why study the history of mathematics?, Composing the history of twentieth-century mathematics*, and *Great Theorems of Mathematics.* In addition the AMS ran special sessions on the *History of Topology* and *Sixty Years of Mathematical Reviews.* Fred Rickey was one of the presenters in the latter session.

Members of our society who were organizers of regular sessions include Fred Rickey and Victor Katz on *The Use of History in the Teaching of Mathematics* and Karen Parshall and David Zitarelli on *The History of Mathematics*. Following is a listing of the members of the society who spoke at these sessions and the titles of their talks. If any member has been omitted please contact the editors and we will correct the error.

Thomas Archibald: Mathematics in France, 1870-1890: A view via Doctoral Theses.
June Barrow-Green: Plagiarism and piracy: Isaac Todhunter and his mathematical textbooks.
Judy Green and **Jeanne LaDuke**: Religious women and algebraic geometry at the Catholic University of America.
John Fauvel: Florian Cajori and the practice of history.
Victor Katz: Why Quadratic Equations.
Kenneth Manders: Roth, Faulhaber and Descartes.
Sandra Visokolskis: Teaching calculus at three Argentinean universities: a comparison.

How I Learned to Love... (cont from p. 10)

is to present historical results to students, to let them know that new mathematics isn't usually developed the way it is presented in text books and that it is often useful to share erroneous results since sometimes someone else may see where the wrong turn was taken.

After receiving the Ph.D. degree I obtained a full time academic position and started attending conferences. At a history session at the Joint Meetings in the early '80s I met some members of the CSHPM/SCHPM and was asked to join. My association with society members and attendance at meetings has greatly deepened my interest in history and has taught me much. Today I can truly say I love the history of mathematics!!

Annual General Meeting

The editors would like to thank Rebecca Adams and Pat Allaire for furnishing the information for this article.

Plans are well underway for our annual meeting to be held this year at McMaster University, Hamilton, Ontario. For the first time we are holding our meeting in conjunction with the Canadian Mathematical Society, the Canadian Applied and Industrial Mathematics Society, the Canadian Operation Research Society, and the Canadian Symposium on Fluid Dynamics. Information and registration forms for the meeting and hotel reservations can be found at their website <www.camel.math.ca/ CMS/Events>. CSHPM talks are scheduled for Saturday, June 10 through Monday, June 12. Organizer of the Special Session, History of Mathematics at the Dawn of a New Millennium, is Tom Archibald, while Pat Allaire and Rob Bradley are coordinating the General Session. Abstracts for the talks as well as a schedule will be sent to you under separate cover sometime after the middle of May.

To help plan your stay in Hamilton, here are some recommendations and some resources. First, your best site for accommodations, transportation and a preview of attractions is: <http://www.hamilton-went.on.ca/vis_info.htm>. If you are downtown for shopping, Jackson Square, located in the heart of downtown, includes The Hamilton Eaton's Centre, a fourteen story garden atrium and the Indoor Farmer's Market. It is connected to the Sheraton Hotel on King Street. There is also Centre Mall, downtown on Barton Street East and Ottawa Street North, which offers a variety of fast food restaurants. See http://www.shops.ca/centre/index.html for a listing of all stores.

For natural beauty, the Royal Botanical Garden is Canada's largest botanical garden. There are five separate garden areas (with connecting shuttle) including lilacs, roses, iris, and spring bulbs: the Laking Garden, Rock Garden, Rose Garden, Arboretum and Mediterranean Greenhouse. See http://www.rbg.ca/index2.html for transportation details.

For a walk through the Victorian style of 1855, take a tour through the forty-plus rooms of Dundurn Castle, located at 610 York Boulevard, Hamilton. See <http://www.city.hamilton.on.ca/cultureand recreation/dundurn.html>. This is a sampler of Hamilton's best with the hope that you enjoy your visit.

Nominating Committee Report

Sharon Kunoff, for the nominating committee, has submitted a report proposing the following slate:

President, Glen Van Brummelen;
Vice-President, Len Berggren;
Secretary, Pat Allaire;
Treasurer, Robert Thomas
Council, Rebecca Adams, Roger Godard, Hardy Grant and Alexander Jones.

Ballots will be sent out under separate cover and will be counted at the annual general meeting. Sharon would like to thank the nominating committee, Craig Fraser and Robert Thomas, for their efforts.

Web Review (cont. from p.6)

space axioms in 1888, the Peano Postulates in 1889 and space-filling curves in 1890.

One of the more priceless finds in the CDL Math Book Collection *is Philosophy and Fun of Algebra* by Mary Everest Boole, the wife of George Boole (and apparently, through her unorthodox health care practices, a contributor to his untimely demise). With catchy chapter titles such as "Macbeth's Mistake" and "Jacob's Ladder", this book is aimed at schoolchildren. In it, she tells of the "Boole Method" (for which she jointly credits herself and George), a "conveyance which will take you safely wherever the Great Unknown directs you to go. Some people mistake it for the carpet in the *Arabian Nights*..."

The CDL is a precious addition to the digital archive of historical mathematics books. It suffers from a number of minor limitations, some of which are a consequence of the medium itself. For example, the texts themselves are not searchable; this is unavoidable, as the books are scanned and not typeset, so the words on their pages are nothing more than portions of image files in the GIF format. However, there is no searchable index of authors and titles either, a situation which I hope will be remedied as the prototype evolves into a permanent archive. If you're connecting via a modem, you may find the loading times of the images files to be tortuously slow, although the technology itself will eliminate that problem as cable modems, ISDN, and home satellite dishes become cheaper and more widely available. And remember as you sit impatiently waiting for an image to load: it may already have done so. Left-hand pages at the beginning of a book or facing a new chapter are often left blank on purpose!

President's Report (cont. from p.3)

On the way back from California, I stopped in at Calvin College in Grand Rapids, Michigan, to give two talks on the history of mathematics. At their Woman's History Month Colloquium Series, I spoke on women and mathematics in England in the late nineteenth century. At the department colloquium, I spoke on mathematics of the first millennium (AD). In April, I will be giving two lectures at the Spring meeting of the Mathematical Association of America's Rocky Mountain Section at Colorado State University in Fort Collins.

At the moment, I am putting the finishing touches on the CSHPM/SCHPM 1999 Proceedings. Mike Kinyon and Steve Shore of Indiana University at South Bend will be assuming the editorship beginning with the 2000 CSHPM/SCHPM Proceedings.

Preparations for the 2001 annual meeting at Laval University in Quebec with the HSSFC (Learneds) are underway. I look forward to seeing you in Hamilton this June.

Memorial to Jon Barwise, 1942-2000

K. Jon Barwise, College Professor of Mathematics, Computer Science, and Philosophy at Indiana University, died on the 5th of March this year. Born on 24 June 1942, he received his bachelor's in mathematics and philosophy from Yale in 1963 and his doctorate from Stanford in 1967 for a dissertation on infinitary logics and admissible sets. He taught at the University of Wisconsin in the constellation of logicians that included Kleene, Rosser, Keisler, and Kunen, and (See **Barwise** p. 16)

Statue of Alan Turing to be Erected

(information for this article came from the BSHM website: <www.dcs.warwick.ac.uk/bshm/>)

As it is exceedingly rare for anyone to erect a statue to a mathematician, however distinguished, SCHPM/SCHPM members will be pleased to know that there is a proposal for a statue of British mathematician Alan Turing (1912-1954). This is an overdue tribute to a very important mathematician, whose work laid intellectual foundations for computing and thus did much to ensure that the next millennium will be different from this one.

A site has been chosen in Manchester and a sculptor, Glyn Hughes, has made a preliminary model. It shows Turing sitting, "scruffily dressed as was his habit", on a bench on which passers-by may join him. He holds an apple, which carries various overtones. The statue will be life-size, in bronze. A photograph of the model and further details are available at the sculptor's web site, and there is also a BBC news report.

An appeal is being organised to pay for the memorial, which is expected to cost about £50,000. Donations should be sent to Sir Derek Jacobi, The Alan Turing Memorial Fund, PO Box 4, Hayfield SK22 2FD, from whom further information may also be obtained. The BSHM presented a cheque for £1024, contributed by members and by the Society, to the Turing sculpture appeal at their AGM on 16th December 1999.

The appeal to raise funds for the statue to Alan Turing, the "father of computer science", has failed to receive the backing of a single computer company. Sculptor Glynn Hughes, who speaks for the appeal, said he found it hard to explain why computer firms had not contributed "a single penny" to the £55,000 needed to honour their industry's founder. He told BBC Radio 4's Today programme: "What I hear repeatedly from academics and professionals in the computer business in Britain is it's because he wasn't American."

US software giant Microsoft has since said that it is giving the appeal "urgent consideration". Another market leader, Apple, has also said it is considering setting up a secure website which could receive credit card donations over the Internet.

Alan Turing's massive contribution to computer science has been described as "epoch making". It was during the 1930s, while at King's College, Cambridge, that he first expounded his theory of a machine that could use numbers to carry out functions similar to thought processes. He suggested it should be called an "electronic computer". He went on to apply his work and his genius for mathematics to the problem of cracking the Enigma cipher used by German U-boats during World War II. He deciphered it using a machine called the "Bombe" while working at the British Intelligence codebreaking centre at Bletchley Park, near Milton Keynes. The breakthrough is credited with giving the Allies the upper hand in the Battle of the Atlantic.

The bronze statue of Mr Turing seated on a bench was meant to have been unveiled last year in Sackville Park, Manchester. If plans for the statue go ahead, it will not be the first time he has been honoured. There is already an Alan Turing Way in Manchester and last January the Royal Mail issued a 63p stamp to the great inventor.

PERSONAL ITEMS

Daryn Lehoux writes: "I have recently published a review of Reviel Netz's 'Shaping of Deduction in Greek Mathematics' in the *Bryn Mawr Classical Review* (http://ccat.sas.upenn.edu/bmcr/) 2000-02-17. My wife and I had a wee bairn in November (Zoe Alberta Bryant Lehoux). And lastly, I will be off to the University of Cambridge next year for a postdoc. Woo Hoo!"

Hardy Grant gave two talks at Virginia Wesleyan College in Norfolk, respectively on "Mathematics and the Liberal Arts", to a general campus audience, and on the history of factoring methods, to the mathematics students' club.

Ed Cohen writes: "A few months ago I received two e-mail requests for two papers, probably because of what I had written previously in the CSHPM volumes. One, called 'Adoption and Reform of the Gregorian Calendar', has already appeared in the February 2000 (pages 5-11) issue of the undergraduate journal, *Math Horizons*. The other, an 11 page article called 'What day of the week is it?', will be appearing in the May issue of the Chilean journal *Cubo Matematica Educacional*, an undergraduate-graduate historical/educational magazine."

Barwise (Cont. from p.14)

proceeded from there to Stanford, where he was co-founder and first director of the Center for the Study of Language and Information. Since 1990 he had been on the faculty at Indiana University and he received a doctorate of science honoris causa from the University of Pennsylvania in 1992.

Barwise was a brilliant expositor, borne out by his technical writing (Admissible Sets and Structures, for example, which includes a recipe for Heatherton Rock Cakes when the going gets tough) as well as by his more popular work. As editor of the Handbook of Mathematical Logic he was instrumental in shaping a generation's view of the situation in logic forty years after the work of the mid 1930's. Much of his last two decades was devoted to work in mathematical linguistics and the philosophy of language, to which he contributed in conjunction with distinguished collaborators as well as in his own right.

Barwise's influence on his students also ran into areas outside the strictly technical. A seminar he gave at the University of Wisconsin on Montague semantics and subsequent work in the area of mathematical linguistics provided plenty of light moments to go with the challenges of solving the problems that arose of trying to model natural language. Hearing him work through the implications of a particular assortment of quantifiers (especially when there were two 'mosts' in the sentence) offered the class the chance to express their intuitions as well. He notes in Admissible Sets and Structures, 'Neither space nor memory permit us to list all the people who have found gaps in earlier proofs of this lemma.' It is safe to say that the list of those who have found inspiration and guidance from Jon Barwise's lectures and published work would require an inordinate amount of space and will continue to grow.

ABOUT THE BULLETIN

The *Bulletin* is published each May and November, and is co-edited by Tom Drucker <tld@globalim.com> and Sharon Kunoff <cshpm@cwpost.liu.edu>. Material without a byline or other attribution has been written by the editors. Les pages sont chaleur-eusement ouvertes aux textes soumis en français. Comments and suggestions are welcome, and can be directed to either of the editors; submissions should be sent toTom Drucker and Sharon Kunoff at the above e-mail addresses, or by post to Tom Drucker, 304 S. Hanover Street, Carlisle, PA 17013 U.S.A.