

# BULLETIN CSHPM/SCHPM

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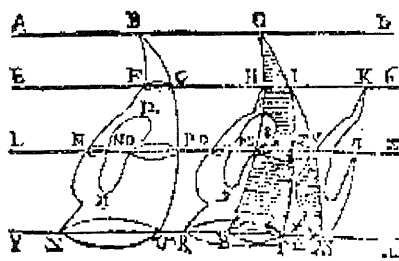
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**Canadian Society for History  
and Philosophy of Mathematics**

**Société canadienne d'histoire et  
de philosophie des mathématiques**

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## A Message from the President

**Robert Thomas**

I have quite a lot to report on in this *Bulletin*, partly because the lateness of the previous issue rendered part of what I said there less useful.

First, the ramifications of that late appearance of the *Bulletin*, with its ballots and other enclosures. The Executive met at St. John's in June, in the absence of Jim Tattersall (who was receiving a teaching award elsewhere), of Glen Van Brummelen (who couldn't afford to attend both this meeting and the Oxford one), of Israel Kleiner (who had intended to come but had to change his plans), and of Tom Archibald. As you know by now, the Executive had to cope with the fact that the election that it had thought was happening could not in fact occur. Since we could not expect people to mail ballots to St. John's after the meeting there was over, we decided on a new election, which by the time you read this will have been held. Since the proposed constitutional changes, mandated the year before at Brock, were in the delayed *Bulletin*, we could not get approval of these at the meeting and so decided to put them off for a year.

Then, other business. The Executive wanted to relieve the program chair of having to decide who should get what length of time for talks at the annual meetings. Its decision that all talks should be the same length does not mean exactly what it may seem, in view of the obvious and permanent fact that exceptions can be made. But it does mean that exceptions must be approved by the Executive, not by the program chair. The decision does not specify what the uniform length should be. That has to be negotiated by the program chair, depending on the number of talks and the time available. There is no harm in the time's being longer than it sometimes has been. For more on all this, please see the Executive minutes, elsewhere in this issue. The Executive's decision about talk times was reported to the Annual General Meeting,

where I tried to respond to some of the concerns; please see the minutes of that meeting also.

The interesting part of the St. John's conference went well. Rüdiger Thiele in particular, as our invited speaker, gave a stimulating overview of the work of Leonhard Euler, with many pictures, diagrams and book pages to illustrate his points. That things went so well owed much to the labours of the program chair, Tom Drucker, and of the local organizer, Roland Eddy, who did much more than local organizers sometimes need to (I speak from experience as one).

The outside-the-meeting-room part of the conference seemed to me to go rather badly. Because the residences were always locked, it was impossible to communicate with anyone even if one knew the room location, information that was not distributed because of its practical uselessness. I was staying with friends, which made me much more available, but only in principle. We must solve the communication problem at future meetings, as it is not enough to be able to hear talks at scheduled times. There were folks at that meeting who I knew were there but whom I never saw — a pity from at least my point of view. The President's Reception, at which one traditionally sees people from other societies as well as from one's own, was held on the first of our originally scheduled three days, the day that in the end we did not use for talks. I was there, as were a few other of our members, but many had not yet arrived. What I, at least, did not then know was that we could have changed the reception for our Society to the next night. The hosts would not have cared, and it would have been much more satisfactory. I expect that next year in Ottawa there will be so many more of us that we shall use the whole three days, but we must put into our communal memory the proper solution to that problem for when it recurs.

No sooner was I home from St. John's than I was preparing for the next CSHPM/SCHPM adventure, at Oxford. (This closeness of timing meant that I, and presumably many others, gave short shrift to the late-June meeting in Calgary on history and philosophy of science in science teaching, which had much more mathematical activity than I had expected.) The conference at Oriel College in Oxford was a model of communicative ease, since everyone was staying in the same place, a real help, and ate together. Most of the meeting site was entertainingly picturesque. My quarters, since my wife was along, were rather lavish, consisting of two small bedrooms and an enormous living room in a 17<sup>th</sup>-century part of the College, and an adequate bathroom with 20<sup>th</sup>-century plumbing, theoretically shared with another such suite that was vacant. My embarrassment at these riches was reduced by my discovery, at the end of the conference when I invited all and sundry to come and see, that Mac Priestley's teenaged daughter was similarly equipped, though she had to share the bathroom with her parents. We were looked after very well indeed by Oriel, and the whole conference was smoothly organized by John Earle of the Maynard School, Exeter, the Honourary Treasurer of the BSHM, and, from a distance, our own Jim Tattersall. We were welcomed by Judith Field, the President of the BSHM, in French and in English. Our ranks were swelled on the second day, the only full day, by a group of students taking a short course at Middlesex University under Ivor Grattan-Guinness. Including them, there were persons from over 20 countries, and about 70 attending in all. The sessions took place in a newish lecture hall with all the usual amenities, like breaking-down overhead projectors. Meals were taken in the Hall of the College, under the gaze of a gallery of portraits, of whom I recognized Cecil Rhodes since a very similar picture was hung (over objections from me and others) in the Rhodes Room of Trinity College, Toronto, in 1961. Lest any of you think that the meeting was all work and no play, I should mention the talk on Friday evening about mathematics in Oxford, given by Robin Wilson with both dash and impressive resources. This was followed on Saturday afternoon by a walking tour of "mathematical

Oxford", led by John Fauvel and Raymond Flood, that took its intrepid participants to Corpus Christi College, Merton College, the Examination Schools, All Souls College, Wadham College, the University Museum, and the Ashmolean Museum, and past a number of other landmarks. There was also a simultaneous tour to the Oxford Science Museum.

At the end of what was uniformly regarded as a most enjoyable and therefore successful meeting, we undertook to arrange a rematch — possibly in 1999, when our annual meeting, if held as usual as part of the "Learneds", would be at Sherbrooke and Bishop's, not-quite-adjacent universities in the Eastern Townships of Quebec. It is not too soon to register opinions (with Jim Tattersall) on the advisability of making a joint meeting with the BSHM our *only* meeting that year (it is difficult for many of our members to get to two). Meanwhile our next meeting will be at the University of Ottawa on May 29-31. This will be in the context of a new policy of having the "Learneds" run for a shorter time, which should make it easier, in principle, for different societies to interact. We shall try to avoid the kind of overlapping of our Society's events with those of the CSHPs that has prevented people from attending all of the high points of the two societies' programs; as a first step toward that goal, the two meetings will be not exactly simultaneous.

The academic year will be well along by the time you read this message, written in August. I hope that you are having a good year and are getting ready for our Ottawa meeting. I look forward to seeing you there.

## DUES

Because of the sabbatical-related wanderings of the Secretary-Treasurer, the announcement for the 1998 dues will arrive this year a little later than usual, in late December or January. Those who signed up for affiliate membership in the CSHPs for 1997 may not have received anything from them, because of some difficulties on their side; the memberships you paid for will instead be valid for 1998.

## Euclid's Book VII and the History Texts

*The idea of the prime-factorization theorem, as well as the lemmas used in proving it, can be found in Euclid's Elements in Books VII and IX.*

Oystein Ore, *Number Theory and Its History*, p 52

### Christopher Baltus

Book VII is the first of the books of Euclid's *Elements* devoted to number theory. It begins with definitions, including definitions of number, part (divisor), parts, prime number, numbers prime to one another (relatively prime), and proportion. Euclid's Algorithm, to find the greatest common divisor of two given positive integers, is presented in the first two propositions of Book VII. This information can be found in a variety of history texts.

How about the rest of Book VII? Propositions 5 through 22 develop properties of ratio and proportion, from which the nearly parallel Propositions 24 and 30 follow. Proposition 30 is a major theorem. It is the claim that if a prime divides the product of two numbers then it divides one of the two numbers. Hardy and Wright label it "Euclid's First Theorem," for which The Fundamental Theorem of Arithmetic is a "corollary." [1.3] Gauss recognized the importance of Proposition 30. He proved it [Article 14] in *Disquisitiones Arithmeticae* (1801), by the concept of congruence that he had just introduced, and continued

Euclid had already proved this theorem in his *Elements*. However we did not wish to omit it because many modern authors have employed vague computations in place of proof or have neglected the theorem completely . . . .

translation by Arthur A. Clarke 1966

As with the case of the Parallel Postulate, it took twenty-one hundred years and a person with the acumen of Gauss to recognize Euclid's own astuteness with respect to mathematical foundations. [See Salomon Bochner, *The Role of Mathematics in the Rise of Science*, p 214.]

However, little about Book VII beyond the Euclidean Algorithm is to be found in recent history texts, as I found while putting together a unit on Euclid's number theory for a History of Mathematics course. I came to the conclusion, moreover, that in what does appear the emphasis is generally misplaced. (Morris Kline's *Mathematical Thought from Ancient to Modern Times* (1972) is the exception.) It does take time to get used to Euclid's way of thinking about ratio and proportion, but it is worth the effort and within the capability of undergraduate students. There are gems in Book VII. Euclid's development of Proposition 30 deserves to be more widely known.

The sins of the authors, as I see the situation, are various. The dazzling Proposition 14 from Book IX, so like the modern Fundamental Theorem of Arithmetic, may lead to temporary blindness. IX.14 is the statement that the least number divisible by each prime of a given collection is divisible by no other prime. The proof explicitly and essentially depends on VII.30. Ronald Calinger's *Classics of Mathematics* (1995), for example includes IX.14 but not VII.30.

Or the similarity of Euclid's treatment to that in modern number theory books may let us forget how different Euclid is from any modern writer. David Burton's *History* (1991) has a 14-page section called "Euclid's Number Theory"; however, the proofs employ modern -- nonEuclidean -- arguments. Proposition 30 does appear but is not so labeled and the proof is not Euclid's.

Granted, the concept of proportion in the preliminary work of Book VII is cumbersome and foreign to modern readers, for whom  $a : b = c : d$  ( $b, d \neq 0$ ) simply means  $ad = bc$ . Here is Definition 20 of Book VII:

Numbers are *proportional* when the first is the same multiple, or the same part, or the same parts, of the second that the third is of the fourth. [Heath, 1956]

The meaning of the definition emerges in the propositions.

Suppose that  $a$  is not a *part* (divisor) of  $b$ .

There must be some common measure of  $a$  and  $b$ , say an  $n^{\text{th}}$  part of  $b$ . Then  $a$  would be an  $n^{\text{th}}$  part of  $b$  taken some  $m$  times; I'll write  $a = m \frac{b}{n}$ , where  $\frac{b}{n}$  must be an integer. If  $a : b = c : d$  then  $c$  is also an  $n^{\text{th}}$  part of  $d$  taken  $m$  times.

(See also recent historical investigations, such as D. H. Fowler, "Ratio in early Greek mathematics," *AMS Bull.* 1(1979), 807-847.)

Modern readers may also be surprised to find a definition of multiplication: the second

number "is added as many times as there are units in the other, and thus some number is produced." In this way Euclid distinguishes whole number multiplication from that of magnitudes. His definition makes necessary a proof of commutativity, given in Prop. 16.

Early propositions include fundamental properties:

if  $a : b = c : d$  then

$$(a + c) : (b + d) = a : b \text{ (Prop. 5, 6) and}$$

$$a : c = b : d \text{ (Prop. 9, 10, 13, 15);}$$

if  $k \neq 0$  then  $a : b = ka : kb$  (Prop. 17).

In the crucial Proposition 19, the equivalence of the modern definition of proportion and Euclid's definition is proved.

Then come the remarkable Propositions 20 and 21; these lead to the interesting Proposition 24 and to Proposition 30. (The statements of the propositions are from Heath. The proofs are Euclid's arguments, as given by Heath, in my own words and notation. For whole number arithmetic, I trust that any distortion introduced by the notation is outweighed by the gain in clarity.)

**Proposition 20.** *The least numbers of those which have the same ratio with them measure those which have the same ratio the same number of times, the greater the greater and the less the less.*

Proof. Let  $a : b = c : d$ , with  $a, b$  the least numbers in this ratio. Then  $a$  must be a *part* or *parts* of  $c$ . (*parts* of  $c$ : not a *part*; a multiple of some  $n^{\text{th}}$  part of  $c$ , where the part may be 1.)

Suppose that  $a$  is an  $n^{\text{th}}$  part of  $c$  taken  $m > 1$  times,  $[a = m \frac{c}{n}]$ . By Prop. 13,  $a : c = b : d$ , so  $b$  is an  $n^{\text{th}}$  part of  $d$  taken  $m$  times,  $[b = m \frac{d}{n}]$ . Now, as one of the  $n^{\text{th}}$  parts of  $c$ , namely  $\frac{c}{n}$ , is to one of the  $n^{\text{th}}$  parts of  $d$ , namely  $\frac{d}{n}$ , so is the  $m$ -term sum  $\frac{c}{n} + \frac{c}{n} + \dots + \frac{c}{n}$  to the  $m$ -term sum  $\frac{d}{n} + \frac{d}{n} + \dots + \frac{d}{n}$ . These sums are  $a$  and  $b$ , respectively.

Therefore,  $\frac{c}{n} : \frac{d}{n} = a : b = c : d$ . But this means that  $a$  and  $b$  are not the least numbers in the ratio  $a : b$ .

Therefore,  $a$  cannot be parts of  $c$ . So  $a$  is a part (divisor) of  $c$  and  $b$  is the same part of  $d$ . □

**Proposition 21.** *Numbers prime to one another are the least of those which have the same ratio with them.*

Proof. Let  $a, b$  be relatively prime and suppose that numbers  $c, d$  are smaller than  $a, b$  and the least numbers such that  $a : b = c : d$ . By Proposition 20,  $a = nc$  and  $b = nd$ . Therefore,  $n$  measures (divides) both  $a$  and  $b$ , contradicting the supposition that  $a$  and  $b$  are relatively prime. □

**Proposition 30.** *If two numbers by multiplying one another make some number, and any prime number measure the product, it will also measure one of the original numbers.*

Proof. Let the prime number  $p$  measure (divide) the product  $ab$ . Say that  $ab$  is  $p$  taken  $m$  times. Therefore,  $ab = pm$  and, by Proposition 19,  $p : a = b : m$ .

Suppose  $p$  does not divide  $a$ . Then  $p$  and  $a$  are relatively prime. Since  $a$  and  $p$  are relatively prime, then by Proposition 21  $a$  and  $p$  are the least numbers in the ratio  $p : a$ . By Proposition 20,  $p$  divides  $b$ . In a similar way, if  $p$  does not divide  $b$  then it must divide  $a$ . □

Isn't that pretty!

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## DIRECTORY

The Society's Secretary-Treasurer has obtained about ten copies of the *World Directory of Historians of Mathematics*. This invaluable little book will keep you in contact with your colleagues without your having to keep track of addresses written on loose bits of paper. The directories are available from Glen Van Brummelen at the discounted price

of \$9 (Cdn) / \$7 (U.S.); the only catch is that you will have to wait until January to receive your copy. Glen is taking orders now, so if you are interested please contact him at <vanbrumm@compuserve.com> or at School of Historical Studies, Institute for Advanced Study, Princeton, NJ 08540 (U.S.A.). (These addresses are valid until December 15.)

## A Course on the History of Modern Cosmology

CRAIG FRASER

I would like to describe a new undergraduate course that I have developed over the past three years dealing with the history of modern cosmology. The course begins with William Herschel in the late eighteenth century and ends with the discoveries being made today at the Keck observatories and the Hubble orbiting telescope. Although HPS 360 is not a course in the history of mathematics, developments in geometry and analysis have played and continue to play an important role in the more theoretical parts of the subject. For this reason, and because of its considerable general interest, I thought the course would be of interest to members of CSHPM.

The revolution that has taken place in cosmology in our century is arguably as profound as the one that occurred in planetary astronomy during the period 1550-1650. Historian of physics Helge Kragh has observed that the modern Big Bang theory "ranks among the greatest conceptual innovations ever made in science", rivaled in "conceptual greatness" only by quantum mechanics. The groundwork for modern cosmology was laid in the nineteenth century with the invention of large telescopes, stellar spectroscopy and stellar photography. In addition, important work in mathematics and theoretical physics produced a radical new understanding of our basic concepts of space and time. The emergence of the astrophysical observatory at the end of the century prepared the way for the discovery of extra-galactic nebula and the red shift phenomenon. Developments in general relativity and nuclear physics during the period 1915-1940 provided a theoretical framework for observational cosmology. The advent of radio astronomy and a continued interest in the problem of radio interference

led in the 1960s to one of the most important scientific events of our time, the discovery in 1965 of the microwave background radiation. The history of cosmology since then has been an enormously active field, combining expertise in various areas of pure and applied science.

In addition to advances in astronomy the course examines developments in mathematics and theoretical physics, including the invention of non-Euclidean geometries, classical and relativistic theories of space and time, and high energy physics. Although cosmology in this century has been an extremely active area of theoretical study it is interesting to note that the formative driving events in its history have all resulted from observation - the identification of extra-galactic nebulae, the discovery of the red-shift relationship and the detection of the cosmic background radiation. The course explores the rich historical and philosophical literature on the relationship of theory, observation and experiment in science. Although HPS360 is a third-year course, it involves no formal science prerequisites, and the mostly upper level students enrolled in it come from a range of backgrounds and specializations. I use Michael Crowe's *Modern Theories of the Universe from Herschel to Hubble* (1984) and a collection of readings taken from the primary and secondary literature. Students are allowed a fair amount of freedom in writing the essay for the course. Papers range from traditional historical studies to subjects that discuss philosophical and theological issues raised by the momentous developments of modern cosmology.

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## Participants at Oxford Conference



### REPORT ON OXFORD

*The following British perspective on the joint CSHPM- BSHM meeting at Oxford in July was written for the BSHM newsletter, and appears here by courtesy of the author and of the newsletter's editor, John Fauvel.*

#### **Philip Maher**

The joint meeting of the BSHM and the CSHPM/SCHPM was characterised by several features which, I believe, reflect some of the

directions work on the history of mathematics is now taking.



The feeling of the conference (accentuated by the comparatively small size and picturesque aspect of Oriol) was one of intimacy: virtually all of the BSHM contingent knew one another already as, it seemed, did the Canadian contingent. This feeling of intimacy was not merely enjoyable socially; it had its academic advantages too: there was a lot of successful networking as preprints were shared and articles elicited for journals.

The plural -- journals -- is relevant. The conference managed to cover an extraordinarily wide range of topics: from the early history of proof of incommensurability (Janet Sisson), via changing conceptions of the infinite (Gregory Moore), the mathematics and astronomy of mediaeval Islam (Glen Van Brummelen) up to the beginnings of general topology (Rebecca Adams) plus an exiting overview of the problematics concerning the nature of proof (Israel Kleiner).

The conference was memorable, moreover, not just for the range of topics covered by the speakers but for the intellectual excitement as they engaged with, and often tackled head on, intrinsically difficult philosophical issues: one thinks of Janet Sisson's talk and, above all, of Jeremy Gray's masterly overview which started the conference.

Given the direction much contemporary writing on cultural history is taking, this engagement with philosophical issues is as inevitable as it is welcome (as is the engagement with issues to do with gender, as evinced by Jim Tattersall's talk on women's involvement in the *Educational Times*).

The phrase "cultural history" used above is deliberate: if you regard mathematics as interpenetrating many areas of cultural life, as I do, then the study of the history of mathematics can be regarded as part of the study of the history of culture (and here it is relevant to mention Florence Fasanelli's engaging talk on the relation between modern mathematics and modern (visual) art).

Rebecca Adams' and Israel Kleiner's talks pointed to two further -- and, I hope, increasingly prevalent -- features of current work in the history of mathematics: first, the history of mathematics is now encroaching forward to take in the history of modern mathematics (a very tangled area, that); and working mathematicians (like Kleiner) are increasingly venturing into areas they might once have thought the domain of "proper" historians of mathematics.

As it is, some very distinguished mathematicians attended the conference. The concert which concluded the conference dinner (excellent grub!) was given by Cheryl Praeger, Peter Neumann, and Robin Wilson: two leading group theorists and a well-known worker in graph theory.

## CARROLL

1998 will be the centenary of the death of C.L. Dodgson ("Lewis Carroll"). A (no doubt partial) list of places planning celebrations includes the University of Wales at Cardiff (April), the Grolier Club, in New York (April), the Pierpont Morgan Library, in New York (May - August), Christ Church, Oxford (August), Columbia University, and New York University.

## Minutes of the Meeting of the Executive Council

Memorial University, St. John's, NF, June 7, 1997

**Present:** Tom Drucker (program chair, by invitation), Roland Eddy (local arrangements, by invitation), Hardy Grant, Sharon Kunoff, Jacques Lefebvre, Robert Thomas (chair)

**Regrets:** Tom Archibald, Israel Kleiner, Jim Tattersall, Glen Van Brummelen

The Executive went through a proposed agenda for the General Meeting, due to be held the next day.

Since ballots for election to the Executive could not be collected as planned, the Council decided to have new ballots distributed for return to the Secretary-Treasurer by September 30. The new ballots were to contain only the names of the officers and of Fred Rickey (nominated to replace Hardy Grant), since the other Executive members were elected for two years in 1996.

It was decided that at the same time as ballots are distributed, suggestions should be invited for a theme for the 1998 meeting in Ottawa, and also for an organizer of the special session (if any). "Victorian mathematics" was suggested at this meeting.

It was noted that the proposed constitutional changes had not reached members before the General Meeting and so could not be voted on; they would be postponed to next year's meeting.

The Council agreed to put to the General Meeting the continuation for one year of the reciprocal agreement with CSHPS/SCHPS, if

they are willing. It was pointed out that our members who have joined CSHPS had received no sign of the fact from the latter society. This slip was an internal CSHPS matter: their Secretary had not passed the CSHPM members' names to the editors of their newsletter. He was aware of the oversight and would correct it.

It was agreed that complete overlap between the meetings of the two societies — dates, invited-speaker times, general-meeting times — is more like conflict than like co-ordination, and is not desirable. Accordingly the President was instructed to have the two meetings slip-aligned by one day (they had been planned to coincide again in '98). [This was subsequently done; our dates are May 29-31.] The program chair must also consult his or her CSHPS counterpart to avoid the level of coincidence (high at St. John's) between the times of things that members of both societies might like to attend.

Tom Drucker said that no formal report has been prepared on the refereeing of proposed talks at the annual meetings. The Executive, in its function of making the Society's meetings run smoothly, decided that all non-invited talks should be of the same length and that each person should present no more than one talk at any given meeting. This decision does not preclude exceptions (for good and unusual reasons), but does pass responsibility for making exceptions from the program chair to the Executive.

(Cont. Page 14 Executive)

## PERSONAL ITEMS

**Fran Abeles** delivered the keynote address, "Lewis Carroll's Mathematical Inventions", at the First Annual Creativity Conference at St. Benedict's College and St. John's University in Collegeville, MN, on October 18.

**Barry Davies** is continuing to pursue his historical approach to illustrating the idea of a curved 3-space, via computer-aided visualization in the spatial part of Schwarzschild's metric in general relativity. The goal is to illustrate the concept of Riemannian curvature as presented by Tullio Levi-Civita in his *Absolute Differential Calculus* (1923, Italian; 1926 English translation by Marjorie Long, Dover reprint). Publication on the Web has begun: <http://www.uvw.com/crv3spc>.

**Katherine Hill** organized a session on "Negotiating Roles: Social Shapings of Mathematical Practice" for the annual meeting of the History of Science Society held in San Diego in early November. Her own paper was "Imperial Achievements: Negotiating a Role for Mathematics in Navigation".

**Albert Lewis** is pressing on with the new CD-ROM Dauben bibliography project described in the May issue of the *Bulletin*. Everyone is invited to read the current status report and listing of titles and to let him know of any gaps. <http://www.iupui.edu/~alewis2>

**Jim Tattersall** has been elected Associate Secretary of the MAA by that organization's Board of Governors. His primary responsibility is the arrangement and supervision of the MAA's meetings; his term begins in February 1998.

**Glen Van Brummelen** is currently on sabbatical at the Institute for Advanced Study in Princeton, NJ. He is working with E.S. Kennedy in an attempt to learn the mathematical astronomical system behind the horoscopes cast in the 10<sup>th</sup>-century astrologer Musa ibn Nawbakht's work, the *Kitab al-Kamil*. Beginning in January, he will be at Simon Fraser University, continuing work with Len Berggren on some of Abu Sahl al-Kuhi's geometrical treatises.

## AWARDS TO FRASER AND STEVENS

Longtime CSHPM members **Craig Fraser** and **Wesley Stevens** were honoured this past July while in Liège, Belgium for the meeting of the Division of History of Science (DHS) of the International Union for History and Philosophy of Science. They were installed as "membres actives" of l'Academie Internationale d'Histoire des Sciences, a strictly honorary society which exists, so to say, side-by-side with DHS. This year there were 49 nominees for only five places. Craig and Wesley were elected on the basis of their extraordinary contributions to knowledge of the history of science. Congratulations to both!

## TATTERSALL AWARD

**Jim Tattersall** was honoured in June as one of the 25 recipients for 1997 of the MAA (Northeastern Section) Awards for Distinguished Teaching. He is now eligible to vie for one of the three national Deborah and Franklin Tepper Haimo Awards for Distinguished Teaching. Congratulations, Jim!

## Minutes of the Annual General Meeting

Memorial University, St. John's, NF, June 8, 1997

**Present:** Fran Abeles, Amy Ackerberg-Hastings, Bill Anglin, Jim Burling, Ed Cohen, Matt Corrigan, Tom Drucker, Roland Eddy, Roger Godard, Aditi Gowri, Hardy Grant, Peter Griffiths, Sharon Kunoff, Jacques Lefebvre, Michael Millar, Robert Thomas (President).

Since representatives of the HSSFC were expected to come to the meeting, Robert Thomas reminded members that this organization is the result of a merger last year between the Canadian Humanities Federation and the Social Sciences Federation of Canada. It is a large and powerful lobbyist, whose successes include the restoration of our temporarily lost funding.

1. **Motion** (Kunoff/Godard): To approve the agenda. Carried.

2. **Motion** (Kunoff/Grant): To approve the minutes of the previous meeting. Carried.

### 3. Matters arising from the minutes:

(a) Robert Thomas noted that our contribution of \$100 to the Canadian Undergraduate Mathematics Conference had been merely suspended for one year and will be restored.

(b) Robert Thomas reported that the trial cross-membership arrangement with CSHPS has attracted about 30 of our members to them and about 10 of theirs to us. Both executives wish to continue the arrangement for another year. The CSHPS is considering production of a volume of Proceedings, for which our

members wishing copies would pay. Our Executive suggested "slip-alignment" of the two societies' annual meetings, to partially avoid simultaneity of talks, and we have contrived this for next year. Aditi Gowri urged that the two societies' business meetings should be on different days.

**Motion** (Kunoff/Gowri): To continue the cross-membership arrangement. Carried.

(c) Tom Drucker addressed the possible refereeing of papers for the annual meeting. He cited the "plethora" of papers received last year and the desirability of avoiding parallel sessions. He sought (i) volunteers for a committee which would consider the matter and (ii) suggestions for criteria for choosing among papers when there are too many submissions for the available time. Aditi Gowri volunteered.

(d) Robert Thomas reported the Executive's decision to limit speakers to one talk per meeting and to allow all speakers the same amount of time. Bill Anglin urged flexibility, but Thomas replied that any "discretionary" element (at the level of program chair) is just what we should try to avoid. Fran Abeles suggested that cases of "real need" for more time can be scheduled just before breaks. Jacques Lefebvre asserted that "most" papers can be compressed to 30 minutes and that we should be firm now and see what flexibility may be necessary in the future. Tom Drucker noted that the program chair can bring "exceptional" cases to the attention of the Executive.

#### 4. Secretary-Treasurer's Report:

(a) The forms for travel-subsidy requests were distributed.

(b) In the regretted absence of Glen Van Brummelen, Robert Thomas gave an abbreviated version of the Secretary-Treasurer's report, noting that the full document is in the May *Bulletin* [which members had not yet received at the time of the meeting].

**Motion** (Kunoff/Grant): To approve the Secretary-Treasurer's report. Carried.

It was noted that Hardy Grant had agreed to write an account of the St. John's conference for the HPM newsletter. The same publication seeks a "Canada columnist".

#### 5. President's Report:

Robert Thomas

(a) noted that the ballots for election of officers were being mailed with the *Bulletin* and were therefore unavailable, but that, happily, the constitution allows setting of another election date. Accordingly, it had been decided that new ballots would be sent out, for return to the Secretary by September 30. As for the proposed constitutional changes [set out in the May *Bulletin*], the Executive had decided that these are not urgent and that they can be voted on next year.

(b) reported that Jim Tattersall, who usually lugs copies of the *Proceedings* to the conference, was this year unable to attend because he was accepting an MAA teaching award [cheers!], but had mailed out the *Proceedings* early in June.

(c) announced that the 1998 meeting will be in Ottawa on May 29-31, dates that are "slip-aligned" with the CSHPS'. We have already a volunteer for local arrangements. Next year the "Learneds" will run for only 11 days.

(d) advised that "Victorian mathematics" had been proposed in the Executive meeting as a special-session theme for next year, and invited comments. Aditi Gowri suggested "The Writing of Mathematics", with Donald McKenzie as invited speaker. Roger Godard said he prefers "late-19th-century" to "Victorian"; Aditi Gowri countered with "early professional period". The matter was left undecided.

(e) extended thanks to

\* Roland Eddy, for local arrangements for this conference

\* Memorial University, for the use of facilities

\* Tom Drucker, for organizing the program and chairing all the sessions

\* Hardy Grant, for work on the *Bulletin*

\* other members of the Executive

\* Jim Tattersall, for work on the *Proceedings*

\* Glen Van Brummelen, for work as Secretary Treasurer

\* The King's University College, Edmonton, for secretarial support.

#### 6. Visit of HSSFC representatives:

Chad Gaffield and Jacqueline Wright represented the HSSFC. Prof. Gaffield said that the merger which created this organization [cf. above] has worked very well. But the "bad news" is that the place of the humanities and social sciences in policy debates is now "marginal". He cited the new Canadian Foundation for Innovation, whose purpose is the support of research

infrastructure and whose budget is \$800-million; this enterprise has been conceptualized in a way likely to most benefit the science and biomedical communities. He said that attempts will be made to revitalize the “Learneds”, by (i) reducing their time to 11 days, to promote interdisciplinary contacts, (ii) making the publishers’ display more “dynamic”, (iii) involving “non-academic” people in the host city, (iv) seeking more media coverage and a greater on-line presence, and (v) attempting to increase attendance from outside Canada (currently about 15 per cent). He described the HSSFC’s successful “Breakfast on the Hill” [Parliament Hill, site of the Canadian legislature] series of presentations by leading researchers in the humanities and social sciences; these typically attract 100-150 people, including Members of Parliament and Deputy Ministers. Tom Drucker asked if HSSFC’s competition for money with (for example) the physical sciences is zero-sum; Prof. Gaffield said that it is not, but that it is up to groups like ours to come forward with “interesting initiatives”.

#### 7. Other business:

(a) Hardy Grant, editor of the *Bulletin*, appealed for someone to come aboard as co-editor, explaining that the work involved is rather too much for one person. [Sharon Kunoff subsequently volunteered.]

(b) Citing the Society’s large American membership, Aditi Gowri urged that we consider trying to attract foundational support in the U.S.

(c) Tom Drucker extended thanks to Robert Thomas for his tireless work as President.

**8. Motion** (Kunoff/Godard): To adjourn. Carried.

H. Grant, Secretary (*pro tem*)

### EXECUTIVE

(cont. From page 10)

The Executive recognized its responsibility to strike a nominating committee and instructed the President to request the Past President to chair such a committee. [This was subsequently done.]

The Canadian National Committee for the International Union for the History and Philosophy of Science had requested that our Society adopt a policy on support for the registration fee of a member of the Society named as a delegate to the quadrennial assembly of an IUHPS Division (as at Liège this year). The Executive agreed that the Society would pay up to the amount of one such fee (which might be shared between two delegates), but only if the delegate(s) can not obtain other support for that expense, and only if the delegate(s) actually participate(s) in the business meetings of the IUHPS Division assembly.

The committee considered a request from Industry Canada for support for the following statement: “This organization recognizes the legitimacy of scholarly material published in electronic form when such scholarly material conforms to broadly accepted standards of peer review.” The Executive decided to decline support, not because of disagreement with the statement but out of concern for the use that an agency such as Industry Canada might make of it, since in fact “the legitimacy of scholarly material” has nothing to do with Industry Canada or governments.

## BALTIMORE MEETING

The joint AMS - MAA meeting to be held in Baltimore from January 7 to January 10, 1998, offers a number of sessions likely to be of interest to members of the CSHPM:

\* John Stillwell will speak on Wednesday, January 7 at 3:20 p.m., on "Some Exceptional Objects and their History".

\* Fred Rickey and Victor Katz will conduct a minicourse entitled "Teaching a Course in the History of Mathematics". This will be on Wednesday, January 7 from 8 to 10 a.m. and from 4:30 to 6:30 p.m. The cost is \$45 (U.S.) and prior enrolment through the MAA is necessary.

\* Brian Smith and Mary Robinson will conduct a minicourse entitled "Teaching the History of Mathematics Using the World Wide Web". This will be on Tuesday, January 6 from 3 to 5 p.m. and from 7 to 9 p.m. The cost is \$65 (U.S.).

\* Karen Parshall and Jim Tattersall will run a special AMS session on the history of mathematics. This will be on Friday and Saturday, January 9 and 10.

\* John Dawson will run a session on History of Mathematical Logic. This will be on Wednesday, January 8 from 2:15 to 6:20 p.m.

\* Florence Fasanelli, Fred Rickey and Victor Katz will run a special AMS-MAA session on the uses of history in the teaching of mathematics. This will be on Thursday, January 8 from 8 a.m to noon and from 2:15 to 4:15. Many of the speakers have participated in the Institute in the History of Mathematics and its Use in Teaching.

Further details are available in the October issues of the AMS *Notices* and of the MAA *FOCUS*, and also at [www.ams.org](http://www.ams.org).

## CONFERENCE IN HONOR OF UBI D'AMBROSIO

A conference in honor of the 65th birthday of Ubi D'Ambrosio, and celebrating his role as the originator of ethnomathematics and his influence in mathematics education and in the history of mathematics, will take place on Tuesday, January 6, 1998, beginning at 9 a.m., in the Omni Inner Harbor Hotel in Baltimore, MD, the day before the beginning of the Joint Mathematics Meetings. Confirmed speakers include Marcia Ascher, Paulus Gerdes, John Fauvel, Dirk Struik, Reuben Hersh, and Jeremy Kilpatrick. The conference is sponsored jointly by the International Study Group on the Relations Between History and Pedagogy, Americas Section (HPM), and the International Study Group on Ethnomathematics (ISGEM). To register for the conference, please send a check for \$50 (US), made out to HPM, along with your name, addresses, and phone numbers, to Karen Michalowicz, 5855 Glen Forest Dr., Falls Church, VA 22041 (USA). The fee is chiefly to cover the cost of a festive birthday dinner. (If it is difficult for you to send a US dollar check due to currency conversion problems, please send a note to that effect and the organizers will collect the fee at the conference itself.) Queries should be directed to Victor Katz at [vkatz@maa.org](mailto:vkatz@maa.org).

"Mathematics is a game, but a serious game, not a gamey one ...

The well-defined systems of mathematics may be unicorns, but they are powerfully muscled."  
-- C.F. Hockett

## Web Review

### BOOKS: THE NEXT GENERATION

#### Glen Van Brummelen

“Euclid's *Elements* Online”, by David Joyce  
<http://aleph0.clarku.edu/~djoyce/java/elements/elements.html>

In one of my favourite episodes of *Star Trek*, Captain Kirk, accused of a crime, is defended by a cantankerous eccentric lawyer. The key to his oddness is his love of books: real sheets of paper with the printed word, bound between covers, rather than the much more easily used electronic methods of information retrieval available at the local computer console. His inevitable triumph over the forces of evil is the link he feels to our history and culture, found within those dusty pages.

We, as historians, likely feel closer to the lawyer than to the Web guru. For most of us the primary sources are old, (usually) paper-bound documents, which we use to bring us closer to past cultures. If we are going to embrace a new medium for our reading, there should be obvious advantages. And, of course, our beloved books will never disappear from our shelves.

Too often, the Internet today is merely a transfer of information already otherwise available to electronic form, with ads thrown liberally into the mix to sponsor the cost of the transfer process. The advantage involved in booting the computer, paying for connection time, and enduring the World Wide Wait to get what we want seems marginal at best. Why should one bother to go through all of this, merely to get the text of (say) Euclid's *Elements*, when one can simply

pull one's paper copy off the shelf at arm's reach?

David Joyce, already the author of one of the best history-of-mathematics sites on the Web, gives us a taste of the answer through his developing site “Euclid's *Elements* Online”. Over the past year or two, Prof. Joyce has transcribed the text and is currently adding historical and mathematical comments to each proposition, many taken from Heath's edition. Each proposition appears on a separate page, and when a previous proposition is quoted in a proof, a link allows the reader to go directly to that proposition.

The linking ability adds a slight benefit to the work, but it is not the key attraction of Joyce's site. Along with each proposition, one finds a beautifully-rendered diagram illustrating the geometric fact to be conveyed. The diagrams, however, are not merely pictures, but small programs. Each image may be manipulated by the reader, so that the initial conditions vary continuously, but the geometric elements remain intact. Thus, for example, you can alter the length or width of the triangle in the proof of the Pythagorean Theorem, and watch the various lines and squares in the diagram move continuously in response to your change.

The educational advantages to these interactive illustrations are obvious. The fact that is being proved can be seen clearly, since one can move through a continuous range of examples at once. The geometric relations between lines and curves in the figure are much easier to understand, since the reader can control the shape of the diagram and observe how the lines respond to her directions. And, it's a lot of fun!



The potentials of this sort of mathematical interactivity are currently being explored and utilized by such programs as Geometer's Sketchpad and Cabri Geometrie, and can now be found in some classrooms as early as the fifth grade. But, with the Web, one doesn't need to have any separate programs to manipulate these drawings. The secret to this bit of wizardry is the latest magic computer word, Java. Java is a programming language much like any other, but with two substantial edges: firstly, it is geared for use on the Internet, and secondly, it is machine-independent. This means that anyone with a "Java-enabled" Web browser (Netscape or Internet Explorer version 3 or higher) can go to Joyce's site, have the program ("applet") required to manipulate the figures downloaded onto his computer, and run it within the browser, perhaps even without realizing it is there. It matters not whether your computer is Intel-based, a Macintosh, Sun workstation, or anything else: if you have a sufficiently powerful Web browser, you can run the program.

Java is the rage now, but it is not in itself very important. What is important is that the Internet is developing to the point that

substantial interactivity between the user and the Web site will soon be possible. The ability of a Web site to interact with the user provides educational capabilities that a book simply cannot match, and Joyce's site is the perfect example of what might be possible. The technology is not yet quite up to the task: one must endure frustrating waits to load the pages, and the interactive diagrams are difficult to control due to their lack of smooth response as opposed to diagrams in Geometer's Sketchpad. These are matters of bandwidth, and in a few years the connection speeds will reach sufficient levels to allow the potential to be realized. The chief value of Joyce's site is to demonstrate that the Internet can add genuine richness to a text, even one as ancient as Euclid.

I will never throw away my copy of the *Elements*, and someday I may be as cantankerous about books (and other things) as the lawyer in *Star Trek*. But I will keep my computer monitor nearby. Interacting in new ways with old ideas can be enlightening and stimulating. Learning, after all, is what happens when children grow up and forget to stop playing.

### Midwest History Conference

The Midwest Conference on the History of Mathematics will be held at Iowa State University, Ames, Iowa, on Oct. 2-4, 1988. The conference will include a special session on the history of logic. Papers are requested; the organizer, Jim Murdock, says that "you are welcome to submit a paper whether you are a historian, a mathematician with an amateur interest in the history of your field, or a

teacher interested in the use of history of mathematics in the classroom". Further information is available on the Web at <http://www.math.iastate.edu/jmurdock/conference.html>, by e-mail to [jmurdock@iastate.edu](mailto:jmurdock@iastate.edu), or by regular mail to Jim Murdock, Mathematics Department, Iowa State University, Ames, IA 50011 (U.S.A.).

## NEW MEMBERS

*The following have recently joined the Society. A warm welcome to all! An asterisk identifies members of the British Society for History of Mathematics who have taken advantage of the cross-membership agreement between that Society and our own. Apologies for any errors or omissions; these should be brought to the notice of the Bulletin's editors.*

**Eisso Atzema**, Department of Mathematics and Statistics, Neville Hall, University of Maine at Orono, Orono, ME 04469, USA

**Janet Beery**, Department of Mathematics, University of Redlands, 1200 E. Colton Avenue, Redlands, CA 92373, USA

\* **John Bibby**, 1 Straylands Grove, York, UK, YO3 0EB

\***Reg Chaplin**, 199 Beehive Lane, Ilford, Essex, UK, IG4 5EB

\***Steve Cumbers**, 7 Horsecroft Close, Orpington, Kent, UK, BR6 0RA

\***John Earle**, 20 Dunvegan Close, Exeter, Devon, UK, EX4 4AF

\***Westley Eaton**, 27 Cumberland Drive, Dundonald, Belfast, Northern Ireland, UK, BT16 0AT

\* **John Fauvel**, 5 Marshworth, Tinkers Bridge, Milton Keynes, UK, MK6 3DA

**Doug Girvan**, Box 5005, Red Deer College, Red Deer, AB T4N 5H5

\***George Hardy**, 7 Hawthorn Road, Northampton, UK, NN3 2JH

\***Derek Kassem**, 51 Farmleigh Gardens, Great Sankey, Warrington, Cheshire, UK, WA1 3FA

\***P.J. Maher**, Middlesex University, Queensway, Enfield, Middlesex, UK, EN3 4S

\***David Mancini**, 40 Saxon Road, Pakefield, Lowestoft, Suffolk, UK, NR33 7BT

**Duncan Melville**, Department of Mathematics, St. Lawrence University, Canton, NY 13617, USA

\***Susana Matalx**, Square Marguerite 9, 1000 Bruxelles, Belgium

\***Paulo Oliveira**, Casal de Ouressa Lote 7, 6 DTO, 2725 Mem-Martins, Portugal

\***Peter Ransom**, 29 Rufus Close, Rownhams, Southampton, UK, SO16 8LR

\***Eleanor Robson**, Wolfson College, Oxford, UK, OX2 6UD

\***Leo Rogers**, 29 St. Winifred's College, Teddington, Middlesex, UK, TW11 9JS

\***Steve Russ**, Department of Computer Science, University of Warwick, Coventry, UK, CV4 7AL

\***Man-Keung Siu**, Department of Mathematics, Pokfulam Road, University of Hong Kong, Hong Kong, China

\* **Elizabeth Stamp**, JIS, P.O. Box 1078 JKS, Jakarta, Indonesia 12010

**Trudy Thorgeirson**, #8 - 111 McKinstry Road, Duncan, BC, V9L 5E4

**August VandeVoorde**, 8003 Winter Gardens Blvd, #106, El Cajon, CA 92021-1487, USA

\***Conrad Ware**, Tasis England, Coldharbour Lane, Thorpe, Surrey, UK, TW20 8TE

## CONTRIBUTIONS WANTED

The *American Mathematical Monthly* is seeking high-quality articles on the history of mathematics. As noted in the editorial policy of the *Monthly*, "novelty and generality are far less important than clarity of exposition and

broad appeal." Victor Katz, who is a member of the *Monthly's* editorial board, advises that he would be happy to discuss the suitability of any ideas that prospective contributors may have. Contact him at <vkatz@udc.edu>.

## LIÈGE MEETING

At the recent (July 22, 25) meeting in Liège, Belgium of the Division of History of Science (DHS) of the International Union for History and Philosophy of Science (IUHPS), all three of the Canadian delegates were members of the CSHPM. Craig Fraser and Wesley Stevens were nominated for this role by the Canadian National Committee for IUHPS and appointed by the National Research Council of Canada, while Glen Van Brummelen served as alternate for another such appointee who was unable to attend. DHS chose Mexico City (over New York and Beijing) as the site of its next congress, to be held in 2001.

Craig Fraser was elected first vice-president of the inter-union Commission on Mathematics; congratulations!

Wesley Stevens is active on the Commission on Bibliography and Documentation, which has created an international bibliography for history of science and technology and its influence on culture from prehistory to the present. This results from a merger of bibliographies from Italy, the U.K., and the U.S.A., known as HST. HST is now available online for library subscription through the Research Libraries Group Citadel Service; Internet addresses are either via Netscape Navigator to <http://www.eureka.rlg.org/> or via Telnet to [mercury.rlg.org](http://mercury.rlg.org).

At Liège the XXth International Congress of History of Science, organized and sponsored by DHS, attracted some 1200 participants, representing about 70 countries. The following papers were presented by CSHPM members:

- \* Len Berggren, "Minor geometrical works of Al-Kuhi: a historical and mathematical survey"
- \* Craig Fraser, "Mathematical existence and Euler's analysis"
- \* Wesley Stevens, "En route with medieval cosmology"

\* Glen Van Brummelen, "Mathematical methods in the tables of planetary motion in Kushyar ibn Labban's *Jami' Zij*".

## ELECTIONS

Elections usually take place at the annual meeting with persons present voting and mail ballots counted at that time. Late mailing of the original ballots necessitated a new election. Secretary-treasurer Glen Van Brummelen decided to send email ballots to all members with an electronic address, and paper ballots to all other members. We received 64 electronic votes as well as 10 paper ballots. The officers Robert Thomas, President, J.J. Tattersall, Vice President and Glen Van Brummelen were reelected to their respective offices unanimously. Our new Councillor Fred Rickey was elected with 73 yeases and 1 abstention.

## MONTREAL MEETING

The recent AMS meeting at l'Université de Montréal included a session on the history of mathematics, ably organized by Israel Kleiner and Jim Tattersall of the CSHPM. The following CSHPM members gave talks: Pat Allaire, "Duncan F. Gregory, the unknown Gregory"; John Anderson, "Cubic curves, coordinates and classification: geometric style between Newton and Euler"; Liliane Beaulieu, "Measure vs integral in the Bourbaki integration"; Craig Fraser, "The concept of integration in Euler's analysis"; Judy Green, "Who is Ragsdale of the Ragsdale conjecture?"; Israel Kleiner, "Proof, a many-splendored thing"; Jacques Lefebvre, "Mathematics in 'la logique ou l'art de penser' of Port-Royal"; Abe Shenitzer, "Remarks on Riemann, based on Detlef Laugwitz's recent book *Bernhard Riemann* (this talk was also part of the Special Session on non-Euclidean and Spacetime Geometries); Jim Tattersall, "Some thoughts on Nichomachean mathematics"

## CALL FOR PAPERS

This is a call for papers for the 1998 Annual General Meeting of the Society, to be held from Friday, May 29 to Sunday, May 31 at the University of Ottawa. There will be a special session on late 19th century mathematics, with a feature on Charles Dodgson. Please send titles and abstracts to the organizer, Fran Abeles, Mathematics Dept., Kean College Union, NJ 07083 (USA); fabeles@turbo.kean.edu. Titles and abstracts for the regular session should be sent to G. Van Brummelen, Simon Fraser Univ., Burnaby, BC V5A 1S6 (Canada) E-mail: gvb@sfu.ca Deadline in each case is February 28. Participants are respectfully reminded that by decision of the Society's Executive, all (non-invited) talks are to be of the same length. Exceptions are possible, but only in exceptional circumstances; decisions in this matter will be made by the Executive, not by the program chair(s).

## ABOUT THE BULLETIN

The *Bulletin* is published each May and November, and is co-edited by Hardy Grant, (hgrant@freenet.carleton.ca), York University, Toronto, Canada & Sharon Kunoff (kunoff@titan.liunet.edu) C.W. Post Campus/ Long Island University. Material without a byline or other attribution has been written by the editors. Les pages sont chaleureusement ouvertes aux textes soumis en français. Comments and suggestions are welcome, and can be directed to either of the editors; submissions should be sent to Hardy Grant, at the above e-mail address or by post, to 539 Highland Avenue, Ottawa, ON K2A 2J8 (Canada) 1997.

## European Honours Course in History of Mathematics, 15 July - 1 August.

The Centre for Cultural and Historical Aspects of Mathematics of the School of Mathematics and Statistics of Middlesex University (UK) organised this post-graduate course under the auspices of the Socrates Directorate of the European Union. The organising committee was formed of Ivor Grattan-Guinness as Director, with Tony Crilly and doctoral students, Adrian Rice and Richard Mankiewicz. The theme was the history of mathematics education and institutions. Twenty students from eight countries were selected to take part in the program of talks, tutorials, computing-lab sessions, and student presentations. In addition to the organising committee, the speakers were: Jens Høyrup, Gert Schubring, Karen Parshall, John Fauvel, Ruth Wallis, Andrew Warwick, Eileen Magnello, Janet Burt, June Barrow-Green, Albert Lewis, Henk Bos, and David Singmaster. One of the high points was the day outing to the Saturday sessions of the joint CSHPM-BSHM meeting in Oxford. The lively involvement of the students, in both the formal and informal parts of the course made for what was clearly an enjoyable and worthwhile experience for everyone. Further details can be found in Ivor Grattan-Guinness's report at the *Historia Mathematica* Web site: [www.math.ruu.nl/hm/hmann.html](http://www.math.ruu.nl/hm/hmann.html)

*Albert C. Lewis*

"You can't cheat in mathematics or poetry or music because they're based on truth."

-- John Steinbeck