Canadian Society for History and Philosophy of Mathematics
Société canadienne d'histoire et de philosophie des mathématiques

1982 ANNUAL MEETING

UNIVERSITY OF OTTAWA

June 7 - June 9, 1982

Location of lectures: Education Building LMX 124
A small seminar room (LMX 204) is also available.

MONDAY, JUNE 7

2:00 p.m.	Marshall Walker, York University "Mean and extreme ratio and Plato's <u>Timaeus</u>"
2:40 p.m.	Roger Fischler, Carleton University "What are Euclid's <u>Data</u> 84, 85 all about"
3:30 p.m.	Ross Willard, University of Toronto "Analysis, synthesis, fluxions and limits"
4:15 p.m.	Victor J. Katz, University of District of Columbia "Differential forms - a study in definition"
8:00 p.m.	INVITED ADDRESS A.J. Coleman, Queen's University "Mathematics in Canada: 1935-1982 -- Some anecdotes and some dogmatic opinions"

TUESDAY, JUNE 8

9:15 a.m.	D.G. Tahta, formerly School of Education, Exeter "History in mathematics education"
10:15 a.m.	Break
10:30 a.m.	INVITED ADDRESS Carolyn Eisele, Professor Emeritus, Hunter College, NY "C.S. Peirce"
11:30 a.m.	Business meeting and lunch

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2:00 p.m. Tom Archibald, University of Toronto
"Green's Theorem and its generalizations, 1857-70"

3:00 p.m. Viktors Linis, University of Ottawa
"Life and work of Piers Bohl"

3:45 p.m. Break

4:00 p.m. PANEL DISCUSSION ON "GÖDEL, ESCHER & BACH" by D. HOFSTADTER
John Berry, University of Manitoba
Patricia Craig, Mount Allison University

WEDNESDAY, JUNE 9

9:30 a.m. Francine Abeles, Kean College
"On representation and power"

10:30 a.m. Josephe Badrikian, Université de Clermont
"Simulations des problèmes de probabilités traités au 17e et 18e siècles"

11:30 a.m. Late papers

Abstracts

Marshall Walker, "Mean and Extreme Ratio and Plato's Timaeus"

A three-dimensional geometric growth model is formulated embodying the principles: (1) growth occurs according to a process of simple algorithmic adjunction so that overall form is maintained (2) stages are inter-related by mean and extreme ratio. The model is employed to clarify a critical passage of Plato's Timaeus. As a consequence mean and extreme ratio takes on new importance in the beginnings of Greek mathematics and philosophy.

Roger Fischler, "What Are Euclid's Data 84,85 All About?"

Several authors (e.g., Tannery; Heath, History, I, 423; Van der Waerden, p. 121) support their association of Elements II,5,6 with the solution of the equations $y \pm x = a$; $xy=b$ by a reference to the statements of Data 84,85.

In this talk we argue that a detailed examination of the proofs of Data 84,85 together with the statement and proof of "85'" indicate that it does not suffice to look at the statements of 84,85 and that whatever maybe true about the "meaning" of II,5,6 it is misleading to bring in Data 84,85 in order to justify an "algebraic" interpretation.

Ross Willard, "Analysis, Synthesis, Fluxions and Limits"

Berkeley's Analyst precipitated in Britain a number of vigourous defences of the use of fluxions, and of prime and ultimate ratios, in the "higher geometry". The best of these--by Robins and Maclaurin--dealt primarily with epistemological concerns surrounding the notion of synthetic demonstration, and with the pragmatic concern about the susceptibility to error of analysis. The methods of fluxions, of prime and ultimate ratios, and of infinitesimals were judged accordingly; but despite their common concerns, Robins and Maclaurin disagreed fundamentally in their conclusions.

Victor J. Katz, "Differential Forms - A Study in Definition"

Differential forms, the "things which appear under integral signs", had been essentially studied for many years before Elie Cartan gave the first definition in a paper of 1899. But Cartan's definition was "purely symbolic" - differential forms were expressions formed by adding and multiplying differentials and coefficient functions according to certain rules.

It was already well-known that the integral of a differential form was, but in terms of the twentieth century insistence on a set-theoretic definition of any new concept, it was certainly not clear what a differential form "was". Differential forms were nevertheless much used during the next decades, but even DeRham in his famous 1931 paper comparing differential cohomology with singular homology defined his differential forms as "expressions".

It was apparently not until 1946 that a set-theoretic definition was published by Chevalley in connection with the study of Lie groups. His definition, though essentially still in use, was rapidly subsumed under the more general definitions of sheaves and vector bundles which were being developed in the late 1940s.

Tom Archibald, "Green's Theorem and its Generalizations, 1857-70"

Riemann's analysis situs is often imagined as an abstract development that arose in connection with purely geometrical considerations. In fact, Riemann was in large part motivated by a desire to create physically useful mathematics. In this paper, I shall show that this was clear to Riemann's contemporaries Helmholtz and William Thomson, I shall particularly emphasize the latter's proof of a version of Green's Theorem valid in multiply-connected regions, which was developed in connection with the theory of vortex motion.

Viktors Linis, "Life and Work of Piers Bohl"

The mathematician Piers Bohl (1865 - 1921) spent his creative years at the University of Dorpat (Derpt, Yurjev, Tartu) and at the Riga Polytechnic Institute. His work in differential equations arising from problems in celestial mechanics overlaps and complements the work of Poincaré. In his investigations Bohl introduces methods and concepts which later have become "classical" theorems of Brouwer (fixpoints of mappings), Bohr (almost periodic functions) and Weyl (distributions modulo one).

Francine Abeles, "On Representation and Power"

Political representation has many facets: what should be represented, how many representatives, how should they be chosen, how effective is the representation? The analytical theory of voting, begun in the second half of the 18th century, and considerably expanded since the end of World War II, attempts to deal with aspects of this last question. On the one hand there are voting methods that are useful in deciding between more than two alternatives; on the other there are indices for measuring power in a voting body. In this paper we will examine an extension of the Shapley-Shubik power index to selecting a winner from an ordered list.

Carolyn Eisele, "Charles S. Peirce, Mathematician"

Until recently studies in the mature thought of the American philosopher and logician Charles S. Peirce (1839-1914) have failed to recognize the most pervasive of all the ingredients in its foundations -- the "new" mathematics of the late 19th century. The edition of his so-called Collected Papers...(8 volumes. 1931-1935; 1958), omits scores of mathematical manuscripts, as well as mathematical references far above the level of high-school algebra and Euclidean geometry. The appearance of these materials at last in The New Elements of Mathematics by Charles S. Peirce (1976) as edited by C. Eisele reveals Peirce as an outstanding American mathematician in his time. Other manuscripts on his investigations in the history of science and mathematics now being edited by Eisele give further insight into his relentless search for valid mathematical and scientific methodology throughout the ages.