**Canadian Mathematical Society Winter Meeting**
**December 8-10, 2007**
**Marriott Hotel, London, Ontario**

History and Philosophy of Mathematics
Org: Tom Archibald (SFU) and Deborah Kent (Hillsdale College)

Sunday December 9

8:30 - 8:55 John Bell, Delta, Officer's Club

9:00 - 9:25 Zoë Misiewicz, Delta, Officer's Club

9:30 - 9:55 Alexander Jones, Delta, Officer's Club

10:30 - 10:55 Jackie Feke, Delta, Officer's Club

11:00 - 11:25 Glen van Brummelen, Delta, Officer's Club

16:00 - 16:25 Deborah Kent, Delta, Officer's Club

16:30 - 16:55 Tom Archibald, Delta, Officer's Club

Monday December 10

9:00 - 9:25 James Robert Brown, Delta, Officer's Club

9:30 - 9:55 David DeVidi, Delta, Officer's Club

10:30 - 10:55 Robert Dawson, Delta, Officer's Club

11:00 - 11:25 David Bellhouse, Delta, Officer's Club

## History and Philosophy of Mathematics
## Histoire et philosophie des mathématiques

(Org: **Tom Archibald** (SFU) and/et **Deborah Kent** (Hillsdale College))

---

**TOM ARCHIBALD**, Simon Fraser University

*Formulas, Concepts, and the "Jacobi Limit" in the 19th C.*

Many historians have observed that the eighteenth century was a time when the recognition of patterns produced results directly from hand calculations. Around 1840 Jacobi remarked that the limitations of this calculational method as a source of discovery were becoming apparent. Reading with hindsight, his remarks seem prophetic, directly preceding a move to a more "modern", conceptual viewpoint. This shift has been described by several writers in terms of a change from a formula-based to a concept-based mathematics. However, formulas have a variety of purposes: they may be used to classify objects or to represent generic objects. The distinction between the older and the newer views is thus difficult to summarize in terms of the distinction between formulas and concepts or structures.

In this paper, we consider the distinction between formulas and concepts against the background of differing views about the ontological status of mathematical objects. Some writers viewed mathematical objects as naturally occurring, so that their relations were objectively given, and not merely subject to the whim of the mathematician and the requirements of consistency. This viewpoint has several advantages for the historian, while still shedding light on the distinction in question.

---

**JOHN BELL**, Philosophy Dept., UWO

*On the Indecomposability of the Continuum*

In my talk I will trace the development of the idea that the continuum is indecomposable—that it cannot be split into disjoint nonempty parts—an idea, I contend, that goes back at least as far as Aristotle. Time permitting, I will also describe how indecomposable continua are modelled in contemporary mathematics.

---

**DAVID BELLHOUSE**, University of Western Ontario, Department of Statistical and Actuarial Sciences, London, Ontario N6A 5B7

*Eighteenth Century English Life Annuities: Calculations and Applications*

The first life annuity evaluation in England was done by Edmund Halley in 1693 related to his construction of the Breslau life table. The work had little impact until Abraham De Moivre published his work on life annuities in 1725. After that point several English mathematicians, most notable among them Thomas Simpson, became interested in life annuity valuations. The topic is covered from two perspectives. First, some eighteenth century annuity tables have been recalculated to try to discover the author's intentions and mistakes, if any. The second thread of enquiry is to try to answer the question why books on annuities were published by mathematicians when some modern historians have doubted whether they were ever used in practice.

---

**JAMES ROBERT BROWN**, University of Toronto

*Mathematical Explanation*

Mathematics is often claimed to be essential for science. While extensive use is made of mathematics, it is far from clear that it plays the same sort of role in explaining and understanding that the rest of science plays. An interesting recent example concerns the 17 year life-cycle of the cicada. Why that long? Because 17 is a prime number. Of course, more is involved, but

it is claimed that primarily is part of the explanation. I shall argue that this is misconceived. Mathematics, in this sense of explanation, explains nothing in the natural world. On the other hand, there is a second sense of explanation—understanding, as in "I want to understand your theory; please explain it to me." What do we understand of, say, physical properties such as the spin of an electron? Can it be explained, in the sense of providing understanding? I would say that we know nothing, except that electron spin is in some sense analogous to a certain matrix, and so on. In this sense of explanation, namely, understanding, mathematics is often essential. The only understanding we have of the spin of an electron (and of much in the world), is by means of mathematical structures that we do understand and that we conjecture to be structurally similar to the natural world. So, mathematics is essential to science, but only in the second sense.

---

**ROBERT DAWSON**, Saint Mary's University
*Your Name Here: The Scandalous Evolution of Bryce's Commercial Arithmetic*

In 1866, Canada's first business mathematics textbook was published. Within a year, it had been replaced by an Americanized version. While it went through at least a dozen editions—several published in Canada—within the next decade, the original version was never republished. Some editions were "published" by business school principals who were hardly involved with the production of the book; in one case, even the supposed author was an impostor. In this talk, we will examine the background to these irregularities. We will also consider the difficulties of studying the publication history of a book for which misleading title pages were the rule rather than the exception.

---

**DAVID DeVIDI**, University of Waterloo
*Pluralisms, Mathematical and Logical*

Many reasons have been advanced for being a pluralist about logic, i.e., for holding that more than one system of logic is correct, and some of these have something to do with mathematics. For instance, it is sometimes claimed that the logic of natural language must be non-classical, due to the vagueness of the predicates involved, while classical logic is correct for mathematical reasoning. On the other hand, while it is common enough to find people willing to advocate pluralism about mathematics in the pub, it is harder to find ones who will do so in print. The reason is that it is simply harder to make sense of the claim that more than one mathematics is correct. This talk will describe what I take to be the best bets for making good the claims of mathematical pluralism. This will involve closer investigation of the relationship between mathematical and logical pluralism, and of whether a view can be genuinely pluralist if one holds that there are two correct systems, but one is a subsystem of the other.

---

**JACKIE FEKE**, IHPST, University of Toronto, Room 316, Victoria College, 91 Charles St. W., Toronto, ON M5S 1K7
*Ptolemy's Mathematical Realism*

Claudius Ptolemy is best known for writing the Almagest, his mammoth and influential compendium of astronomical hypotheses. For decades now, scholars have debated whether Ptolemy merely intended to present mathematical fictions, with the aim of saving the phenomena of planetary motion, or whether he endeavored to expound a cosmological system that he truly believed to exist. In other words, was Ptolemy an instrumentalist or a realist? Examination of Ptolemy's astronomical hypotheses in the context of his more methodological and philosophical expositions suggests that Ptolemy did believe in the reality of mathematical objects, astronomical and otherwise. To begin with, in Almagest 1.1, Ptolemy adopts Aristotle's classification of the three theoretical sciences: physics, mathematics, and theology. He describes the objects that each of the sciences studies, and he characterizes mathematical objects as form, shape, number, size, place, time, and motion from place to place. In adopting an Aristotelian ontology, Ptolemy demonstrates that he believes in the existence of mathematical entities. Moreover, his realism is evident in the method he utilizes in the Harmonics. Ptolemy introduces the concept of harmonia, which he defines as an active power in the cosmos that enforms rational objects. Music, human souls, and heavenly bodies all exhibit the same harmonious ratios. Ptolemy's mathematical correlation of these diverse phenomena is proof that he believed that the mathematical entities heard in music, posited in the soul, and observed in the heavens really do exist.

**ALEXANDER JONES**, Classics, University of Toronto, 97 St. George Street
*The Crime of Vettius Valens*

Vettius Valens wrote a treatise on astrology in Antioch during the late 2nd century of our era, about the same time that Ptolemy was active in Alexandria; the book is among the richest sources we have for the use of mathematical methods in ancient astrology. Vettius Valens had a special enthusiasm for calculations predicting the length of a person's life, and he illustrates them and their efficacy through examples drawn from the lives of his clients. The details of these examples cast interesting light both on the role of mathematical methods in Greek astrology and on the manipulation, whether conscious or unconscious, of data to obtain exact agreement between theories and empirical data.

**DEBORAH KENT**, Hillsdale College
*Mathematicians in search of war work, 1917–1918*

This talk will investigate the variey of ways the mobilization to enter World War impacted the mathematical community in the United States. It will also explore the efforts of individuals working to aid the war effort with their mathematical training in colleges and universities, as well as in military and industrial contexts.

**ZOË MISIEWICZ**, University of Toronto
*Greek Geometers on Geometry*

Greek mathematical texts do not consist purely of solutions to problems and proofs of theorems; they often begin with introductions in which the mathematicians speak explicitly about their work. The statements of Greek geometers about geometry shed light on their motivations, their attitudes towards their work, and, most fundamentally, what exactly they think that mathematics is.

**GLEN VAN BRUMMELEN**, Quest University
*A Different Sort of Sacred Geometry: The Medieval Analemma for Finding the Direction of Mecca*

The direction toward which Muslim faithful must face for prayer, the qibla, garnered a great deal of attention from medieval astronomers. But, of course, the mathematical astronomy they inherited from India and Greece did not instantly provide a solution. One approach, attributed to one of the earliest and greatest Muslim scientists Habash al-Hasib, solved the problem geometrically, borrowing from the Greek tradition of the analemma. This technique, a clever reduction of the problem from three dimensions to two using several rotations within the celestial sphere, would be transformed into a popular trigonometric tool that may be thought of as a sequence of coordinate transformations on the celestial sphere. We will survey the relevant history, and emphasize the beautiful mathematics of this and related methods.