ANNUAL MEETING OF THE CANADIAN SOCIETY FOR THE HISTORY AND PHILOSOPHY OF MATHEMATICS/ SOCIÉTÉ CANADIENNE D'HISTOIRE ET DE PHILOSOPHIE DES MATHÉMATIQUES

The 1976 Annual Meetings of the CSHPM/SCHPM were held at Université Laval, Québec City, Québec, on June 4th. The program consisted of several papers presented by members (see below), an invited address by Professor Asger Aaboe on "The Scientific Foundations of Ancient and Mediaeval Cosmology", and the Annual Business Meeting.

Professor Aaboe discussed the results of recent research on the sources of the nested sphere cosmology in Ptolemy and the methods of calculating the size of the spheres. The sources of Ptolemy's "planetary hypothesis" are Hebrew and Arabic texts of Book 1 of *Almagest*, which contain an addendum not translated by Heiberg in his German edition.

At the Annual Business Meeting, the members revised the Bylaws, directed the Executive Council to seek membership for the Society in the Humanities Research Council of Canada, elected officers, and discussed plans to meet at McMaster University (Hamilton, Ontario) for the 1977 Annual meetings, probably on June 2nd.

The results of the elections of officers were as follows: Viktors Linis (Mathematics, U. of Ottawa) re-elected President; G. deB. Robinson (Mathematics, U. of Toronto) re-elected Vice President; Charles V. Jones (Mathematics, York University) re-elected Secretary-Treasurer; Maurene Flower (Gellman, Hayward & Partners Ltd., and U. of Toronto) elected Council Member. (Other Council Members of the Society are William Higginson (Education, Queen's University), Kenneth O. May (Mathematics, and Institute for History and Philosophy of Science and Technology, U. of Toronto), and Gregory Moore (Institute for History and Philosophy of Science and Technology), U. Of Toronto).

SESSION I:

Kennedy, Hubert C. (Providence College, R.I.): *Karl Marx and the Foundations of Differential Calculus*. The publication of the complete mathematical writings of Karl Marx was announced at the International Congress of Mathematicians in Zurich in 1932. This did not take place, however, until 1968, but in the meantime some fragments were published and there were several studies of them, especially by Soviet mathematicians. Since 1968 interest in Marx' mathematical writings has increased and there is now wide-spread recognition of the value and originality of Marx' ideas, particularly those regarding the foundations of differential calculus. This paper gives a description of Marx' writings in this field and tries to show how they fit into the historical development of mathematics and how they illustrate the philosophy of dialectical materialism of Marx and Engels.

Lehmann, Hugh (University of Guelph): *Proof in Mathematics.* This paper discusses several different definitions of mathematical proof--an argument which shows that its conclusion is true; a valid argument with true premisses; an argument in accord with a conventional form. The paper argues in favor of the following definition: a proof is an argument in mathematics which can enable someone who understands the premisses to come to know the conclusion

Moore, Gregory H. (University of Toronto): *Cantor's Continuum Problem: The Thorny Path to its Solution.* The Continuum Problem is one of continuing interest to mathematicians from 1878 to the present day. In 1900 David Hilbert cited it as critical to the development of twentieth century mathematics. Kurt Gödel remarked in 1947, one of the surprising features of the Problem is how little is really known about it. Cantor's Continuum Problem grew out of an analysis of sets in n-dimensional Euclidean space. In 1878 he claimed to have proved, by a process of induction, that any infinite set of real numbers had the power of the natural numbers or of the real interval (0, 1). This proposition was later known as the Continuum Hypothesis. As Cantor's claim that every set can be well-ordered was not accepted without proof by other mathematicians, so Cantor's Continuum Hypothesis was viewed with interest but with some restraint. Attempted solutions tended to take one of two directions. The first was to split the Hypothesis into parts. Cantor had proved the Hypothesis, to the satisfaction of other mathematicians, for closed subsets of reals. Felix Hausdorff (1914, 1916) among others extended Cantor's result to a wider class of subsets, the Borel sets. The second approach was to prove or disprove the Hypothesis as a whole. Here Cantor himself (1884, 1897), Paul Tannery (1884), Julius König (1904), L. E. J. Brouwer (1907), David Hilbert (1925), and Felix Bernstein (1938) tried and stumbled. But the framework of the Problem became axiomatic in 1938 when Kurt Gödel proved the Continuum Hypothesis consistent with the usual axioms of set theory. At that time Gödel was inclined to accept the Hypothesis since it was implied by his Axiom of Constructibility. However, when Paul Cohen (1963) proved the independence of the Hypothesis from the usual axioms, all such attempted solutions by Gödel and others appeared of limited value.

Abeles, Francine (Kean College of New Jersey): *The Mathematical Thought of Jean Piaget, I Topology.* "All knowledge has to do with structures," Piaget wrote in 1961 in *The Mechanisms of Perception.* In *The Child's Conception of Space,* written about twenty-five years earlier, he discusses the "groupings" of additions and subdivisions of proximities and separations; of the formation of ordered series and of enclosure by means of surrounding. These elementary structures are the origin of the group of continuous transformations. By examining some of the major works of Piaget, we trace the evolution of his thinking about topology, especially the influence of the Bourbaki school on that development.

SESSION II (Joint with the Canadian Society for the History and Philosophy of Science/Société canadienne d'histoire et de philosophie des sciences):

Thompson, Ron. B. (Toronto): *Jordanus de Nemore: Biographical Problems of a 13th-Century Mathematician.*

Higginson, Bill (Queen's University): *Mathematicians in Colonial Canada: Bougainville and Maseres.* Among the members of the colonial service in pre-Confederation Canada were some very able mathematicians. Two of these were Comte Louis Antoine Bougainville, aide-de-camp to General Montcalm and Francis Maseres, Soliciter-General in Quebec between 1766 and 1769. This paper outlines the mathematical careers and contributions of these two men.

Stevens, W. M. (Winnipeg): *Teaching the Liberal Arts at Fulda--Mathematical Sciences in the 9th Century.*

Craig, Robert T. (Herbert H. Lehman College, N.Y.): *History of Modern Group Theory in the U.S. 1889-1916.* Research into the history of finite group theory in the United States during the formative years. Finite group theory was the first major contribution of American research mathematicians.

SESSION III (Joint session with CSHPS/SCHPS):

Zeman, V. (Concordia University): *The Infinitesimal and Reality.* A historical and systematic discussion of the relation between the mathematical concept of an infinitely small number, a physical concept of continuity and the philosophical concept of reality. Some possible advantages of H. Cohen's project for a justification of the unity of all forms of knowledge will be listed, then the miscomprehensions in the very basis of the theory will be revealed. The paper will try to show why not only the Kantian but also the Cohenian pure metaphysics of nature had to fail in spite of their switch from a purely metaphysical towards a transcendental form of justification.

Castonguay, Charles (Université d'Ottawa): *Le théorème de Church et les raisonnements synthétiques a priori en mathématiques.*

Bunge, Mario (McGill University): *How do Mathematical Objects Exist?*