

Canadian Science and Technology Historical Association (CSTHA)

Kingston XIIth Conference Program

12-14 October 2001, Kingston, Ontario
Donald Gordon Centre

Friday, October 12

20 h – 21 h 30

Panel : Does History of Science Have a Future?

Liberal arts are under increasing pressure in Canada. Funding is funnelled into computer science and computer-oriented technology: "IT" has wedged into arts faculties and the Premier of Ontario is on record that humanistic studies are useless to build a competitive work force. History of science, technology and medicine are marginal in the curriculum at the best of times. Do they have a future?

21h 30 -

Conversazione (Bar)

Saturday, October 13

09 h – 10 h 30

Session A1

Science and Technology in the Cold War

Chair

Richard JARRELL (York)

G.R. LINDSEY (Ottawa)

Operational Research and Systems Analysis in the Canadian Department of National Defence throughout the Cold War

As the Canadian Armed Forces were expanded and reequipped for the Cold War, small Operational Research sections were organized in the field commands and headquarters of the three armed services. The primary OR effort was devoted to learning about the performance under field conditions of the new equipment being issued, and the development of tactics and procedures needed to maximize its effectiveness. Actual operations of war had to be simulated by trials, exercises, and war gaming. As the sophistication and costs of technology advanced, while the defence budget ceased to grow and the size of the armed forces reduced, increased priority was given to systems analysis of the operational aspects associated with major equipment projects such as the Arrow interceptor, the maritime patrol aircraft, the ASW hydrofoil, sonobuoys, the Leopard tank, variable depth sonar, the new fighter aircraft, and the Canadian Patrol Frigate. Other developments included the use of analytic methodology for the study of problems in logistics, personnel, and arms control.

Edward JONES-IMHOTEP
(Harvard)

Communicating the North: Post-war Canadian Culture and the Panoramic Ionogram

This paper explores how the great touchstone of Canadian post-war identity - the North - played into the more ethereal realm of ionospheric research, and particularly into the analysis and interpretation of its most cherished inscription - the panoramic ionogram. In the two decades following World War II, the government of Canada mounted a wide-ranging programme to gain cognitive, technological and cultural control over the northern borderlands of the nation. One of the chief aims of this programme, shot through with the tensions of an emerging Cold War, was to establish Canada as a distinctively northern nation, to use the Canadian North as a fulcrum through which to elevate Canada's status and identity against a declining Britain and an emerging U.S. superpower. Alongside the broad cultural initiatives of the CBC and the National Film Board, scientific research in traditional fields like climatology, glaciology and geology helped underwrite such claims to northerness and the status it would bring. They were crucially buttressed by less traditional allies. Ionospheric research - struggling to remedy the problems of shortwave radio on which northern control depended, and resonating with the profound cultural discourse of communications in Canadian history - played a critical role in the scientific construction of the 'New Canada of the North'. Marshaling magnetic effects, auroral disturbances and the singular geophysics of northern polar regions behind them, Canadian ionospheric researchers pointed to the visual traces of the ionogram, and to the unusual difficulties in interpreting them, as evidence of Canada's unique claims to the title of northern nation. Through their efforts, the ionogram formed a mediating device through which the profound cultural myths that had underwritten ionospheric investigations in the first place could re-enter Canadian culture in altered and more authoritative form.

Roger GODARD (RMC)

Langmuir Probes and Space Physics Experiments in Canada: 1960-1970

In 1926, Mott-Smith and Irving Langmuir published a master article in *Physical Review* about the theory of collectors in gaseous discharges. This article represents a strong analytical and theoretical effort to study the behavior of the collected current by cylindrical or spherical electrodes in a plasma; a word that Langmuir invented. This article is widely referred to in scientific literature. Langmuir probes became devices to estimate the electron density and the electron temperature in a plasma. After World War II, in 1946 and 1947, the US Air Force and the University of Michigan launched Langmuir probes on board of V2 rockets. The objective of these flights was a study of the plasma of the upper atmosphere. And the first article about dynamic probe measurements appeared in 1953 in the *J. of Geophysical Research*. Indeed electron density profiles were already obtained from ionospheric sounders. However, the first profiles of the electron density at the top of the ionosphere were obtained from Langmuir probes. From roughly 1960 to 1970, Space Research became very active in the United States, Canada, France, the United Kingdom, Sweden and the Soviet Union. This period coincides with the launching of very successful satellites: the Explorer series, Alouette I and II, Ariel, Fr1. All these satellites carried devices to measure the electron density. Thus the ionospheric research progressed rapidly: profiles of density and electron temperature in the auroral zone, studies of the energy budget and thermodynamic properties of the ionosphere, discovery of the plasmopause, mapping and tomography of the electron density, density irregularities in the ionosphere, etc. During the sixties, Canada launched a series of rocket experiments, and in 1969 A.G. McNamara from NRC published an important articles about rocket measurements of plasma densities and temperature in visual aurora. Rapidly, experimenters realized that the data processing was more complex and more time consuming than expected. Coning and spinning of spacecraft. sheaths and electrostatic

wakes, supra-thermal particles, surface properties of materials, artificial potential barriers contaminated the data. The worst came around in 1969-1970. Hanson et al. published in 1969 a short letter reporting "conflicting electron temperature measurements in the upper F region of the ionosphere" by pointing a discrepancy between the data of Explorer 32 and the Jicamarca Radar Observatory, by sometimes a factor 2. Carlson and Sayers followed in 1970. And the scientific community was very excited to solve the controversy.

Session A2

Chair

Lysanne COUTURE
(UQAM)

Medecine and Public Health (I)

Robert GAGNON (UQAM)

La constitution des radiologistes comme spécialité médicale au Canada, 1895-1960

Dans les premières décennies du XXe siècle, les radiologistes canadiens, comme ailleurs dans le monde, se sont constitués en spécialité médicale autour d'une nouvelle technologie, les rayons X. La professionnalisation et la spécialisation, comme l'ont montré les travaux en sociologie des professions et en histoire des sciences, ne sont pas dues exclusivement à la complexification des connaissances. Au contraire, la contingence historique et les rapports de force entre des groupes d'intérêts participent, entre autres, de la constitution de pratiques en professions officiellement reconnues. Par ailleurs, nous pensons que la technologie a joué un rôle central dans la constitution de la radiologie comme profession. À la suite de la découverte inattendue des rayons X, le tube de Crookes était utilisé par de larges couches de la population dont les physiciens, les inventeurs, les médecins... L'appareillage étant rudimentaire, des particuliers s'en servaient même à domicile ou dans des lieux publics pour des fins de diagnostic ou de divertissement. Or, pour des raisons de sécurité et de traitements de maladies, l'utilisation de cette technologie a donné lieu à la constitution d'une nouvelle spécialité médicale, la radiologie. Donc, il s'agit ici d'un nouveau cas de figure de la place de la technologie dans les pratiques professionnelles, puisqu'elle est une constituante centrale et essentielle d'une nouvelle profession.

Natasha ZWARICH
(UQAM)

Infrastructures urbaines et santé des populations : Le rôle des ingénieurs sanitaires à Montréal, 1880-1930

Au XIX^e siècle, dans la foulée de l'industrialisation et de l'urbanisation, les grandes villes canadiennes mettent en place des infrastructures permanentes. Pour ce faire, les dirigeants municipaux font appel à des experts dans différents domaines. Les ingénieurs, par exemple, soumettent des solutions aux différents problèmes posés par l'urbanisation (égouts, aqueduc, rues). Plus tard, les médecins deviennent des acteurs importants dans l'élaboration de politiques en santé publique. À Montréal, la création d'un bureau de santé, dans les années 1860, marque le début de l'influence de ce groupe d'experts. Dans les années 1880, les ingénieurs sanitaires dont les connaissances allient, à la fois le savoir médical et les connaissances de l'ingénieur, font leur apparition dans les officines de l'administration publique. Or, si les ingénieurs et les médecins ont suscité de l'intérêt chez les historiens, les ingénieurs sanitaires ont été l'objet de peu d'études. Nos travaux en cours proposent, justement, de jeter un éclairage sur cet épisode de l'histoire des sciences et des techniques au Canada. Au terme de cette étude, nous pensons être en mesure de mieux cerner le rôle et l'impact des ingénieurs sanitaires montréalais sur l'amélioration de la santé publique. Dans cette communication, nous voulons exposer les grandes lignes de notre problématique.

François GROULX
(Montréal)

Histoire de la santé des populations du gouvernement de Montréal (1788-1831)

Durant la période 1788-1831, le Canada connaît les débuts de la médicalisation de la société. Ce mouvement général aux pays occidentaux s'opère sur plusieurs niveaux à la fois. Mis en place d'institutions nouvelles, de programmes de formations et d'enseignement, intervention de l'État au niveau de la législation, etc. Comment réagissent les populations face à cette restructuration de la sphère de la santé? Quelles sont les attitudes et les comportements face à de tels changements? Qui a accès à ces nouveaux types de secours physiques et physiologiques? Les oppositions villes-campagnes, catholiques-protestants, riches-pauvres, hommes-femmes, jeunes-vieux interviennent-ils dans les possibilités de soins nouvelles offertes ou certains groupes doivent-ils se rabattre sur les anciens systèmes de guérison. Quels sont les facteurs et les motivations qui poussent chacun à choisir une alternative plutôt qu'une autre? Cette recherche se concentre sur le gouvernement de Montréal pour la période 1788-1831 et tente de comprendre l'histoire de la santé des populations, vue du côté des récepteurs de soins, et ce, en relation avec les structures médicales disponibles à cette époque.

Session A3

Technology and Media

Chair

Arnold Roos (Heritage Canada)

Andrew RODGER (NAC)

Electronic Photography: A historical overview

Since about 1996 digital cameras and digital photography have captured the public's imagination. The possibilities of a seamless web of image creation -- from the taking of an image with a digital camera, through its manipulation on a home computer and printing of the image on a desk-top ink-jet printer, or publication of it on a web site, or distribution of it to friends and relatives through e-mail -- have appealed to many, particularly those wanting to be on the leading edge of technology. But electronic imagery, and the electronic use and manipulation of photography has a long history. Starting in the nineteenth century, with the earliest attempts at wirephotos, to the development of television in the 1920s, the creation of videotape machines in the 1950s, the use of computers for image capture and manipulation in the 1960s, the development of electronic still cameras in the 1980s and digital still and motion cameras in the 1990s, photography has had an intimate relationship with electronics and with the interpretation of light in electronic form. Both image capture and image alteration have been closely allied with non-conventional photographic methods for decades: for example, remote sensing from the earliest satellites has been regularly translated into rectified false colour images which we can more easily interpret as images than as series of numbers.

Klay DYER (Brock)

Quasimodo's Kiss: The Technologies of Text in Canadian History

"Ceci tuera cela." Familiar to scholars exploring the history, and by extension the future, of the book and of book culture in Canada, the epigraph around which this paper is shaped is an assertion that has long fueled alarmist polemics announcing "The End of Books" as well as techno-futurist warnings of a deep cultural shift that will inevitably render book reading fetishistic or as the mark of a distinctly antiquarian eccentricity. "This will destroy that." Or will it? As the interdisciplinary gesture shaping this multimedia presentation underscores, the history of the book in Canada has long involved a complex albeit intensely anxious negotiation between the certainties implied in traditional humanist literacies and the appeals of the seemingly illimitable

opportunities defining the technological frontier. Allowing the artistic and the technologic pasts to brush against each other, this paper brings the mythoi of westward expansion into an intellectual orbit with postmodern theories of hypertextuality as well as with the densely coded legends of such exhaustive libraries as Borges's Babel and Foucault's fantasia. Skirting both celebration and lament, I will re-visit the stories of the book in Canadian culture in a critical light that might allow our culture to re-imagine and re-connect with Condorcet's 18th-century reassurances that "what the art" of transmission "may lose in point of seduction is more than counterbalanced by the illumination it conveys." This presentation will look at the relationships and developments of electronic photography in a historical context, tracing these and pointing out some of the problems which electronic photography entail for the historian.

Caroline BOILY (UQAM) L'usage pédagogique du cinéma au Québec, 1930-1980

Entre 1930 et 1980, le cinéma était utilisé au Québec à des fins pédagogiques dans les écoles. Plusieurs historiens des techniques se sont penchés sur l'histoire de l'invention et des usages de ce moyen de communication de masse. Le corpus de connaissances qui en émane révèle, de manière générale, qu'il a transformé la façon de diffuser la culture et l'information. Ainsi la majorité des études restent-elles limitées aux domaines du divertissement et de l'information. Or nous savons que l'école a été, à sa manière, un lieu d'usage largement occupé par le cinéma. À partir de résultats préliminaires de nos recherches, nous dégagerons les facteurs sociaux qui lui ont permis de pénétrer l'institution éducative. Nous montrerons qu'au cours des années 1930, certains prêtres s'improvisèrent cinéastes. L'un d'entre eux, le prêtre-agronome Maurice Proulx, réalisa notamment des films pédagogiques pour appuyer son enseignement de la science agricole. La curiosité et la passion de l'abbé Proulx en matière cinématographique ne reflètent toutefois pas celle de tous les membres du clergé de cette période. En effet, la crainte de l'acculturation américaine par le cinéma entraîna les autorités ecclésiastiques à éloigner ses ouailles du cinéma, dès lors jugé corrupteur et dénationalisateur. C'est grâce à l'encyclique *Vigilanti Cura*, publiée à Rome en 1936 par Pie XI, et à un vaste réseau de distribution que le film retrouva ses lettres de noblesse auprès du clergé et qu'il pénétra les établissements d'enseignement québécois. L'encensement du cinéma par le clergé au cours des années 1940-1950 s'accompagna également d'un mouvement culturel indiscutable, le ciné-club. En réaction contre le cinéma commercial, des membres de la Jeunesse étudiante catholique créèrent, à l'intérieur des maisons d'enseignement, la formule des ciné-clubs dans le but d'offrir aux jeunes une culture cinématographique de qualité. Enfin, dans la foulée de la réforme Parent des années 1960, les ciné-clubs disparurent mais leur objectif pédagogique fut récupéré par le ministère de l'Éducation puisqu'une plage-horaire destinée aux cours d'éducation cinématographique sera aménagée à l'intérieur de son nouveau curriculum d'études. En conclusion, notre étude des mécanismes d'intégration du cinéma à l'école contribue plus largement, à la connaissance des usages religieux et éducatifs de la technique.

10 h 30 - 11h

Coffee Break

11 h – 12 h 30

Session B1

Science and Education

Chair

Philip ENROS (Environment Canada)

Suzanne ZELLER (Wilfrid Laurier)

Darwin Meets the Engineers: Early Timber Researches at McGill University, 1890-1910

During the 1890s, McGill University became a centre for pioneering researches in forest sciences. An outgrowth in North America of tension between modern industry's voracious appetite for natural resources and a nascent public awareness of ecology and the need for conservation, forest sciences embraced a broad spectrum of subfields intertwining physics, chemistry, engineering, and biology. As practised at McGill, forest sciences invited interdisciplinary cooperation primarily between the Departments of Applied Science and Botany. Responses to these researches generated cross-border discussions with colleagues at American institutions, engaging 4 different perspectives: a British "empirical" engineering tradition in timber testing; a European "theoretical" tradition in timber physics; a "progressive" evolutionary tradition in plant phylogeny; and a "reductionist" evolutionary revisionism in plant morphology. The resulting exchanges highlight the historical relationship between science and nation as highly utilitarian, and contingent upon the broader context of its time. They also illustrate some of the longterm difficulties encountered by post-Darwinian scientists.

Richard JARRELL (York)

The NRC Scholarship Programme and the Canadian Scientific Professoriate

One of the earliest acts of the Honorary Advisory Council for Scientific and Industrial Research (later the NRC) was to create a small number of scholarships to allow recent science graduates to undertake post-graduate studies at Canadian universities. The rules were not rigid and foreign study was possible, though very few took advantage of it. Whilst the programme's express purpose was to provide a cadre of industrial research workers for Canadian companies – which it did do – one of its greatest benefits was to provide the training of research-oriented faculty members for Canadian universities. Thanks to the statistics published by the council between 1917 and the eve of the Second World War, we can track what constituted the top ranks of Canadian science students. We can also see the extent to which Toronto and McGill dominated doctoral studies in the inter-war years.

Richard WHITE (Toronto)

The Evolution of Research at the University of Toronto Faculty of Applied Science and Engineering, 1900-1940

Research did not become central to the activities of academic staff at the University of Toronto's Faculty of Applied Science and Engineering until the 1950s, or even later. But research had a presence at the school long before that. Even the earliest staff members, instructors of such practical subjects as surveying and applied chemistry, undertook and published research of a sort, and through the early decades of the twentieth century research flourished in several practical fields. Based to a large extent on reading the published research work itself, this paper will describe and analyze this early research as it evolved over four decades. The subject of engineering research has drawn the attention of several US historians of science and engineering in recent years, and these findings from the University of Toronto will be put into the context of that literature. In some ways, research work at the University of Toronto's faculty fits the features of engineering research identified in that literature -- in its emphasis on practical matters, for instance. and in the gradual development of what is now called

'engineering science'. But in other ways it does not -- there was almost no corporate sponsorship of research at U of T, for example. The paper will explore these similarities and dissimilarities. Of particular interest is that fact that, compared to the leading US engineering schools, the Faculty was slow in adopting research, particularly that based on advanced science and mathematics, and had become in some ways a rather backward place by 1940. The paper will offer suggestions as to how and why this resistance to change took hold in the Faculty.

Session B2

Chair

Rita GRIFFIN-SHORT
(Hamilton, Ont.)

Science & Technology in the 18th and 19th Centuries

Alain CANUEL (NSERC)

Observing Venus in Transit 1769: The Royal Society's astronomical Team on Hudson's Bay

The Royal Society sponsored four teams to observe the 1769 transit of Venus from various points around the world. The team of Wales and Dymond was sent to Fort Prince of Wales. Dymond was assistant to the newly appointed Royal Astronomer, Nevil Maskelyne. The team was equipped with state of the art viewing instruments and recording techniques and had waited almost a year, being sent out in 1768 in order to be ready for the June 3rd event. The success of their observations, thanks to clear weather, was hailed by their scientific colleagues. Wales would voyage with James Cook while Dymond would continue at Greenwich.

Kenneth PRYKE
(Windsor)

Scientists, Practical Men, and Acadian Mines, 1850-1860

In 1850 active work began to develop a deposit of iron ore at a site on Cobequid mountains which became known as Acadian Mines and is now known as Londonderry. This deposit, which stretched some thirteen miles, contained several types of iron ore, including hematite, which was a high quality and suitable for making steel by the long established method of puddling. All aspects of the process of producing iron, however, including mining and dressing the ore, preparing the charcoal for use as fuel in the blast furnace, and the actual smelting of the ore, proved to be extremely difficult. In part this was due to poor management practises and to a lack of experienced workers. However, even experienced practical men were unable to deal successfully with some of the difficulties encountered in making iron from 1850 to 1857. Promoters of Acadian Mines boasted about the high quality of its iron and this appeared to be confirmed when, in 1856, Acadian Mines was awarded a contract to provide the Royal Armories at Woolich with 1500 tons of iron. The War Office also began preliminary discussion as to buying, or leasing, Acadian Mines. These developments arose from the fact that during the Crimean War several guns and mortars had burst and the British government had immediately begun to a search for high quality cast iron. In 1856 and 1857 iron submitted by some two dozen companies, including Acadian Mines, were submitted to a series of chemical and mechanical tests. Both types of tests were considered necessary because the results of chemical analysis were considered by many, particularly practical iron makers, as being unreliable. It was actually not until the 1880s that microscopy techniques developed by William Sorby enabled metallurgists to determine the true nature of iron and steel. As for mechanical testing, it was a relatively new method and much of the equipment used at Woolich was designed specifically for the tests by Sir William Fairbairn, one of the leading engineers of his day. It was Fairbairn who incidentally had enthusiastically recommended iron from Acadian Mines. As far as the iron from Acadian Mines was concerned the tests amounted to a contest between science, as represented by the chemical tests, and practical men, as represented by the mechanical tests. In this case, after considerable dissension, science won and the iron was rejected as

unsuitable on the basis of the chemical tests. The collapse of the contract with Woolich was a disaster for the Acadian Mines. The company went into bankruptcy in 1858 and the works were only reopened with difficulty the following year. While Acadian mines continued to produce iron for several decades, it remained a failure in terms of the early estimations of the quality of the iron ore. There were numerous reasons for this but both science and practical men were significant contributing factors.

Jean-Louis TRUDEL
(UQAM)

Des patenteux brevetés: les inventeurs canadiens-français au XIX^e siècle (Partie II)

D'une part, nos premiers historiens ont vanté l'auto-suffisance des habitants canadiens-français et l'ingéniosité des anciens "patenteux". D'autre part, l'historiographie contemporaine a souligné la faible part prise par les Québécois aux brevets déposés au Canada (environ 2% depuis les débuts) et a privilégié l'histoire industrielle au détriment d'une étude de l'innovation. Toutefois, nous avons établi précédemment que la participation des francophones aux prises de brevets durant le XIX^e siècle au Canada est loin d'avoir été aussi négligeable que l'a prétendu cette historiographie traditionnelle. Nous commencerons par dresser une typologie sommaire de ces inventeurs en notant leur provenance socio-professionnelle en fonction des époques et en signalant le chevauchement de leurs préoccupations techniques avec les grandes tendances du contexte technologique nord-américain. Ensuite, il convient de noter que, si les inventeurs canadiens-français prennent une part des brevets inversement proportionnelle à la prépondérance démographique des francophones, cette part est en augmentation constante de 1824 à 1900. Cette participation croissante des francophones à l'innovation technique doit être rapprochée de l'évolution de l'alphabétisation, de l'urbanisation, de l'industrialisation et de la fertilité familiale chez eux à la fin du siècle. Les rapports qu'elle entretient avec ces indicateurs sociaux et économiques nous permettront de projeter un nouvel éclairage sur la thèse de Naylor, le problème dit de la transition et la question du "retard québécois".

Session B3

Chair

Vera PAVRI (Toronto)

Engineers and Engineering

Janis LANGINS (Toronto)

The Sons of Martha Revisited: Rudyard Kipling and the Early History of the Iron Ring Ceremony in Canada

In 1930, Rudyard Kipling was scheduled to accept an Honorary Doctorate of Engineering from the University of Toronto as recognition for his outstanding support of Canadian engineers. Kipling was the only non-engineer at the time ever considered for this degree, but unfortunately, an illness prevented him from coming to Canada and accepting the award. Canadian engineers were eager to honor Kipling for composing the Iron Ring Ceremony, a ritual designed for engineering graduates entering the profession. Thus, these engineers believed that awarding Kipling would in some measure, "acknowledge his evident interest and great contributions to the engineering profession." Kipling wrote the ceremony after receiving a request from Herbert Haultain, a Professor of Mining Engineering at the University of Toronto. Kipling's involvement with Canadian engineers might seem surprising given his status. He was a highly popular literary figure best known for his writings about India and the British Empire. Yet Kipling was also intrigued by engineers and technology, and it was this particular interest that prompted him to respond to Haultain's request with such alacrity. In my presentation, I will explore Kipling's involvement with Canadian engineers and his role in the Iron Ring Ceremony. I will illustrate that Kipling's fascination with engineers and

technology stemmed from his background, and from his ideas about labor and craftsmanship. In addition, I will show how Kipling's own personal ties and travels to Canada made him more likely to respond to an appeal from Canadian engineers than from engineers elsewhere. Finally, I will examine both the history and the content of the Iron Ring ceremony itself.

Andrew H. WILSON
(Ottawa, Ont.)

The Knights of Engineering: Yesterday and Today

Around the turn of the 20th century, when Canadians were still eligible to accept British honours, a number of distinguished Canadian engineers received the accolade of knighthood. At least two - Casimir Gzowski and Sandford Fleming - were well known and have remained so. Others, like John Kennedy and Edouard Girouard, less so. And some who earned distinction as engineers - such as Thomas Coltrin Keefer - received more junior honours. Nowadays we have the Order of Canada and a number of today's distinguished engineers have been admitted as Companions. During the intervening years, the professional institutions developed honours and awards systems, which continue in effect. However, it could be argued that today we do less than was done a century ago to honour distinction and service to the profession of engineering. This paper will explore this proposition.

Robert GAGNON (UQAM)

La construction sociale d'une infrastructure urbaine. Le premier réseau d'égouts à Montréal, 1840-1900

Cette communication s'intéresse au rôle de deux groupes d'experts, les ingénieurs et les médecins, dans la mise en place d'un réseau intégré d'égouts à Montréal au XIX^e siècle. Comme dans bien des grandes villes européennes et nord-américaines, c'est, en effet, dans la deuxième moitié du XIX^e siècle qu'un réseau d'égouts voit le jour Montréal. Dès les années 1840, l'idée d'un système général d'assainissement ou d'égouttage émerge dans le discours de certains experts municipaux en charge des travaux publics de la ville. Entre 1842 et 1859, des ingénieurs ont concocté sur leurs planches à dessin les grandes lignes d'un réseau intégré d'égouts qui, faute d'une volonté politique ou par manque d'argent, ne s'est jamais matérialisé. Il faut cependant attendre les années 1860 pour voir la construction d'un réseau d'égouts collecteurs, sans toutefois réaliser le rêve d'un système général d'égouttage tant souhaité par les ingénieurs de la ville. Dans la décennie suivante, l'implication d'un nouveau groupe d'experts, les médecins, relance l'idée d'un plan général d'assainissement. Ceux-ci, en effet, verront à ce que chaque logement soit effectivement connecté au réseau d'égout de la ville, généralisant ainsi son utilisation. L'implication de ces deux groupes d'experts a donc grandement marqué l'histoire de la construction des égouts. Ce sont les ingénieurs qui ont déterminé les grands axes du réseau et ce sont les médecins qui ont permis que le réseau s'étende dans chaque rue de la ville.

12h30 - 14h

Lunch

14 h - 15 h 30

Session C1

Science and the University

Chair

Jim HUNT (Guelph)

Matthew LUCAS (Toronto) Investing Firm Knowledge in Universities

This paper examines how the sharing of equipment, materials, and skills within university-firm partnerships can create incentives and spaces for communication that facilitate knowledge transfer. It inverts the traditional picture of knowledge transfer as a one-way flow from universities to firms by focusing on the need for firms to share their technical knowledge and infrastructure with their university partners. This is supported with empirical results obtained from an ongoing study into university-firm research partnerships at the University of Toronto. This study examines both sides of the partnerships through detailed interviews with university researchers and industry representatives. Promoting university-firm research partnerships is a growing preoccupation of governments through out Canada as these partnerships are seen as vehicles for stimulating innovation within the private sector. Most of the policies designed to encourage knowledge transfer from universities to firms treat knowledge as a neatly packaged commodity. Much of the knowledge created in universities, however, is either tacit or relies on tacit knowledge to be understood and put to work. Tacit knowledge is embedded in the skills, motivation, goals, equipment, materials, and background knowledge that make up the social and physical contexts of the university laboratory. To capture this tacit knowledge firms have to build common ground that overlaps the context of the university laboratory with that of their own R&D laboratories, design shops, and manufacturing plants. To do this firms and governments have tried to reshape the social context within the university laboratory by attempting to realign the motivation and goals of university researchers with the objectives and expectations of the firm. The nature of the university, however, may limit the extent of this realignment. This paper argues that an alternative would be for firms to build common ground around skills, instruments, background knowledge, and procedures by investing their own knowledge assets in the partnership.

Fred HEDGCOCK (McGill)
and Bernard ZIOMKIEWICZ
(Queen's)

J.A. Gray and Nuclear Research at Queen's University in the Early 20th Century

The Archives of Queen's University retain a great deal of J.A.Gray's correspondence with his former Cambridge colleagues, including his former supervisor Ernest Rutherford, as well as a single letter from Hans Geiger at der Universität Kiel in which he offers to send Gray some counter tubes. Although, after 1930, the correspondences revealed more concern with the difficulties of laboratory funding and financing, the earlier communications reflect a free bidirectional flow of information, data and suggestions, and a general mutual cooperation among researchers investigating the foundations of the science of radioactivity. The Queen's Physics Department retains some of Gray's apparatus, and we will be reviewing his publications to identify which apparatus might have been used for his various projects, especially his small-angle x-ray scattering research which resulted in the discovery of what is now known as the Compton Effect.

Scott CAMPBELL (Toronto) The History of WATFOR and the Early Development of Computer Science at the University of Waterloo

My talk will be about WATFOR, a FORTRAN variant developed in 1965 by four undergraduates at the University of Waterloo, intended to better support student programming. It was remarkably well received: within one year, six Canadian and over forty-three American universities were using WATFOR. and both popularity and financial

income drove Waterloo to sponsor further educational software developments. I believe this path shaped the direction and reputation of the fledgling computer science department. I will examine the context of the original project, and explore why WATFOR succeeded, while very similar projects at Purdue and the University of Wisconsin did not.

Session C2

Présidente

Ian J. SLATER (Toronto)

The Use of History

Suzanne ZELLER (Wilfrid Laurier)

The Canadian High-Technology Industry: Policy Initiatives Based in Historical Analysis

The Slowpoke Energy System (SES) project, undertaken by Atomic Energy Canada Limited (AECL) was a prototype for a smaller and safer decentralized or local heating system, to be managed at the municipal or institutional level. The SES emerged out of work on a smaller research reactor, the Slowpoke Demonstration Reactor (SDR), and different ideas about the distribution of nuclear power (traditionally centralised and large scale). The SES project is a historical example of the interaction between government and industry with respect to high-technology industry research and development policy. The SES project was run by a crown corporation (AECL), a corporation that has provided a large scale (heavy water) nuclear reactor network for Canadians, and has also spun off a profitable and now privately owned radioisotope and radiotherapy company (MDSNordion) from the AECL Commercial Products division. The SES project, developed in this successful environment, was eventually abandoned. I will discuss industry-Government relations for the SES project, in order to present policy lessons for future government-industry initiatives in Canadian high-technology industries.

Brian SHIPLEY
(Dalhousie)

The Map as Message: Meaning and Mining in William Logan's Geological Cartography

The five geological maps of Canada created by William Logan between 1852 and 1869 can be viewed in two ways. They were the product of the work done by the Geological Survey of Canada, and as such represent an end result of Logan's efforts. At the same time, however, they were also a tool with which Logan could make a variety of statements about the Geological Survey's implications for Canada and its place in the British Empire. These messages were intended to have an impact on the reception of the Survey's work, in particular by encouraging the idea that the colony was indeed an object susceptible of geological discourse. In addition to locating mineral resources and forging imperial connections with his maps, Logan particularly went to great lengths in his use of the new technology of the telegraph to make much more accurate determinations of the longitude of Canadian towns. This improvement in geographical precision promoted the perception that science offered an unparalleled power to observe, comprehend, and control colonial territory.

Andrew H. WILSON
(Ottawa, Ont.)

The New Engineering Institute History Committee

This Committee was established in June 1999 and began its work in earnest a year later. It was by no means the first of the Institute's engineering history initiatives, and it may not be the last. However, a number of things have been learned throughout the years about what such committees should attempt to do -- and what they might actually achieve. This short report will look briefly at both sides of this question in the light of the new Committee's terms-of-reference and composition, and the Institute's present status as a federation of learned societies in the engineering field.

Session C3

Research and Researchers in Canada

Chair

Benoît GODIN (INRS)

Stéphane CASTONGUAY
(UQTR)

Training Researchers in Governmental Laboratories: the Department of Agriculture and the emergence of scientific specialities after World War II

In this paper, I present the history of two Canadian laboratories established in the aftermath of World War II: the insect pathology laboratory in Sault Sainte Marie and the Dominion Pesticides Laboratory in London. These governmental laboratories were indeed instrumental in the development of two specialties in agricultural research. By examining the origins and development of the Sault Ste Marie and London laboratories, my analysis demonstrates how governmental scientists performed activities normally ascribed solely to university researchers while achieving their practical mission - controlling insect pests. I argue that, by interacting with the patrons of the Department of Agriculture and with the American and British entomological services, governmental scientists mobilized networks to consolidate research specialties and benefited from resources that were specific to them but of which their university colleagues were deprived of. Governmental laboratories then acted as a privileged site for the development of research specialties by the production of knowledge and the training of researchers.

Les SHELILT (McMaster)

Means to Experiment – the Beginnings of RPC

The New Brunswick Research and Productivity Council (RPC) was established by an Act of the provincial legislature which was given royal assent early in 1962. The appointment of a chairman and ten other members of Council proceeded through the year. Development plans to ensure the fulfilment of the mandate prescribed by the Act were drawn up, and, within two years a full-time Executive Director and the first professional staff were in place. In 1965 the first permanent laboratory building was opened on property contiguous to the University of New Brunswick. The next five years saw a rapid growth in physical facilities and staff. The first decade in the life of this provincial research organization is reviewed. Emphasis is laid on the role of the Council, of the Executive Director, of the provincial government, of a number of federal agencies, of a range of national and international liaisons, and of the university. All these elements were instrumental in the founding and building of RPC as a vibrant and useful enterprise.

Jean-François AUGER
(UQAM)

Un peu plus que de l'aide philanthropique: La recherche en génie à l'université McGill et les rapports avec les industriels, 1880-1980

Les historiens de l'éducation, dont Stanley B. Frost, ont souligné le rôle essentiel des pourvoyeurs de fonds, dès la fin du XIXe siècle, dans le développement de l'université McGill. Les industriels philanthropes, tels Redpath, Molson et Workman, pour ne nommer que les plus connus, financèrent en effet l'érection de nouveaux bâtiments et défrayèrent le salaire de professeurs. D'autre part, les rapports avec les industriels ont intéressé les historiens, dont Robert Gagnon, afin d'illustrer les conditions particulières du placement des diplômés et de l'enseignement du génie dans cet établissement, comparativement à l'École Polytechnique de Montréal. Nous voudrions maintenant mettre en lumière les mêmes rapports avec les industries mais, cette fois, en matière de recherche. Les travaux de l'historien James P. Hull ont déjà montré l'étroite collaboration du

département de chimie de McGill, dès les années 1920, avec l'industrie des pâtes et papiers. Les travaux des historiens des sciences et des techniques, dont ceux de John Servos et, dans une certaine mesure, nos propres recherches, nous laissent à penser que la collaboration université/entreprise en matière de recherche remonte à la deuxième moitié du XIXe siècle. Le dépouillement des archives de l'université nous permet de brosser une vue d'ensemble des transformations de la recherche en génie entre 1880 et 1980. Nous verrons que les tests en laboratoire, la consultation privée et la prise de brevet d'invention étaient des pratiques ancrées dans l'univers du corps professoral de McGill au début du XXe siècle. À la suite de cette présentation, nous serons à même d'apprécier, sous un jour différent, les efforts actuels en matière de valorisation des produits de la recherche en génie. Ils ne peuvent être compris que dans une perspective de longue durée où apparaît clairement le caractère cyclique des régimes de recherche modélisés par le sociologue et historien Terry Shinn.

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|----------------|--------------------------|
| 15 h 30 - 16 h | Coffee Break |
| 16 h - 17 h | Biennial General Meeting |
| 18 h 30 – 20 h | Banquet |

Sunday, October 14

09 h - 10 h 30

Session D1

Medicine and Public Health (II)

Chair

Elsbeth HEAMAN (Queen's)

Cynthia COMACCHIO (Wilfrid Laurier)

The Rising Generation: Laying Claim to the Health of English-Canadian Adolescents, 1920-1970

By the end of the Great War, as Canadians were compelled to come to terms with a "modernity" by turns embraced and despised, a number of voices joined in chorus on what came to be classified as a veritable "youth problem." The principal contributing forces were the war's disruptive impact, especially its feared repercussions for "the family" as the basis of sociocultural reproduction, along with what appeared to be the undermining effects of accelerated socioeconomic change on the values historically protected by church, school, community, and workplace. Worried observers also saw an increasingly commercialized, urban, mixed-sex popular culture--more and more a youth culture--as a challenge to the established order of things, especially personal morality and the relations of authority premised on class, gender, "race" and age. Eager to be modern, the young seemed dangerously close to rejecting all that was held to define a progressive, democratic nation: hard work, self-discipline, "efficiency," Christian morality and the requisite age-based deference. By simple virtue of having reached a certain life-stage during a tumultuous time, they became a "youth problem" that, like many other, often related and even overlapping contemporary "problems", demanded the attention of all right-minded Canadians. Among those playing leading roles in designating the period's problems and devising their solutions were the medical doctors. As they strove successfully to professionalize.

modernize, and take the reins of a burgeoning child welfare movement, doctors also became increasingly interested in, and outspoken about, Canadian adolescents. This paper considers the medicalization of adolescence as it developed in English Canada between 1920 and 1970, the closing year marking the establishment of the Canadian Paediatric Society's standing committee on adolescent medicine. It is evident that physicians, and those concerned more specifically with "mental hygiene"—psychologists, psychiatrists, educators and social workers—shared perceptions, fears and approaches in regard to the all-encompassing "health" of the young. The boundaries between medicine and psychology were especially permeable in a time when "child welfare" was a key reform objective, and when paediatrics and child psychology were staking new claims for leadership in the "Century of the Child." While recognizing the overlap, my focus rests primarily on the medical side. I am interested in the ways in which medical discourses intersected with wider public concerns about the nature of modern adolescence: how they reveal not so much a clinical or scientific interest in the physiological and emotional terrain of this life-stage, as they do middle-class, race-and-gender based ideals about training these "near-adults" in appropriate notions of citizenship. Since the language of idealized citizenship permeated child welfare discourses in the early 20th century, it is not surprising that medical views on adolescence paralleled those infusing the period's infant mortality crusade. The modern invention of adolescence was a logical extension of that movement to save infant lives and regulate the upbringing of children in accordance with perceived national goals.

Carolyn B. HERZOG
(Guelph)

Dr. Alexander Milton Ross and the Beginnings of the
Canadian Vegetarian Movement

The American Vegetarian Movement has been well documented by academics such as James C. Whorton and Stephen Nissenbaum since the 1970s. Nineteenth century health reformers such as Sylvester Graham, Russell T. Trall, William Andrus Alcott and John Harvey Kellogg are distinguished for their role in promoting a meatless diet throughout the United States. Many of these health reformers were also quintessential in helping to form the American Vegetarian Society in 1850. What has not been explored is the impact that these reformers had on Canadian reformers in the nineteenth century. Dr. Alexander Milton Ross, a Canadian social reformer, was trained in New York under the hygienic physician Russell T. Trall during the decade in which the American Vegetarian Society was founded. Ross returned to Canada to promote a meatless diet and improve the lifestyles of Canadians. He was the first Canadian legate to the American Vegetarian Movement, and thus initiated the beginnings of a vegetarian movement in Canada. This paper attempts to illustrate the impact of the nineteenth century American health reformers on Dr. Alexander Milton Ross.

Session D2

Chair

Don PHILLIPSON (Ottawa,
Ont.)

Science and Government

Yves GINGRAS (UQAM)

Planning National Science: Resources and Results of the
Royal Society and the National Research Council

Abstract not available.

Sylvia WARGON (Statistics Canada)

The Work of Enid Charles (1894-1972) in Historical Perspective

The focus and elaboration of Charles' demographic work on fertility and the family from the 1920s can be traced to the times in which her ideas developed. Some important influences were: the blossoming of demography's interest in fertility (births), the historical decline in population growth in Great Britain, the prevailing philosophy of eugenics, and the birth and development of "feminism". The latter was important in stimulating Charles' interest on behalf of women, in social welfare in general, and in the economic well-being of families in particular.

Session D3

Chair

Jeff NOAKES (Carleton)

Aviation and Society

Bill RAWLING (DND)

Wasn't the Future Wonderful? Canada and the promise of a STOL airline system, 1965-1976

Beginning in the mid-1960s, anyone opening one of the many aerospace periodicals published in North America would likely have encountered articles or advertisements dealing with the development of STOL (Short Take Off and Landing) aircraft. While many of these aircraft and concepts were promoted to and developed by the military, a significant effort was also made to promote STOL aircraft and their associated systems for the civilian transportation market. It seemed to some that intercity STOL service, operating from small facilities within major urban areas, could provide relief for increasingly crowded airports and air lanes. In the United States, considerable planning and some operational trials were undertaken as part of a proposed STOL system linking major cities on the country's northeast. In Canada, plans for a STOL system also offered the possibility of markets for Canadian aerospace producers, especially de Havilland Canada (DHC), which held a leading position in the development of the necessary aircraft technology. Canadian government support for this development work was a major factor in its decision to acquire DHC in 1974. Part of the government's attempts to assist in the development and marketing of a Canadian STOL system resulted in the Airtransit demonstration project, but a larger system did not materialize. Rising fuel costs, a failure of airline passenger travel to increase at forecast rates, and widespread public opposition to operations from densely populated downtown areas all contributed to the demise of the planned intercity STOL systems. This paper examines what can be described as a "failed option" in the history of aviation technology, and as such differs from the often optimistic and celebratory approaches to this field. Since the Science Council of Canada's support for the development of a Canadian STOL air transport system was one of the factors driving the government's actions, an examination of STOL airliner system development in Canada is also relevant to the history of Canadian science policy.

Stephen BOCKING (Trent)

The View From Above: The Impact of Aviation on Post-War Northern Science

Research in northern Canada underwent dramatic change in the 1940s. A major factor (accompanying war-related activities, and an evolving political context), was the advent of air travel. Aviation "opened-up" the North, rendering it far more accessible to scientists. This accessibility encouraged a great increase in northern research, across a wider range of disciplines. No longer did northern research require major commitment: a year or more of travel.

complex expedition planning, and exhausting long-distance travel by dogsled or canoe. But aviation not only made the North more accessible; it also changed how scientists viewed the northern landscape, and how they related to northern aboriginal communities. This is demonstrated through an examination of some aspects of environmental and ecological research in northern Canada since the 1940s.

10 h 30 – 11 h

Coffee Break

11 h – 12 h 30

Session E1

Biology and the Environment

Chair

Cynthia COMACCHIO (Wilfrid Laurier)

Ralph H. ESTEY (McGill)

A History of Nematology in Eastern Canada

This history will begin with the discovery of nematodes in the roots of Roses, in Ontario, at a time when there were no nematologists in Canada. It will follow the development of the science of nematology in Ontario, Quebec, and the four Atlantic provinces through the time when there were at least a dozen trained nematologists in that geographical area. It will then continue to the beginning of the twenty-first century when there are fewer than a half dozen working nematologists in all of those Provinces, and there is no indication that they will be replaced when they retire.

Eric L. MILLS (Dalhousie)

Evangelizing in the Wilderness: The Canadian Fisheries Expedition of 1915 and its Outcome

It seems paradoxical that the first full-scale application of mathematical oceanography, begun by Henrik Mohn and Vilhelm Bjerknes in Scandinavia, occurred in Canada rather than in the more scientifically-sophisticated northern European nations. This was a historical accident, due to the practical needs of the country and the ambitions of two fisheries biologists, the Canadian E.E. Prince and the Norwegian Johan Hjort. But Hjort's application of state of the art oceanographic techniques during the Canadian Fisheries Expedition of 1915 and in its report, published in 1919, fell on stony ground. Canadian marine science was singularly unready to incorporate a quantitative approach because of poor preparation, entrenched attitudes, and lack of scientific resources. In this, Canadian marine scientists were an extreme case, but were not alone, in having problems assimilating mathematical techniques into the accepted canons of scientific practice.

Session E2

Museums

Chair

George RICHARDSON (Queen's)

Annette BURFOOT (Queen's)

Using Science Museums to Study Science

During an investigation of Italian 17th century science museums it became clear that these places offer the possibility for methodological innovation in science and technology studies. For example, these displays provide an entry to crucial organizational information such as classification and colonization. This presentation will highlight how the study of science museums in

Florence and Bologna serves as a rich methodological tool that can be used with Canada's historical and contemporary displays of science and technology. This study may also serve as a call for preserving such displays in their original form (as has happened in Italy) so as not to lose the historical cultural information embedded in the displays.

Jim HUNT (Guelph)

The Halton County Electric Railway Museum

Abstract not available.

12 h 30 – 14 h

Lunch and Conference Close