

Toronto skyline.

## Foreign Travel

Many of us in the United States have had occasion to visit some of the major cities abroad and have been struck by obvious differences between these cities and our own: differences of language, transportation, pace, and a host of other cultural attributes; differences we had come prepared for, if not in detail, then in general expectation; and differences which tend to make for an exciting and stimulating, if sometimes exasperating, visit. Even noting that there appears to be a greater cultural similarity among the world's very large cities than there is between each of them and its own hinterland, the differences we note are both real and manifest.

Toronto is "abroad"; one must pass through customs to enter (see helpful hints under Meeting Information), and one must get used to metric highway signs as well as bilingual official information signs. However, one's first impression in Toronto is that of no apparent difference: the same tall buildings, English spoken with the same apparent accent, and people moving resolutely about their tasks. Yet, in the back of one's mind, one senses a difference, not readily apparent, quite subtle, but nonetheless real. The city is clean, and although the language is spoken with essentially the same accent, there is a difference of tone—the sound is friendlier and there seems to be a genuine concern for the questioner's needs; the transportation system is efficient and inexpensive; the pace of people going about is purposeful but not frenetic. Intermixed with the modern tall buildings are small Victorian houses with their individual gardens—homes where people live. And old landmarks, beautifully restored and maintained, abut new and often ultramodern ones.

The accessibility of these landmarks to everyone was brought home to me during a recent stroll late one evening through downtown Toronto, as I wandered through the intricate wrought-iron "cow gates" (designed to keep the 19th-century cows from grazing on the manicured lawns) into the grounds of the Palace of Justice and from there to the sparkling new plaza of the very modern City Hall with its large fountain. During the preceding winter, from my room at the Sheraton Centre across the street, I had seen very many young people ice-skating on the frozen surface of that same

fountain. As I walked over then, I had noticed two teenage girls finish their skating, don their street shoes, throw skates over their shoulders, and trudge off toward home—unescorted and obviously uninhibited by the downtown around them. It is a safe city.

The winter temperature hovers near freezing during the day and drops to the upper teens (°F) at night—necessitating warm clothing. However, for those who will attend the Annual Meeting, the short walk between the two Meeting hotels (see map) can be negotiated almost entirely—except for a one-street crossover which is being corrected—through an active underground shopping plaza. Thus for those staying in the two main hotels, heavy coats can be dispensed with during the day.

My further wanderings brought me to the cloistered grounds of the University of Toronto, now the largest university in Canada, and I took the opportunity to walk through the newly restored original building which housed the entire university more than a century ago. The intricate carved wood and stained-glass windows so symbolic of our older concept of educational institutions contrasted sharply in my mind with the modern, open design of the magnificent Ontario Science Centre I had visited on an earlier trip. Yet each was accessible: one by foot for a downtown wanderer and the other, although suburban, via a short bus and subway ride (with automatic transfer—no additional fare or even a turnstile) from the same downtown area. Toronto is an accessible city.

As I pondered the subtle difference between the "foreign" city of Toronto and the United States cities I have lived and traveled in, it struck me that this is the difference between my cities as they are and as I would like them to be. I felt, in fact, that in Toronto, "I have seen civilization, and it works."

Come and see for yourself. The January weather is not forbidding—precipitation is rare on the Toronto side of Lake Ontario, and the Program we have prepared, as you can see in the next several pages, has much that you will want to participate in. Make your reservations early to avoid the holiday rush; forms for your convenience are on pages 776 through 778.

ARTHUR HERSCHMAN

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## Preconvention Program

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# Science and Technology: Bridging the Frontiers

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### Public Lectures

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- **AAAS Keynote Lecture (3 Jan., 8:30 p.m., RY).**  
Northrop Frye (*University Professor and Professor of English, Victoria College; Chancellor, Victoria University, Toronto*).  
The Bridge of Language.
- **AAAS Public Lecture (4 Jan., 1:30 p.m., RY).**  
Paul C. Warnke (*Partner, Clifford & Warnke, Washington, D.C.; former Director, U.S. Arms Control and Disarmament Agency, and former Chief U.S. Negotiator, Strategic Arms Limitation*).  
Linkage and Logic: Arms Control Negotiations in a Cold Climate.
- **AAAS Public Lecture (4 Jan., 8:30 p.m., RY).**  
The Honourable John Roberts (*Canadian Minister of State for Science and Technology, and Minister of the Environment*).  
Science and Technology: Meeting Canadian and International Needs Into the Twenty-first Century.
- **AAAS Public Lecture (5 Jan., 1:30 p.m., RY).**  
John B. Slaughter (*Director, National Science Foundation, Washington, D.C.*).  
NSF Looks to the Future.
- **AAAS Public Lecture (5 Jan., 8:30 p.m., RY).**  
Philip Morrison (*Institute Professor, Massachusetts Institute of Technology*).  
The Rude Law of the Frontier: Deep-Sky Astronomy Today.
- **Phi Beta Kappa Public Lecture (6 Jan., 1:30 p.m., RY).**  
Freeman Dyson (*Professor, School of Natural Sciences, The Institute for Advanced Study, Princeton, N.J.*).  
Infinite in All Directions.
- **AAAS President's Public Lecture (6 Jan., 8:30 p.m., RY).**  
Frederick Mosteller (*President, American Association for the Advancement of Science; Chairman, Department of Biostatistics, School of Public Health, Harvard University*).  
Innovation and Evaluation.

- **George Sarton Memorial Public Lecture (7 Jan., 8:30 p.m., RY).**  
Richard S. Westfall (*Professor, Department of History and Philosophy of Science, Indiana University; Past President, History of Science Society*).  
A Scientific Life in the 17th Century: The Career of Isaac Newton.
- **AAAS Public Lecture (7 Jan., 8:30 p.m., RY).**  
Joseph B. MacInnis (*President, Undersea Research Ltd., Toronto*).  
The Arctic: Tomorrow's Ocean.

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### 1. General Interest

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**AAAS Annual Youth Symposium (3 Jan., 9:00 a.m., 1:30 p.m., SH):** New developments in genetics, flying circus of physics, the prepared mind, soap bubbles, UFOs, computers, relativity, whales, the planets, star clusters, continental drift, Darwin and evolution, what we see, ancient materials, elementary particles.

John F. Fowles, David Suzuki, Jearl Walker, Hubert Alyea, George Vanderkuur, Robert Hudek, Jim Butterfield, Eustace Mendis, Peter Beamish, Bob MacDonald, Helen S. Hogg, J. Tuzo Wilson, William Swinton, E. Llewellyn-Thomas, Ursula M. Franklin, Jim Prentice.

**Mount St. Helens (4 Jan., 9:00 a.m., SH):** Geologic impact, sedimentation, tephra, climate, hazard.

Robert I. Tilling, Donald W. Peterson, Richard J. Janda, John A. Westgate, J. Murray Mitchell, Jr., Richard A. Warrick.

**Successful Innovation in Meeting Urban Transportation Needs (4 Jan., 2:30 p.m., SH):** Marketing regional transit, land-use planning, technological innovation, Ontario experience.

Margaret Scrivener, Allan F. Leach, R. Michael Warren, Kirk W. Foley, Louis J. Gambicini.

**The Other Frontiers of Science (5 Jan., 9:00 a.m., SH):** University, industry, international science, development.

D. Allan Bromley, Claude Fortier, Allan R. Crawford, Larkin Kerwin, Louis Berlinguet.

**Frontiers in the Social Sciences: New Directions in the Study of Cognition (5 Jan., 2:30 p.m., SH):** Social organization, behavior.

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### HOTEL CODES: Sheraton Centre . . . (SH): Royal York . . . (RY)

Register in advance and receive a free 1981 AAAS Calendar with your Program; housing, registration, and air travel forms can be found on pages 776 through 778. For information on tours and the Film Festival, see *Science*, 3 October 1980.

ioral theories, decision-making, language, anthropology of thought.

Peter B. Read, Aaron V. Cicourel, James G. March, George A. Miller, Richard A. Shweder, Roy G. D'Andrade.

**Frontiers in Medical Genetics and Immunogenetics (6 Jan., 9:00 a.m., SH):** Transplantation antigens, radiation hazards, recombinant DNA.

Richard M. Krause, Thomas J. Kindt, J. Donald Capra, Paul S. Russell, James Van Gundia Neel, Frank E. Young.

**Microsurgery and Herbal Medicine (6 Jan., 2:30 p.m., SH):** Natural product chemistry, synthesis in China, extremity re-plantation, transplantation.

Huang Jiasi, Liang Xiaotian, Xie Yuyuan, Chen Zhongwei, Chen Xuxi.

**The Frontiers of the Natural Sciences (7 Jan., 9:00 a.m., 2:30 p.m., SH):** Center of the earth, harp seal, proton, inorganic chemistry, mathematics and art, the universe.

Rolf M. Sinclair, Rene J. A. Levesque, Peter M. Bell, Ho Kwang Mao, Keith Ronald, Maurice Goldhaber, Fred Basolo, H. S. M. Coxeter, Sidney van den Bergh.

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## 2. Directing Science Toward Peace

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**Trends in Strategic Weapons and Doctrines and Their Implications for Arms Control (4 Jan., 9:00 a.m., SH):** Strategic vulnerability, MX missile, beam weapons, weapons in space.

Bernard T. Feld, Jack P. Ruina, Herbert Scoville, Jr., Kosta Tsipis, Richard L. Garwin.

**Negotiations as an Approach to Arms Control and Disarmament (4 Jan., 2:30 p.m., SH):** Achievements, future prospects, strategy as a new approach, arms limitation talks.

George Ignatieff, George W. Rathjens, Roger Fisher, William Epstein.

**The Problem of Nuclear Proliferation (5 Jan., 9:00 a.m., SH):** Nuclear fuel cycle, test ban, consequences, policy issues.

Abram Chayes, George W. Rathjens, William Epstein, Lewis Dunn, George Quester, Amory B. Lovins.

**Psychological and Bureaucratic Dynamics of Arms Races and Peace Races (5 Jan., 2:30 p.m., SH):** Strategy for survival, bureaucratic and political interplay, intergroup conflict, factors in arms control.

Charles E. Osgood, Adam Yarmolinsky, Svenn Lindskold, George Rathjens.

**Enlarging the Arms Control Constituency (6 Jan., 9:00 a.m., SH):** The media, physicians' efforts, curricula, nongovernmental organizations.

Anne H. Cahn, Daniel Schorr, Eric S. Chivian, Elise Boulding, Nancy Ramsey.

**The Political Economy of Reversal of the Arms Race (6 Jan., 2:30 p.m., SH):** Military economy—the U.S., the U.S.S.R., industrial technology, organized labor.

Lloyd J. Dumas, Seymour Melman, David F. Noble, William Winpisinger.

**International Analysis of International Problems: Science in the Service of Peace (7 Jan., 9:00 a.m., SH):** Energy system, urbanization and development, ecology and environment.

Roger E. Levien, Wolf Haefele, Verne Chant, Andrei Rogers, Crawford S. Holling.

**The First Nuclear Weapons: Scientists' Response and Responsibility (7 Jan., 2:30 p.m., SH):** Los Alamos, Hiroshima, H-Bomb.

Charles Weiner, Spencer R. Weart, Alice Kimball Smith, Martin J. Sherwin.

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## 3. Physical Sciences

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**The Revolution in Experimental Techniques in the Sciences (4 Jan., 9:00 a.m., SH):** Limits of perception, testing gravitation, understanding molecules, lasers at frontiers of research.

William M. Fairbank, William Peter Trower, C. W. Francis Everitt, Gerhard Herzberg, Theodor W. Hansch.

**The Age and the "Size" of the Universe (5 Jan., 9:00 a.m., SH):** Distance scale, oldest stars, nuclear physics.

Bruce Partridge, Sidney van den Bergh, Gustav Tammann, John P. Huchra, Icko Iben, David N. Schramm.

**Chemically Solvable Problems (5 Jan., 9:00 a.m., 2:30 p.m.; 6 Jan., 9:00 a.m., SH):** Agriculture, feedstocks, nonfuel utilization, profit from a pollutant, adequate diets, air quality, medicine, fertility control, cancer chemotherapy, hypertension, diagnostics.

Jean'ne M. Shreeve, Helen M. Free, Raymond J. Miller, Arthur E. Humphrey, Peter S. Shenkin, Michael E. D. Raymont, Kenneth A. Laurence, D. Mark Hegsted, Thomas E. Graedel, Leland C. Clark, Koert Gerzon, Harold E. Zaug.

**Exploration of the Solar System (5 Jan., 2:30 p.m., SH):** Saturn, Titan, and Jupiter; larger satellites; rings of Saturn; inner planets.

Tobias Owen, David Morrison, Bradford A. Smith, Harold Marsusky.

**Astronomical Crossroads of Science and the Unity of the Universe (6 Jan., 9:00 a.m., SH):** Galaxies, cosmic optics, cosmology, laws of physics.

Kenneth Brecher, Philip E. Seiden, Robert C. Roeder, Ira M. Wasserman.

**The Laser Revolution in Chemistry (6 Jan., 2:30 p.m., SH):** Molecular motions, picosecond reactions, photodetachment, tunable diode lasers.

George W. Flynn, John C. Polanyi, Peter M. Rentzepis, W. Carl Lineberger, Arlan W. Mantz.

**Recent Developments in Lasers and Their Uses (7 Jan., 9:00 a.m., SH):** Frequency stabilized lasers, interaction with matter, communications, spectroscopy.

Boris P. Stoicheff, John L. Hall, A. John Alcock, Joseph A. Giordmaine, Arthur L. Schawlow.

**Applications of Ultrasensitive Mass Spectrometry With Accelerators (7 Jan., 2:30 p.m., SH):** Cosmogenic radioisotope production,  $^{36}\text{Cl}$  and  $^{129}\text{I}$ , rare element assay, nuclear physics and astrophysics, radiocarbon dating, future applications.

Albert E. Litherland, Kenneth H. Purser, Grant Raisbeck, Roelf Beukens, John C. Rucklidge, Walter Kutschera, Edward T. Hall.

**Science for the Naked Eye: Or, the Physics of Everyday Experience, VIII (8 Jan., 9:00 a.m., 1:30 p.m., SH):** The Arctic, medicine, computer games, sensory abilities of birds, sea shells, mod art.

Rolf M. Sinclair, H. Leonard Sawatzky, Dee B. Crouch, Hans Berliner, Melvin Kreithen, Robert M. Linsley, Susan Jane Colley.

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## 4. Engineering and Technology

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**New Directions and Applications for Nondestructive Evaluation (4 Jan., 9:00 a.m., SH):** New directions, flaw characterization, ultrasonic applications, eddy current flaw detection.

Donald O. Thompson, Clifford H. Wells, M. J. Buckley, James Lankford, Jr., S. D. Hudak, R. Bruce Thompson, M. V. K. Chari, T. G. Kincaid.

**The Emerging Field of Biomechanics: Theory, Method, and Applications (4 Jan., 2:30 p.m., SH):** Method and measurement, occupational biomechanics, gait, performance of sport, consumer products.

Harold P. Van Cott, Peter R. V. Cavanagh, Donald B. Chaffin, Robert W. Mann, Doris I. Miller, Carl O. Muehlhause.

**The Application of Bifurcation Theory to Urban and Regional Analysis (6 Jan., 2:30 p.m., SH):** Self-organizing systems, urban spatial structure, aggregate urban evolution, systemic communications and control.

Robert W. Crosby, Robert M. Thrall, Peter M. Allen, J. R. Beaumont, M. Clarke, A. G. Wilson, Dimitrios S. Dendrinis, Barbara Abbott Segraves-Whallon.

**Sulphur—New Uses for an Ancient Material (7 Jan., 9:00 a.m., SH):** Historical overview, future supply, plasticized sulphur, extended asphalt, building with sulphur.

Gerald D. Love, Marion D. Barnes, Harold L. Fike, John Dale, Gerhard J. A. Kennepohl, Witold Rybczynski.

**The CANDU Heavy Water Reactor System (7 Jan., 2:30 p.m., SH):** Operation and performance, power plants, heavy water reactors.

F. Kenneth Hare, W. Bennett Lewis, William G. Morison, Jan B. van Erp, Charles E. Till, I. Y. Chang.

**Innovations in Measurement for Scientists and Consumers (7 Jan., 2:30 p.m., SH):** Canadian program, change and society, laser wavelength and frequency measurements, computers.

Frances J. Laner, Paul C. Boire, Sydney D. Andrews, Howard P. Layer, Kenneth M. Evenson, Howard M. Faulkner, Louis F. Sokol, John M. Sargent, Mario Iona, L. A. Zadeh.

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## 5. Energy

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**Health Risk Associated with Energy Technologies (4 Jan., 9:00 a.m., SH):** Subjective judgments, nuclear power, coal energy, unconventional technologies, global risks.

Curtis C. Travis, Elizabeth L. Etnier, Baruch Fischhoff, Reginald L. Gotchy, Samuel C. Morris, John P. Holdren, Frank von Hippel.

**Biological Energy Conversion (4 Jan., 2:30 p.m., SH):** Photosynthesis, solar cells, hydrogen production, tandem photo-electrolysis, oil from microbes.

James R. Bolton, Michael Seibert, Elias Greenbaum, Robert E. Schwerzel, Morris Wayman.

**Beyond Conventional Crude Oil (5 Jan., 9:00 a.m., SH):** Bitumen, oil sands, oil shale, heavy oil.

G. B. Mellon, R. E. Landry, Gordon H. Thomson, H. Brent Scott, Frank P. Barrow, C. W. Bowman.

**Energy Policy Overview (6 Jan., 9:00 a.m., SH):** Canada, U.S. view; future oil prices; environmental and water limitations; future generations.

S. Fred Singer, F. Kenneth Hare, Wilbert H. Hopper, John C.

Sawhill, Steven C. Ballard, Michael D. Devine, David A. Penn, Douglas E. MacLean, Lewis J. Perelman.

**North American Energy Systems (6 Jan., 2:30 p.m., SH):** Manageable energy future, political perspective, energy supply, Canadian perspective.

F. Kenneth Hare, Hans H. Landsberg, Ray Hnatyshyn, Arlon R. Tussing, W. Edmund Clark.

**Solar Energy and Conservation: How Well Are We Doing? How Well Can We Expect To Do? (7 Jan., 9:00 a.m., 2:30 p.m., SH):** Current look, solar commercialization, California experience, multi-country perspective, solar futures, legislative past, congressional overview.

Jon M. Veigel, Bruce Anderson, Donald E. Anderson, Ronald Doctor, Lee Schipper, Eric Hirst, Amory B. Lovins, L. Hunter Lovins, Denis Hayes, George E. Brown, Jr.

**The Future of Transportation Fuel (8 Jan., 9:00 a.m., SH):** Fuel economy improvement, substitution for liquid fuel, coal and oil shale, biomass liquids, refining challenges.

Michael D. Devine, Martin R. Cines, S. Fred Singer, William G. Agnew, Allan R. Evans, Michael A. Chartock, Steven E. Plotkin, Thomas E. Bull, Dennis L. Ripley.

**Engineering and Health Science With Respect to Energy Conservation (8 Jan., 1:30 p.m., SH):** Control strategies, ventilation reduction, indoor air quality, building materials, relative humidity and respiratory illnesses, occupant comfort.

Tamami Kusuda, Samuel Silberstein, James E. Woods, Craig D. Hollowell, P. W. Purdom, George H. Green, Lawrence G. Berglund.

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## 6. Environment

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**Acid Precipitation: Ecological and Societal Effects (4 Jan., 9:00 a.m., 2:30 p.m., RY):** Ecological effects, cloud water and ion deposition, snowmelt and water quality, terrestrial ecosystems, scrubber technology, sulfur dioxide emissions, public policy problem, U.S. perspectives and coordination, bilateral agreements, activist viewpoint, state actions.

George H. Tomlinson II, Phyllis Kahn, Donald Chant, John A. Kadlacek, Carl L. Schofield, Thomas C. Hutchinson, William L. Wells, The Honourable John Roberts, Richard Dowd, Harry H. Hovey, Anne Park, Rick Pratt, Arlene I. Lehto, Ian Marceau.

**Lead in the Environment (5 Jan., 9:00 a.m., RY):** Human influence, ILZRO research, dietary exposure, neurobehavioral effects, neurochemical effects.

Jerome O. Nriagu, Robert W. Elias, Jerome F. Cole, Kathryn R. Mahaffey, Herbert L. Needleman, Ellen K. Silbergeld.

**The Natural Environment and Renewable Resources—Current Problems in Ontario (5 Jan., 2:30 p.m., RY):** Once-through cooling, ecosystem planning, acidification, impact assessment, risk assessment.

Henry A. Regier, Thomas H. Owen, Allan E. Christie, Robert S. Dorney, Douglas W. Hoffman, Paul F. J. Eagles, Harold H. Harvey, R. E. (Ted) Munn, David Estrin, George R. Francis, Ian Burton, Anne V. Whyte.

**The Great Lakes: Contamination Trends and Consequences (6 Jan., 9:00 a.m., 2:30 p.m., RY):** Mineral fiber, Lake Superior, Lake Michigan, base metal processing, Lake Huron, atmospheric deposition, health effects, organics, DDT and PCBs, fish-eating birds, xenobiotic compounds.

Helen L. Cannon, William M. J. Strachan, Arthur Flynn, Philip M. Cook, Richard A. Cahill, Neil F. Shimp, Nels Conroy, James

R. Kramer, Eugene V. D. K. Perrin, A. R. Davis, P. Brooksbank, David E. Armstrong, Richard L. Thomas, Douglas J. Hallett, R. J. Norstrom, D. V. Weseloh, P. Mineau, Wayland R. Swain.

**Hazardous Waste Management: Some Key Issues (7 Jan., 9:00 a.m., 2:30 p.m., RY):** Resource Conservation and Recovery Act, Canadian perspective, management options, recycling, public involvement, evaluating human health, remedial clean-up, detoxification, selecting repository sites, waste management.

Michalann Harthill, John P. Lehman, D. Stewart Hay, Lawrence P. Beer, Carl G. Schwarzer, Bill S. Forcade, Beverly J. Paigen, Stephen U. Lester, Sam K. Lee, Charles D. Hollister, Charles L. Sercu.

**Radicals and the Biosphere (8 Jan., 9:00 a.m., RY):** Free radical, toxic action, xenobiotics, carcinogens, metabolism of drugs, aging and stressed plant tissues.

Anne P. Autor, J. Brian Mudd, Daniel B. Menzel, Ronald P. Mason, John E. Thompson.

**The Proper Role of Inexpensive, Short-Term Biological Tests in Environmental Toxicological Testing (8 Jan., 1:30 p.m., RY):** Mutagenic/carcinogenic substances, product safety, regulatory approaches, exposure limits, human health.

R. Daniel Benz, Michael F. Salamone, Frederick J. de Serres, Mark Hite, Robert H. Haynes, Albert C. Kolbye, Jr., Arthur D. Bloom.

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## 7. Climate and Ecology

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**Problems of Arctic Wildlife Associated With Increases in Human Population and Technological Development (4 Jan., 9:00 a.m., 2:30 p.m., RY):** Natural resources, wildlife refuge systems, land uses and transportation problems, special interest technologies, political aspects, demographic predictions, socioeconomic developments, future developments.

Donald J. Zinn, Thomas L. Kimball, Lynn A. Greenwalt, Andrew R. Thompson, Andrew H. McPherson, Ian McTaggart Cowan, Ronald O. Skoog, Wayne Speller, David R. Klein.

**Macrodevelopment in the Tropical Forest and Arid Zones: Social and Environmental Impacts (4 Jan., 2:30 p.m., RY):** Environment and development, Southwest Asia, subsistence economics, sub-Saharan Africa, limitations of approaches, West Africa, planning.

John W. Bennett, Brian Spooner, John Lewis, Emilio Moran, James C. Riddell, Allan Hoben.

**Forest Utilization: Past, Present, and Future (5 Jan., 9:00 a.m., RY):** Wood products and science, forests and economic and social development, rational utilization.

John M. Yavorsky, Theodore S. McKnight, Robert L. Youngs, Marion Clawson, Marcel Lortie, Pierre R. Gendron, John S. Spears.

**Unmet Requirements of Irrigation Project Development for Native People in the U.S. Four Corners Area (5 Jan., 2:30 p.m., RY):** Resource constraints and opportunities, Navajo project, development opportunities, social patterns, educational and training needs.

Cyrus M. McKell, Lora Mangum Shields, Philip R. Ogden, Bahe Billy, Philip Reno, Harris Arthur, John W. Hernández.

**Planning for Uncertainty: Climate Change and the Study of Impacts (6 Jan., 9:00 a.m., SH):** Atmospheric carbon dioxide,

energy use, CO<sub>2</sub>-induced climate change, constructing scenarios.

David M. Burns, Roger Revelle, Walter Orr Roberts, Gordon A. McKay, Lester B. Lave.

**Climate and Food: Case Studies in Vulnerability and Response (6 Jan., 2:30 p.m., RY):** Canadian climate, Canadian prairies, West African Sahel, drought in Yemen, food supply in Mexico, Peruvian anchoveta crisis.

John G. Corbett, Gordon A. McKay, Diane Liverman, William Derman, David McClintock, Ruben Mujica Veliz, Linn Hammergren.

**CO<sub>2</sub>-Induced Climate Change and the Dynamics of Antarctic Ice (7 Jan., 9:00 a.m., RY):** Antarctic ice sheet collapse, polar ice sheets and future climatic changes, sea ice, Ross ice shelf.

Charles Bentley, David M. Burns, Terry Hughes, Uwe Radok, Gunter Weller.

**Testing Climate Models (7 Jan., 2:30 p.m., RY):** Solar variability, role of ocean, glaciation, Milankovitch hypothesis, faunal extinctions, effects on human populations.

Alan D. Hecht, Minze Stuiver, William F. Ruddiman, Andrew McIntyre, James D. Hays, John Imbrie, Thomas J. M. Schopf, Robert W. Kates, Richard A. Warrick.

**The Global Atmospheric Research Program (GARP): A Significant International Scientific Undertaking of the 1970's (8 Jan., 9:00 a.m., 1:30 p.m., RY):** International organizations, scientific objectives, satellites and computers, field experiments, tropical atmospheric phenomena, numerical atmospheric models, global observations and forecasting, world climate program.

Eugene W. Bierly, Richard S. Greenfield, Oliver M. Ashford, Robert W. Stewart, Verner E. Suomi, Joachim P. Kuettner, Joshua Z. Holland, T. N. Krishnamurti, Richard E. Hallgren, Robert M. White.

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## 8. Agriculture

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**Animal Agriculture Research: Social and Economic Priorities (4 Jan., 9:00 a.m., RY):** Production, marketing and distribution, resources and the environment, public policy, research.

Larry J. Connor, Henry A. Fitzhugh, Ray N. Van Arsdall, Wesley B. Sundquist, Gerald W. Thomas, James T. Bonnen, Richard O. Wheeler.

**National Impacts of Recommended Dietary Changes (4 Jan., 2:30 p.m., RY):** Human health, quality of land and water, energy and minerals, the economy.

Alex Hershaft, John Scharffenberg, Georg A. Borgstrom, David Pimentel, J. B. Penn.

**Energy Dimensions of Small-Scale Food-Processing Technologies (4 Jan., 2:30 p.m., RY):** Limited-resource processing, indigenous fermented foods, energy-saving technologies, food residues, Untouchables in Uttar Pradesh.

Irene M. Tinker, Carol I. Waslien, Robert P. Bates, Keith H. Steinkraus, Fred F. Barrett, Stanley M. Barnett, R. S. Khare.

**Agriculture as a Producer and Consumer of Energy (5 Jan., 9:00 a.m., RY):** Rising energy prices, conservation and substitution, alternatives, crop residues, alcohol fuels program.

William Lockeretz, Otto C. Doering III, Donald R. Price, Roger J. Blobaum, William E. Larson, Folke Dovring.

**Future Food-Fuel Conflicts (5 Jan., 2:30 p.m., RY):** Overview of bioenergy; agricultural biomass; food versus fuel; fuel alco-

hol industry; international conflicts: Brazil, world's food supply.

Bill A. Stout, Thomas E. Bull, Wallace E. Tyner, Marilyn J. Herman, Milton L. David, Norman Rask, János P. Hrabovszky.

**U.S. Agriculture in the 1980's: Continued Abundance or Scarcity? (6 Jan., 9:00 a.m., RY):** Agricultural inputs, government regulation, productivity and technical progress, demand for food.

Joseph D. Coffey, David L. Debertin, Angelos Pagoulatos, Sterling Brubaker, Earl R. Swanson, Oral Capps, Jr., James G. Horsfall.

**Agricultural Lands: World Pressures on Food Production (6 Jan., 2:30 p.m., RY):** North American land base, food crisis outlook, economic and institutional stress, foreign policy.

Gail S. Ludwig, N. R. Richards, Michael F. Brewer, Harold F. Breimyer, Don Paarlberg, Barry L. Flinchbaugh.

**Gene Resource Conservation in Agriculture and Forestry: Policies and Strategies (7 Jan., 9:00 a.m., RY):** Canadian program, California program, forest management, genetic diversity in breeding, new and potential crops.

Christopher W. Yeatman, David Kafton, Roland Loiselle, Stanley L. Krugman, Lyndon W. Kannenberg, H. Garrison Wilkes.

**Chemical Communication in Insects: From Basic Principles to Pest Control (7 Jan., 2:30 p.m., RY):** Stored-product beetles, ants and bees, moths, bark beetles.

Robert M. Silverstein, Wendell E. Burkholder, Murray S. Blum, Ring T. Cardé, David L. Wood.

**The Ecology of Agriculture and Biological Pest Control (8 Jan., 9:00 a.m., 1:30 p.m., RY):** Natural succession, tropical agroecosystems, ecology of overyielding, food resource use, resource management, group farming, changes in the world economy, biological control, pest-stable systems, intercropping, weeds, variability of yields.

Douglas H. Boucher, S. W. T. Batra, John Ewel, Moises Amador, Judith Espinosa, Stephen R. Gliessman, John H. Vandermeer, Katherine Yih, Kathryn G. Dewey, Michael Gertler, Phillip Ehrenschaft, Helen Boudier, J. S. Kelleher, Miguel A. Altieri, Stephen Risch, Alan K. Watson, Richard Levins.

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## 9. Biological Sciences

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**Trophic Dynamics of Aquatic Ecosystems (4 Jan., 9:00 a.m., 2:30 p.m., RY):** Phytoplankton communities, encounter with zooplankton, microcrustaceans, copepod evolution, planktivorous fish, food resources of fishes, resource supply rates, African lakes, energy reserve cycle, biomanipulation of zooplankton, lake ecosystem dynamics.

J. Rudi Strickler, Dewey G. Meyers, John T. Lehman, James J. McCarthy, W. John O'Brien, Karel F. Liem, Susan Soltau Kilham, Peter Kilham, Robert E. Hecky, Clyde E. Goulden, W. Charles Kerfoot, W. Gary Sprules.

**Problems and Possibilities: The Development of an Effective Shark Repellent From Naturally Occurring Biologically Active Substances (5 Jan., 2:30 p.m., RY):** Red Sea Moses Sole; pardaxin; flatfish, fireflies, and sharks; ecology of toxicity; elasmobranch fishes; nature's weapons.

Bernard J. Zahuranec, Eugenie Clark, Naftali Primor, Jose A. Zadunaisky, Joseph Bonaventura, Celia J. Bonaventura, Gerald J. Bakus, Samuel H. Gruber, William O. McClure.

**Research on Fish—A Renewable Resource (6 Jan., 9:00 a.m.,**

**RY):** Global aspects, marine fisheries, farmed fish, fish as food, fish diseases, aquaculture.

David R. Idler, Richard C. Hennemuth, Gary L. Rumsey, E. Graham Bligh, George W. Klontz, T. V. R. Pillay.

**Circadian Clocks in Man: Timekeeping in Health and Disease (6 Jan., 2:30 p.m., RY):** Biological rhythms in man, normal and abnormal timekeeping, mathematical simulations, human and nonhuman primates, manic-depressive cycles.

Martin C. Moore-Ede, Charles A. Czeisler, Elliot D. Weitzman, Richard E. Kronauer, Thomas A. Wehr.

**Ecogenetics—The Importance of Genetically Determined Variation in the Responses of Individuals to Environmental Agents (7 Jan., 9:00 a.m., RY):** Metabolic sensitivity, genetic screening, legal and policy implications.

Kenneth K. Kidd, Gilbert S. Omenn, Arthur Falek, Charles R. Scriver, Devra Lee Davis.

**Ecological Implications of Evolutionary Genetics (7 Jan., 2:30 p.m., RY):** Character displacement, coevolution, *Anolis* lizard populations, plant-insect associations, population structure, natural selection.

Lev R. Ginzburg, Douglas J. Futuyma, Montgomery Slatkin, Jonathan Roughgarden, Michael J. Wade.

**Some Mathematical Questions in Biology (8 Jan., 9:00 a.m., 1:30 p.m., RY):** Spatial sequences of structures, control of ovulation number, the developing embryo, particle capture by copepods, particle motion through pores, human locomotion.

Stephen Childress, J. K. Percus, Hans Meinhardt, H. Michael Lacker, Mimi Koehl, Sheldon Weinbaum, Simon Mochon.

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## 10. Cell Biology

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**Theories of Aging, I (4 Jan., 9:00 a.m. RY):** Longevity assurance processes, evolutionary theory, mutations and epigenetic changes, genetic clock, programmed theory of aging.

Alain F. Corcos, Lawrence R. Krupka, Ronald W. Hart, George A. Sacher, James E. Trosko, Edward L. Schneider, Leonard Hayflick.

**Theories of Aging, II (4 Jan., 2:30 p.m., RY):** Hormonal regulatory mechanisms, cellular senescence, hormone action, age-associated processes and diseases.

Richard C. Adelman, Vincent J. Cristofalo, George S. Roth, Arthur Schwartz.

**Reproductive Biology and Its Impact on Populations (5 Jan., 9:00 a.m., RY):** Gonadotrophin secretion, domesticated animals, reproductive and social factors controlling behaviors.

Neena B. Schwartz, Fernand Labrie, David K. Pomerantz, Janice M. Bahr, Constance S. Campbell, Martha McClintock.

**The Genetic Connection Between Molecules and Behavior (5 Jan., 2:30 p.m., RY):** Learning and memory, neurotransmitter mutants, cerebellar mutants, variations in neural proteins, human genetic markers, DNA sequence polymorphism.

Xandra O. Breakefield, William G. Quinn, Jeffrey C. Hall, Richard J. Mullen, Raymond L. White.

**Biological Implications of Enzyme Polymorphism (6 Jan., 9:00 a.m., RY):** Electrophoretic detection, biological significance, speciation, genetic variation.

Shiva M. Singh, George Carmody, Charles Langley, Richard K. Koehn, Francisco Ayala, Kenneth Paigen.

**The Cancer Cell Surface (6 Jan., 2:30 p.m., RY):** Behavior of malignant disease, cancer biology, surface carbohydrates, tumor cell behavior characteristics, human leukemias, membrane compounds and diagnosis.

Michael A. Baker, Phil Gold, George Poste, Robert S. Kerbel, Robert N. Taub.

**Role of Receptors in Human Diseases (7 Jan., 9:00 a.m., RY):** Autoantibodies, allergic respiratory disease, myasthenia gravis, acetylcholine receptors, lipoprotein receptors and atherosclerosis, androgen receptor, steroid sensitivity.

Jesse Roth, Hadley L. Conn, J. Craig Venter, Daniel B. Drachman, Joseph L. Goldstein, C. Wayne Bardin.

**Cellular Messenger Systems—Role of Calmodulin (7 Jan., 2:30 p.m., RY):** Cyclic nucleotide metabolism; structure, function and evolution; protein interactions; secretory processes; calcium action.

Thomas C. Vanaman, Jerry H. Wang, Claude B. Klee, Robert J. Delorenzo, Daniel M. Watterson.

***Drosophila* as a Model Biological System (8 Jan., 9:00 a.m., RY):** Epimorphic pattern regulation, homoeotic mutants, molecular biology, informational complexity, neoplastic mutants.

William P. Hanratty, Jack Girton, Michael Russell, Mary Lou Pardue, David Nash, Frank Janza.

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## 11. Medical Sciences

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**The Role of Dissociation in Hypnosis and Psychopathology (4 Jan., 9:00 a.m., RY):** Historical perspectives, amnesia, hysterical blindness.

Marion Kenn, Kenneth S. Bowers, Patricia Bowers, John Nemiah, John F. Kihlstrom, Harold A. Sackheim, Ruben Gur.

**Recent Developments in Medical Imaging (5 Jan., 9:00 a.m., 2:30 p.m., RY):** High resolution structure, electron microscopy, ultrasound, computerized fluoroscopy, CT scanners, tomography, nuclear magnetic resonance, three-dimensional imaging, positron emission tomography, diagnostic radiology.

Harold E. Johns, F. P. Ottensmeyer, D. P. Bazett-Jones, J. W. Hunt, S. Foster, Andrew B. Crummy, Charles A. Mistretta, Aaron Fenster, Brian Rutt, John W. Keyes, Jr., John Mallard, J. M. S. Hutchinson, M. A. Foster, W. A. Edelstein, C. R. Ling, F. W. Smith, A. Reid, R. Selbie, G. Johnson, T. W. Redpath, Paul C. Lauterbur, David M. Kramer, Howard E. Simon, M. Phelps, K. W. Taylor.

**Why Don't Patients Take Their Medicines and What Can Be Done About It? (6 Jan., 9:00 a.m., RY).**

David L. Sackett, R. Brian Haynes, D. Wayne Taylor, Barry Blackwell.

**Geographic Medicine: A New World (6 Jan., 2:30 p.m., RY):** Tropical diseases, trypanosomiasis, malaria, smallpox, schistosomiasis, health care.

Kenneth S. Warren, Frederick C. Robbins, Adetokunbo T. Lucas, Anthony Cerami, Victor Nussenzweig, William Foege, Adel A. F. Mahmoud, John R. Evans.

**Cancer Therapy: Clinical Trials, Regulations and Bioethics (7 Jan., 9:00 a.m., RY):** Status, oncology, regulatory considerations, ethical dilemmas.

Vijaya L. Melnick, Franklin D. Hamilton, Lasalle Le Fall, Philip Schein, Robert S. K. Young, Harley M. Dirks.

**Cell-Cycle Kinetics and Chemotherapy (7 Jan., 2:30 p.m., RY):** Cancer therapy, differential sensitivity according to the phases

of the division cycle, multi-agent therapy, late cell renewal failure.

Daniel E. Bergsagel, Ian Tannock, Hywel Madoc-Jones, Leslie Botnick.

**New Insulin Delivery Devices: Will They Alter the Treatment of Diabetes Mellitus? (8 Jan., 9:00 a.m., RY):** Bioartificial devices, isolated islets of Langerhans, subcutaneous infusions, intravenous infusions.

A. Michael Albisser, Gerard Reach, Philip Felig, E. B. Marliss.

**Intrauterine Diagnosis (8 Jan., 1:30 p.m., RY):** Fetal diagnosis, abnormalities, lung maturity, lipid analysis, ultrasonography, heart rate monitoring.

Mildred T. Stahlman, Ronald G. Worton, Doran E. Enhorning, Murray Miskin, John Patrick.

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## 12. Health Care

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**Network Models in Health and Human Services (4 Jan., 9:00 a.m., RY):** Community ties and support, helping networks, social networks, marital satisfaction, stress, divorced couples, personality correlates.

Alvin W. Wolfe, Barry Wellman, Donald I. Warren, Linda Gutwirth, Muriel Hammer, Gary S. Hurd, Barbara W. Lex, E. Mansell Pattison, Christopher Tolsdorf, Eileen Edmunson, Richard Weinberg.

**Adoption and Social Impact of New Medical Practices (4 Jan., 2:30 p.m., RY):** Randomized clinical trials, communication network, health care technologies, technology assessment.

Stan N. Finkelstein, Edward J. Sondik, John R. Evans, Laurence R. Tancredi, Donald A. Young, Barbara J. McNeil, Jack Homer, A. Joseph Kleinmann, Charles U. Lowe.

**Choices in Health Care: Decision-Making and Evaluation of Effectiveness (5 Jan., 9:00 a.m., 2:30 p.m., RY):** Prescriptive approaches, information systems, cardiovascular treatment, discriminant function analysis, liver disease, psychological approaches, end-stage renal disease, surgical decision-making, cost-effectiveness, policy implications, health status indices, voice states, physical function, social and psychological outcome.

Raisa B. Deber, Claire Bombardier, Antonio Ciampi, Janet Barnsley, Howard S. Barrows, Stephen G. Pauker, H. Dominic Covey, David M. Goldberg, Arthur S. Elstein, Eugene Vayda, George W. Torrance, Milton Weinstein, Greg L. Stoddart, Joseph Lipscomb, Norman F. Boyd, M. Katz.

**The Meaning of Child Health (6 Jan., 9:00 a.m., RY):** New morbidity, the community, chronically ill, social stress, child as a consumer.

Jack Elinson, Dorothy Jones Jessop, I. Barry Pless, Mary Grace Kovar, Ruth E. K. Stein, Robert J. Haggerty, Charles E. Lewis.

**Immunopharmacology: A Rapidly Expanding New Interdisciplinary Field (6 Jan., 2:30 p.m., RY):** Interferon, inflammation, immune response, immunotoxicology.

Leslie Z. Benet, Alan M. Reynard, William E. Stewart II, Kenneth L. Melmon, Peter W. Mullen, Donald F. Horrobin.

**Surveillance of Drugs and Prescribing (7 Jan., 9:00 a.m., 2:30 p.m., RY):** Quality and economy of prescribing, ambulatory utilization, pharmacokinetic data, computer audit, post-marketing surveillance, Joint Commission on Prescription Drug Use, consumers, FDA's role.

David A. Knapp, Dee A. Knapp, Joseph A. Oddis, Harold J. Segal, Henry E. Simmons, Lawrence R. Rose, Jacques

Tremblay, Robert S. Beardsley, Donald A. Brand, Dennis Slone, Kenneth L. Melmon, Monroe E. Trout, Sidney M. Wolfe, Stuart L. Nightingale.

**Rationale and Methods of Controlled Release of Pharmaceuticals (8 Jan., 9:00 a.m., RY):** Membrane properties, osmosis, polymer erosion.

Jorge Heller, Joseph R. Robinson, Charles E. Rogers, Felix Theeuwes.

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### 13. Sociology and Economics

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**The Factory as Workplace: Past, Present, and Future (4 Jan., 9:00 a.m., RY):** Emergence of the factory, scientific management, industrial workplace, future.

Gary Kulik, William S. Pretzer, Craig Heron, Nina Shapiro-Perl, Harley Shaiken.

**The Organizational and Human Implications of New Manufacturing Technology (4 Jan., 2:30 p.m., RY):** Industrial worker, social aspects, human value systems, adjustment and adaptation, organization of the firm.

Joel D. Goldhar, Barbara A. Burns, Rolf Piekarz, Robert Schrank, Sidney P. Rubinstein, David Sirota, Joel A. Fadem.

**Aging from Birth to Death: Sociotemporal Perspectives (5 Jan., 9:00 a.m., 2:30 p.m., RY):** Generation and age, life course, conflict between age strata, early life transitions, socioeconomic careers, changing age systems, families, retirement, social indicators.

Matilda White Riley, Michael S. Teitelbaum, David I. Kertzer, Jennie Keith, Nancy Foner, Dennis P. Hogan, Albert Simkus, Anne Foner, Michael B. Katz, Maris Vinovskis, Barbara Boyle Torrey, Denis F. Johnston.

**The Measurement of Socioeconomic Status: Current Issues (6 Jan., 9:00 a.m. RY):** U.S. census data, Canadian census data, Duncan Socioeconomic Index, assessment.

Mary G. Powers, Bernard R. Blishen, Charles B. Nam, E. Walter Terrie, David Featherman, Gillian A. Stevens, Monica Boyd, Hugh McRoberts, Judith Treas.

**Society and the Handicapped: Ethical, Social-Psychological, Sociological, and Administrative Perspectives (6 Jan., 2:30 p.m.,**

**RY):** Disabled in society, conflict in the blindness system, college priorities.

Hanan C. Selvin, Yole G. Sills, Warren Reich, Robert Kleck, George T. Potter, Manoucher Parvin.

**Sino-American Exchange of Information: Status of Study in the Social Sciences (7 Jan., 9:00 a.m., 2:30 p.m., RY):** Social sciences in China, sociology and anthropology, structure of exchanges, new developments in China, T'aitou revisited, communes, aging in China, fieldwork in Guangdong.

Burton Pasternak, Anne F. Thurston, Mary Brown Bullock, Fei Xiaotong, Martin King Whyte, Norma Diamond, Stephen B. Butler, Deborah Davis-Friedman, Helen Funghar Siu.

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### 14. Anthropology

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**Women and Science: Two Cultures or One? (4 Jan., 9:00 a.m., RY):** Competition and cooperation, scientific objectivity, feminism, biology.

Evelyn Fox Keller, Hilde Hein, Marian Lowe, Elizabeth Fee, Hilary Rose, Madeleine J. Goodman.

**Humanity's Place in Nature: Exploring the Convergence of Scientific, Philosophical, and Religious Perspectives (4 Jan., 2:30 p.m., RY):** Psychoccephalon, ethics, human nature, evolution, religious experience, world divergence.

Karl E. Peters, Philip Hefner, Paul D. MacLean, Garrett Hardin, Robert C. Sorensen, W. Widick Schroeder, John W. Bowker.

**Undocumented Immigration: Sociocultural and Ethical Considerations (5 Jan., 9:00 a.m., RY):** Mexican experience, ethical interpretations.

Nancie L. Gonzalez, Peter G. Brown, Thomas Weaver, Henry Shue, Vernon Briggs, James W. Nickel, Judith Sorum.

**Religion and Food (5 Jan., 2:30 p.m., RY):** Ritual feast, prescription and proscription, Jewish tradition, Ethiopia.

Solomon H. Katz, William K. Powers, Marla M. Powers, Janet Theophano, Barbara Kirchenblat Gimlet, Ephraim Isaac, Sherry Rosen, John W. Bowker.

**Pluralistic Approaches in a Pluralistic Society: The Scientific Study of Religion in Canada (6 Jan., 9:00 a.m., RY):** Conservative religion, Mackenzie Pipeline Inquiry, dialectical the-

## Schedule of Contributed Papers

At the Toronto Meeting, contributed papers will be presented in **poster session format only**; there will be no slide sessions. Abstracts for the individual papers can be found in the *Abstracts of Papers* volume, which is available on site to all registrants. The poster sessions will be held at the Sheraton Centre and are scheduled as follows:

- **Poster Session I (4 Jan., 11:30 a.m.–12:45 p.m.).**  
*American Junior Academy of Science: Research Papers by High School Students.*
- **Poster Session II (4 Jan., 1:15 p.m.–2:30 p.m.).**  
*Physical and Biophysical Sciences.*
- **Poster Session III (5 Jan., 11:30 a.m.–12:45 p.m.).**  
*Biological and Ecological Sciences.*

- **Poster Session IV (5 Jan., 1:15 p.m.–2:30 p.m.).**  
*Cell Biology, Immunology, and Genetics.*
- **Poster Session V (6 Jan., 11:30 a.m.–12:45 p.m.).**  
*Medical Sciences and Psychiatry.*
- **Poster Session VI (6 Jan., 1:15 p.m.–2:30 p.m.).**  
*Psychology and Education.*
- **Poster Session VII (7 Jan., 11:30 a.m.–12:45 p.m.).**  
*Social Sciences.*

ory, civil religion, religion and nationalism, sociology of religion.

Roger O'Toole, John H. Simpson, Roger Hutchinson, Gibson Winter, T. Rennie Warburton, Robert Blumstock, Roland Chagnon, John Mck. Whitworth.

**Rural Inequality and Change (6 Jan., 2:30 p.m., RY):** Growth and impoverishment, rural income, Kenya, development schemes, alien settlers, development and inequality, measurement, Sahel.

Priscilla Reining, Irma Adelman, Edgar V. Winans, Eric Reynolds, Angelique Haugerud, David Brokensha, Peter McLoughlin.

**The Origins of Man: Biochemical, Anatomical, and Paleontological Perspectives (7 Jan., 9:00 a.m., 2:30 p.m., RY):** Phylogenetic position, *Australopithecus afarensis*, early human evolution in Africa, anatomical change, diet, molecular contributions, origin of man, Darwinian theory, Miocene hominoids, limits of interference, reproductive strategy.

C. Owen Lovejoy, Glynn Isaac, Tim D. White, D. Carl Johanson, B. Tom Gray, Alan E. Mann, Alan C. Walker, Vince M. Sarich, Morris Goodman, Elwyn L. Simons, Richard J. Smith.

**Palaeopathology of Prehistoric Populations of Canada (8 Jan., 9:00 a.m., RY):** Maritime archaic peoples, Great Lakes, Central Plains, Northwest Coast Indians, Ontario Iroquois.

F. Jerome Melbye, James E. Anderson, Susan Pfeiffer, William D. Wade, Jerome S. Cybulski.

**Social Systems and Evolutionary Theory (8 Jan., 1:30 p.m., RY):** Malaysian culture, cladistic analysis, projectivism, mutational processes, historical complexity, functional simplicity, evolutionary analysis.

Eugene E. Robkin, Paul Diener, Donald M. Nonini, Susan Ford, Harvey Wheeler, Howard H. Pattee.

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## 15. History and Philosophy of Science

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**Do the Engineering and Scientific Societies Have a Role in Promoting Ethical Conduct Among Their Members? (4 Jan., 9:00 a.m., RY):** Ethics activities, code of professional conduct, moral roles, constraints.

Mark S. Frankel, Sheri L. Smith, Donald E. Wilson, Joseph R. Sanders, Oliver R. Smoot, Martha B. Montgomery, Paul D. Reynolds, Warren Niederhauser.

**Alfred L. Wegener (1880–1930) and the Revolution in the Earth Sciences (4 Jan., 2:30 p.m., RY):** Continental drift, Frank Taylor's theory, British reception and North American rejection of Wegener's theory, new interest.

Henry Frankel, Harold Burstyn, Mott Greene, Rachel Laudan, Ursula B. Marvin, Robert Dott, E. Irving.

**The Place of Science in the History of Science (5 Jan., 9:00 a.m., RY).**

George Basalla, Brooke Hindle, Camille Limoges, Frederic L. Holmes, Robert E. Kohler, Nathan Reingold.

**The Human Knowledge Process: The Role of Its Special System-Forming Activity in Human Ecology (5 Jan., 2:30 p.m., RY):** Epistemic precursor sensitivity, evolution and transcendence, humane evolution, triune brain, deep subjectivity, technology as the milieu, obsolescence.

William Gray, Aristide H. Esser, Jerzy A. Wojciechowski, Paul D. MacLean, Roger Poole, Ursula M. Franklin, Ervin Laszlo.

**Patterns in Scientific Thinking (6 Jan., 9:00 a.m., RY):** Scientists' self-concepts, causal loop theories, evolutionary architecture, overlooked factors, anthropologists' study.

Magoroh Maruyama, Roger Krohn, Paul Diesing, Wolfgang Hilbertz, James H. Austin.

**Views of the Universe: Science versus Tradition (6 Jan., 2:30 p.m., SH):** Time Scales, evolution, big-bang cosmology, traditionalist movements.

Rolf M. Sinclair, Porter M. Kier, Milton K. Munitz, William V. Mayer.

**Psychological Bases of Morality (7 Jan., 9:00 a.m., RY):** Reciprocity in personal relations, peer interaction, gossip and moral life, moral reasoning.

Robert Hogan, Michael Chapman, James Youniss, William Damon, Maury Silver, John Sabini.

**The Scientific Literature as a Mirror of Science: Quantitative Studies (7 Jan., 2:30 p.m., RY):** Intellectual space, quantum mechanics, intellectual resources, model scientific literature.

Belver C. Griffith, Howard D. White, Henry G. Small, Derek de Solla Price.

**Documenting the History of Science and Technology (8 Jan., 9:00 a.m., RY):** Individual and team, crucial documents, records of technical societies, nonhistorian users, preserving and publishing.

Edward C. Carter II, Reese V. Jenkins, Nathan Reingold, Bruce Sinclair, Helen W. Slotkin, Darwin H. Stapleton.

**Frontiers of General Systems and Cybernetics Research (8 Jan., 1:30 p.m., RY):** Epistemology; methodological considerations; humanistic considerations; systems, observers, and groups; global learning; applications.

William J. Reckmeyer, Roger Conant, Heinz von Foerster, George J. Klir, William Gray, Stuart A. Umpleby, Michelle Geslin Small, Mihajlo D. Mesarovic.

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## 16. Information and Computing

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**Machine Intelligence and Perception: Premises and Progress (4 Jan., 9:00 a.m., 2:30 p.m., RY):** Vision and cognition, waveforms and images, histologic patterns, human movement, language and inferences, percept and concept, automation, printed circuit, office automation, productivity loss.

Judith M. S. Prewitt, D. Raj Reddy, Laveen N. Kanal, Norman Badler, Aravind Joshi, B. Chandrasekaran, Charles Rosen, Eugene McVey, Charles Rieger, Howard Resnikoff.

**Graph Theory in Contemporary Science and Technology (5 Jan., 9:00 a.m., RY):** Computing, chemistry, DNA research, reliable networks, economics, optimization.

Judith M. S. Prewitt, Martin C. Golumbic, Allen J. Schwenk, Stephen B. Maurer, Frank Boesch, J. Adrian Bondy, V. Chvatal.

**Human Factors Considerations in Computer Systems for Non-professional Users (5 Jan., 2:30 p.m., RY):** Inexperienced users, humanizing criteria, human-computer interface, time-sharing systems, end user systems, involving users.

Michael J. Seven, Frederick A. Muckler, Theodore D. Sterling, Robert C. Williges, J. R. Tessier, Garry A. Helander, C. Michael B. Anderson.

**International Exchange of Scientific and Technical Information (6 Jan., 9:00 a.m., 2:30 p.m., RY):** Congressional view, trans-border data flow, international dimensions, scientific interpretation, changing technological boundaries, National Li-

brary of Medicine, developing countries, formulating policies, the future.

Robert L. Chartrand, George E. Brown, Jr., Peter Robinson, Thomas R. Pickering, Sidney Passman, Charles Dalfen, Jane Bortnick, Mary E. Corning, John E. Woolston, Edward K. Zimmerman, Taro Nakayama.

**Technologies for the Information Society: A Canadian Perspective (7 Jan., 9:00 a.m., 2:30 p.m. RY):** Telidon, educational applications, direct broadcast satellites, Inukshuk project, digital revolution, fiber optics.

Lewis Auerbach, Arthur Cordell, Ronald E. Barrington, Douglas F. Parkhill, John C. Madden, Mario L. Cioni, N. G. Davies, David Simailak, Lindsay A. Green, Michel Dufresne, Donald A. Chisholm, Rudolph Kriegler.

**Functional Limitations in Primary Memory (8 Jan., 9:00 a.m., RY):** Theoretical views, speech and reading, output, children's thinking, memory deficits.

Fergus I. M. Craik, Robert G. Crowder, Robert A. Bjork, Robbie Case, Marcel Kinsbourne.

**Quantification of Mental Work Load in Man-Machine Systems (8 Jan., 1:30 p.m., RY):** Theoretical basis, methodologies, system failure.

John W. Senders, Thomas B. Sheridan, William B. Rouse.

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## 17. Education

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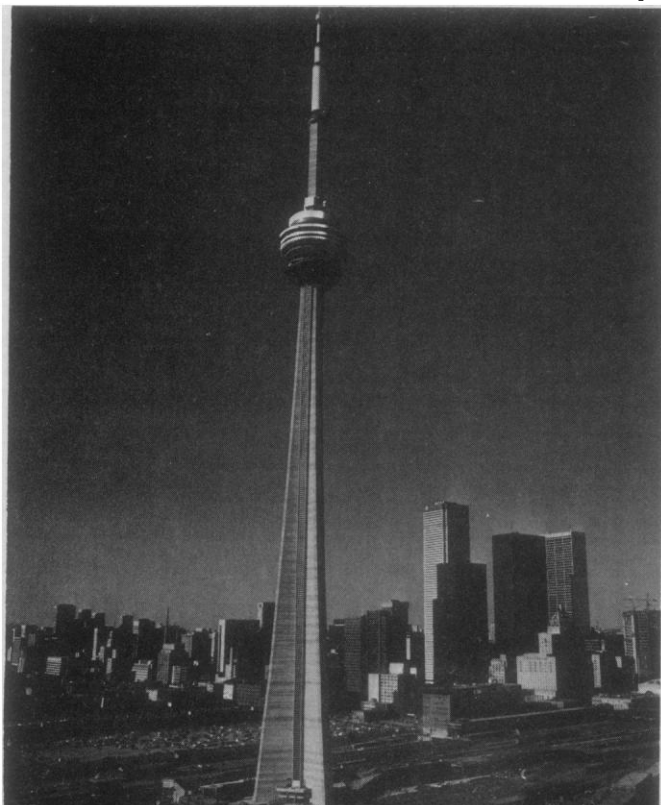
**Self-Instruction for Medical Students: Old and New Methods (4 Jan., 9:00 a.m., RY):** Clinical textbook, journal, self-instruction by computer.

Philip K. Bondy, Paul B. Beeson, Arnold S. Relman, Gregory L. Trzebiatowski.

**Can We Educate for Leadership? (4 Jan., 2:30 p.m., RY):**

Anna J. Harrison, Frederick Mosteller, John A. Carey, James M. Ham, William N. Hubbard, Charlene Jarvis, Thomas Moss.

CN Tower. [Courtesy Canadian Government Office of Tourism]



**Science Education Programs Bringing the Research Scientific Community Together With Teachers and Students (5 Jan., 9:00 a.m., RY):** Science research training, scientists in schools.

Sidney Borowitz, Morris Shamos, Bonnie Brownstein, Harry Lustig, Leslie Mitchell, Charles Wilson, Willard Jacobson, Seymour Papert, Michael Tempel.

**An Exploration of Early Intervention to Improve the Academic Skills of Black Students (5 Jan., 2:30 p.m., RY):** Present status, adult-child interactions, preschool period, early primary grades.

Lloyd G. Humphreys, J. Mcv. Hunt, Victoria R. Seitz, Wesley C. Becker, Siegfried E. Engelmann, Edmund W. Gordon.

**A Program to Introduce Science to Physically Handicapped Students (6 Jan., 9:00 a.m., RY):** NSF project, biology, visually handicapped, research participation, computer science, orthopedically impaired, general science, hearing handicapped.

S. Phyllis Stearner, Nansie S. Sharpless, Kenneth S. Ricker, William H. Rauckhorst, John C. Longstreet, Dean R. Brown.

**New Directions in Education: Implications of Recent Developments in Cognitive Science and Computation (6 Jan., 2:30 p.m., RY):** Mechanistic systems, mental models, qualitative reasoning, computer-assisted instruction, Socratic teachers, human problem-solving.

Frederick Reif, John Seely Brown, Michael D. Williams, Allan Collins, Andrea A. di Sessa.

**Early Adolescence: A Critical Stage for Science Education (7 Jan., 9:00 a.m., RY):** Canadian education, student beliefs, curricular choices, alternative science curriculum.

James T. Robinson, Graham W. F. Orpwood, Gaalen Erickson, Douglas A. Roberts.

**Social and Political Implications of Achievement Testing (7 Jan., 2:30 p.m., RY):** Social consequences, politics, trial by testing.

Joseph D. Novak, Ezra Glaser, Robert L. Ebel, Leon Kamin, E. Wood Kelley.

**Science, Mathematics and Gifted Youth (8 Jan., 9:00 a.m., 1:30 p.m., RY):** Defining giftedness, youth futures, academic performance, professional preparation, schools, science academy, science centers, anti-intellectualism.

Joseph M. Dasbach, Arthur H. Livermore, Letitia Lestina, Abraham J. Tannenbaum, Shirley M. Malcom, Robert Finnell, Heather L. Carter, Leroy R. Lee, Melvin R. Webb, Kay Davis, Jesse L. Jackson.

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## 18. Public Access to Science

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**Science Museums, Science Centres, and Television: Seeing versus Doing in the Public's Understanding of Science (4 Jan., 2:30 p.m.; 5 Jan., 9:00 a.m., 2:30 p.m., SH):** History museum, science museum, new museum, Ontario Science Centre, profile of visitors, demonstrations, science education, scientists on the TV screen.

James W. Bell, Peter Swan, Brooke Hindle, Frank Oppenheimer, Charlene James, David Baird, Fiona Nelson, J. Tuzo Wilson, Phyllis Mayeda, George Vanderkuur, Eustace Mendis, Joel Weiss, June Callwood, George Gerbner, Alice Courtney, David Suzuki, Gerald Wheeler.

**Promoting Science at the Grass Roots Level: The Local Academy (5 Jan., 2:30 p.m., RY):** Heritage publications, faculty development, state government liaison, science issues and policies, industrial development.

Everett L. Wisman, Robert W. Hanson, Lynn E. Elfner, Dean A. Roseberry, Ertle Thompson, John Cain, Robert E. Henderson.

**Science and Secrecy (6 Jan., 9:00 a.m., RY):** Privacy, impeding research, national security, nuclear secrecy.

Stephen H. Unger, David Kahn, George I. Davida, David H. Brandin, Hugh E. Dewitt.

**Distance Education (6 Jan., 2:30 p.m., RY):** Post-secondary education, laboratory and fieldwork, evaluating programs.

Trilochan S. Bakshi, Donald R. McNeil, Robert G. Holmberg, Dennis D. Gooler.

**Public Input Into Science Issues in the Canadian Inquiry Process (7 Jan., 9:00 a.m., RY):** Commission of inquiry, citizen as scientist, roles of science, decision-making.

Judith Miller, Jack Basuk, René Beaudry, David V. Bates, Liora Salter, James E. Brydon.

**The Attitudinal and Behavioral Foundations of Public Participation in Science Policy (7 Jan., 2:30 p.m., RY):** Attentive public, referendum, nuclear power.

Jon D. Miller, Kenneth Prewitt, Don K. Price, Debra Hensler, Carl Hensler, Dan Metlay, Harvey Averch, Paul Buckley.

**Science in the New: Risks and Benefits (8 Jan., 1:30 p.m., RY):** Three Mile Island, recombinant DNA, genetic screening, model reporting program.

William E. Burrows, Fred Jerome, David M. Rubin, Rae Goodell, Richard Severo.

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## 19. Social Implications of Technology

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**Radioactive Waste: Technically and Politically Viable Solutions (4 Jan., 9:00 a.m., 2:30 p.m., SH):** Options for storage and disposal, solidification, deep underground disposal, burial in deep sea, waste management, total system solution, national program, environmentalist's approach, Congressional approaches, politics.

Rustum Roy, Eva L. J. Rosinger, S. Alex Mayman, Gregory J. McCarthy, G. E. Grisak, C. D. Hollister, D. P. Anderson, G. Ross Heath, Roger E. Kasperson, Robert W. Kates, Robert B. Lyon, George W. Cunningham, James Harding, Stanley N. Lundine, Roy MacLaren.

**Innovation and the Law (5 Jan., 9:00 a.m., 2:30 p.m., SH):** Antitrust law, regulation, intellectual property law.

Joel D. Goldhar, Thomas B. Leary, Alvin M. Stein, Michael S. Baram, Mary Hamilton, Robert H. Pry, David Guberman, Julius D. Heldman, Jack L. Lahr, Yale Braunstein, Melvin Kranzberg, Robert F. Rich.

**State/Province and Federal Roles in the Management of the Nuclear Fuel Cycle (6 Jan., 9:00 a.m., 2:30 p.m., SH):** Jurisdictional conflict, industrial perspective, transcontinental shipping, uranium mining, nuclear power plants, uranium mill tailings, federal preemptive legislation, Congressional viewpoint.

Phyllis Kahn, William Scanlon, Jon H. Jennekens, Hugh S. Irvine, Robert E. Luna, David V. Bates, Emilio E. Varanini III, Dean Abrahamson, Elisa J. Grammer, Paul Hess, Ian Marceau, Ralph Torrie.

**The Impact of Technological Policy on Industrial Policy: Comparative International Experiences (7 Jan., 9:00 a.m., SH):** French, Canadian, EEC, Japanese.

John Diebold, William Diebold, Jr., Pierre Aigrain, others to be announced.

**The SST Controversy Ten Years Later: A Case Study in the Use of Science for Decision-Making (8 Jan., 9:00 a.m., SH):** Nitrogen oxides, models or observations, stratospheric ozone, values underlying the controversy.

S. Fred Singer, Harold I. Schiff, Robert C. Oliver, Harold S. Johnston, Hugh W. Ellsaesser, Brian Martin.

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## 20. Science and Technology Policy

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**Successful Models of University-Industry Collaboration on Research (4 Jan., 9:00 a.m., RY):** Chemical research, Exxon, catalytic science and technology, California State Colleges.

Walter S. Baer, John D. Caplan, Alfred E. Brown, Peter J. Lucchesi, James R. Katzer, Francis A. Darknell.

**The Scientist as Expert Witness (4 Jan., 9:00 a.m., 2:30 p.m., SH):** Expert witnesses in the courtroom, forensic experts, shadow of doubt, defense experts, statistical assessments as evidence, training to testify.

Albert H. Teich, Emilio Q. Daddario, Alan H. Legum, Donald A. Gordon, Daniel E. Willard, Howard T. Markey, W. Brown Morton, Jr., Daniel W. Vomhof, Stephen E. Fienberg, Miron L. Straf, Robert F. Hanley, Lawrence E. Walsh.

**Bad Research—Good Decisions: The Role of Expert Analysis in Policy-Making (6 Jan., 9:00 a.m., RY):** Love Canal, nutrition controversy, energy policy decisions, peer review.

Jessica T. Mathews, Frank von Hippel, Charles E. Carter, C. Wayne Callaway, Martin Greenberger, Lionel S. Johns.

**The Mediation of Environmental Disputes: The U.S., Canadian, and Joint Experience (6 Jan., 9:00 a.m., RY):** Native peoples, U.S. experience, pollution across national boundaries, Canadian/U.S. problems.

Robert E. Stein, Leon Mitchell, Gerald W. Cormick, James W. MacNeill, Lawrence Susskind.

**The Uses of History in Policy Analysis and Strategic Planning (6 Jan., 2:30 p.m., RY):** Smoke control movement, air transport industry.

Vary T. Coates, Joel A. Tarr, David C. Mowery, Nathan Rosenberg, George E. Brown, Jr., John Reuss, W. H. C. Simmonds, Merrick Rose Smith.

**Policy Outlook on Science and Technology (7 Jan., 9:00 a.m., RY):** Five-Year Outlook Report, policy tool.

Jurgen Schmandt, Daryl E. Chubin, Susan G. Hadden, John M. Logsdon, Robert P. Morgan, Edward Wenk, Jr., William P. Blanpied, Albert H. Teich, William T. Golden, Norman Hackerman, Robert Harris, Melvin Kranzberg, Thomas Moss, Bruce L. R. Smith.

**Interdisciplinary Research: Policy and Performance Issues (7 Jan., 2:30 p.m., RY):** Industry and university, government support, biomedical sciences.

Alan L. Porter, Frederick A. Rossini, Dael Wolffe, Herbert I. Fushfeld, Robert S. Cutler, Anthony R. Michaelis, Daryl E. Chubin, Terry Connolly, Philip H. Birnbaum, Albert H. Teich.

**Impact and Risk Assessment: Professionalism and Participation (8 Jan., 9:00 a.m., 1:30 p.m., RY):** Theory and practice, decision-making process, technology assessment, professionalism, community approach, anthropological view.

Frederick A. Rossini, Joshua Menkes, William R. Freudenburg, Howard Raiffa, Robert Budnitz, G. Patrick Johnson, Arthur Norberg, Jiri Nehnevajsa, Vary T. Coates, Desmond M. Connor, Steven C. Ballard, Thomas E. James, John Peterson, C. P. Wolf, Alan L. Porter.

# Meeting Information

Listed below are the Toronto hotels which are used by the AAAS for housing and program activities during the Annual Meeting. The two-letter codes in parentheses identify session locations in the preliminary program.

**Sheraton Centre (SH):** Symposia; Exhibit; contributed papers (poster sessions); business meetings; social functions; advance and onsite registration desks; tour and banquet tickets desk; welcome center; resource center for disabled attendants; headquarters office; newsroom; employment information facilities; *Science Film Festival*.

**Royal York Hotel (RY):** Public lectures; symposia; business meetings; social functions; advance and onsite registration desks; welcome center; resource center for disabled attendants; headquarters office.

**Hotel Toronto:** Housing only.

Although the hotels are within walking distance of each other, there will be meeting registration areas in both the Sheraton Centre and the Royal York. For hotel locations see map on page 775.

## Meeting Registration

Registration categories and fees are listed on the advance registration form on page 776. The fee includes the full program book and the abstract volume.

Please note that onsite registrants must pay with Canadian currency. For the convenience of all attendants, there will be a money exchange station in each registration area.

**Advance registrants, please note:** We will *not* mail the full program before the Meeting. Instead, we will send you in early December an expanded preconvention program, your badge, registration receipt, and a voucher redeemable on site for the program book, condensed program (foldout), abstract volume and, as a bonus for early registration, your free copy of the 1981 AAAS Calendar. Present your voucher at one of the advance registrants' desks, located in the Sheraton Centre (Concourse Lobby) and the Royal York (Convention Lobby). Registration hours are as follows:

Saturday, January 3 ..... 2:00 p.m. - 6:00 p.m.  
Sunday through Wednesday,  
4-7 January ..... 8:00 a.m. - 6:00 p.m.  
Thursday, 8 January ..... 8:00 a.m. - 12 noon

## Registration Refunds

The AAAS will refund advance registration fees for all cancellations received by letter or telegram prior to 26 December 1980. *No refunds will be made on cancellation notices received after this date.* Refunds will be mailed from the AAAS Offices in Washington after the Annual Meeting.

## IRS-Attendance Requirements for Foreign Conventions

Those who pay their own convention expenses and deduct them from their individual tax returns must comply with Section 602 of the 1976 Tax Reform Law, which places limitations on the tax deductions for convention attendants traveling outside the United States, its possessions, and the trust territories of the Pacific. Individuals who will be reimbursed by their employer for convention expenses should check on the employer's requirements for substantiation of attendance. These individuals must report the following:

- Total number of days of the meeting;
- Total number of hours of each day spent on business-related activities;
- Provide a copy of the program and a statement signed by an officer of the sponsoring organization attesting to the individual's attendance at the business-related sessions.

Travel deductions are limited to an amount not greater than coach air fare and may be claimed only if at least one half of the trip is devoted to business-related activities. Subsistence expenses may be deducted if the individual attends a minimum of 4 hours of busi-

ness-related meetings per day. Deductions cannot exceed the per diem rate established by the U.S. Government in each city. As of July 1980, the per diem rate for Toronto was \$68.

Meeting registrants who require such documentation should take their condensed program, which contains space for verification purposes, to designated IRS-Attendance Verification desks located in the registration areas at both meeting hotels; this should be done on a daily basis. Each registrant must be responsible for retaining the documented program for tax purposes. In the event that the IRS audits an individual's tax return and requests further substantiation of the verified program, a photocopy of the entire document should be sent to the AAAS Meetings Office, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036. Upon request, AAAS will compare the information with registration data and prepare a verification statement signed by an officer of the Association.

## Entry into Canada

**From the United States:** Citizens and legal residents of the United States do not need passports or visas. *U.S. citizens* should carry proof of citizenship in the form of a birth certificate (if native-born), naturalization certificate, or voter's registration card. *Permanent residents* who are not U.S. citizens need their alien registration cards.

**From Other Countries:** Citizens of countries other than the United States, who are not legal permanent residents of the United States, must have valid passports. For further information contact the nearest Canadian Consulate or Embassy.

Please note that on entering Canada you must be prepared to pass through (1) Canadian Immigration and (2) Customs inspection. When returning to the United States, you are required to pass through (1) U.S. Customs and (2) Immigration inspection.

Due to the current premium on the U.S. dollar (\$Can 1.00 = \$U.S. 0.86 with slight daily fluctuations), it would be prudent to change some U.S. currency into Canadian cash or traveler's checks. Although U.S. currency is accepted in Toronto, vendors are not required to pay the premium because of the daily variance. For the convenience of all attendants, there will also be a commercial money exchange station in each meeting registration area.

## Hotel Reservations

The three Toronto hotels used for housing and meetings have set aside—at guaranteed reduced rates—blocks of guest rooms for the attendants of the AAAS Annual Meeting. **These rates are guaranteed only when reservations are made through the AAAS Housing Bureau prior to 12 December 1980.** Hotel rates are quoted and payable in Canadian dollars; *there is no room tax in Toronto.* Please read the Hotel Reservation Form on page 777 carefully. Room assignment will be delayed if any information is omitted from the form.

## Don't Miss It!

Don't miss this year's exhibit! It's bigger and better than ever, with displays from government agencies, publishers, associations, and every aspect of science and industry. The fascinating *Science Circus* will be on view, courtesy of the Ontario Science Centre. And if you need a quick bite to eat on the way to a session, luncheon will be available daily at reasonable prices.

If your company or organization would like to participate, or if you know of an organization you think should be there, contact Steve Pike, Marketing Manager, Sixth Floor, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036. Telephone: 202-467-4490.

## MEETING INFORMATION

**Do not be a "no-show!"** If you have made a hotel reservation and find that you cannot attend the Meeting, write to or call the AAAS Housing Bureau to cancel.

### Airport-to-Hotel Transportation

*Airport express buses* operate between the Toronto International Airport and The Sheraton Centre and the Royal York Hotel at approximately every 20 minutes; the fare is \$4.50. *Airport limousines* charge a flat rate of \$15 and may be ordered by calling 416-494-4155. *Metered taxicab* fares range between \$15 and \$17. All fares are as quoted at press time and are subject to change.

### Resources for Disabled Registrants

The AAAS, in cooperation with the Toronto Advisory Committee, is again making every effort to make the Annual Meeting fully accessible to disabled individuals. In addition to guest rooms which can accommodate wheelchairs, the following resources will be available at both The Sheraton Centre and the Royal York Hotel:

- Resource Centers staffed with volunteers to offer assistance on request.
- Assistance in movement within and between meeting hotels as needed.
- Transportation service to and from the airport and train and bus terminals, as needed.
- Interpreters for the hearing-impaired at all public lectures and for other sessions on request.
- Emergency repair service for wheelchairs.
- Special tour and sightseeing information for disabled persons.
- Audiotaped highlights of the meeting program for persons with visual impairments.

Persons needing special hotel accommodations, interpreting services, and other assistance are strongly urged to so indicate on the advance registration and housing forms. Your early response will help us to plan and serve you better. For additional information, contact Virginia Stern, AAAS Project on the Handicapped in Science, 1776 Massachusetts Ave., NW, Washington, D.C. 20036 (phone: 202-467-4496).

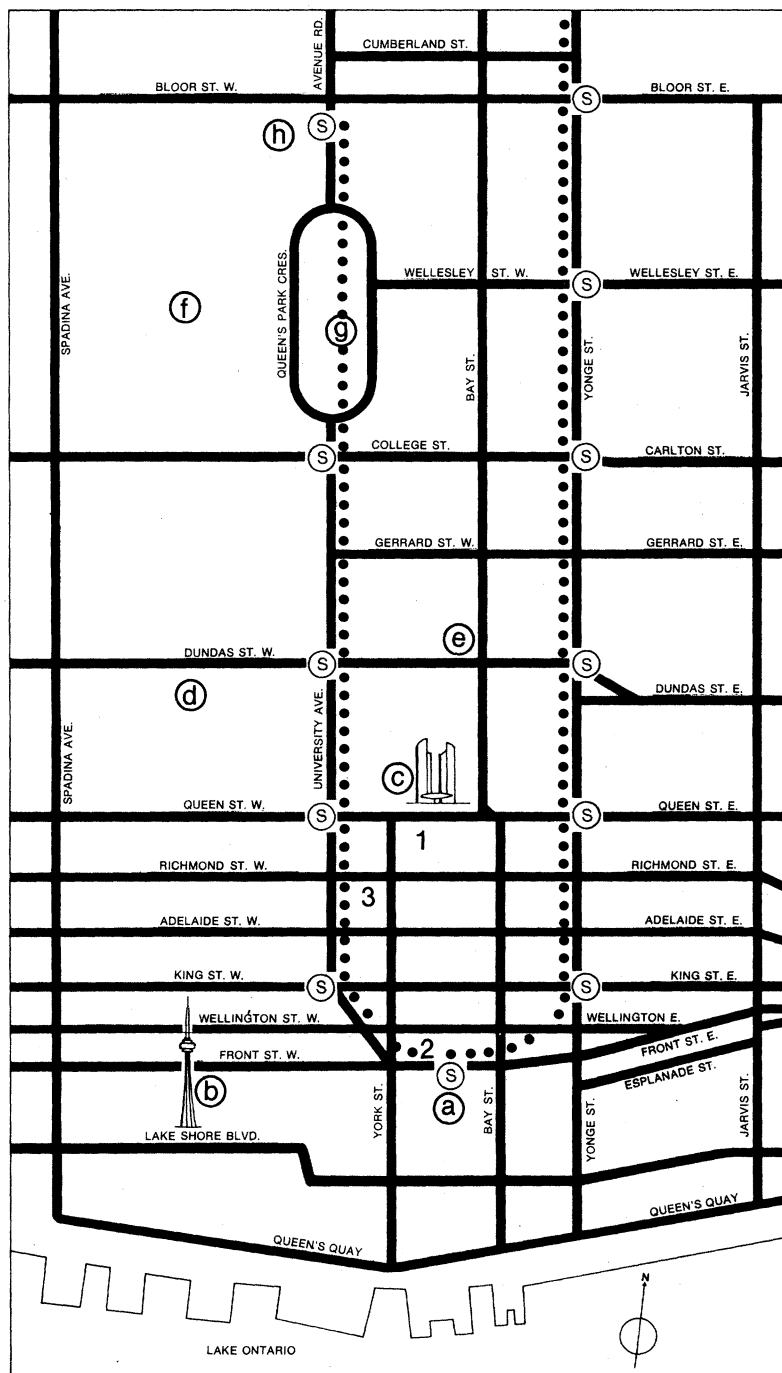
### Employment Information Center

In the exhibit hall at The Sheraton Centre, there will be bulletin boards for posting "positions wanted" and "positions open" notices. Also available will be several separate tables for the conduct of interviews. AAAS will not coordinate interactions between prospective employers and employees. **Hours:** 4 Jan., 10 a.m. to 5 p.m.; 5 and 6 Jan., 10 a.m. to 4 p.m. and 5:30 to 7 p.m.; 7 Jan., 10 a.m. to 5 p.m.

### Child Care Services

For child care or baby-sitting services, check with the head housekeeper of your hotel. A 24-hour notice is usually required to facilitate such arrangements.

## Downtown Toronto



### Hotels

1. The Sheraton Centre
2. Royal York Hotel
3. Hotel Toronto

### Places of Interest

- a. Union Station
- b. CN Tower

### c. City Hotel

### d. Art Gallery of Toronto

### e. Bus Terminal

### f. Univ. of Toronto

### g. Parliament bldgs.

### h. Royal Ontario Museum & McLaughlin Planetarium

... S ... Subway route and stops