geogram

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FROM THE DIRECTOR GENERAL

The immediate challenges facing the GSC have changed profoundly during the past year because of dramatic changes in the economy. Twelve months ago, at the GSC "Futures Conference", attention was focussed on the problems of providing the additional information and advice that would be required because of impending megaprojects, including many large-scale energy and mineral resource developments. Now, attention is focussed on the challenges created by the urgent need to foster the rejuvenation of faltering mineral and energy resource development activities, and by reductions in government revenues and spending. The problem of trying to retain and recruit professional personnel in the face of competition from vigorously growing petroleum and mining exploration industries has been replaced by the problem of trying to help find ways to employ, productively, the skilled personnel from the mining and petroleum industries who are now unemployed. These are truly abrupt shifts in priorities; but scientific programs that commonly require years, rather than months or days, to develop to the level where they produce their main results are not well suited to abrupt shifts in the deployment of personnel and resources in response to changes in short-term goals. Nevertheless, the GSC has shown in the past that it can respond effectively to the need to meet urgent, new, short-term demands, while preserving its capacity to deal with its long-range commitments regarding the geology of Canada. It undoubtedly can do so again now.

There are some recent developments involving the scientific programs of the GSC that are particularly encouraging when considered in the context of the present grim economic climate. Several of the new initiatives identified as future thrusts of the Earth Sciences Sector of the Department, are being developed in spite of adverse economic conditions. The "sedimentary basins" thrust was the subject of a special meeting of the Branch Management Committee in October. This involved presentations by scientists from ISPG, AGC, the Precambrian and Cordilleran Divisions, and the Earth Physics Branch, and participation by the senior management of the Earth Physics Branch and advisors from the petroleum exploration industry. As a follow-up to this meeting an informal workshop on "basin analysis" is being held at ISPG this month in conjunction with a meeting of the EMR Petroleum Resources Review Committee which will finalize estimates of Upper Triassic-Lower Jurassic plays in the Sverdrup Basin. This meeting will include a "round table" discussion involving representatives from various components of GSC and EPB, and it will form the basis for the continuing development of the new initiatives on basin analysis. The proposed new initiatives on the deep structure of the continental crust are being pursued on a modest but significant level through several co-operative programs in the Canadian Shield that involve the EPB and the GSC, through a co-operative program in the Atlantic offshore area involving AGC and various U.S. institutions, and through the Canadian Geoscience Council's Major Projects Committee which submitted a proposal to NSERC and EMR for a co-operative national program named "Lithoprobe". New initiatives on the study of the origin of mineral deposits have been focussed, during the past year, mainly on the study of active submarine metalliferous hydrothermal systems, having been spurred by recent discoveries of exhalative hydrothermal sulphide deposits on the Juan de Fuca Ridge system off Vancouver Island. A workshop on the topic is being planned by a joint GSC-EPB Task Group, for May 1983 at the Pacific Geoscience Centre in Victoria. Work on geological hazards and environmental constraints on development has been increasing in the offshore areas where development of petroleum and natural gas resources are expected to occur relatively soon.

The emergence of new arrangements for co-operation between the GSC and provincial geoscience agencies is another noteworthy new development. New co-operative programs have been established in Newfoundland and Nova Scotia, and are

The Logan Boulder at GSC headquarters, Ottawa, with its new plaque.
Le bloc Logan et sa nouvelle plaque au bureau chef de la CGC, à Ottawa.

Canada

under discussion for British Columbia, Manitoba, Ontario and Quebec. In addition to these bilateral arrangements, the National Geological Surveys Committee, comprising representatives from the provinces and territories and the GSC, provides an important forum for developing nation-wide co-operation that is essential for the co-ordinated study of the geology of a very large country with a relatively small population, and a very small cadre of geologists dedicated to the task.

An important report on the evaluation of the output of the Geological Survey of Canada has been prepared by an advisory committee from the Canadian Geoscience Council, chaired by Alan Coope of Newmont Exploration of Canada Limited. The committee has worked with great dedication and has consulted widely within the GSC and among users of GSC output, both inside and outside the government. Their report provides important insights on how the GSC is perceived by the organizations and the people it serves. It will help us to do our job better, and when published it will help our clients and customers to know us better. Some of the recommendations in the report have already been implemented.

Shortly after the publication of the last issue of Geogram, Geoff Leech left his position as Director of the Economic Geology Division to begin his official retirement. We wish him well. The GSC is indebted to Geoff for his long and distinguished service, and I am personally indebted to him because my introduction to geological field work 30 years ago, as his field assistant, led me to change from a planned career in physics and chemistry to one in geology. Chris Findlay has replaced Geoff, and is now thoroughly involved in the mangement activities of the Economic Geology Division and of the Branch Management Committee.

Honours bestowed on members of the GSC reflect back on the GSC. We can take special pride in the recent installation of Brian Norford as Chancellor of the University of Calgary; and in the award of the Leopold von Buch Medal by the Deutsche Geologische Gesellschaft (German Geological Society), to former Director General, Digby McLaren, just prior to the completion of his term as President of the GSA.

MESSAGE DU DIRECTEUR GENERAL

Les défis immédiats auxquels fait face la CGC ont été considérablement modifiés, au cours de 1982, en raison des sérieux changements qui ont touché l'économie nationale. A la conférence concernant les lendemains, tenue il y a un an, l'attention s'est portée sur les problèmes que poserait l'accès aux renseignements et aux recommandations supplémentaires susceptibles d'être requis dans le cadre de mégaprojets imminents, notamment plusieurs projets de mise en valeur à grande échelle des ressources énergétiques et minérales. A l'heure actuelle, on s'intéresse particulièrement aux défis que posent le besoin urgent d'encourager la regénération des activités chancellantes de mise en valeur des ressources minérales et énergétiques, et la découverte des mesures susceptibles de réduire les dépenses et les revenus gouvernementaux. Le problème que présente le maintien et le recrutement du personnel professionnel face à la concurrence vigoureuse qu'exerce une industrie de l'exploration pétrolière et minière en plein essor a fait place au problème que présente la recherche des mesures requises pour assurer l'emploi, à des fins productives, du personnel spécialisé, actuellement sans travail, des industries minière et pétrolière. Il s'agit là véritablement de changements brusques dans l'ordre des priorités; cependant, les programmes scientifiques dont la réalisation au point où ils peuvent fournir le résultat attendu requiert habituellement des années, et non pas quelques mois ou quelques jours, se prêtent mal à des changements subits dans la répartition du personnel et des ressources en réponse à la modification des objectifs prévus à court terme. Néanmoins, la CGC s'est montrée apte à répondre efficacement au besoin de satisfaire aux nouvelles exigences urgentes et à court terme, tout en conservant la capacité de voir à ses engagements à long terme relatifs à la géologie canadienne. La Commission saura, une fois encore, relever le défi.

Les plus récents progrès réalisés dans le cadre des programmes scientifiques de la CGC sont particulièrement encourageants lorsqu'on les examine dans le contexte de la conjoncture économique actuelle assez sévère. L'élaboration de certaines des nouvelles initiatives identifiées comme étant les domaines d'action éventuels du secteur des sciences de la Terre se poursuit malgré la situation économique défavorable. L'initiative portant sur les "bassins sédimentaires" a été le sujet d'une réunion spéciale du Comité de gestion de la Direction en octobre. Les présentations faites à l'occasion de cette réunion provenaient de scientifiques de l'IGSP, du Centre géoscientifique de l'Atlantique, des divisions du Précambrien et de la Cordillère, et de la Direction de la physique du globe; des hauts fonctionnaires de la Direction de la physique du globe, ainsi que de l'industrie de l'exploration pétrolière, y ont également participé. Pour donner suite à cette réunion, un atelier officieux portant sur "l'analyse des bassins" aura lieu à l'IGSP en décembre, de concert avec une réunion du Comité d'examen des ressources pétrolières du ministère de l'Energie, des Mines et des Ressources qui mettra la dernière touche à l'évaluation de l'importance des activités prévues dans la zone des dépôts du Trias supérieur et du Jurassique inférieur du bassin Sverdrup. Cette réunion comportera une table ronde qui regroupera des représentants des diverses agences de la CGC et de la Direction de la physique du globe, et servira également de point de départ à la mise en oeuvre continue de nouvelles initiatives en matière d'analyse des bassins. Les nouvelles initiatives proposées relatives à la structure profonde de la croûte continentale se poursuivent à un rythme assez important, bien que modeste, par l'entremise de quelques programmes de nature coopérative entrepris par la Direction de la physique du globe et la CGC dans le Bouclier canadien; d'un programme conjoint entrepris par le Centre géoscientifique de l'Atlantique et divers organismes américains au large de la côte Est; et du Comité sur les projets d'importance majeure du Conseil canadien des sciences de la Terre qui a proposé au CNRSG et au ministère de l'Energie, des Mines et des Ressources de s'engager dans un programme conjoint d'envergure nationale appelé "Lithoprobe". Au cours de 1982, de nouvelles initiatives dans le domaine de l'étude de l'origine des dépôts minéraliers ont surtout porté sur l'étude des systèmes hydrothermiques métallifères actifs gisant en milieu marin, encouragée par les récentes découvertes sur les dépôts de sulfure hydrothermiques se manifestant sous forme d'exhalaisons sur la crête Juan de Fuca au large de l'île Vancouver. Le Groupe mixte de la CGC et de la Direction de la physique du globe prépare actuellement un atelier qui portera sur ce sujet; prévu pour 1983, il aura lieu au Centre géoscientifique du Pacifique, à Victoria. On remarque une augmentation des travaux sur les risques de nature géologique et les contraintes environnementales touchant les projets de mise en valeur dans les régions au large des côtes où l'on entrevoit prochainement entreprendre l'exploitation des ressources pétrolières et gazières.

La mise en place de nouvelles mesures visant la collaboration entre la CGC et les agences géoscientifiques provinciales est un autre progrès digne de mention. Terre-Neuve et la Nouvelle-Ecosse ont décidé de procéder à de nouveaux programmes conjoints tandis que la Colombie-Britannique, le Manitoba, l'Ontario et le Québec considèrent actuellement des initiatives semblables. Outre ces dispositions bilatérales, le Comité national des

commissions géologiques, regroupant des représentants des provinces, des territoires et de la CGC, s'avère un forum idéal pour la mise en oeuvre de projets de nature coopérative à l'échelle nationale; cette collaboration est nécessaire à l'étude coordonnée de la géologie d'un très vaste pays doté d'un faible taux de population et comptant très peu de géologues qui s'adonnent à cette tâche.

Un comité consultatif du Conseil canadien des sciences de la Terre, présidé par M. Alan Coope de la Newmont Exploration of Canada Limited, a préparé un rapport portant sur l'évaluation du rendement de la Commission géologique du Canada. Le Comité s'est voué à la tâche et, suite à une enquête auprès des membres du personnel de la CGC et de ses usagers, aussi bien à l'intérieur qu'à l'extérieur du gouvernement, a produit un rapport qui donne une appréciation utile de la façon dont la CGC est perçue par les organisations et le public qu'elle dessert. Ce rapport nous aidera à mieux accomplir notre devoir et, une fois publié, devrait aider nos clients à mieux nous connaître. Certaines des recommandations proposées dans le rapport ont déjà été mises en vigueur.

Peu après la parution de la dernière édition de Geogram, M. Geoff Lynch a quitté son poste de Directeur de la Direction de la géologie économique pour prendre sa retraite. Nous lui exprimons nos meilleurs souhaits. Nous lui sommes redevables pour les nombreuses années d'éminent service qu'il a consacrées à la CGC et je lui suis, moi-même, plus particulièrement redevable en raison du fait que je lui dois mon introduction au travail géologique sur le terrain lorsque j'ai eu l'occasion, il y a de cela 30 ans, de lui servir d'adjoint sur le terrain. Cette expérience m'a convaincu d'abandonner le domaine de la physique et de la chimie que je m'étais proposé, et de me consacrer plutôt à la géologie. M. Chris Findlay a remplacé Geoff, et s'adonne déjà énergiquement aux activités administratives de la Division de la géologie économique et du Comité de gestion de la Direction.

Les honneurs conférés aux membres de la CGC réjaillissent sur la Commission elle-même. Nous pouvons tout particulièrement être fiers de la récente installation de M. Brian Norford dans le poste de chancellier de l'Université de Calgary, et de la remise de la médaille Leopold von Buch par la Deutsche Geologische Gesellschaft (Société géologique allemande) à l'ancien Directeur général, M. Digby McLaren, juste avant que son terme à la présidence de la GSA ne prenne fin.

STAFF NEWS

DIRECTOR GENERAL'S OFFICE

Program Office

Dave Benson is the new Chief, Program Office, replacing Art M. Kelly who left earlier in the year to take up scientific duties at the Canada Centre for Remote Sensing. Dave, a former hardrock geologist, is a graduate of University of New Brunswick (B.Sc. 1951, M.Sc. 1953) and McGill (Ph.D. 1958). He joined the GSC in 1959 and, apart from one brief foray to the Arctic (Baffin Island in 1970), mapped in the Maritimes for the Appalachian Section. Dave spent 4 years (1963-67) based in Halifax and transferred from the Regional and Economic Geology Division to the Program Office in 1978.

Administrative Services

We thank Minx Lockwood for the work she did while replacing Kathy Gareau who has successfully completed her Language Training. Minx left Administrative Services and is now working for Geological Information Division. Good luck Minx and welcome back Kathy.

The Word Processing Centre said good-bye to Dawna Ramsay in August. Dawna is now working for Fisheries and Oceans. We welcome Diane Winsor who has been offered a position in the centre as a Word Processing Operator. Best wishes are extended to Susan Gagnon and Claudia Clarke who are presently on maternity leave. Christine Parkinson is a term replacement for Susan Gagnon.

A farewell to Joan Clark who left the Survey to join Administrative Services at EMR Headquarters. Joan left on August 31st and is being replaced by Randy Robinson who will be acting until the competition process is finalized.

Accounts Office

Two new faces in the Accounts Office, but first we say good-bye to André Levesque who left in June for Financial Administration Branch. André is being replaced by Randy Taylor who came to us on September 1st from Public Works Canada. Joan Potter is our new accounts clerk. Joan came from Topographic Survey, Surveys and Mapping. Welcome to Randy and Joan.

ECONOMIC GEOLOGY DIVISION

Retirement – G.B. Leech

Geoffrey B. Leech retired as Director, Economic Geology Division in July 1982. During his 10 years of stewardship, Geoff guided Economic Geology from a subdivision within the old Regional and Economic Geology Division (1972-1979) to its current status as a full Division (1979-1982).

Geoff Leech received a Ba.Sc. in geological engineering from the University of British Columbia in 1942, an M.Sc. from Queen's in 1943 and a Ph.D. in economic geology from Princeton in 1949. He joined the GSC permanent staff in 1949 after several years with Inco in Sudbury and several summer seasons as a student assistant with GSC field parties.

In his early years with the Survey, Geoff carried out classic, horse-assisted geological mapping projects in the Purcell and Rocky mountains, including a series of definitive geological and structural interpretations of the history of the southern part of the Rocky Mountain Trench. He mapped in the Fernie and Kananaskis lakes regions and conducted regional syntheses of this part of the southern Cordillera.

In the mid-1960s, Geoff turned much of his professional attention to co-ordinating and compiling a metallogenic map of Canada, as Canada's contribution to the Metallogenic Map of North America (World Metallogenic Map Commission). This work occupied much of his time until his appointment as Head, Economic Geology Subdivision in 1972. After taking on Division head duties, Geoff continued to act as the Canadian spearhead in the North American Metallogenic Map project and, working with Phillip Guild of the U.S. Geological Survey, he exerted a major influence on the direction and completion (1981) of this major collaborative project.

Geoff Leech was active in many professional associations and various and sundry committees throughout his career with the Survey. He served on committees for the Royal Society of Canada, Canadian Institute of Mining and Metallurgy, Geological Society of America, Pacific Geoscience Congress and Geological Association of Canada, just to name a few. He is a continuing member of the Committee for the Metallogenic Map of North America, the

Geoff Leech

Canadian Metallogenic Map Committee (Chairman) and the Commission for the Tectonics of Ore Deposits (International Association on the Genesis of Ore Deposits – IAGOD). He is Associate Secretary General for IAGOD. He has also served on numerous internal GSC committees.

Geoff brought a thorough knowledge of the geology of Canada, hard work, infinite patience and excellent scientific judgment to his career as a scientist and manager at the GSC. The sixth floor (Economic Geology) was indeed fortunate to have him as its leader in the not always tranquil times of the 1970s and early 1980s. Economic Geology thanks Geoff sincerely for his genuine efforts on its behalf and hopes that his face will still be a familiar sight in the sixth floor corridors in times to come.

Retirement – F.D. Anderson

One of the GSC's most colourful figures retired in December 1981, after 33 years with the Survey. Frank Anderson leaves his position as Assistant Director of the Economic Geology Division to head for the Clayton Lake area in Lanark County where, for the past few years, he has been building his new log house.

Frank grew up in the Edmundston, New Brunswick area where, among other things, he picked up a useful knowledge of French. His first work with the GSC was in 1944 and 1946 on field parties with H.C. Cooke in the Eastern Townships of Quebec. After graduating in geology-chemistry at the University of New Brunswick, Frank began his full-time career with the GSC, taking on geological studies in southwestern Alberta and northwestern Quebec. In 1951, he received his Masters degree from McGill University for work on the McDougall-Segur conglomerate in southwestern Alberta. His work in New Brunswick led to a Ph.D. from McGill in 1956 on the geology of Woodstock and Millville areas, and a GSC Memoir in 1968 on the geology of the Woodstock, Millville and Coldstream areas.

Frank moved on to greater heights (6th floor from 4th floor?) in 1972 when he took the position of Assistant Chief with the Economic Geology Subdivision. In 1979, Economic Geology became a Division, and Frank, its Assistant Director. People in the Division still marvel at Frank's mastery of the bureaucratic "ins and outs", and all are amazed by his wizardry with office equipment inventory. Perhaps like a squirrel preparing for winter, Frank is reputed to have stashed away surplus furniture in dusty, little-travelled corners throughout the building, ready to be retrieved when the inevitable need should arise. Over the years, greenhorns in the Division, unsure of how to obtain necessary materials to do their work, or even unsure of their place in the world, were always confronted and comforted with the same words: "See Frank – he'll know".

At an informal retirement luncheon given by members of the Division earlier this year, Frank was presented with a hand-carved pine wood plaque adorned with rock cut-outs in the shape of New Brunswick and Newfoundland in recognition of his work in those provinces. The particular areas in which he mapped were marked by cut sections of the appropriate rock types. Roy McLeod and his crew cut and polished the rock sections, while Richard Lancaster provided the carving.

Frank is a member of the Canadian Institute of Mining and Metallurgy and is a fellow of the Geological Association of Canada and the Geological Society of America. He was chairman of the Northeastern Section of the GSA during 1971-72.

Frank Anderson has been on part-time in Economic Geology since January 1982 to "keep things going". His expected second retirement, around Christmas, will mark the loss of one of the Survey's most likable and respected figures. We all wish him well. And we wonder if his successors will ever find that cache of office furniture.

INSTITUTE OF SEDIMENTARY AND PETROLEUM GEOLOGY, CALGARY

Incoming personnel to the ISPG over the summer months have included several research scientists, visiting scientists and technical experts, who have chosen this Institute as their place of research. The following is a short description of some of the new faces to be seen busy at their microscopes, maps, and labs in Calgary.

In August, David Blackburn joined the Coal Technology Section of the ISPG as a Postdoctoral Fellow, supported by a grant from NSERC. He works under the supervision of Alex Cameron on Tertiary lignites and subbituminous coals from Western Canada. David completed his Ph.D. in 1978 in the Department of Botany, University of Adelaide, Australia, and since then pursued postdoctoral studies in paleobotany. By studying plant materials that make up coals, he is able to reconstruct past environmental conditions, the factors influencing changes in vegetation, and the relationships between source plants and coal lithotypes.

Although not a new face to the ISPG Neil Ollerenshaw has certainly diversified his career. He left the Coal Geology Subdivision on July 2nd, 1982 to become the Head of the Geological Information Subdivision and Scientific Editor. Neil has been with the GSC since 1962, working mainly in regional studies of the structure and stratigraphy of the Alberta Foothills, and is a founding member of the ISPG. Since 1975 he has been studying the Dominion Coal Block in the Fernie Basin of southeastern British Columbia. He has first-hand experience of the geology of the Alps, Appalachians, Rocky Mountains, and orogens of the United Kingdom. He brings a lot of experience and enthusiasm to his new assignment.

Faribor Goodarzi joined the Coal Technology Section in June. His postgraduate studies (M.Sc., Ph.D.) in

Scientific Editor Neil Ollerenshaw at work in his ISPG information office.

the field of organic petrology were completed in 1975 at the University of Newcastle-upon-Tyne, England. Since then he worked as a researcher and lecturer at the university level. Most recently, he held a position in the Carbon Research Laboratories and Organic Geochemistry Unit of the University of Newcastle-upon-Tyne. He has also served as a United Nations consultant on oil and coal exploration. His principal interest has been the study of the optical properties of coals and the dispersed organic material in Lower Paleozoic strata. At present he is involved with projects that deal with the compositional character of Hat Creek coals, the mineral matter and trace element content of Canadian coal in general, and the properties of dispersed organic materials from Lower Paleozoic rocks of Canada.

Roger Macqueen, Professor of Earth Sciences, University of Waterloo, returned to ISPG in September to work with Trevor Powell on two projects: the organic geochemistry of sediment-hosted lead-zinc deposits, and on the setting, sources, and origins of Ontario's oil and gas deposits. During his sabbatical year he will also be renewing his long-standing acquaintance with Mississippian rocks of the Foothills and Rocky Mountains, partly through work with one of his graduate students, Angelo Speranza, and partly through the collaboration of Wayne Bamber of ISPG.

The Petroleum Geology Subdivision has acquired new personnel. Marcel Labonté joined the subdivision as Resource Geology Systems Manager on September 1, 1982. In his new position, he is responsible for ensuring the operation of current computer systems, the development of new systems to be added to the currently existing software and hardware, and the co-ordination of usage of these resources. He looks forward to keeping up-to-date on the evolution of computer applications in the Institute in general. Marcel's past work experience includes scientific data systems support at the Université du Québec à Rimouski (sedimentology, ecology), automated mapping for the National Capital Commission in Ottawa, research and development of communication systems for the St. Lawrence Seaway Authority, and software development in the field of aerospace engineering.

Program Analyst, David Lepard, will also be contributing his computing skills to the Petroleum Geology Subdivision. He earned his Ph.D. under H.L. Welsh as a physics student interested in High Resolution Roman Spectroscopy at the University of Toronto. His physics career has taken him from Memorial University of Newfoundland, to the Herzberg Institute of Astrophysics (NRC, Ottawa), and to Brock University in Saint Catharines, Ontario, where he was a professor of physics from 1967 to the present. Through these experiences he has developed advanced computational skills, which will certainly aid the Petroleum Group in their programs. Since July, optical fluorescence problems have "absorbed" him and he has also worked on some aspects of the X-ray system. Someone must have noticed that he is a spectroscopist!

Two scientists from the Nanjing Institute of Geology and Paleontology, Rui-Lin and Liao Zhuo-ting, are currently undertaking paleontological research projects at the Institute. Rui-Lin is studying Upper Carboniferous and Permian fusulinids of Ellesmere Island and Liao Zhuo-ting is researching Permian brachiopods of Ellesmere Island.

Tomasz Jerzykiewicz is a sedimentologist. He completed his Ph.D. in sedimentology at the Jagiellonian University, Cracow, in 1971 and was granted an associate professorship there. His main interest while completing his graduate-level studies in Poland concerned the sedimentology and mineral resources of Upper Cretaceous formations of the Sudetes Mountains (southwestern Poland). In 1971, he was sent to the Gobi Desert of Mongolia to participate in a Polish Paleontological Expedition, where he investigated the sedimentology of dinosaur-bearing formations. While an Associate Professor with the University of Wrockaw, from 1974-81, he studied copper-bearing deposits of the Fore-Sudetic Monocline (southwestern Poland), and the geology of coal-bearing Tertiary formations of central Poland. During the period 1976-77, Tomasz was a Postdoctorate Fellow at ISPG and worked with D.K. Norris and J.R. McLean on sedimentology of coal-bearing Upper Cretaceous and Lower Tertiary formations in the Coal Valley area of Alberta. Since May 1982, when he joined the Coal Geology Subdivision as a research scientist, Tomasz has been concerned with sedimentological studies of coal-bearing Upper Cretaceous and Paleocene formations of the Alberta Foothills.

Brenda Hriskevich joined the Paleontology Laboratory as a technician in August. She graduated in geology from the University of Calgary in 1982 and while a student worked as a field assistant for Neil Ollerenshaw in the southern foothills of Alberta.

Palynologist Dave McIntyre recently joined the research staff of the ISPG. After graduating from Victoria University of Wellington, he worked for the New Zealand Geological Survey for six years. Since 1965 he has been in Canada, working with several oil companies, including a recent four-year stint with Petro-Canada. After his experience in the oil patch, Dave is ready for the scientific challenges his new position offers.

A geology professor from the University of Calgary, Len Hills, is spending a large portion of his sabbatical leave at the ISPG; he is undertaking a number of projects over the next several months. One major project is the compilation of the Lexicon of Canadian Stratigraphy. Other studies involve describing fossil charophytes, from the Silurian to the present, and checking the diagnoses for indexes of chitinozoa and scolecodonts. Tertiary palynology was the subject of his Ph.D. thesis while at the University of Alberta. As a professor at the University of Calgary, Len's first Ph.D. student was ISPG palynologist Art Sweet.

Willie Williams joined the staff of the Institute in July. He transferred from the Petroleum Incentive Administration's office where he had been on staff since June of 1981. He is currently in charge of Stores. For twenty-two years he belonged to the Royal Canadian Air Force and served as a supply logistics officer in many parts of Canada, Europe, and the Middle East. Blair Davies also joined the ISPG in April of this year as a storesman. Gayle Burrows started working in Stores in May as a term employee. Both Blair and Gayle have technical backgrounds: Blair studied tool and die making at Algonquin College in Ottawa in 1980 and Gayle trained as a medical lab technologist at Calgary General Hospital in 1971.

ISPG welcomes four employees to the Word Processing Centre. Bonnie van Regen, a term employee, replaces Anita Oliver as a switchboard operator/receptionist while Anita is on maternity leave. Dannielle Beauregard replaces Margo Brown as a word processing operator. Margo is currently the Administration Officer Secretary. Ann Seif joined the word processing group in June; she replaces Earlena Ijeh, who transferred to Parks Canada. Over the summer, our favourite Jughustler and Shooter, Maria Varalta, improved her keystrokes in the centre. She is now enjoying the Australian summertime (she left in September).

Outgoing staff members included: Dennis Braman, Lou Kamenka, Parmjit Singh, Dana Frank, Ray Quarry, and Anna Thorsteinsson.

Dennis Braman undertook a detailed stratigraphic, petrographic and sedimentological study of the Jurassic-Cretaceous Husky Formation in the subsurface of the Mackenzie Delta area, in July of 1981, and completed his investigation of that area in July of this year.

Lou Kamenka has worked as a geologist for the National Coal Inventory Program since 1980, when he joined ISPG. He has been responsible for determining coal resources within the Central Plains region of Alberta. Lou is leaving the GSC to finish his Master's thesis, which deals with water quality and environmental problems associated with open-pit coal mines in the Rocky Mountains of Alberta and British Columbia. His long-term goal is to work in environmental research concerned with open-pit mine site reclamation.

Parmjit Singh, junior technician in the Organic Geochemistry Lab, left the Institute, and Mike Ferguson began working as a geochemical technician in the lab in early May.

A retirement tea in the finest ISPG tradition was held in honour of Ray Quarry, Secretary of the Paleontology Subdivision, on September 24th. Ray's public service career included several years with the Department of Indian and Northern Affairs and the Department of Veterans Affairs before transferring to the ISPG four and a half years ago. She was presented with travel accessories (she plans to visit Australia) and well wishes from everyone present.

The library lost two of its staff. Librarian Dana Frank left behind book collections and catalogue cards for a homestead in Illinois, and Anna Thorsteinsson resumed her secondary school education this fall.

Don Skibo has transferred to the Petroleum Geology Subdivision from the Petroleum Resource Appraisal Secretariat, as a member of the project team for quantitative modelling and research on hydrocarbon generation and accumulation in the Western Canada sedimentary basin. The project will follow new approaches for hydrocarbon resource assessment and quantification of the remaining conventional oil potential of Western Canada. He looks forward to learning much and to productive involvement with the analytical methodologies and models developed here at the ISPG, at the Atlantic Geoscience Centre, and also those of his former colleagues at M.I.T.

Congratulations on promotions are in order to J.R. Dietrich, Don Cook and John Brindle. J.R. Dietrich is a petroleum geophysicist who was recently promoted to a PC4 position in the Petroleum Geology Subdivision. He continues to study geophysical properties of the Beaufort-Mackenzie Basin. Don Cook and John Brindle became Senior Managers at the Institute in August.

Don Cook delivers a farewell speech to Ray Quarry on behalf of the Regional Subdivision. In the back-ground (left to right): John Wall, A.W. Norris and Mike Cecile).

RESOURCE GEOPHYSICS AND GEOCHEMISTRY DIVISION

In June, Conrad Grégoire joined the staff of the Resource Geochemistry Subdivision. Conrad received a B.Sc. in chemistry from the University of New Hampshire at Durham and an M.Sc. in analytical chemistry from the University of Manitoba. His doctoral work, in the field of atomic absorption spectrometry, was completed at Carleton University.

Since joining the Public Service in 1978, Conrad has worked as a research chemist at the Standards Laboratory (Consumer and Corporate Affairs) and at the Customs and Excise Laboratory (Revenue Canada).

Although a native of New England, Conrad is a Francophone having learned French as a first language. He was a member of a large French-speaking community in New Hampshire which emerged as a result of the large scale migration of French-Canadians to the manufacturing centres of New England early in the century.

GEOLOGICAL INFORMATION DIVISION

Pierre Debain retired on August 4, having spent more than 30 years producing or supervising the production of maps in the Cartography Section. He was one of the founders of the original compilation unit and later was a driving force in the Section's initial efforts in computer mapping. Pierre will be remembered for his outstanding knowledge of Cartography and his attention to detail. He plans to spend his new found leisure time working full-time in his graphic arts studio in Aylmer, Quebec.

August also saw our long time colleague Larry Champagne retire from his position as Storeman and "general factotum" in the Cartographic Section. Known throughout the Branch for his ability to "get things done", his willingness to tackle any job and his gregarious nature, he will be missed by his many friends and associates.

Larry and his wife "Nel" were feted at a luncheon and informal presentation, attended by a large number of the GSC staff on August 9.

We wish both Pierre and Larry many years of health and happiness.

Gordon Currie transferred from his position in Publications to the vacancy in the Cartography Section on September 27 and we wish him every success in his new job.

Gwynneth Martin, Head of the Data Systems Group which provides guidance and advice to all parts of the Branch involved in the development and application of data systems, resigned in early September to accept a position at Treasury Board where she is responsible for evaluating EDP proposals from NRC. Gwynneth joined the GSC in January 1975 as a Systems Development Officer under Bill Hutchison and for the past several years effectively directed the work of the group.

Marie-France Dufour, a graduate of Ottawa University, joined the scientific editorial staff in September where she will share with L.-E. Vincent the increasing volume of work being published in French. Marie-France worked with Terrain Sciences before joining Communications EMR where she was associated mainly with editing a variety of general purpose material for publication in French.

CORDILLERAN GEOLOGY DIVISION

Vancouver

Dirk Tempelman-Kluit returned to the Vancouver office from the Yukon where he had been since the fall of 1979 in the Whitehorse office of the Department of Indian and Northern Affairs.

Michael Force replaced Peter Dnistransky as storeman last December and was made permanent in June.

Victoria

Brian Bornhold left in mid-September for Perpignan, France, where he will spend the winter at the Centre de recherches sédimentologie marine, université de Perpignan. His work there will be concerned mainly with sedimentary studies related to glauconite. He is expected to return to Victoria next April or May.

CENTRAL LABORATORIES AND TECHNICAL SERVICES DIVISION

Staff changes since July include:

H.R. (Hal) Steacy quietly disappeared from his Seventh Floor office at the end of July, thus ending over 35 years of association with the GSC. His many contributions to the Branch, both technical and social, to the Department (the "rock garden" in front of Surveys and Mapping, for example) and to mineralogy in general, will remain both a pleasant memory and a tangible reminder of his long sojourn with us. The many cartoons that he produced so effortlessly on so many subjects will continue to remind us that life was never really as serious as it seemed at the time!

R.G. (Rick) Gordon, who was filling a term position at the Rock Collection Facility at Tunney's Pasture, was the successful candidate in September for a vacant full-time position in the Mineral Separation and Sample Preparation Unit.

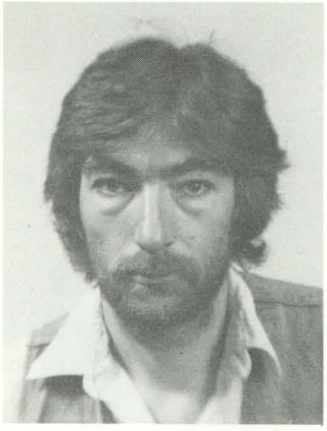
G. (Gina) M. LeCheminant came to a term position in the Mineralogy Section in July from a similar position in the Economic Geology Division.

A. (Ann) E. Darnley joined Gary Ansell in late September, to work for a specified term with the Reference Collection of the National Mineral Collection.

PRECAMBRIAN GEOLOGY DIVISION

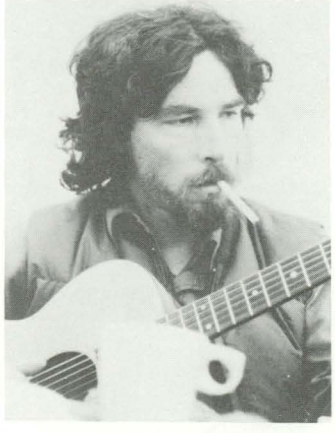
Three geologists with an interesting array of backgrounds and geological experience are welcome new additions to the Division.

Simon Hanmer graduated from the University of Wales with a B.Sc. in geology in 1973 and went on to complete a Ph.D., "Precambrian Basement in the Variscan Orogen of Southwest Finistère, France", at the University of London in 1977. He returned to France for two



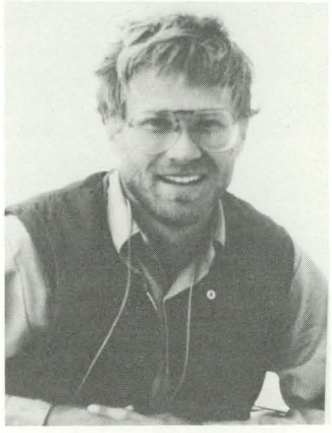
Simon Hanmer

years with a Royal Society of London Postdoctoral Fellowship to work at Rennes on the leucogranites in the Armorican Shear Zone. Having worked on Precambrian rocks in the Variscan of France he crossed the Atlantic and was able to confirm the absence of Precambrian structure in the Gander Zone of Newfoundland while holding a Killam Postdoctoral Fellowship (1979-1980) at Dalhousie University. Before joining the GSC, Simon was Assistant Professor in structural geology at Carleton University for one year. Fluent in French and English and with numerous publications to his credit, he demonstrated his ability to communicate his expertise in structural geology on the Division Field Trip this fall. Simon's future research will be concentrated in the Grenville Province with forays into the Northwest Territories to assist with structural problems there.



Bob Hildebrand

Born in Brooklyn, Massachusetts in 1949, as a young man Bob Hildebrand went west to the University of California at Santa Barbara for a Bachelor's degree in geology (1977). In 1976 he began his association with the GSC, working as a senior assistant in the Proterozoic rocks of the east arm of Great Slave Lake. Completing field accounts poses few problems for Bob; during his stay in Santa Barbara he managed two record stores in order to maintain his geology habit. His work in the Great Bear Magmatic Zone of Wopmay Orogen began in 1977. To date the results include a Ph.D. thesis from Memorial University of Newfoundland, "An Early Proterozoic Continental Arc at Great Bear Lake, N.W.T.", several papers and an A Series map. This past summer Bob began a study of the enigmatic Hottah terrane, the westernmost zone of Wopmay Orogen, but he continues to work on the rocks of the Great Bear Magmatic Zone. To balance his boundless enthusiasm for geology, Bob reads a lot of history when he isn't playing his guitar.

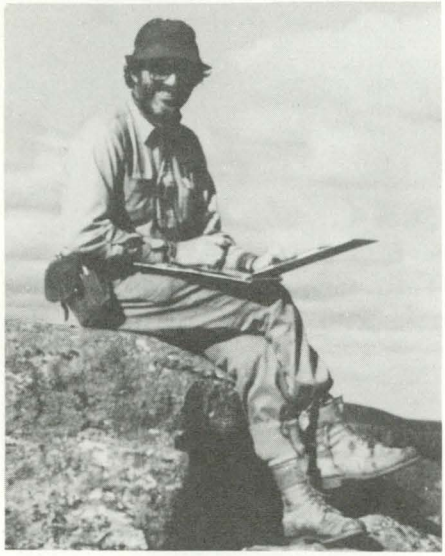


Rein Tirrul

Elliot Lake, Ontario is Rein Tirrul's home town, but he was born in Chapleau in 1953. While obtaining a B.Sc. in Geological Engineering from Queen's (1976) he worked for the GSC in the Kilohigok Basin and the Great Bear Magmatic zone. His B.Sc. thesis topic was "Gravity Differentiation of the Rainy Lake Igneous Complex, N.W.T., Canada". After graduation he worked for Watts, Griffis, and McOuat, mapping in central and eastern Iran. In 1979, with revolution beginning to interfere with geology, Rein returned to Canada to do a contract mapping job for the GSC in the northern Slave Province. With course and residence requirements at University of California at Santa Barbara taken care of, he is waiting to complete the fourth and last season of the field project in the fold-thrust belt before writing the last chapter of his Ph.D. thesis, "Structure of the Foreland of Wopmay Orogen". His publication list includes several papers on his work on Wopmay Orogen, maps of the geology of Iran and the Slave Province, and a paper on the Sirtan Suture Zone, Iran. A capitalist, Rein has an interest in tennis that borders on fanaticism (5 times a week?).

TERRAIN SCIENCES DIVISION

Denis A. St-Onge was appointed to Terrain Sciences Division in September 1982 for an initial assignment of one year under provisions of the Canada



D.A. St-Onge

Executive Interchange Program. Denis comes to the Geological Survey from his position as Professor in the Department of Geography, University of Ottawa, a position which he has held since 1980. During the previous three years Denis held the position of Vice-Dean in the School of Graduate Studies and Research at the University of Ottawa.

Denis is no stranger to the Geological Survey, having first joined its ranks in 1958 as a student assistant working in Newfoundland and during the periods 1965-68 and 1970-73 as a full-time employee. His employment during the intervening periods was with the Geographic Branch and the University of Ottawa.

His research interests are in the fields of geomorphology and Quaternary geology which he has pursued vigorously throughout his career, resulting in many publications dealing with various parts of Canada. Denis is an enthusiastic member of and participant in a number of scientific and technical societies, in particular the Royal Canadian Geographical Society. This Society recognized his scientific contributions, and his excellence as a photographer and public lecturer, by inviting him to present the annual lecture of the Society in Ottawa during May of this year. His address on historical and more contemporary exploration in Coppermine River valley and its geological history attracted capacity audiences, which fairly reflects the wisdom of the Society in asking him to make the presentation.

Denis brings to the Division his characteristic enthusiasm for his work (in both official languages) and is actively involved in pursuing his research in the Coppermine River region using, as in the past few years, the field facilities of his son Marc and Paul Hoffman. He will also assume duties as Acting Section Head for most of the Regional Projects Section thereby enabling Bob Fulton to devote more of his time to the major task of co-ordinating Divisional and national efforts in the revision of the Quaternary portion of Geology and Economic Minerals of Canada.

Stephen Evans

We welcome Stephen G. Evans to the Geomorphic Processes and Engineering Geology Section.

Steve was born in Swansea, Wales, and was bitten by the earth science bug on long walks over the Brecon Beacons (which he used to consider mountains). He graduated with a B.Sc. (Honours) in Geography from the University of London, King's College in 1969; obtained soccer colours for his goalkeeping and, while standing knee deep in mud on a coastal landslide in Dorset, decided to specialize in mass movements. He then went to the University of British Columbia as a Commonwealth Scholar and obtained his M.A. in Geography.

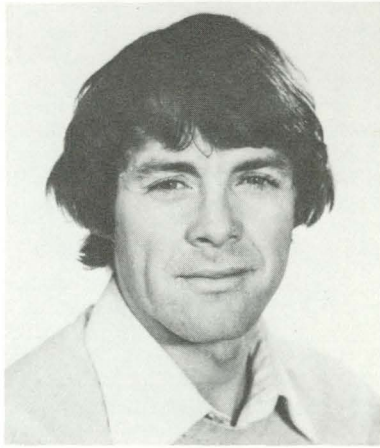
From 1971 to 1976, Steve worked for the Geotechnical Branch of the British Columbia Ministry of Highways, Victoria, specializing in pre-engineering terrain evaluation and landslide investigations for highway routes and subdivision developments, as well as being involved in a variety of slope stability studies.

Eager to refine his landslide skills, he returned to the University of London and obtained a M.Sc. in 1977 in Civil Engineering (Soil Mechanics).

He then returned to Canada to begin a Ph.D. at the Department of Geology, University of Alberta. This fall he will defend his thesis, entitled "Landslides in layered volcanic successions with reference to the Tertiary rocks of south-central British Columbia". The work involved regional landslide mapping, microstructural studies of volcaniclastic materials and their geotechnical properties, as well as the analyses of possible movement mechanisms. While at Edmonton, Steve was associated with Thurber Consultants and still found time to teach at the University.

At the GSC, Steve will continue working on the engineering geology of landslides, particularly in the Cordillera, as well as seeking general relationships in landslide behaviour that may be applied in major development planning. He is most interested in establishing the effect of geological factors on the mechanics of landslide processes and in the wider problem of the magnitude and frequency characteristics of landslide processes as a basis for slope hazard evaluation.

Steve is an avid reader and also enjoys singing, much to the chagrin of his family who flee the house when it's sing-along-with Pavarotti time.



David Sharpe

We welcome David R. Sharpe to Regional Projects Section; he joined in late June 1982 and a week later was shipped to the Arctic for five weeks. This was long enough to start a study of the Quaternary geology of southwestern Victoria Island. Upon returning to sunny climes, Dave finished up final consulting assignments and packing arrangements before moving to Ottawa in late August.

Dave comes to us after a year's experience with Hunter and Associates, environmental consultants based in Mississauga, which took him into such interesting worlds as marketing large-scale fixed-base photography to expert witness testimony. As an expert witness, he appeared in hearings dealing with the movement of potentially contaminated groundwater through Quaternary sediments – there is vital need for geologists well versed in Quaternary sedimentology to balance the viewpoint of hydrogeologists.

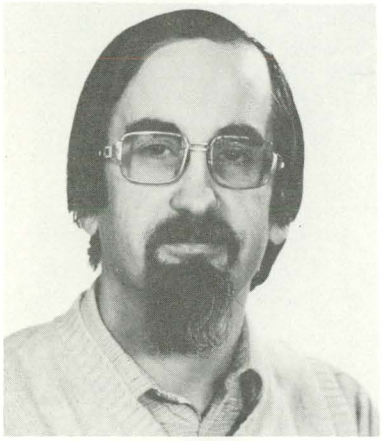
Dave started his career as a geologist, working for three years on a Precambrian mapping project of D.R. Pyke in the Timmins area where ultrabasic lava flows were first reported. In an effort to leave the swamps, Dave headed south and gained field experience in Quaternary geology with W.R. Cowan while completing his B.Sc. at the University of Toronto in 1972. From there he travelled to the University of Colorado and the Institute of Arctic and

Alpine Research (INSTAAR) where he studied Quaternary stratigraphy and worked as a Research Assistant in the sedimentology laboratory. Thesis research was carried out in the San Juan Mountains of southern Colorado on the "Flow constraints, frequency and erosional effectiveness of Alpine Mudflows".

After receiving his M.Sc. Dave joined the Ontario Department of Mines in 1974 and was assigned to mapping Quaternary geology just south of Ottawa in the Merrickville area.

In following seasons he mapped Quaternary sediments in southern Ontario between Toronto and Bruce Peninsula. This work was presented in a field trip for the combined GAC-GSA meeting in Toronto, 1978. In 1979 Dave initiated geotechnical studies in the Toronto area culminating in a field trip for the Canadian Geotechnical Society and a compilation map of Quaternary geology of Toronto and surrounding area. The new Toronto map provides a focus for local educational field trips including one organized by Dave for a meeting of exploration geologists interested in learning prospecting techniques using glacial drift.

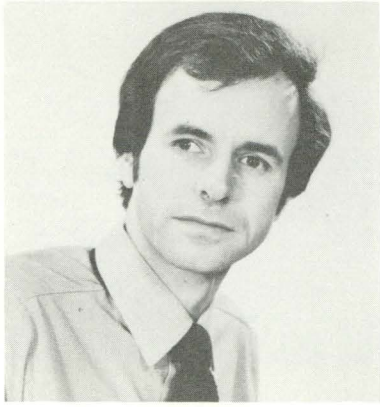
Dave is an avid participant in athletics and enjoys the facilities for sport and outdoor recreation in the Ottawa area.



Stephen Watts

Stephen Watts arrived in September to spend a sabbatical year with Terrain Sciences Division. Following the completion of his Ph.D. studies (1975) at the University of Sydney on silcrete in inland Australia, Steve returned to Canada and for the last six years he has been on the staff of the Geology Department at Sir Sandford Fleming College in Lindsay, Ontario. In 1975 he studied tors and rock weathering on Cumberland Peninsula, Baffin Island, and since 1979 he has been studying weathering phenomena and processes on Ellesmere, Coburg, and Somerset islands, supported by EMR Research Agreements and the Polar Continental Shelf Project.

During his time in Ottawa Steve is continuing work on aspects of salt weathering, making use of the SEM to examine rock surfaces. If he is not in his office (Room 504) he is apt to be hunting up obscure references in the GSC Library.



Mike Price

Michael Price arrived at Terrain Sciences Division in October for one year as part of the U.K.-Canada Public Servants Exchange Scheme.

This is not his first visit to Canada. After he received his B.Sc. (geology) at University of Birmingham in 1968 he worked with Chevron-Standard in Calgary. He returned to England where he obtained his M.Sc. (hydrogeology) from University College, London. In 1970 he joined the Institute of Geological Sciences (formed by the incorporation of the Geological Survey of Great Britain and the Museum of Practical Geology with the Overseas Geological Survey); Mike is head of the Aquifer Properties Section and his latest work has involved investigating properties of deep aquifers to assess geothermal potential.

His work has taken him to various countries – Libya, Bangladesh, Honduras – but this visit to Ottawa is the first time his family has accompanied him.

Mike is located in Room 540 and is currently investigating hydrogeological and geological aspects of the Radioactive Waste Disposal Program. He also hopes to look at hydrogeology in sediments on a regional scale, perhaps from the geothermal point of view.

OF GENERAL INTEREST

CITATION SEARCH

For the dedicated geologist the possibility of increasing his research effectiveness, while conversing with a charming librarian, is an opportunity not to be missed. This is a primer on how this happy combination may be achieved. The method is the citation search; the librarian is Judy Wilks; the place is the GSC library.

Somewhere at the end of a 'phone line' is a computer owned by the Institute of Scientific Information. Within this machine is stored the Science Citation Index*: a listing of the essential information – author, title, journal – for most scientific and technical papers and books published in the world since 1974, plus all references cited in these tracts. To keep the Index up to date requires the culling of 2600 major journals.

Suppose that someone is writing a paper where some discussion is required on, say, the sulphur isotopic composition of ocean floor basalts. Consider, further, that the imaginary pregnant author is not one of the half dozen or so specialists in this field. But he does wish to see all of the significant results published to the present. One way of doing this is to search a data base, such as GEOREF, using the keywords sulphur, isotope and basalt. However, in this writer's experience, significant papers may be missed because their listings do not include all of these keywords. Also, it is common to retrieve a large number of irrelevant articles.

The alternative approach is to make a citation search. One is usually aware of one or two important papers in the field. Judy, using her terminal, will ask the computer to search for all the papers published to date that cite either of these two articles. This listing, together with the reference lists of the most recent papers retrieved, will usually give a near 100% recovery of relevant articles, with a minimum of unrelated papers. Searches may also be made for papers citing any of the works of a given author or for a listing of all papers by an author prominent in the field of interest. However, these are usually less effective than the method first described in this paragraph.

Finally, two other uses of the citation search may be mentioned. The interested geologist may search for all of the recent papers that cite his work to discover how useful this has been. Perhaps of greater significance is that his masters may also make the same search.

Eion Cameron

* The library will soon have access to a new ISI database, GeoSciTech, which has similar capabilities but covers geoscience literature exclusively.

COAL TRIP TO CROWSNEST PASS

A busload of ISPG support staff accompanied by scientists Don Norris, Alex Cameron, Dave Gibson, and Dave Hughes set out on August 28th, 1982 at 8 a.m. for the Crowsnest Pass area of Alberta and British Columbia, to learn a little about the structure of the Cordillera and the characteristics of coals found in the Coleman-Sparwood-Fernie area. Mississippian, Jurassic and Cretaceous Systems were described and formations such as the Exshaw, Banff, and Livingstone and groups such as the Fairholme, Rundle, Rocky Mountain, and Kootenay were discussed at various roadstops south and west of Calgary.

Spirits were high and the weather was co-operative for most of the two-day field trip. Features like the Lewis Fault, which, we were told, could be traced from northwestern Montana to Banff, were to be seen along the route.

The first day was spent travelling southward past Turner Valley and the Sheep Creek gas seep, where burning gas was quite spectacular. The discovery of the seep led to the exploitation of the Turner Valley gas/oil field, which is relatively uneconomic at present. Folding and thrust-faulting were features identified as important to the discovery of particular oil and gas fields. The structural characteristics of the Savanna Creek gas field were discussed and we learned that the McConnell Thrust and the Livingstone Thrust frame the hydrocarbon setting of that field.

As the bus headed towards the Cordillera and ever westward, the coal-bearing potential of the Jurassic-Cretaceous Kootenay Group was emphasized. The group stayed overnight at the Anco Hotel in Fernie, and after an enjoyable meal, a number of people set out to explore the town while others gathered with D.K. Norris to take a look at the night sky. As binoculars were set up on a country road outside the town, we were told to keep an eye out for Comet Austin, a faint object expected to streak across the sky. Although the sky was fairly clear and the view relatively unobstructed by light pollution from Fernie, it was not possible to track Austin. Several orbiting satellites could be seen, however, as well as a number of faint galaxies, especially Andromeda, so that the effort of going out that evening was worthwhile and the crowd that had gathered to hear Don speak on astronomy and observation techniques appreciated his efforts.

The next day was spent learning about coal mining operations. Senior Mine Geologist of the Byron Creek Collieries Ltd., Alan Beavan, gave us a tour of that mining operation. The coal seams at the Coal Mountain site have been mined both above and below ground since 1908. The present plant was developed in 1978, when a contract was signed to provide Ontario Hydro with cleaned and processed coal. At present, 1.1 million tonnes per year are mined, of which 750 000 tonnes is contracted by Ontario Hydro. The remainder is transported to the west coast for export to Korea. A visit to the No. 11 north ridge pit exposed the group to footwall rocks of the Moose Mountain Member and huge, thick seams of deformed, sheared coals which, we were told, had a 14-30% ash content. Open pit mining there is a truck and load operation whereby front-end loaders with 5 or 6 cubic foot buckets attached to them remove coal from the surface. We saw seams 45-60 m (150-200 feet) thick of good quality thermal coal. The coal is trucked from the pit to a breaker where it is screened and cleaned. Another operation is located at Tent Mountain and is now a good example of reclamation work.

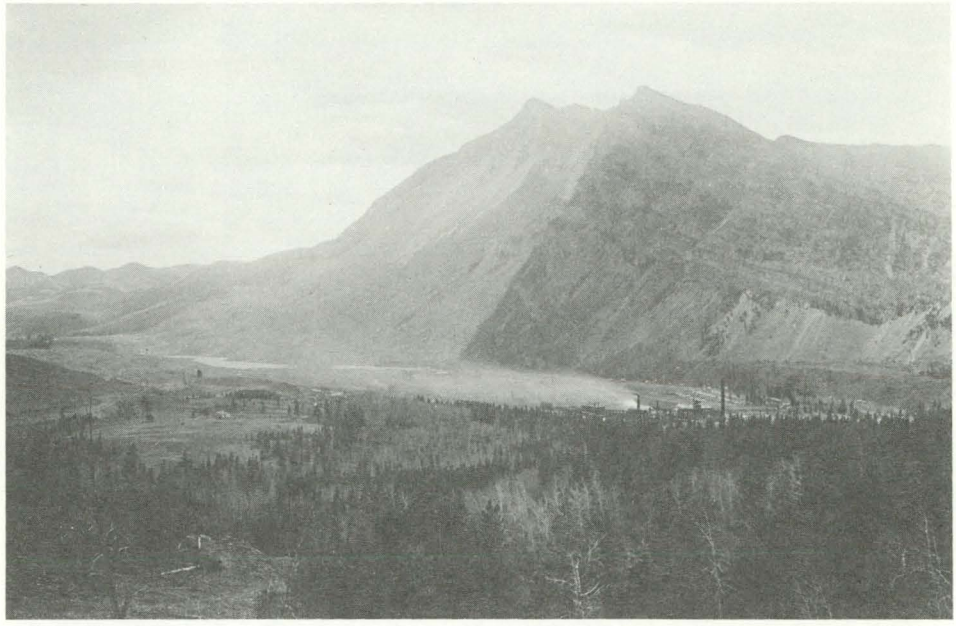
Alex Cameron and Dave Hughes described the Kootenay coals at Coal Mountain and discussed their classification, reflectance characteristics, and thermal qualities. Don Norris and Dave Gibson answered questions concerning

ISPG support staff and group leaders stop at Quirk Creek to hear Don Norris speak about the Turner Valley Anticline.

The ISPG group gathers at the No. 11 pit (Mammoth Seam) on Coal Mountain. Some of the participants (front row, from left to right): Paul Wong, Glen Edwards, Len Wardle, Brian Ortman, Bryan Rutley, Barbara Fischer, Bill Sharman, D.K. Norris, Gideon Smith.

the coals and fossils. They defined rank as the degree of metamorphism of coals and stressed the importance of knowing rank for the determination of industrial uses (according to ASTM standards). The Tent Mountain coals are medium-volatile, have a 0.16% sulphur content, and make good coking coals. Alex pointed out that although there are Kootenay exposures in Alberta and British Columbia, the B.C. exposures are the only ones currently being exploited. He described the maceral content of coals – the building blocks of coaly material: vitrinite, liptinite, and inertinite – and the organic environmental setting for coal deposition. The glassy bands in the samples picked up from the coal walls were made up of vitrinite, while the duller layers had increased proportions of liptinites and fusinites. For many of the support staff, this was their first "hands on" experience with unprocessed coal. Alex described the blends of macerals that make up a good coking coal (a blend of "reactive" vitrinite and exinite with "inert" materials such as some fusinite). Large amounts of fusinite, however, are not desirable in combustion coals (used in electric power generation, for example). He also described the different types of coals, from anthracite in Canmore to subbituminous coals in the Fernie Basin, which could be identified in the field trip region.

Other highlights of the excursion included a look at Crowsnest volcanics at Star Creek and a close-up on-site examination of blairmorite, the rock used to set the international standard for the lower limit of the upper Cretaceous at 100 million years.



The Frank Slide

Before returning to Calgary the bus stopped briefly at the site of the Frank Slide of April 29, 1903. At 4:10 a.m. that day, a mass of Livingstone Limestone, 640 m (2100 feet) high, 915 m (3000 feet) wide, and 150 m (500 feet) thick, in total 90 million tons of rock, fell 1.6 km (one mile) to devastate part of the town of Frank. We were impressed by the sheer weight and movement of that amount of rock.

Another stimulating field trip had been shared by the ISPG staff who arrived later that Sunday evening in Calgary, armed with samples of coal, fossil plants, blairmorite and, of course, with very dirty hands!

Lynn Machan-Gorham

ECONOMIC GEOLOGIST IN BRAZIL

Ralph Thorpe of the Economic Geology Division was in Brazil in September, attending the International Symposium on Archean and Early Proterozoic Geological Evolution and Metallogenesis. He participated in a well organized, pre-conference field excursion in Bahia State to the major Caraiba copper deposits in granulite facies rocks, including Archean evaporitic anhydrite. Two chromite districts, Jacurici Valley and Campo Formoso in ultramafic complexes that are in areas of highly metamorphosed rocks, were also examined.

A paper on "Lead Isotope Evidence Regarding Archean and Proterozoic Metallogeny in Canada" was presented at the symposium and another on "Mineral Deposits of the Canadian Shield" was presented in Belo Horizonte, in Minas Gerais State, to the regional division of the Brazilian Geological Society. The latter talk was especially well attended and received. Ralph managed to do some field work on gold deposits and to visit a major iron mine in the Belo Horizonte area before returning home.

IMA MEETING – BULGARIA

The 13th General Meeting of the International Mineralogical Association was held in Druzhba, Bulgaria, September 19th-25th, 1982. Druzhba is a small resort about 8 km from Varna on the Black Sea. In general the organizational aspects of the meeting left much to be desired. Russian and English were the official languages and of the 295 papers, 128 were in Russian – although the majority of the Soviet papers were cancelled. The IMA meets every two years with each second meeting held jointly with the IGC. However, due to organizational problems, the IMA has decided not to meet with the 1984 IGC in Moscow.

D.C. Harris

ASSOCIATION OF EXPLORATION GEOCHEMISTS – DISTINGUISHED SERVICE AWARD

In May 1982, at the 9th International Geochemical Exploration Symposium, Eion M. Cameron was presented an award for distinguished service to the Association of Exploration Geochemists. Eion was one of the founding members of the association in 1970 and an early member of the council and executive. The membership has now grown to 800 in 60 countries.

In 1971 Eion founded the journal of Geochemical Exploration, published jointly by the Association and the Elsevier Publishing Company and he continues to be its editor-in-chief. This journal has quickly grown to have the most paid subscriptions of any of Elsevier's 35 or so Earth Science Journals.

BRAZILIAN VISITOR TO ECONOMIC GEOLOGY

Maria Helena Taira Oguino, of the Brazilian National Department of Mineral Production (DNPM), recently spent one month with the Mineral Data Bank to study our methods of handling mineral resource data. A geologist, she has become involved with mineral resource inventory files in Brazil, and wanted to have a good look at CANMINDEX and related mineral deposit files used in the Economic Geology Division. She left with considerable information and seemed impressed by the Survey's capabilities in this field.

THE BOOK PEOPLE

What's a library? It's a place where they keep books, right? Wrong! In today's jargon, libraries retrieve and disseminate information and library workers are the gatekeepers of that information. In plain English this means that we are in the business of seeing that you get the information (data or documents) that you need to carry out your work. For your information, here's a list of the library's gatekeepers and a description of their functions. The year each person joined the GSC is shown.

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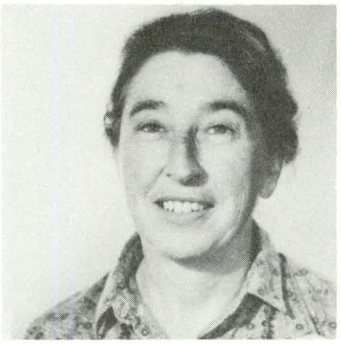
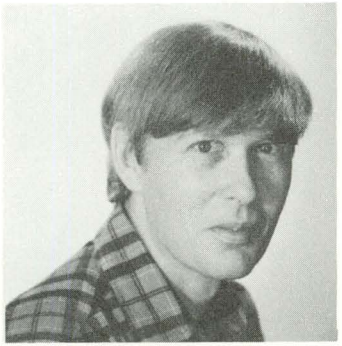
2. 

3. 

4. 

1. Annette Bourgeois (1977)

Annette is Head of Library Services and she tries to improve services by upgrading the library support systems and by implementing automated systems to better meet user needs.

2. Liz Frebold (1977)

Directs the Information Services activities of the Library, including circulation, reference, interlibrary loan, on-line searching, CAN/SDI current awareness service, book selection, and the Map, Open File and Central Technical File Collections.

3. Doug Tedford (1977)

In charge temporarily of Reference and Circulation, his main occupation is Interlibrary Loan. He borrows books we don't have from other libraries to fill requests from GSC personnel. A 98% success rate!

4. Rosemary Swan (1981)

Librarian in charge of reference and circulation is on Maternity Leave until March 1983.

5. Mike Foster (1975)

Mike is our official greeter who mans the circulation desk and supervises the photocopying operation.

12. Samuel O. Alexander (1981)

Sam oversees the Technical Services Department of the Library. He was appointed as the Head in July 1981. Responsible for purchasing and cataloguing of books, serials and other items for the Library, this unit also administers a healthy international exchange of publications.

13. Le'Anne Frieday (1977)

Le'Anne works in the Technical Services Department as Head of the Library's Automated Support Systems. She is involved in all aspects of automated cataloguing, using the University of Toronto Library Automation System (UTLAS). It is this system which produces the Library's microfiche catalogue, replacing the old card catalogue, as well as the newly streamlined Accessions List.

14. Eleanor Smith (1971)

Eleanor orders the books and periodicals and arranges for payment.

15. Eva Klobouk (1982)

Eva, a geology-paleontology specialist, catalogues, classifies and codes newly acquired library material written in a variety of languages.

16. Rosemarie Pleasant (1976)

Rose has been working in the library for 6 years. She is in charge of the Kardex, and does the weekly display of new books and periodicals.

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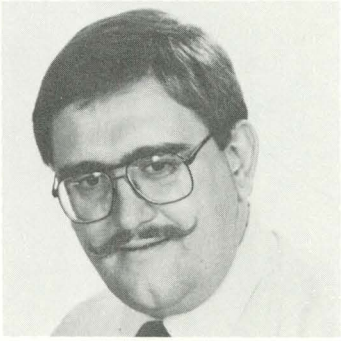
17. 

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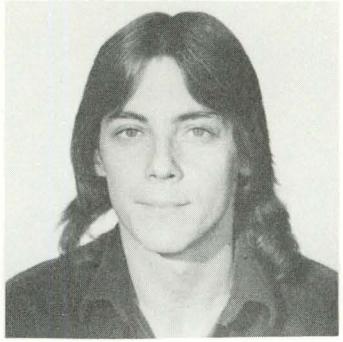

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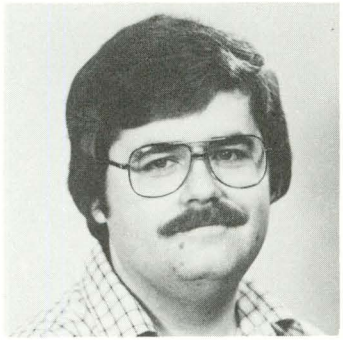

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6. Gary Conners (1982)

Gary photocopies articles from books and periodicals.

7. Judith Wilks (1980)

Judy is the librarian responsible for the current awareness CAN/SDI service and on-line computer searches. She also answers questions at the Information desk.

8. Tara Naraynsingh (1979)

Tara is responsible for the development and organization of the Map Collection as well as the provision of map library reference services.

9. Irene Kumar (1982)

Irene is the library technician in the Map Library, assisting the librarian in all map library functions.

10. Pam Strachan (1982)

Pam is with us temporarily as Interlibrary Loans Officer.

11. David Roadhouse (1976)

David shelves books and maintains the stacks, retrieves and sends out material on interlibrary loans, as well as ordering library supplies and maintaining the micro-fiche/film equipment.

17. David Reade (1981)

David is Head of the National GEOSCAN Centre, a section of the GSC Library established in November 1981. GEOSCAN is a bibliographic data base covering Canadian geoscience documents and it is co-operatively produced through the indexing contributions of ten federal and provincial geoscience agencies.

18. Wendy Stark (1980)

Wendy is Projects Librarian and as such performs a variety of functions, including compiling the GSC publications index which appears at one or two year intervals. Recently Wendy has been helping out in the National GEOSCAN Centre.

19. Minx Lockwood (1982)

Minx is a recent addition to the staff of the National GEOSCAN Centre where she performs a wide variety of secretarial and clerical duties including operation of the electronic mail system on the HP3000 and the MICOM 2001E word processing system. Prior to her arrival at the National GEOSCAN Centre, Minx worked in the Administrative and Finance Section and the IUGS group in the GSC.

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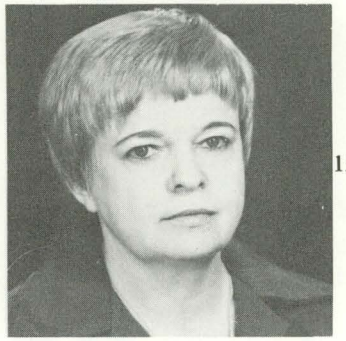

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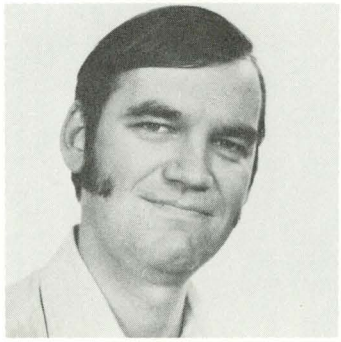

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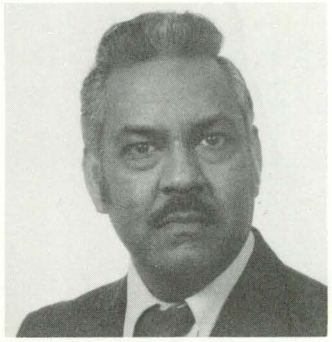


CHINESE GEOLOGISTS VISIT GREENSTONE BELTS AND TANTALUM DEPOSITS IN CANADA

During October, the Economic Geology Division hosted two delegations from the Ministry of Geology and Mineral Resources of the People's Republic of China. The first group, interested in the geology and mineral deposits of greenstone belts in the Canadian Shield, visited from October 7 to 26. This group was headed by Shen Baofeng, a metallogenist and Director of the Tianjin Institute of Geology and Mineral Resources, and included two petrologists and a structural geologist.

Following their arrival in Ottawa, the group was briefed on the geology and metallogeny of greenstone belts by John Percival, Jim Franklin, Don Sangster, Ralph Thorpe, Gordon Gross and Roger Eckstrand. Don Cranstone of the Mineral Policy Sector discussed exploration trends and discovery success in greenstone belts. The group then left Ottawa on October 9 for a two-week tour of three Archean greenstone belts and visits to 11 active and former producers of iron, gold, copper, zinc, and nickel.

The field tour started in northwestern Ontario where the group examined the geology of the Red Lake greenstone belt and the English River gneiss belt, guided by Jim Franklin and by Marcel Durocher of the Ontario Ministry of Natural

The Chinese greenstone belt delegation, left to right: Wang Wei, interpreter, Chinese Academy of Geological Sciences, Beijing; Shen Baofeng, Tianjin Institute of Geology and Mineral Resources; Zhu Kai, Ministry of Geology and Mineral Resources, Beijing; Lin Baoqin, Shenyang Institute of Geology and Mineral Resources; and Zhang Shouguang, Chinese Academy of Geological Sciences, Beijing.

The Chinese tantalum deposits delegation with their Canadian hosts in the Bernic Lake area, Manitoba, left to right: Richard Lancaster, GSC; Tu Huiliang, Ministry of Geology and Mineral Resources, Beijing; Dave Trueman, Tantalum Mining Corporation of Canada Limited; Xiong Changliang, interpreter, Ministry of Geology and Mineral Resources, Beijing; Dong Hejin, Geological Survey of Hunan Province; Petr Cerny, University of Manitoba; Xie Yanbao, Geological Survey of Guangdong Province; Qiu Nianming, Geological Survey of Fujien Province; and Joseph Liu, interpreter, Secretary of State.

Resources. The group also visited the Dickenson gold mine in Balmertown and the Griffith iron mine in Ear Falls.

The tour then moved east to the Beardmore-Geraldton area for a one-day examination of iron formation, including a visit to the Pan-Continental gold mill at Beardmore. This portion of the tour was led by John Mason of the Ontario Geological Survey. This was followed by a visit to the Geco copper-zinc mine at Manitouwadge where surface and underground tours were guided by the mine staff.

The delegation was greatly interested in the exploration for and development of iron resources and visited the Sir James, Lucey and McLeod iron mines at Wawa under the guidance of the various mine staffs and Roy McLeod. The group then headed to Timmins for surface tours of ultramafic flows in Munro Township and nickel occurrences, led by Roger Eckstrand, and an underground tour of the Dome gold mine.

At Noranda, Leopold Gélinas of the Université de Montréal, Harold Gibson and Dave Watkins of Corporation Falconbridge Copper, and Don Sangster provided two days of detailed and interesting tours and discussions of the felsic volcanic pile and associated mineralization in the area. From Noranda, the group moved into the Kirkland Lake-Larder Lake area for a two-day tour led by Larry Jensen of the Ontario Geological Survey and John Kerswill. Included in the Kirkland Lake area tour was a visit to the Adams iron mine.

The field portion of the trip concluded with a one-day tour of the Sudbury area provided by Walter Peredery of INCO.

After their return to Ottawa following the field trips, Shen Baofeng and Zhu Kai presented talks to GSC personnel on aspects of the Precambrian in China and on organization of geoscientific studies in China. Before they departed, Ken Card provided the delegation with a detailed discussion on the geology of the Sudbury area.

Throughout their visit the delegation was accompanied by Wang Wei, a translator attached to the Chinese Academy of Geological Sciences. Wan Liang-guo, a visiting scientist with the Economic Geology Division, also provided excellent translation and other technical services. Steve Green rendered very capable technical assistance and guidance, particularly during the field trip portion of the tour.

The second delegation, whose interest focused on tantalum and niobium deposits, visited from October 10 to 22. This group was headed by Dong Hejin of the Geological Survey of Hunan Province and included two other geologists who are actively involved in exploration for such deposits in other provinces in southeast China. The two other members of the delegation were a geologist and a translator, both from the Ministry of Geology and Mineral Resources in Beijing.

In Ottawa, scientific and technical briefing on the geology of Canadian tantalum and niobium deposits was provided by Ken Dawson (the elder), Stu Roscoe and Tony Davidson. Dave Fong of the Mineral Policy Sector presented a comprehensive review of world tantalum development, marketing and outlook.

The field tour began in the Chicoutimi area, Quebec, with an underground visit to the Niobec mine, led by mine geologist Eddy Dénommé, and a surface tour of the Crevier deposit, led by Gilles Gagnon and Jean Gilbert of SOQUEM. This was followed by very interesting tours and detailed presentations on the geology of the Tanco mine and pegmatite occurrences in the Bernic Lake area, Manitoba, guided by Petr Cerny of the University of Manitoba and Dave Trueman, Tantalum Mining Corporation of Canada Limited. A one-day tour of the abandoned Oka mine near Montreal was led by Guy Perrault of Ecole Polytechnique. GSC guides during the field tours were Dave Sinclair, Leo-Paul Tremblay and Richard Lancaster. Joseph Liu, an interpreter provided by the Secretary of State Department, rendered expert translation services.

Debriefing sessions in Ottawa after the field tour included an informative presentation by Tu Huiliang on tantalum deposits in China.

Fruitful discussions were also held with the members of both delegations concerning proposals for return visits to China. One proposal is to visit tungsten and tin deposits in southeast China and the second is to visit sedimentary copper deposits in Yunnan Province and nickel-copper and volcanogenic massive sulphide deposits in Gansu Province. Both delegations appeared to be very pleased with their tours here and were enthusiastic about receiving Canadian delegations. The prospects for useful scientific exchanges with the People's Republic of China with respect to mineral deposits appear to be excellent.

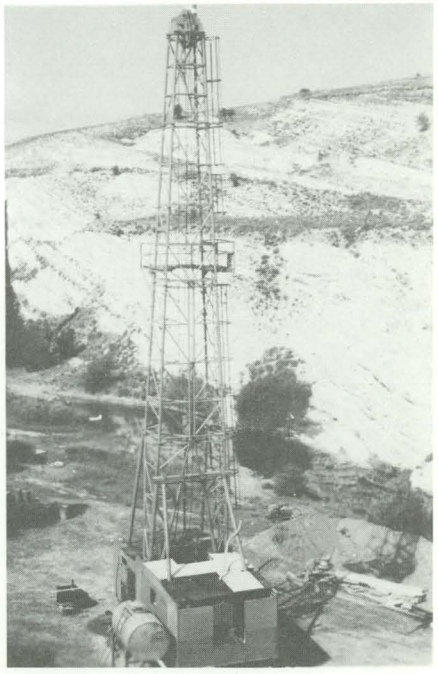
Dave Sinclair
Steven Green

CYPRUS DRILLING PROJECT

The drilling of an ophiolite complex in Cyprus may at first sight seem to have little bearing on the geology of Canada yet Canadian participation, both financial and scientific, in just such a project is currently in progress. Several Canadian universities and the GSC are involved in various aspects of this work which it is hoped will throw light on geological problems of universal interest.

Ophiolites are a particular sequence of rocks, found repeatedly throughout the world, which are widely accepted as slices of oceanic crust emplaced at the surface of the earth. The four major components of a typical ophiolite sequence in descending order are: 1) an assemblage of pillow lavas analogous to the ocean floor, 2) a zone of continuous dyke swarms corresponding to the theoretical accretion zone that is assumed to spread away from mid-ocean ridges, 3) a plutonic layer equivalent to the magma chambers that are postulated to underlie the mid-ocean ridges, and 4) a deformed ultramafic rock of composition and structure corresponding exactly to that proposed for the upper mantle. If the analogy is correct it means that problems relating to development of ocean floor are much cheaper and easier to investigate in ophiolites on land than from drilling oceanic crust in place from ships. From this point of view, then, an ophiolite is a poor man's oceanic crust but in addition affords a much broader scope for investigation. The Troodos Complex in Cyprus, one of the best preserved ophiolites in the world and easily accessible, hence, is the object of the current study.

The International Crustal Research Drilling Group (ICRDG) is responsible for undertaking the Cyprus Project. It is an informal association of earth scientists from eight countries bound by a common



Drill site on the Akaki River. Chalks in background overlie upper pillow lavas of the Troodos ophiolite.

interest in oceanic geology. Its current Chairman, Jim Hall of Dalhousie University, was one of its founders and has been a guiding hand in a number of previous projects, the most ambitious of which was a 2 km drillhole in eastern Iceland in 1978. The present project is under the immediate direction of Paul Robinson of University of California, Riverside, but currently at Dalhousie on a senior fellowship. Funding is from a number of sources: NERC in the United Kingdom; the Geological Survey Department, Cyprus; NRC in Denmark; the Volkswagen Foundation in Germany; and NSERC and IRDC in Canada. The IRDC (International Research Development Centre) contribution adds a novel feature to the project in the form of a training program for geologists from third world countries where similar rocks are known or can be expected to be found. Three groups of trainees were brought to Cyprus for 2-month sessions where they attended lectures, field trips, and took part in investigations. Some of them will continue their investigations for a further 2 months in the coming year in the home laboratories of their Cyprus collaborators.

Drilling began in April 1982 from the top of the ophiolite sequence with a view to first penetrating the pillow lava succession. Regretably severe caving forced abandonment of the hole at a depth of about 500 m, but it is to be continued later from a lower level in the sequence. Next the drill was moved to one of the numerous copper orebodies developed within the pillow lavas and two holes were drilled during the summer and fall to investigate the relationships of the ores to the volcanic processes responsible for the lavas. Currently, drilling is underway from the base of the dyke zone into the plutonic layer. It is hoped that with 2 km of drilling budgeted for this hole will reach the base of the layer. The drilling is being done by Bradley Brothers of Noranda who were also employed in previous ICRDG projects in Iceland and the Azores.

Why is the project of interest to Canada? In general terms because we share with the rest of the scientific world a keen interest in learning more about the tectonic processes that have built and shaped our lands. The results from Cyprus have direct application to our own less well-preserved ophiolites in the Appalachians and Cordillera. Finally, ore deposits of Cyprus have close analogues in many of the volcanogenic ore deposits of Canada but are less deformed, more directly linked to the tectonic environment, and more amenable to study. Taking part in the Cyprus Project are a number of people from the GSC: John Lydon of Economic Geology, Eion Cameron and Gordon Bernius of Geophysics and Geochemistry, and Maurice Lambert and Bob Baragar of Precambrian.

Bob Baragar

WORKSHOP ON HYDROCARBON OCCURRENCES IN CARBONATE ROCKS

Lubomir Jansa of the Eastern Petroleum Geology Subdivision of AGC attended this workshop which was held in Surabaya, on the island of Java in Indonesia, between the 2nd and 8th of August, 1982.

The meeting was organized by the Asian Council on Petroleum (ASCOPE) and by the Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP). ASCOPE is a regional organization whose members, the heads of the national oil companies or national oil agencies of Indonesia, Malaysia, the Philippines, Singapore and Thailand, with the exception of Singapore, are actively carrying out exploration and production activities in southeast Asia. CCOP is an intergovernmental organization, member states of which are China, Indonesia, Japan, Kampuchea, Republic of Korea, Malaysia, Papua New Guinea, the Philippines, Singapore, Thailand, the Trust Territory of the Pacific Islands and the Socialist Republic of Vietnam. The organization is supported by the United Nations Development Programme and has as one of its immediate objectives the assessment of hydrocarbon resources beneath the marine shelves and adjacent oceanic areas of East Asia. Lubomir, who was invited to attend the meeting, had all his expenses paid by ASCOPE/CCOP.

Sixty-two geologists, chiefly from East Asia, participated in the workshop which was well organized and on a professional par with any Penrose Conference. The importance of carbonate rocks as exploration targets for hydrocarbons has been recognized in East Asia, where carbonate deposition is present on both passive and active continental margins. Although the workshop demonstrated that modern seismic methods are successful in delineation of subsurface reefs, the prediction of porosity and reservoir trends remains the major obstacle in exploration. Another complication is the severe micritization of the southeast Asian reefs which can obliterate them into a pile of micrite, decreasing their reservoir capability, and causing their eventual disappearance.

Lubomir, who gave two papers at the workshop, suggested that a specialized workshop related to reefs and their role in oil exploration in southeast Asia should be organized. He also stressed the need for establishing national core repositories similar to the Canadian system adopted by the Canada Oil and Gas Lands Administration and the GSC for the storage of materials from exploration wells. While in Java, Lubomir found time to climb an active volcano to study volcanic features that may be similar to those on buried volcanoes on the Scotian Shelf, and participated in a one-day field trip to the living reefs in Jakarta Bay.

MINERAL SURVEY COMPLETED IN BRAZIL

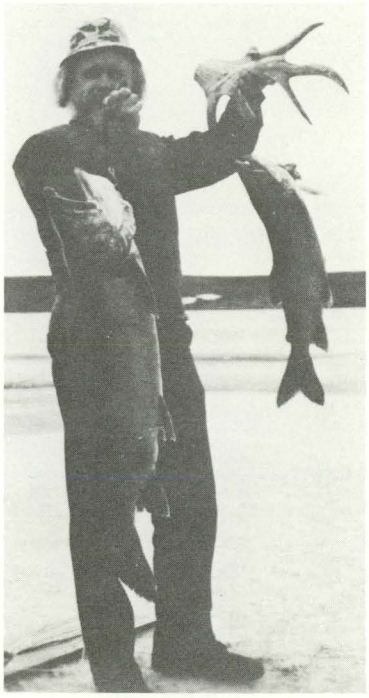
The most important geophysical and geochemical study ever carried out in Brazil – in the opinion of the nation's National Department of Mineral Production – has just been completed.

The final disbursement for the project, which was financed with the help of a Canadian dollar loan of 4.4 million, approved by the Bank in 1973 from the Canadian Fund, was made in May 1982.

The project, to which the Canadian International Development Agency contributed also, was carried out jointly by Brazil and the Geological Survey of Canada.

BIOLOGICAL ANOMALY FOUND DURING GEOCHEMICAL SURVEY

During a joint GSC-INCO hydro-geochemical survey northwest of Baker Lake in spring 1982 a large biological anomaly was encountered. Early indications were that the anomaly was due to trout. But follow up tests suggested that it could have been due to arctic char or a variety of land-locked salmon. From tests with a variety of taste buds a unanimous conclusion was finally reached: the samples provided a unique experience not to be equaled in latitudes south of sixty.

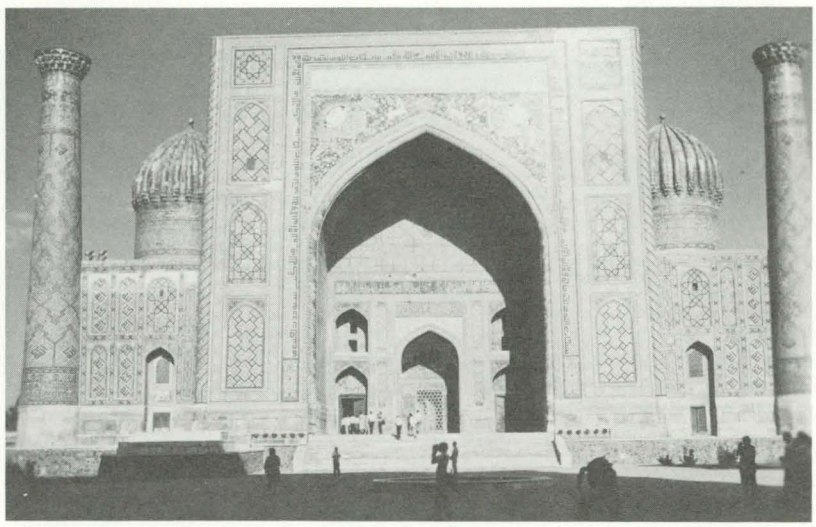


Biological Anomaly

The results of the study provide basic geophysical and geochemical data which will be of great value in locating mineral resources in the west-central part of the country, including parts of the states of Goias, Para, Mato Grosso, and Maranhao. Activities carried out included aerial surveys, geophysical, geological and geochemical analyses, and the preparation of maps and reports. In addition, a Brazilian aircraft was equipped with the latest geophysical mapping resources, and technicians were trained.

Actual work on the project was initiated in 1975, and the first data results were obtained two years later. In the ensuing five years the region has become the section of the country where the greatest number of mineral prospecting concessions have been extended.

(from Inter-American Development Bank Newsletter, September 1982)

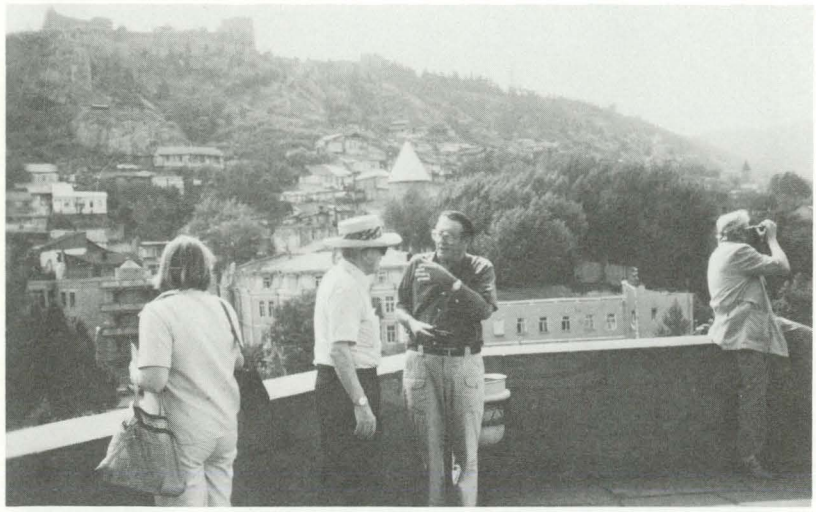


Mosque Bibi Khanym, Registan Square, Samarkand.

IAGOD SYMPOSIUM, U.S.S.R.

The 6th Symposium of the International Association for the Genesis of Ore Deposits (IAGOD), held in Tbilisi, U.S.S.R., was attended by Wayne Goodfellow and Bob Boyle of the Resource Geophysics and Geochemistry Division. During the symposium, which ran from 6-12 September, over 350 papers were given on topics as diverse as ore-forming hydrothermal systems, relationships between ore formation and granitic magmatism, and mathematical methods in studying ore deposits. Working groups and commissions also dealt with the following subjects: tectonics and ore deposits; paragenesis; ore-forming fluid inclusions; skarn deposits; genesis of ore deposits as a base for exploration; experimental petrology, and manganese deposits. Two papers were given by Wayne Goodfellow: one on the geochemistry and origin of the Howard's Pass (XY) Zn-Pb Deposit, Yukon, and the other on wall-rock alteration associated with the Brunswick No. 12 Zn-Pb-Cu massive sulphide deposit, New Brunswick. Abstracts of all papers were published in English and Russian, and all oral presentations were simultaneously translated.

Tbilisi, the capital of Georgia, situated between the Caspian and Black Sea, proved to be an excellent city to host this symposium which was held in a modern downtown convention centre. The old town of Tbilisi is dominated by a castle built in the fourth century. Approximately 1000 geologists attended this conference, 75 per cent of whom came from the U.S.S.R. or eastern European countries. In general, the papers given provided a valuable cross-section of the types of studies now being conducted in the U.S.S.R. Of particular interest was the widespread use of primary haloes surrounding different types of deposits in the exploration for mineralization buried and concealed at depth. The exploration methodologies employed in the U.S.S.R. are perhaps more integrated and systematic than in the west. Furthermore, explorationists in the U.S.S.R. appear more willing to drill what are often deep and costly drillholes. The drawback to this approach is that often more work is carried out in a given area than is justified by its mineral potential.



Bob Boyle (third from left) talking to John Ridge (U.S.A.), Tbilisi, U.S.S.R.

Field trips to various deposits were offered prior to and after the symposium. Field trip C-2 included visits to four mineral deposits situated in Uzbekistan, located in the central part of Soviet Central Asia, characterized by deserts, foothills, the Tien Shan Mountains and intermontane depressions. To reach some deposits, we travelled through barren yet beautiful arid plateaus that centuries ago supported pine forests. Uncontrolled deforestation has turned the area into windswept sparsely grassed plains where only goats and sheep now roam. This area has a rich history having been conquered by Cyrus the Persian, Alexander the Great, Arabs, Turks, Genghis Kahn, Tamerlane (Timur the Lame) and finally Russians only 100 years ago. The oasis of Samarkand lies in the valley of the Zeravshan River. In Uzbek, Zeravshan means "bestower of gold". According to early writing, Samarkand was founded in 329 B.C. (about the time of Rome) although legend puts the city at about 5000 years old. During the 14th century, Tamerlane built several large mosques which have been restored to their original beauty. Tashkent, on the other hand, was destroyed almost completely by an earthquake in 1966, and then rebuilt into a modern city.

The core of the Tien Shan Mountains of Uzbekistan comprises Precambrian and Paleozoic formations which are overlapped by Mesozoic and Cenozoic sediments within foredeeps and

intermontane depressions. Volcanic-plutonic belts extend along the boundaries of the mountains. These rocks have been tectonically deformed during the Caledonian, Variscan and Alpine orogenic events.

The first reliable record of silver and lead mining are provided by Arabic silver coins minted during the 8th to 9th centuries. During this period, silver and lead deposits were mined in addition to copper and iron in the Almalyk area south of Tashkent.

The first deposits visited during the field trip were the Kalmakyr porphyry copper and Kurgashinkan Pb-Zn skarn in the Almalyk area. The Kalmakyr deposit is hosted primarily in hydrothermally altered porphyritic syenite-diorites of Middle Carboniferous age. The primary ores occur as impregnations, streaks or nest-like vein clusters. The ore zone has an inverted cup geometry and contains 1-0.1% Cu, 0.001% Mo and recoverable Ag, Au, Se and Re. The open pit is 2.5 km long, 1.8 km wide and 500 m deep. Present production is 100 000 tons per day although work is already underway to increase production to 250 000 tons. The Kugashinkan deposit has been classified as a Pb-Zn skarn occurring in limestone intersected by Carboniferous intrusive rocks. Galena and sphalerite are the only minerals of economic interest although minor magnetite, chalcopyrite, and molybdenite are also found.

After leaving the Tashkent region, the Uchkulach stratiform Pb-Zn deposit situated north of Samarkand was visited. This deposit, which has been dated as Early to Middle Devonian, is hosted in a sequence of rhythmically interbedded tuffs, tuffite, sedimentary(?) breccias and carbonates. Two dominant mineral types have been recognized: polymetallic and pyrite-polymetallic. Most of the orebody is represented by the first type which includes galena, sphalerite and barite; the second type comprises mostly pyrite and chalcopyrite. The deposit is zoned with galena, sphalerite and barite in the lower sections, galena and sphalerite in the middle sections, and laminated pyrite and chalcopyrite at the top. From discussions with Soviet geologists, it seems that the deposit is perhaps similar to the Devonian Jason and Tom Pb-Zn-Ba deposits, Selwyn Basin, Yukon, having formed from hydrothermal fluids discharged into local basins generated by synsedimentary faulting. Grades for Pb and Zn are low although the Ag content is high for this type of deposit. Ore reserves are estimated at about 25 million tonnes.

The Koitash tungsten skarn located just south of Samarkand is localized near the contact between Middle Carboniferous limestone and adamellites of Upper Carboniferous age. The tungsten is bound primarily in scheelite that occurs in both the calc-silicate skarns and the intrusive body. Most of the scheelite is restricted to the garnet-vesuvianite skarn. The average grade is 0.26% W.

During the field trip and symposium our Russian, Georgian and Uzbek hosts were extremely hospitable and delighted in proposing what seemed like endless toasts to one's health, friendly relations, respective hockey teams, scientific exchanges, etc. This tradition is perhaps understandable considering vodka helps one endure the endless delays, dreaded line-ups and unexplained schedule changes that are thrown in ones path to make sure ones trip is not forgotten quickly. Although the amount of vodka consumed cannot compare with a previous GSC visit (if you can believe what was quoted in Geogram), the per capita consumption was just as large and none was rejected.

Wayne D. Goodfellow

PRECAMBRIAN FIELD TRIP

"Tectonic Features in the Central Gneiss Belt, Parry Sound Region, Ontario" was the title of the Precambrian Division field trip this fall. Organized and led by Tony Davidson, the trip had a wet start in Ottawa on Monday, September 27, progressed through three sunny days, including a boat-assisted traverse of the islands in Georgian Bay, and one rainy morning, before ending in sunshine Friday afternoon, October 1. Thirty members of the Division, one recently retired member, Bill Morgan (GID), and Rod Kirkham (EG), participated. Having completed three field seasons, including a helicopter reconnaissance, mapping at 1:50 000 and 1:250 000 scale, Tony had an exciting story to tell about some very complex rocks. He has proposed that the tectonic history of the area involved northwest-directed ductile shear and thrusting at relatively deep levels in the crust, and that the structure is compatible with a Himalayan-type collision model for development of thickened crust. Simon Hanmer assisted on the field trip with articulate explanations of numerous outcrop-scale tectonic features. Many participants learned things that are directly applicable to their own field areas. The opportunity for geologists who are normally dispersed across the entire Precambrian Shield to stand on the same outcrop waving their arms and discussing or arguing about the geology was much appreciated. Although people tended to sit in approximately the same place on the bus throughout the trip the composition of groups on outcrops, at meal times, and at evening meetings, was constantly changing. Geology, of course, was not the only topic discussed. Spirited exchanges on federal-provincial politics or American-Canadian relations and interesting background information, such as the fact that one of the members of Geochronology Section present was once a professional whisky taster, added spice to an already intellectually stimulating trip. Everyone recognized that the success of the venture reflected the hard work and organizational ability of Tony Davidson. Where to next year, that is the question?

PROCESSING AND ANALYSIS OF DATA FROM LASE

Ian Reid has just completed two months at the seismic processing centre of Lamont-Doherty Geological Observatory in New York, reducing and processing results from LASE (Large Aperture Seismic Experiment). This was a major multiship seismic experiment carried out off the east coast of North America during June 1981 to test new techniques for studying the deep structure of

Transport for the Precambrian field trip to the islands in Georgian Bay.

continental margins. Participating institutions were the Atlantic Geoscience Centre, Woods Hole Oceanographic Institution, the University of Texas, and Columbia University.

A major objective of the experiment was to test the feasibility and effectiveness of merging seismic reflection data from sources and receivers on separate ships at distances of up to fifteen kilometres apart. In the past two months' work, the multiship data were successfully composited, and study of the resultant record sections should enable us to judge the effectiveness of this technique relative to conventional single-ship multichannel operation.

During the same experiment, expanded spread refraction profiles were run. These differ from conventional seismic refraction profiles in having a greatly increased data density, which makes them particularly suitable for analysis using processing techniques such as tau-p transformation and semblance analysis. These techniques were applied, with excellent results, and modelling and interpretation will commence shortly at BIO. We expect that the combination of high quality refraction and reflection data will enable us to take maximum advantage of each in the geological interpretation.

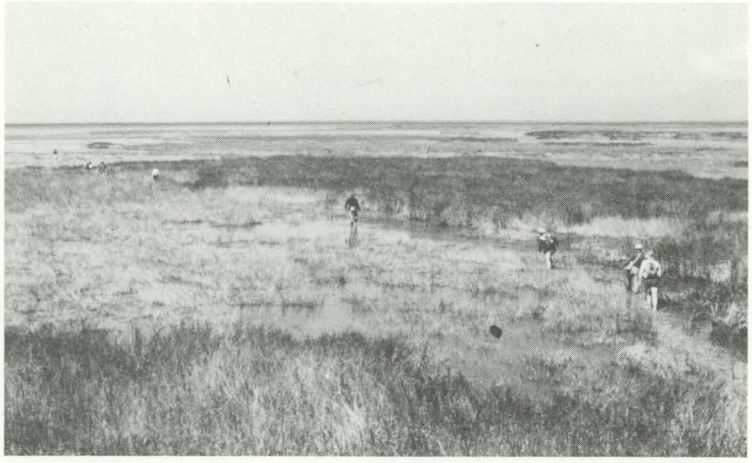
Detailed study of the processed data will indicate the optimum combination of techniques and parameters, and an improved set of processed sections will be produced in future work at Lamont-Doherty. It is already apparent that our experience with these data will enable us to assess far better the relative effectiveness and suitability of the various seismic methods for studying the continental margin and hence in planning future experiments.

FIELD TRIP – INTERNATIONAL ASSOCIATION OF SEDIMENTOLOGISTS

John Clague (Terrain Sciences, Vancouver) and John Luternauer (Cordilleran Division, Patricia Bay) led a one-week field trip in southwestern British Columbia in August 1982. The trip, one of 21 held in connection with the Eleventh International Congress on Sedimentology at Hamilton, Ontario, dealt with late Quaternary sedimentary environments in lowlands and mountain valleys near Vancouver. Scientists from Canada and several other countries, including Australia, Italy, Japan, and the Netherlands, participated, making the excursion truly an international event.

The theme of the field trip was the sedimentary response to late Quaternary climatic change in southwestern British Columbia. The first day was spent examining sediments deposited during a period of climatic deterioration accompanying the growth of the last continental glaciers in North America about 25 000-17 000 years ago. Thick outwash and ice-contact sediments accumulated in front of and at the edges of growing glaciers, profoundly altering the earlier nonglacial landscape at Vancouver. On the second day of the excursion, attention shifted to sedimentary environments that prevailed during deglaciation about 13 000-11 000 years ago. Field-trip participants examined sediments of deltaic, glaciofluvial, and glaciomarine origin deposited as glaciers retreated across the then-submerged Fraser Lowland. Participants were taken to Chilliwack Valley in the Cascade Mountains east of Vancouver on the third day. There, they were shown critical sedimentary sections upon which much of the geological history of the region is based. The sedimentary record of the present Interglacial (the last 10 000 years or so) was the focus of days 4 and 5. Special attention was devoted to the Fraser Delta – a large body of sediments built out into the Strait of Georgia by the Fraser River during postglacial time. The evolution of the Fraser Delta from its birth about 10 000 years ago until the present was discussed, and contemporary sedimentary environments both on the offshore delta slope and on the tidal flats at the mouth of the river were examined in detail. A working cruise on the research ship **Vector** provided participants with first-hand knowledge of the techniques and instruments used to study the Fraser Delta slope. A scenic bus tour to the head of Howe Sound, a typical British Columbia fiord, on day 6 and an airplane flight over glacier-clad Mount Garibaldi on day 7 brought this highly successful field trip to a close.

This excursion will be repeated, albeit in a scaled-down form, at the Geological Association of Canada Annual Meeting, Victoria, B.C., in May 1983.



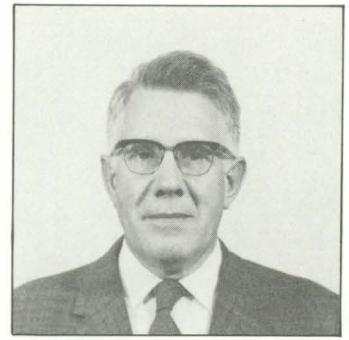
Members of the International Association of Sedimentologists Field Trip 30A slog across a Fraser Delta marsh after receiving John Luternauer's promise that alligators are not much of a problem here.

An inspired lecture on biosedimentology by David Swinbanks attracts a crowd on the Fraser Delta tidal flats.

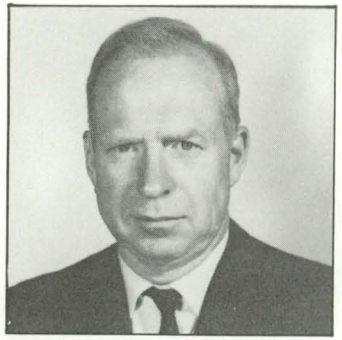
CHURCHILL SECTION OF THE PRECAMBRIAN GEOLOGY DIVISION

This small band of geologists is responsible for the mapping, synthesis and interpretation of the geology of the Churchill Structural Province of the Canadian Precambrian Shield.

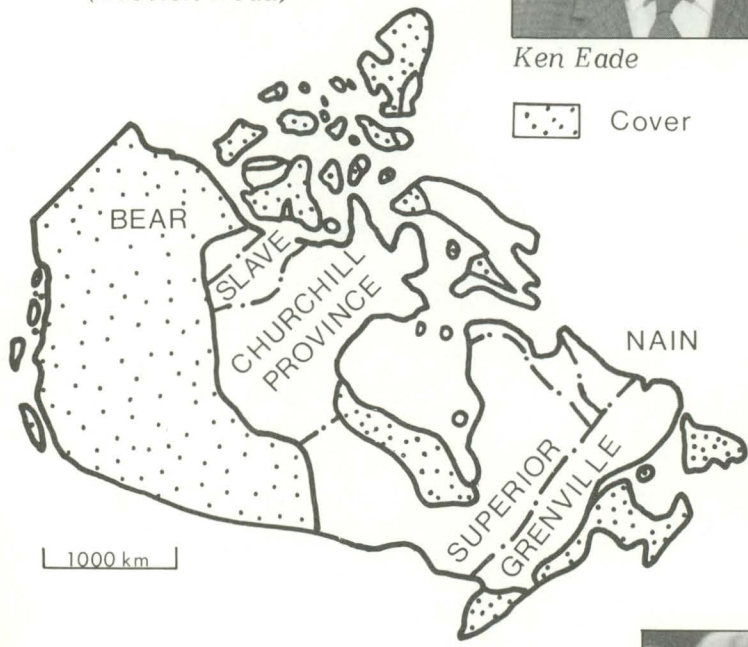
Tony LeCheminant (Section Head)



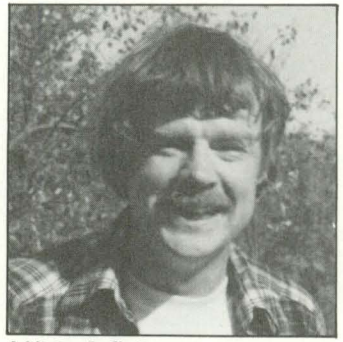
Ken Eade



Al Fraser

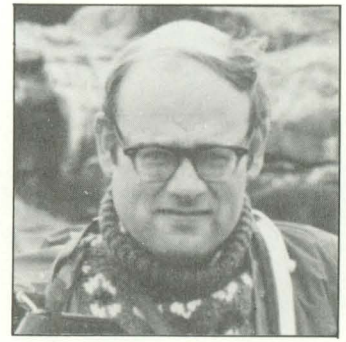


Garth Jackson



Mikkel Schau

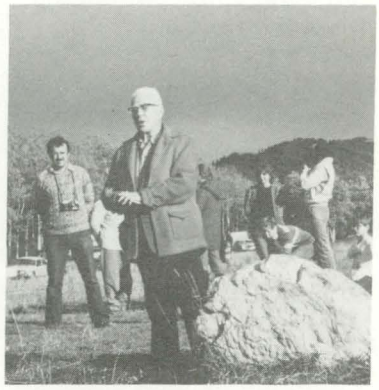
Subhas Tella



Tom Frisch

Some Logan Day enthusiasts: Ian Hutcheon, Vladimir Okulitch, Mr. and Mrs. Phil Simony and daughter, Marion and Don Norris, Maggie Hanna, Bob Christie, Herb Benthin, Carole Henderson, Bill and Serena Martindale and Heather Snow.

Carole Henderson, Vladimir Okulitch and Andy Okulitch inspect pork roast progress.



Harry Hunter describes the early days of the CSPG under Stan Slipper.

LOGAN DAY WESTERN STYLE

The annual Logan Day pig-roast celebrations took place in the Sandy McNabb wilderness area of the Bow Crow Forest near Turner Valley on the weekend of October 2nd. Campers arrived at the forested area full of enthusiasm, ready to participate in two days of festivities. The chinook winds were kindly to the faithful; the cloud cover that rolled into the area in the evenings ensured campers of comfortable temperatures.

Outdoor events this year included the East-West Soccer Game (the East won by a goal), the egg tossing contest, and the horseshoe-throwing competition. Approximately 110 people turned up to spend time together in the pine-scented atmosphere of the forestry reserve.

By 4 o'clock Saturday afternoon the group was ready to gather together to hear stories in praise of Logan, and also in praise of the early days of the Canadian Society of Petroleum Geologists, then called the Alberta Society of Petroleum Geologists or ASPG. Andy Okulitch of the ISPG introduced the first toastmaster, his father Vladimir Okulitch who had known geologists who had worked alongside Logan. Vladimir provided a colourful description of the early days of Canadian geology. Frank Adams, one of McGill's geology professors in the 1930s, had been a field assistant on some of Logan's expeditions before beginning his teaching career. While carrying out his own mapping projects in the Gaspé Peninsula, Okulitch noted that Logan's descriptions (published in the Geological Survey's report of 1863) of the area between Quebec and Montreal were so reliable that he could always locate specific outcrops by using the pioneering geologist's highly accurate descriptions. Okulitch taught paleontology at the University of British Columbia, over a period that extended from the Second World War years to 1971. He served as the Head of the Geology Department and retired from the university as Dean of Science.

Mike Perkins of Home Oil then introduced the Canadian Society of Petroleum Geologists' toastmaster, Harry Hunter. Currently an honorary member of the CSPG and one-time past president, Harry is knowledgeable about the origins of the ASPG/GSPG in Alberta since its formation in the 1930s, and he shared much of that history with the Logan Day crowd. He toasted Stan Slipper, the founding president of that society, and described the early years of discovery and exploitation of the Turner Valley oil field.

After paying their respects to such geological greats as Logan and Slipper, the group's attention shifted to the porcine sacrifice. The pig roast itself had been elevated to the level of "gourmet" this year, thanks to the efforts of several expert chefs such as Mike Cecile, Andy Okulitch, Carole Henderson, and John Mahr. The roaster was constructed by Andy Okulitch and the pig sides were allowed to grill all day long. No more the dirt trench into which the beastie would be laid to sizzle. Rather, three pork sides were stretched over iron pipe skewers and roasted lovingly over the day.

Following the meal of pork, which had been rounded out with salads, buns, beer and wine, the celebrants gathered in pockets around camp fires to exchange stories and get better acquainted with each other. The stillness of the evening was broken by the music and song of Alex Christie on banjo, Andy Okulitch on guitar, and a cast of assorted wandering minstrels.

And another enjoyable Logan Day weekend was shared by all.

Lynn Machan-Gorham

This is all that was left of the feast!

Good times, good food, good friends – Logan Day weekend 82.

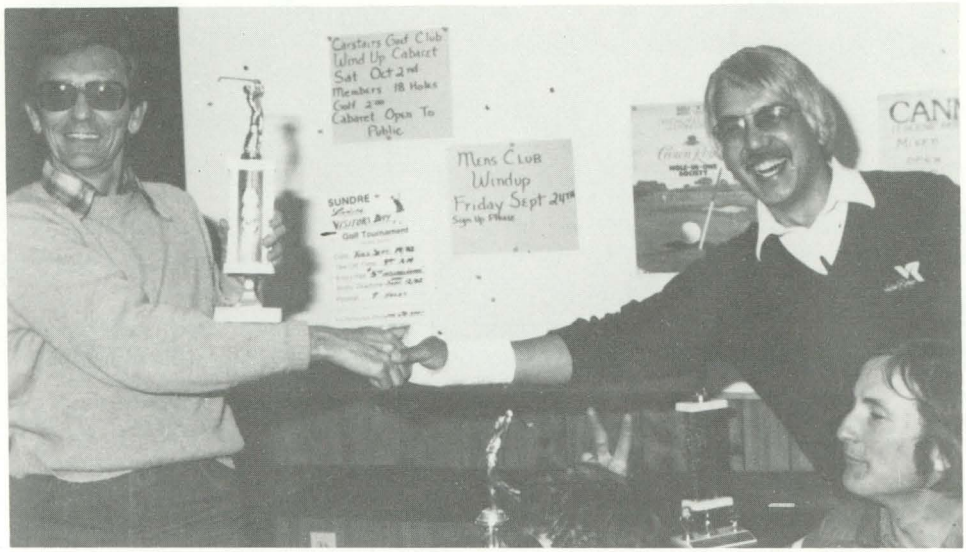
Logan Day celebrants gather to toast Canadian geology.

THE ISPG GOLF TOURNEY

Dennis Peatman's fondest wish (i.e. that of winning at his favourite game) came true on the afternoon of September 14th, when he made sure that the annual golf tournament took place on the turf of his own club, the Carstairs Golf Club. Dennis obviously used the home advantage and his retirement time well. One speculates that he will soon be ready for the greens of Arizona or maybe even Pebble Beach...

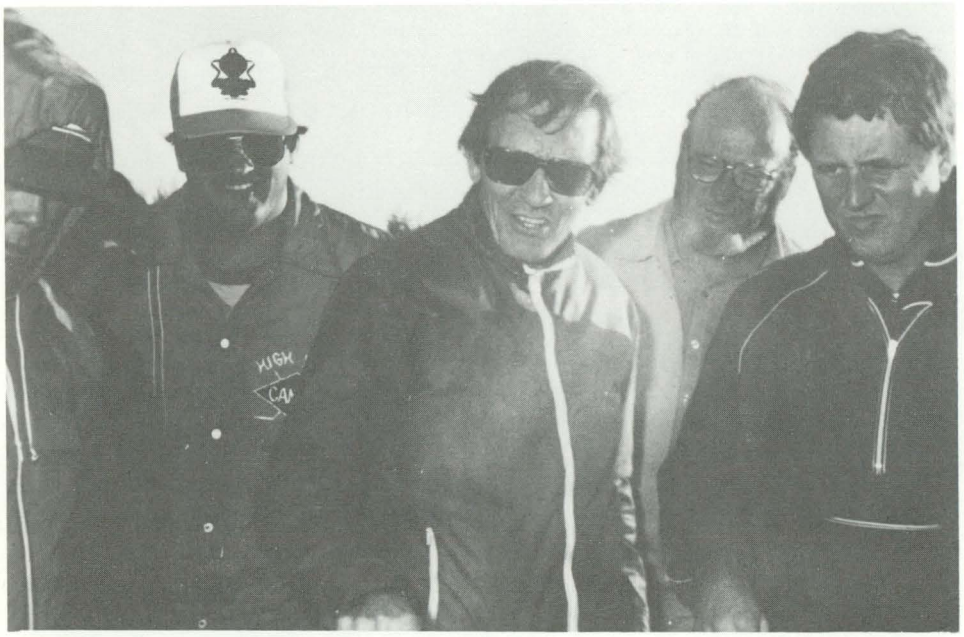
But did he win by honorable means? After much discussion, an independent jury of experts(?) ascertained that, although some tense moments in the competition were provided by Wayne Bamber's drives, Peatman had the game from the first hole. Besides, Steve Orzeck was wearing contact lenses (mistake) that windy, bright afternoon, and couldn't see for the sun and the wind. At one point Orzeck almost seared the down off a duck when he fired into a pond. He is still waiting for that nasty letter to come from Ducks Unlimited...

The foursomes teed off at about 12:30 a.m. and it was all over by 6 p.m. Most of the group ended up waiting for stragglers (whose names will not be mentioned in order to protect the guilty. Hint: they were three in number). The four challenging groups were: John Thomson, Steve Orzeck, Dennis Peatman, Wayne Bamber; Willie Williams, Bob Davidson, Brent Hogue, Bill Wall; Jean Dougherty, Ken Nairn, Bryan Rutley, Denise Then; and Audrey Peatman, Cyndee Rutley, and Joanne Vermette.



Wayne Bamber (left) accepts the ISPG Trophy from Bill Vermette (right) for Low Gross Champion (1982).

One foursome needs special mention, if only to point out their special styles and strategies. That group included golfing names like Ken Nairn, Jean Dougherty, Bryan Rutley, and Denise Then. Ken "scared the hell" out of the rest of the foursome by sinking a putt from 12-15 feet off the green. But the bluff did not work for long; the group's worst fears were allayed as Ken promptly settled down to his usual sloppy game style. Rutley had a rather unique approach. His strategy was to confuse and threaten bodily harm. He managed to plunk three consecutive balls into a water hole that was at right angles to the line of drive. The third ball, a "worm burner", narrowly missed Ken and Jean as they sauntered down what they thought was the "safe" zone of the fairway. Much group time was spent searching for Bryan's balls. (They never were found, although Jean Dougherty claims she did in fact find one.) Denise Then's strategy was to distract the group with her hot ball. She chose a fluorescent orange ball which sank, smoldering, to the bottom of a pond, after it dribbled off a tee. Yes, the group was hot!



Golfers gathered around the steak pit are (left to right): John Thomson, Denise Then, Brent Hogue, Wayne Bamber, Ken Nairn, Willie Williams.

After all the ISPG golfers had proved what they had set out to prove in all of this (does anyone remember?), it was time for chow. John Thomson annointed the barbecue pit with garlic salt. Luckily there was a strong wind even during this part of the annual event, so that most of the condiment ended up being airborne rather than beef-borne! The steaks were carried into the club lounge and over dinner the prizes were awarded. This is how it shaped up:

The prize for low hidden went to Brent Hogue and the prize for high hidden was awarded to Denise Then. In golfer's lingo, that means that two secret holes were selected (No. 8 and No. 12). The person with the lowest score at the low hole won that prize and the golfer with the highest score at the high hole won a prize as well. Bob Davidson outdid Bryan Rutley in lost balls and Jean Dougherty won the Bo Derek Award for the most 10's. That is, she had the most number of holes that took 10 or more strokes to sink the ball. Having never swung an iron before, she managed to beat out the remaining members of her foursome (the Amazing Rutley, the Calculating Ken, the Distracting Denise). The Low Gross Champion was Dennis Peatman who walked away (smiling broadly) with the Wild Leitz

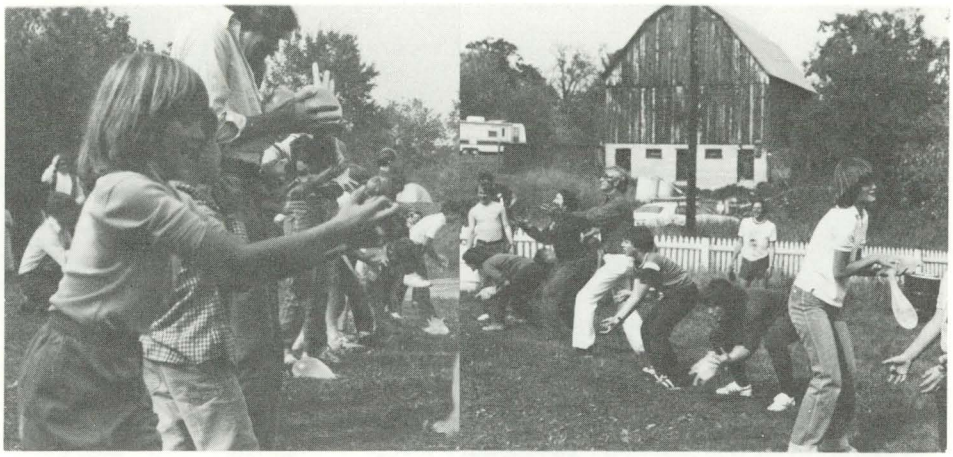
Trophy, and Wayne Bamber claimed the ISPG Trophy for the Low Net Champion. In the annual draws for prizes Jean Dougherty won the major one (an Adidas sports bag). Minor prizes were drawn by Audrey Peatman, Willie Williams, Joanne Vermette, Bill Wall, Brent Hogue, Steve Orzeck, and Dennis Peatman.

The prizes were awarded by Bill Vermette, better known to the Cartography Unit as the one-armed bandit. Bill couldn't play this year because he fell down his basement stairs and broke his little finger (luckily the rum bottle didn't break). We are confident that next year he will be brandishing irons at the ISPG tournament.

MAC CONODONT?

Michael Orchard of the Cordilleran Geology Division spent four weeks in Europe during August-September studying conodont collections at universities and museums in Austria, England and Sweden, and attending the third European Conodont Symposium in Lund and Gotland. This meeting attracted an international gathering of some fifty conodont workers who participated in a valuable exchange of information, including a presentation of what appears to be a fossil of the genuine conodont-animal, a worm-like impression complete with conodont apparatus from the Carboniferous of Scotland.

LOGAN DAY: OTTAWA



The rubber glove contest.

Logan Day Ottawa style was celebrated last Sunday in September in beautiful weather at Carleton University's Calabogie field camp, Ontario. Participants from university, private industry and government with their families partook of a menu of games and barbecued pigs. The GSC continues its dominance in logan tent raising and, the universities, in the canoe race. The egg throwing game is being replaced by the water filled rubber glove tossing game as the most exciting event. Irv Anneslay of Ottawa University was the organizing light this year and more than a hundred and fifty participants thank him and his team for their hard work.

The winners of the "Tent Raising Contest" are in the forefront.

QUATERNARY GLACIATIONS IN THE NORTHERN HEMISPHERE

IGCP Project 24 Meeting, 1982

The 9th and final general meeting of IGCP Project 24 (Quaternary Glaciations in the Northern Hemisphere) was held in France and Italy, September 1-17, 1982. It consisted of a field trip in Corsica, September 1-5 (which I did not attend); an excursion in Normandy, September 6-8; a meeting in Paris, September 9-10; an excursion to the Lyon area, September 12-14; and a field trip near Milan, September 15-17. About 75 people from 13 countries attended the main meeting in Paris and each field trip was enjoyed by between 15 and 25 participants. Five Canadians, R.J. Fulton, V.K. Prest, L.A. Dredge, D.R. Grant, and S. Occhietti attended.

Paris Meeting

We were welcomed to Paris and the meeting by a number of high officials among whom was the Assistant Director of UNESCO, the President of INQUA, the President of the French Quaternary Association, and the Director of the Environmental Program for UNESCO. Apparently UNESCO is now planning its next six-year program and is looking for projects treating environmental and natural resource concerns and showing the proper use of science to meet human needs. We were encouraged to start a new project which would, in part, involve understanding and being better able to predict future climatic changes. Following this introduction we were treated to a variety of talks.

Normandy IGCP Trip

This trip to the general vicinity of Rouen was led by J.P. Lautridou of Centre nationale de la recherche scientifique, Caen. Most of the time was spent looking at loess and paleosol sequences, in places interbedded with periglacial, fluvial, and estuarine deposits. Most of the sites were in the lower valley of the Seine although several were on the adjacent plateau. The Seine occupies a valley several kilometres wide that is cut into the Cretaceous chalk. The valley pattern is one of broad meanders. Terraces and underlying gravel deposits are present in some places but in general are covered by loess. The area outside the valley is a plateau with a cover of clay containing flints overlying the chalk and thick loess on top of these residual deposits.

Lyon Field Excursion

This excursion, led by P. Mandier from a research institute affiliated with Geography at the University of Lyon, basically looked at evidence for attributing ages to different glacial deposits in the area. Most Quaternary deposits are gravels and minor tills with paleosols. The gravels generally occur in terraces and some correlation has been done by geomorphological work on terrace levels.

Deposits referred to as Wurm extend from the foothills to the west towards Lyon. Moraine ridges are present which indicate that during the most recent part of this glacial period the ice front stood not far from the pre-Alps.

Older ice advances were more extensive and one or two times pushed west to cross the Rhone and to develop indistinct ridges and large meltwater channels west of Lyon. Many of the gravel terraces were said to be related to these glaciations.

Excursion in Italy

The Italian excursion, organized by G. Orombelli, Geology Institute, University of Milan, visited three different areas with quite different geology: the Asti area west of Milan, the area between Como and Milan, and a region northwest of Milan.

The excursion exposed us to a good cross-section of Quaternary stratigraphic work currently being done on continental deposits in western Europe. Their stratigraphy in general depends on sorting out loess units containing paleosols. The deposits they are dealing with are different from those familiar to most Canadian workers. They generally have to fit their deposits into a much longer time record than we have to consider. There, as here, however, the greatest progress is being made by those who use multiple correlation techniques and carefully adhere to fundamental geological stratigraphic principles.

R.J. Fulton

Germaine Drapeau who for more than 20 years served as secretary to the Publications Distribution Unit of GID died in late November. After graduating from school Germaine worked for some years at the Museum and for a time assisted Dr. Marius Barbeau, one of Canada's outstanding ethnologists famous for his collections of Indian folklore. After raising a family of two sons and two daughters Germaine returned to the GSC and for many years was a mainstay of Laurier Touchette. Germaine coped with more than her share of life's problems but was always ready to help others and cheerfully served on committees such as the United Appeal. She will be missed by many at the Survey.

ALASKA FIELD TRIP

Chris Dodds, Dick Campbell and Glen Woodsworth of the Cordilleran Geology Division attended the June 3-12 Trinational Field Trip to southeastern Alaska, organized by the U.S. Geological Survey. The dozen geologists, including leaders Dave Brew, Henry Berg, and Jim Smith of the USGS, included representatives from Canada, Ireland, and the U.S.A. They examined several transects, from Juneau to Ketchikan, through the metamorphic and plutonic rocks of the Coast Mountains along fiords that rank among the most scenic in the world. The accommodation, cuisine, and hospitality aboard the **R.V. Don J. Miller II** were all that could be desired. This cruise was one of several organized by the Alaskan Branch of the USGS; it is hoped that a third trip, in Canadian waters, can be arranged by the GSC Cordilleran Division.

CANADIAN INSTITUTE OF MINING AND METALURGY AWARD

Congratulations to Gordon Gross who has been awarded the 1981 District 3 Proficiency Medal of the CIM in recognition of his significant contributions to the geology, metallurgy and evaluation of iron formations in Canada, to the enhancement of Canada's image abroad in the geological sciences, and to the continuing interest he has shown in the activities of the Canadian Institute of Mining and Metallurgy.

DID YOU KNOW THAT...

Steps, door sills, and platforms to the entrance of the Geological Survey at 601 Booth Street are made from a grey porphyritic granodiorite with pink potash feldspar phenocrysts. This granodiorite is quarried in the Ste-Cecile batholith 1.5 km west of St-Samuel, Frontenac County, in the Eastern Townships, Quebec. The Geochronology Section of the Geological Survey determined the potassium-argon age of the biotite in this rock to be 379 ± 38 million years.

The mottled dark green and black stone used for the main entrance, facing stone near the entrance doors, columns, planting boxes, pillars, and around first floor windows is an alkaline syenite mined from a quarry on Mount Megantic, Frontenac County, Eastern Townships, Quebec.

Window sills throughout the building are a buff Italian limestone of Cretaceous age called Aurisina Fiorito. The limestone consists mainly of fossil fragments, including many rudists, large and unusual pelecypods characteristic of the Mesozoic rocks of the Mediterranean region.

CONGRATULATIONS !

Congratulations to Quentin Bristow of Resource Geophysics and Geochemistry Division who received a significant monetary award, under the Public Servants Inventions Act, for developing a computer-controlled automated geochemical analysis system. The award was presented to Quentin by Ray Price at an informal gathering on 23 December.

Many thanks to those who contributed to this issue of **Geogram.**

Material for the next issue of **Geogram** should be sent via your Division Office to GID

Les articles pour la prochaine parution de **Geogram** devront-être dirigés au secrétariat de votre division et de là acheminés à la Division de l'information géologique.

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