SGA News

NOVEMBER 1997 Number 4

Hunting base-metal giants down-under -- current research into Australian Proterozoic Zn-Pb-Ag deposits

Garry Davidson, Peter McGoldrick and Tony Webster

CODES SRC, University of Tasmania, PO Box 252-79, Hobart, Tasmania 001, AUSTRALIA

In 1883, a 37 year old German boundary rider, collected some heavy dark rock samples from a low range of black, red and brown hills at the edge of the Australian desert in far western New South Wales. The material was subsequently assayed and identified and found to contain some Ag and Pb. Charles Rasp had discovered the gossanous outcrop of the giant Broken Hill Pb-Zn-Ag deposit and started a golden era of base-metal mining and exploration that continues in Australia today. High-grade Pb-Zn-Ag ore still issues from the headframes at Broken Hill, a powerhouse of inspiration to miners and researchers. Charles Rasp and his partners faced heat, isolation, and financial difficulties to make their dream a reality, but today a whole new set of problems besets the earnest explorer. Land access has become a highly technical issue, with the rights of many land-users now being considered in the exploration process. Whereas in previous decades explorers fossicked the outcropping areas, the new generation is exploring deeper in those same terrains, and peering out with dim geophysical eyes beneath the thin cover of surrounding undeformed sedimentary basins, a far more expensive style of exploration. The key problem bringing explorationists and researchers together is the need to understand the genesis of large Proterozoic base-metals deposits in order to provide new and better exploration models. Exploration models that are needed to increase the rate of new discoveries in Australia, and elsewhere.

(☞ *to page 8)*

Contents

◆5th Biennial SGA Meeting will be held in London, England 11-13 August 1999

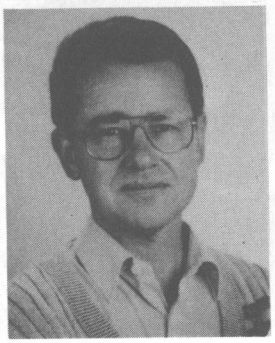
see page 20

◆Letters to the editors

see page 6

◆I. R. Plimer fighting fund

see page 6



From the Editor of SGA News

L. Fontboté, Department of Mineralogy, University of Geneva, Switzerland

Jobs: a Good Reason to Reinforce Economic Geology Teaching at European Universities

"The minerals exploration business is presently in a unique position. Over the past few years there has probably been more money spent on minerals exploration than at any time in the past. Furthermore, the level of activity is more uniformly spread globally than ever before. More countries are open for exploration than ever in the past. Consequently the opportunities for graduates entering the business now are unprecedented." This was the start of a keynote address given by Noel White, Chief Geologist, BHP Minerals International Exploration, at a recent seminar at the University of Geneva. Similar statements were made by representatives from major oil companies regarding the work market situation in hydrocarbon exploration.

My experience confirms these views. Recent graduates of our university are finding it easier to get positions in the mineral and oil exploration industry than in other "modern fields" including environmental geology.

Strangely enough, the jobs argument is one which only rarely is brought up in academic discussion when fighting against cutbacks in classical Earth Sciences. The fact is that today European university graduates with a wide field-based practical and theoretical geological training, with critical and analytical thinking, and with a sound foundation in ore deposits have their main career opportunity in mineral exploration. Of course, the jobs will probably not be in Europe. But in a global economy, what else could be expected in a truly international industry, as mineral exploration has always been? The question is whether our universities always provide this solid basic training. In geological mapping and practical aspects at least, significant shortcomings exist. But there are also serious concerns in the field of economic geology, as in some universities it is not even possible for students to study a course on ore deposits.

The Society of Geology Applied to Mineral Deposits has, in my opinion, a responsibility to help improve this situation by (1) facilitating bridges between industry and academia (the Turku Biennial Meeting, with a very significant participation from industry, shows the right direction), (2) specifying what the basic training needs are, (3) increasing the visibility of economic geology as a modern and necessary activity, and (4) transmitting the message to education and academic authorities that well-formed exploration geologists are getting jobs and that they will also be needed by industry in the future.

All can profit: Universities from new exciting research topics on metallogeny; students from better career opportunities; industry from well-trained professionals; ...and SGA from future active members.

Lluís Fontboté,
SGA NEWS editor, Geneva

Note: *As foreseen, with this number 4, I will cease being editor of SGA NEWS. The newsletter will continue to be edited in Geneva for two years more under the direction of Dr. Massimo Chiaradia (who acted as coeditor from No.1), and with the support of other members of the Geneva Ore Deposits Group. I would like to thank warmly all the authors and contributors who have always sent (almost) on time the solicited articles and have made the editor's task an easy one. My special thanks go to Massimo Chiaradia who, while heavily engaged at the lead isotope laboratory, has been, from the very beginning, instrumental in the creation and production of SGA NEWS. I wish him great success and a lot of fun editing SGA NEWS.*

Werner F. Giggenbach - In Memoriam

Werner F. Giggenbach died late on 7 November, 1997, during sampling of volcanic gases in a crater at Rabaul, Papua New Guinea, two days short of his 60th birthday. He was considered by many to be the world's leading geochemist on active geothermal and volcanic-hydrothermal systems; he had conducted field-based studies in over 23 countries on all continents. He recently extended his published studies to hydrothermal ore deposits as well as hydrocarbons in high heat flow basins. Born in Augsburg, he received a doctorate in 1966 in Chemistry at the Technical University of Munich (on the blue solutions of sulfur), followed by a post-doctoral fellowship at the University of Michigan. In 1968 he joined the New Zealand DSIR Chemistry Division, now the Institute of Geological and Nuclear Sciences, and helped to establish the group that advanced so greatly our understanding of hydrothermal processes. He was posted to the International Atomic Energy Commission in 1980 for two years, and with the IAEA and other international bodies was involved in the geothermal energy and volcanic hazard assessments around the globe. Giggenbach was the glue that held together the IAVCEI Commission on the Chemistry of Volcanic Gases, a group whose aim is to help mitigate volcanic hazards. His 100th published manuscript was to be a chapter he was preparing for an SEG Reviews volume, in which he himself said that despite having vowed not to use four-letter words such as gold in his papers, he had reconsidered his pledge. He had an incandescent mind, seldom following, always leading. He was also an iconoclast in many subjects; he chastised those who put mag[mat]ic arrows beneath ore deposits without evidence. Werner was accompanied on his last field trip by Agnes Reyes, his colleague and wife.

J. Hedenquist, Geological Survey of Japan

SGA News

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NEWS OF THE SOCIETY

☞ Review of the 4th Biennial SGA Meeting

"The 4th Biennial SGA Meeting in Turku (10-13 August 1997) was a great success. We have asked Prof. Heikki Papunen, Chairman of the Organization Comittee, to summarize the most significant outcomes of this Meeting. On the behalf of the Society we would like to thank Heikki Papunen and the whole organization committe for the superb job!"

On Sunday, August 10, 1997 the 4th Biennial SGA Meeting convened 417 participants in Turku, Finland. Distribution of registered participants between different categories was: 16 invited speakers including the keynote ones, workshop and short course lecturers, 109 SEG and SGA Members, 194 non-members, 48 students and 50 accompanying participants. The distribution among the 34 countries represented was as follows: Argentina 4, Australia 18, Austria 14, Belgium 2, Brazil 1, Bulgaria 1, Canada 16, China 2, Croatia 1, Czech Republic 5, Denmark 2, Egypt 5, Finland 103, France 17, Germany 34, Greece 6, Hungary 2, Italy 6, Japan 1, Korea 3, Morocco 1, Norway 4, Poland 13, Portugal 2, Russia 40, Saudi Arabia 2, Republic of Slovakia 1, South Africa 3, Spain 17, Sweden 27, Switzerland 11, Turkey 11, United Kingdom 23, United States 19. The meeting was preceeded by two field trips, A2 and A4. Excursion A2, organized and guided by Dr. Pär Weihed of the Geological Survey of Sweden and Mr. Timo Mäki of the Outokumpu Mining Oy, visited, during 5 days, the Skellefte mining field in Sweden and the Pyhäsalmi and Hitura mines as well as several exploration targets in western Finland. The trip was attended by 25 delegates. Dr. Kirsti Loukola-Ruskeeniemi and Dr. Peter Sorjonen-Ward of the Geological Survey of Finland (GSF) organized and guided the field trip A4 for 21 participants the majority of which were members of the IGCP Project 357. They visited during two long days the black schist occurrences and some other mineral deposits in eastern Finland. Three field trips were organized after the symposium. The 42 participants of the B1 excursion visited the mining areas of northern Fennoscandia and got acquainted with the Kemi chromite and Pahtavaara gold mines in Finland and with Kiruna iron and Aitik copper-gold mines in northern Sweden. Mr. Markku Lappalainen of the GSF skillfully guided the excursion and kept the largest group of field trip participants in good order. The field trip B3 visited during two days the gold occurrences and abandoned mining areas of southwestern Finland. Prof. Carl Ehlers of the Åbo Akademi University was the leader and 30 delegates participated to the trip. Third post-symposium field trip B4 took, during 7 days, the 21 participants to the mineral deposits of the Kola Peninsula, in northwesern Russia. Dr. Markku Iljina of the GSF and Mr. Mikhail Torokhov of the Kola Science Centre (Russia) organized and guided the trip which visited the Pechenga Ni-Cu deposits and the Olenogorsk iron and Khibine apatite mines. All the field trips were succesful, the weather was superb, and I have the feeling that the programmes in general satisfied the participants. Special thanks are devoted to Dr. Pekka Nurmi of the GSF and Prof. Krister Sundblad of the Stockholm University for field-trip coordination, and to all the field trip leaders who spent much time and efforts for preparing the trip, choosing the outcrops to be visited, writing the guide books and taking care of the logistic arrangements. The guide books were printed by the Geological Survey of Finland in the "Guide-Opas" -series and I would like to thank the reviewers, Dr. Peter Sorjonen-Ward and Dr. Hugh O'Brien and the editor Mrs. Sini Autio for their work.

The Workshop "Use of wallrock alteration and primary geochemical dispersion in mesothermal gold exploration" organized by Dr. Ed Mikucki (University of Western Australia) and by Pasi Eilu (University of Turku), as well as the short course "Application of Geochronology and isotope geochemistry to ore deposits" organized by Alain Cheilletz (CRPG-CNRS, Vandoeuvre-les-Nancy), Robert Moritz (University of Geneva), A.E. Fallick (SURRC, Glasgow) and F. Saupé (CNRS, Vandoeuvre-les-Nancy) were held on Sunday, August 10, at the University of Turku. The Gold Workshop gathered 44 participants and the Isotope Geology Short Course 26. The support of the Society of Economic Geology (SEG) covered travel, registration and printing costs for the leaders of the workshop and short course.

The scientific programme of the 4th Biennial SGA Meeting included 8 keynote lectures who spoke in two different sessions so that all participants could attend these high-quality and interesting presentations. I'm sure that all participants agree when I say that keynote lectures were the backbone of the programme and we all owe our sincere thanks to Rob Hill, Bram Janse, Tony Naldrett, Jan Pasava, Jane Plant, Steve Scott, Dick Sillitoe and Noel White for their efforts to prepare skillful and advanced talks.

238 papers were presented either as posters or oral presentations in 12 topical sessions including organics and mineral deposits, gold and precious metal deposits, submarine hydrothermal processes and mineralizations, mineral deposits in mafic and ultramafic rocks, mineral deposits in sedimentary environments, granites and ore formation, industrial mineral deposits, diamond deposits and exploration, metamorphism and ore deposits, mineral deposit modelling in exploration, environmental aspects of mineral deposits and open session. The session on gold and precious metal deposits collected the highest number of papers (54) and also the session on mineral deposits in mafic and ultramafic rocks was popular in terms of the number of papers presented (33). The extended abstracts were prepared by the authors to a camera-ready form and they were printed prior to the Meeting by A.A. Balkema Printers, Netherlands. The quality book with almost 1000 pages was distributed to all participants at the registration.

The congress social programme included the welcoming party at the congress hotel and the reception of the City of Turku which took place at the festival hall of the volunteer corps of the Turku fire-brigade. The delegates were then also informed about the history of the town and the big fire which, in 1827, totally destroyed Turku, at that time capital of Finland. As a result of this Turku lost the capital title and the famous old university in favour of a small fishing village, Helsinki, which had been only

recently raised to a town corporation. More history of Finland and nearby areas was delivered during the Congress banquet which took place at the medieval Turku Castle under the hospitality of Duke John of Finland and his spouse Duchess Catherine Jagellonica. The dinner was prepared and served according to the style of the seventeenth century and it was accompanied by a programme of the Renaissance time. The Duke had a good knowledge of the background of his guests and the dialogue between him and the guests was impressive. The organization of the 4th Biennial Meeting would have not been possible without the volunteer work of tens of people. I would like especially to mention the good and constructive work of the Organizing Committee and the skillful ladies of the Turku University Congress Office who patiently satisfied the changing wishes of the organizing committee and the enquiries of the numerous participants. The local geologists and students who ran the slide show and took care of the arrangements during the Meeting deserve special thanks. The financial support of the Academy of Finland was the backing which made the organization possible. The organizers thank SGA for the support which we could allocate to the registration, traveling and accommodation costs of participants coming from low-economy countries, and BHP Minerals International Exploration Ltd. who kindly supported the participation of students. We also acknowledge with thanks the financial aid of the University of Turku Foundation, of the Society of Economic Geologists and of the mining companies Outokumpu Mining Oy and Terra Mining Oy: the wheels are not running without power and the support of these organizations was the power to speed up the process.

Despite the organization took much of my time during the last two years, the process allowed to establish new contacts with numerous people and to better understand the differences between people and thoughts which all make the world so interesting.

Looking forward to seeing you in London 1999.

Turku, Finland, October 30, 1997

Heikki Papunen, Chairman of the Organizing Committee

☞ Mineralium Deposita and Mineral Deposit Notes

Mineralium Deposita continues to flourish. We are pleased to report that the first *Mineral Deposit Note* has been received in the Denver Office. As you know, these *Notes* were intended to be a form of *Mineral Deposit Letter* which would describe new discoveries of deposits or camps in brief terms for rapid publication. The description includes at least a map of where the deposit is, a cross-section, a description of the geology, a description of the ore and some idea of the size and importance of the find.

NORTH AMERICAN INITIATIVE

The Denver Office is going ahead under full steam. It has begun to receive and handle manuscripts. The Office is spearheading the SGA presence at this years Cordilleran Round-Up and Northwest Miners Association Meeting. This activity is supported strongly by Springer-Verlag. We will keep you posted on its success.

Your suggestions and ideas for any topic of interest to SGA are welcome! They can be addressed to any Council member or to

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MINERALIUM DEPOSITA FINANCE

The last Council meeting put *Mineralium Deposita* finance onto a sound footing. It was agreed that a fixed proportion (47.5%) of the royalties earned by the Journal would be plowed back into Journal development. This allows us to plan more for the long-term future in terms of Thematic Issues, colour plates and English corrections: all designed to give the SGA member a better deal and to continue to improve *Mineralium Deposita* as a superb product. Thematic Issues for 1998 include the important Iberian Issue and the Frank Vokes Issue. Two Thematic Issues are underway for 1999 including Chinese Gold and East Siberian Ores.

David Rickard, Editor of *Mineralium Deposita*

☞ I. Plimer elected SGA honorary member

- Prof. I. Plimer, Melbourne, former SGA President has been elected Honorary Member by the Society (see article by E. Stumpfl on page $).

☞ 5th Biennial SGA Meeting in London

- The 5th Biennial SGA Meeting will be held in London, U.K., August 22-25, 1999 at the Imperial College and the Natural History Museum. The Chair is Dr. C. Stanley (Department of

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Mineralogy, The Natural History Museum, Cromwell Road, LONDON, SW7 5BD, United Kingdom, Fax: +44 171 938 9268, E-mail cjs@nhm.ac.uk). See p. 20 for additional information.

☞ Miscellaneous

- SGA will sponsor the 8th IAGOD/CODMUR International Symposium "Platinum - Genesis to Beneficiation", Rustenburg, June 29-July 2, 1998. (see complete list of SGA activities under "Announcements", p. 17 and "Forthcoming Events", p. 16).
- SGA is experiencing an unprecedented membership increase as can be confirmed by reading the lists published regularly in SGA NEWS. Thanks to all sga members for making the society known! Keep it up!

☞ SGA Special Publications

Strongly reduced prices on SGA Special Publications (see page 13).

SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS (SGA)

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SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS

Report of the Executive Secretary about membership

35 Regular Members, 1 Corporate Member, 5 Junior Members, 10 Student Members and 2 Senior Members applied for membership from March 1997 to September 1997.

List of NEW SGA MEMBERS
(March 1997-September 1997)

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Jon P. THORSON, Littleton, Colorado
Henry AWMACK, Vancouver, BC, Canada
Yury ERINCEK, All-Russia Geological Research Institute, St. Petersburg, Russia
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Jonathan GILBEY, Kingston, U.K.
Leandro BENGOCHEA, University NDC DEL SUR, Bahia Blanca, Argentina
Patrick Lyn CHEETHAM, High Peak, U.K.
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Yasushi WATANABE, Geological Survey of Japan, Tsukuba, Japan
Inessa MINEEVA, Institute of Mineral Ressources, Moscow, Russia
Johannes D. WEISSER, Bad Homburg, Germany
Heikki PANKKA, Geological Survey of Finland, Finland
Dean ROSSELL, Charlotte, USA
Ferdinand DUMLAO, Landsdale, Australia
Richard F. HORSNAIL, Arvada, USA
Richard SILLITOE, London, U.K.
Tapio HALKOAHO, University of Turku, Finland
Fritz EBNER, University of Leoben, Austria
Tatiana POSSOUKHOVA, Geological Faculty, Moscow, Russia
Felix MITROFANOV, Geological Institute, Apatity, Russia
Vladimir SEREDIN, IGEM, Moscow, Russia
Evgenia MILSHTEIN, VSEGEI, St Petersburg, Russia
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Jingwen MAO, Institute of Mineral Deposits, Beijing, China
Kari KOJONEN, Geological Survey of Finland, Espoo, Finland
Anthony F. FALLICK, SURRC, Glasgow, U.K.
Les OLDHAM, COMAPSA, Lima, Peru
Thomas KLEIN, Minera Yanacocha, Cajamarca, Peru

Senior Members
Eduard KONNIKOV, Institute of Experimental Mineralogy, Moscow, Russia
Alexandre OBOLENSKIY, Institute of Geology, Novosibirsk, Russia

Corporate Member
Barrik Gold Corporation, Toronto, Ontario, Canada

Junior members
Dean GREGUREK, University of Leoben, Leoben, Austria
Noreen MCMILLAN, Derry, N. Ireland
Robert KRYMSKY, Institute of Precambrian Geology and Geochronology, St. Petersburg, Russia
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Student members
Dekissa DEBELE JEBESSA, University of Vienna, Austria
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We expect your letters with comments, news, criticisms, ...

Letters to the editors

We publish here a letter which has been addressed to the SGA News Editorial by Prof. Pierre Routhier, one of the founders of the SGA and former Professor of Economic Geology at the University P. et M. Curie, Lab. de Géologie Appliquée. Equipe Provinces Métallogeniques (CNRS), Paris, France.

On some hazardous words and on scientific ethics

About SGA News, nr. 3 (May 1997) I have written some remarks in a letter to the President and Editors. They concern two very different themes:

1) The use in the editorial of words borrowed from politics. I certainly do not blame the sincerity of Prof. Stumpfl but I wish to note how risky such an use may be. You quite always offend somebody! For example the undersigned "founding father" when he reads "nationalism" instead of "chauvinism". In my experience conscious (learned) nationalists do not behave in a chauvinistic way while people seemingly insensible to the cult of ancestral land may act as passionate jingoists.

To avoid heating of nationalist feelings, please do not use imperialist statements such as "English as *the* language of science" (italics are mine)! Let them to John Garfield and his narrow thinking followers. Even when accepted as a fact the today situation should not obliterate: 1) another fact: many other languages can convey limpid science; and 2) the initial wish of the "founding fathers" to maintain some vestiges of language diversity as a symbol of a *truly international* mind.

2) The article on "*Mineral exploration in the Iberian Pyrite Belt*" where the (short) list of references did not mention the work of my former team.

Prof. Lluis Fontboté, co-editor of the News, courteously answered (in good French) that two of the authors had recently published a synthetic paper with a rich list of references, and he joined this list. Actually, in *Ore Geology Reviews* 11, 1996, R. Saez, G. R. Almodovar and E. Pascual listed more than 130 papers and books including those by M. Lécolle (thesis, 1977) and P. Routhier et al. (1978).

I am appeased and cordially thank L. Fontboté for the information. Now, as he himself underlined, a more general problem of ethics and also of efficiency remains open: would it be appropriate not to mention works older than X years? With X=10, or 5 or even 2 as can be verified in so many to-day publications?! If we applied such a rule many detailed descriptive memoirs and most treaties of Metallogeny would be soon forgotten. Then, the history of our field would become obscure to young researchers and even to older science historians. Let us help to saveguard this thesaurus. And say: there is still no better way than to put confidence in the integrity of authors and the knowledge and vigilance of referees and editors.

To end allow me to mention a "wretched" book where, under a surname, I described many violations of ethics in scientific circles; written in French it is nevertheless rich in anglo-saxon examples...

Jean Destouches - Science, le cycle infernal (order to Editions Godefroy de Bouillon, 113-119 rue Lecourbe, 75015 Paris. Tel: 01 45 31 33 65. Price: 80 FF).

Pierre Routhier, 21 rue Charles Fourier, 75013 Paris, France

Appeal for donations to the Professor I.R. Plimer Fighting Fund

Prof. Ian Plimer, Head of the School of Earth Sciences in the University of Melbourne, Australia, is one of the most outstanding members of our Society. Over the past twelve years, he has, in addition to his manifold duties as researcher and teacher, been involved in an increasingly difficult, expensive and unpleasant battle against the creationists. In the course of many years of litigation, considerable legal expenses have accumulated. Prof. Plimer had to sell first his assets and then his house. He now lives in a small rented cottage on the outskirts of Melbourne. In acknowledgement of his courageous stand against creationism, our Society elected Prof. Plimer as Honorary Member at its Council Meeting in Turku in August 1997. It was also decided to take steps to enable members of the geological community to contribute towards offsetting the costs which Prof. Plimer has incurred over the years, not on behalf of himself but on behalf of the entire geological community world-wide. At the time of the Turku meeting, we were not aware of the fact that the Prof. I.R. Plimer Fighting Fund had already been set-up in the well-known mining town of Broken Hill, New South Wales, and it is to this address that contributions should be directed. Details are given at the end of this article.

Let us, however briefly recount the relevant steps in Prof. Plimer's fight against creationism.

Creationism is a fundamentalist movement which claims to be a religion; it also claims that the bible is the only correct source of information regarding the evolution of our planet. The earth was, therefore, created 6,000 years ago, and partly devastated by the great flood about 2,000 years later. In Australia, fundamentalists have been trying to establish a creationist evolutionary theory as a subject to be taught in schools. Indeed, the Minister of culture for Queensland has agreed to this proposal.

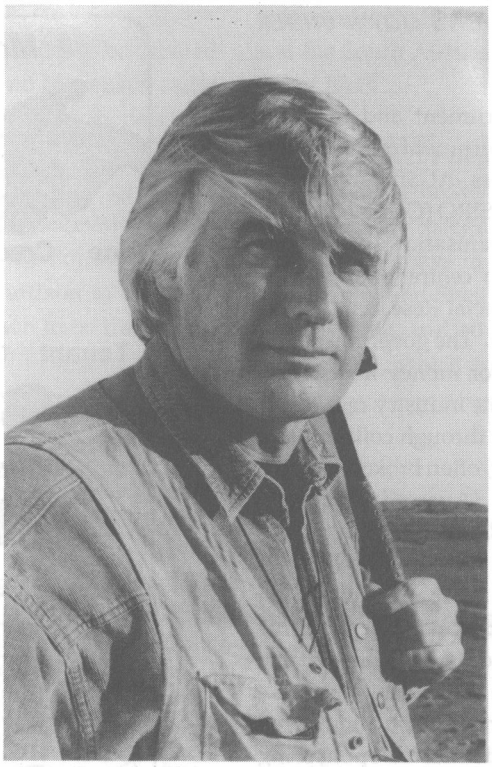
Creationists' efforts are directed mainly at the school system and at children. It all started in 1985, when Prof. Plimer was Head of the department of geology in the University of Newcastle, NSW, and a certain Dr.A.A. Snelling submitted a paper on "The Great Flood" to a symposium on "Advances in the Study of the Sydney Basin". This was part of the attempts of the fundamentalist sect to highjack the education system.

Prof. Plimer comments: "As I was privileged in holding one of the chairs in Geology in Australia, was committed to education and had a fascination for the evolution of our planet, it was clear that I had to take a public stand against creationism."

His activities started with public lectures and articles in geological magazines, and soon he was attacked by the creationist movement. He was accused of being guilty of "a tragic misuse of his authority and influence" (Prayer News, August 1987).

In 1988 Prof. Plimer engaged in a dispute with the American guru of "Scientific Creationism", Dr. Duane Gish of San Diego, and the results were legal action, hate-mail, and an organised campaign by creationists to have Prof. Plimer dismissed from his chair.

His public lectures then, as he put it, assumed Orwellian dimensions". Defamatory pamphlets, audio- and video-taping of every word he said, stacked audiences who chanted when he spoke, more hate mail, ("Dear sir, Drop dead") followed. Prof. Plimer continued his anti-creationist activities with radio and TV exposure, publication of more articles and debates - concurrently with administration, teaching, research and his move to the Headship of the Department of Earth Sciences in the University of Melbourne. As a result of these activities, creationists described him as "atheist, Godhater, agent of Satan, amoral evolutionist to be compared with the Nazis." At this time, Prof. Plimer received strong support from theologians who stated that "creationism is anti-Christian. Creationist activities increased, videos and literature were distributed to public and private schools in Australia - and used by some.



I. R. Plimer

In 1992, the controversy took on a new aspect. A "Dr." Alan Roberts, who held a mail order doctorate from a Florida university, gave a series of lectures on his supposed discovery of Noah's ark in Eastern Turkey. Prof. Plimer knew the area from extensive field work and also knew that the supposed ark, was actually the outcrop of a synclinal structure. At Roberts' lectures, Plimer tried to ask questions but was forcibly ejected by "thought police". Subsequently, he underwent ejection at a university meeting, this time by police, and again at a third meeting by hired security guards, using batons.

Finally, Prof. Plimer received a supreme court writ for "Defamation of the Creationists". Mismanagement of his case by different law-firms led to the loss of almost $A 400,000. Finally an efficient law-firm was found but bankruptcy was imminent. Having sold his assets and his house, Prof. Plimer now lives in a small miner's cottage. While all this was taking place, Prof. Plimer was maintaining a heavy undergraduate teaching programme, research and Ph.D.-student supervision. 80 public lectures were given per year. He had his own weekly radio programme and made some TV appearances. During these years he also wrote his book "Telling Lies for God" (Random House, Australia, 1994) with a foreword by the Anglican Arch-bishop of Brisbane.

Litigations then continued in the Federal Court of Australia and judgement was handed down in summer 1997.

Prof. Plimer found he had lost a major part of the case. He is now likely to face a cost order of $A 400,000. However, he has decided to appeal and further results of the proceedings cannot be expected before Christmas. This heroic and unselfish battle against creationism has attracted worldwide public interest, from the BBC to the Neue Zürcher Zeitung. However, this has not assisted Prof. Plimer with his financial problems. He has been elected an Honorary Fellow of the Geological Society in London in appreciation of his stand against creationism; he was the 1994 Humanist of the Year and received the Eureka Prize for the Promotion of Science. Our Society has also made him an Honorary Member. However, he and his family still face acute economic problems, including the fact that he still owes a years salary in legal costs, quite apart from those expenses with which he may still be confronted.

As mentioned at the beginning of this article, a decision was taken at the August 1997 council meeting of our Society, to assist Prof. Plimer and his family in their present economic plight. At that date, it was not known that a similar plan was afoot in Australia and indeed there now exists "The Prof. I.R. Plimer Fighting Fund" in Broken Hill. It is administered by the mayor of Broken Hill, Mr. Peter Black, and the Reverend Brian Nicholls of the Uniting Church of Australia. Our Counicl feels that administrative costs should be kept to the minimum, and donations sent direct to the fund at the Broken Hill Community Credit Union Ltd (Bank no. 802377), account no. 56679.

It is seen that through the relentless and heroic efforts of our colleague, the creationist campaign in Australia has been seriously dented and its power significantly reduced. However, the battle is not yet over. The international geological community, on whose behalf this fight is being waged, now has a chance to express its appreciation, and I would urge you most sincerely to contribute to the Plimer Fighting Fund.

E.F.Stumpfl
President, SGA

"The Prof. I.R. Plimer Fighting Fund"
Broken Hill Community Credit Union Ltd
(Bank no. 802377), account no. 56679
Broken Hill, NSW, Australia

from 1: HUNTING BASE-METAL GIANTS DOWN-UNDER

Research Framework

Australia has a long history of government and industry support for ore deposit research. Government support has traditionally been through the universities, AGSO (Australian Geological Survey Organisation) and the CSIRO (Commonwealth Scientific and Industrial Research Organisation) and more recently by providing additional funding to 'centres of excellence' in universities under the Key Centres, Special Research Centres and Cooperative Research Centres schemes. The government also allows industry a 125% tax deductions for money invested in 'innovative' or 'high-risk' R&D. While some industry research is undertaken 'in house', much is carried out through collaborative arrangements with universities and CSIRO, often brokered by the umbrella organisation such as AMIRA (Australian Mineral Industry Research Association). AMIRA projects typically attract funding of up to several hundred thousand dollars per year (A$1 = US$0.7). In these projects, companies invest on average A$10,000-25,000 per annum each over two or three years, with most projects succeeding only if more than 6 companies are involved. The projects are thoroughly vetted by potential sponsors prior to committing money. Once commenced the results of the project remain confidential to sponsoring companies for at least the life of the project, and regular meetings with, and reporting to, sponsors takes place (normally every six months). The benefits to companies involved are manifold and include: (1) the prospect of a competitive edge; (2) improvement in the education of their geologists who attend the regular progress review meetings and read the progress reports; and (3) the 125% tax rebate on research funding. The Australian federal government also recognises the worthiness of industry funded research partnerships, by making available matching funding from the Australian Research Council (ARC) through a competitive granting scheme. If successful, obtaining ARC funding for collaboration with industry effectively doubles the budget available to carry out the research.

Types of Proterozoic base metal deposits

There is a natural division of base metal deposits in Proterozoic terrains in Australia into (1) Broken Hill-type lead-zinc-silver deposits; (2) stratiform sediment-hosted zinc-lead silver deposits and (3) epigenetic copper-gold deposits. The polymetallic nature and gigantic tonnages of many of these deposits has made them popular exploration targets. This article summarises some of the current research into, and controversies surrounding the first two important deposit types.

Although both Zn-Pb-Ag deposit types in Australia occur in rocks of broadly similar age (1700 to 1600 million years) they are geographically separate (Fig. 1). The stratiform sediment-hosted deposits mainly occur in unmetamorphosed to amphibolite facies grade sedimentary basins in northern Australia (the 'Carpentaria Zinc Belt' of Queensland and the Northern Territory - McGoldrick and Large, 1997). These rocks are to the west of amphibolite to granulite grade terrains in Queensland that contain Broken-Hill-type deposits. Laing (1996) argued that the Queensland rocks (the 'Cloncurry Terrane') were once linked with the Georgetown Inlier to the north and the Willyama Inlier (host to the Broken Hill deposit) to the south in north-south orogenic belt he called the Diamantina Orogen.

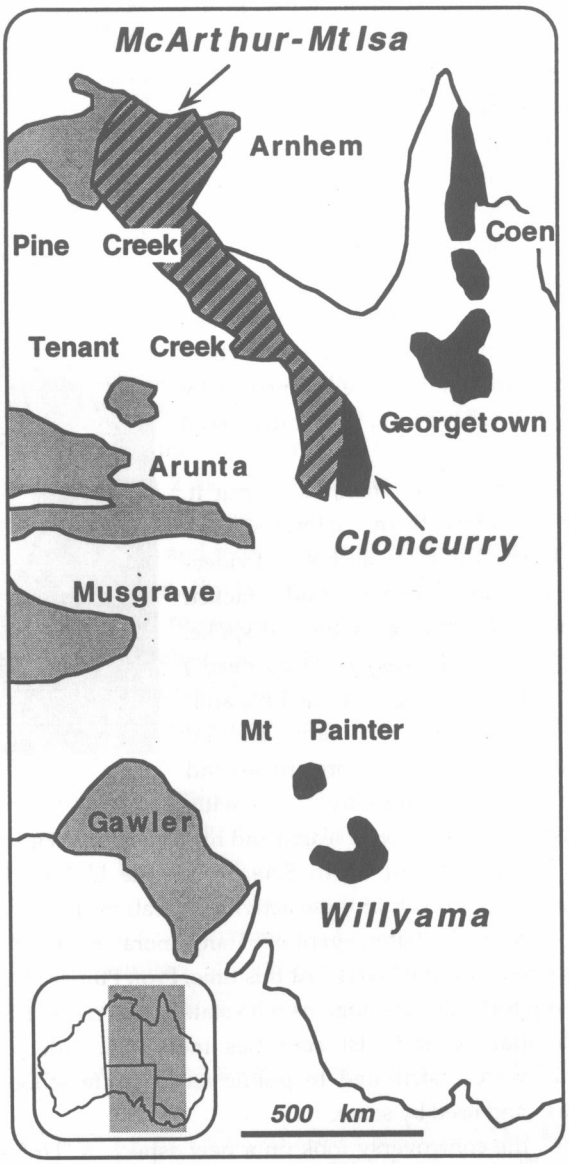


Figure 1: Palaeoproterozoic to early Mesoproterozoic terranes of eastern Australia; the black terranes are the components of the Diamantina Orogen as defined by Laing, (1996), and the hashed (McArthur - Mt Isa) terrane is his Carpentaria Orogen.

Broken Hill-type deposits

Broken Hill deposits were formally defined by Beeson (1990), supported by Parr & Plimer (1993) and Walters (1996), although there has been dispute over the validity of the classification for many years. The critical things that separates them from all other sediment-hosted deposits is their geochemistry: (1) strongly enriched in Mn, F, Ca and P, which results in abundant apatite, fluorite, and manganoan varieties of many different metamorphic minerals; (2) very high Pb/Zn and Ag/Zn ratios; (3) an unusual and characteristic suite of lateral marker facies, including gahnite-bearing cherts, amazonite pegmatites, garnet-rich psammopelite, and sillimanite-rich horizons, and several other important factors reviewed by Walters (1996). A metamorphosed VHMS or sediment-hosted deposit is not likely to drastically alter its chemistry, so it is not valid to continue to refer to BHT deposits as metamorphosed equivalents of other deposit types.

Broken Hill

The origin of the great Broken Hill lode continues to be debated (Pongratz and Davidson, 1996), and, while no consensus exists on genetic models (e.g., Fig. 2a), empirical exploration models (e.g., Fig. 2b) have proved extremely useful in the search for new deposits (Walters, 1996). The application of detailed geological knowledge, stratigraphic interpretation and systematic drilling at Broken Hill resulted in the discovery of the Potosi Orebody which lies within a separate stratigraphic horizon to the main ore lenses. The Potosi Orebody is now known to be the second largest zinc-lead orebody discovered in the Willyama Inlier.

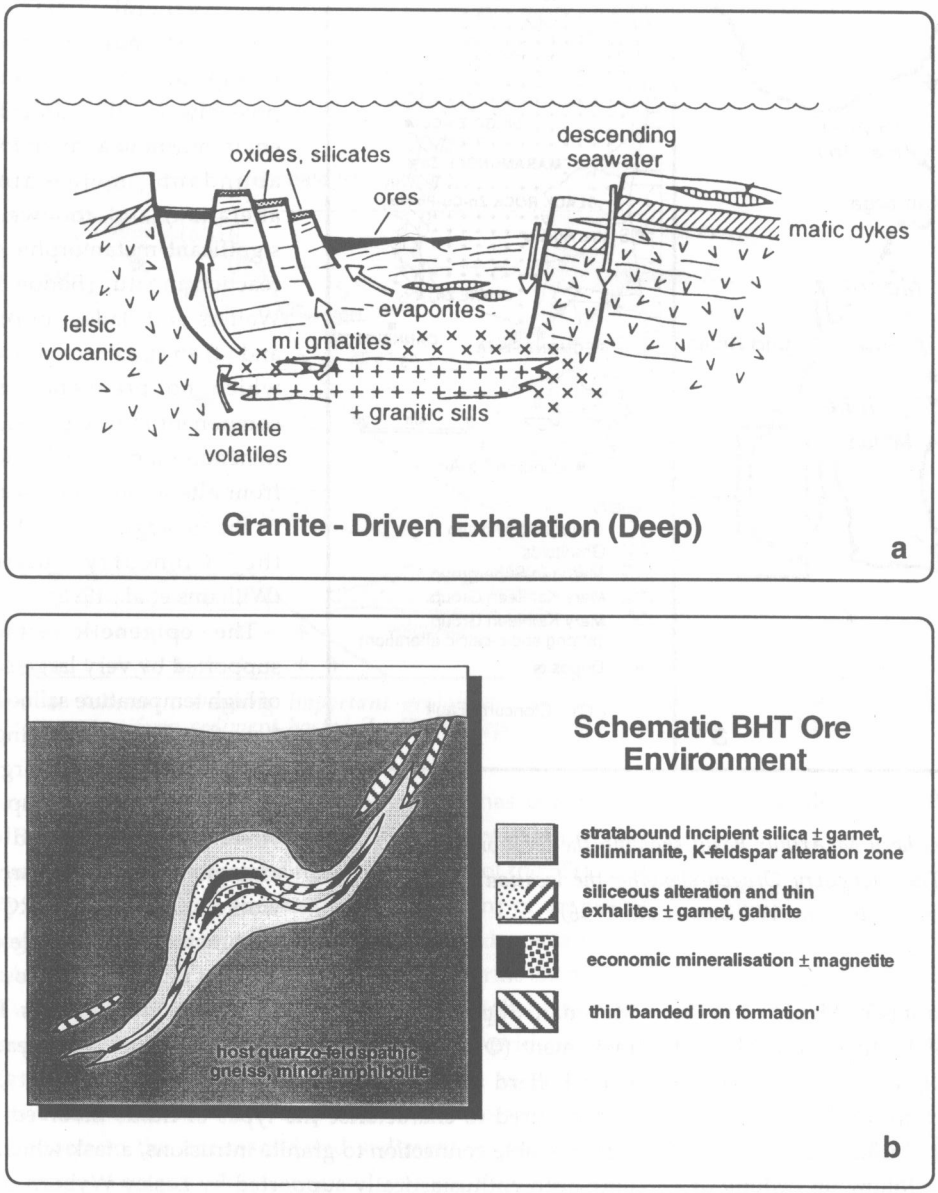


Figure 2 a) A genetic model for Broken Hill deposit (after Plimer and Parr, 1993); b) The geological part of an empirical exploration model for BHT deposits (after Walters, 1996).

New research work in the Willyama Inlier is leading to a re-evalution of the accepted stratigraphic succession of the Willyama Supergroup. The research, being undertaken by the Australian Geodynamics Cooperative Research Centre (AGCRC), involves new structural mapping, high resolution ion probe zircon dating, and includes information from AGSO's seismic transect of the Broken Hill Block. The structural evolution of the Broken Hill orebody is also being re-examined. Detailed aeromagnetic surveys are helping define favourable areas under shallow cover at the margins of the Willyama Inlier, and the South Australian government survey is re-mapping the Olary Block.

Broken Hill-type deposits of the Mt Isa Inlier

Potential for Broken Hill Type deposits in the eastern Mount Isa Inlier was recognised during the 1970's exhalative-driven exploration phase in Australia by companies such as Amoco Exploration and Shell Metals, when it was appreciated by Prof. Dick Stanton, and others, that prospects in the (now) Maronan Supergroup, which forms the eastern border of the Mt Isa Inlier, had similar features to Broken Hill, including small BHT deposits such as Pegmont, Maramungee, Dingo, and Fairmile (Fig. 3). The Maronan Supergroup is a deeper water facies, and much higher metamorphic grade, compared to most units in the rift-related Mt Isa Inlier. It is dominated by feldspathic schists with a strong felsic volcanic component, now collectively referred to as the Fullarton River Group. This is overlain by the Soldiers Cap Group, in which pelitic deep water turbidite units are overlain by basalts and metadolerite sills, with thin oxide and silicate-facies banded iron formations. The Maronan Supergroup was complexly deformed by three major fold events, and during D1 to D2, it experienced sustained upper amphibolite facies metamorphism, resulting in partial melting of feldspathic units. Although the original polarity of the Maronan Supergroup is not known, and its contacts with all other units of the Mt Isa Inlier are major faults, its volcanic geochemistry is consistent with a rift origin. The unusual aspect of the geology is the occurrence of a major intense sodic-calcic alteration front along most of the western fault contacts of the Maronan Supergroup, essentially haloing intrusives of the 1530-1500 Ma Williams Batholith. Large epigenetic copper-gold deposits such as Starra and Ernest Henry, are spatially related to these intrusives, and at least one example,

Osborne, is partly hosted by Maronan Supergroup iron formation.

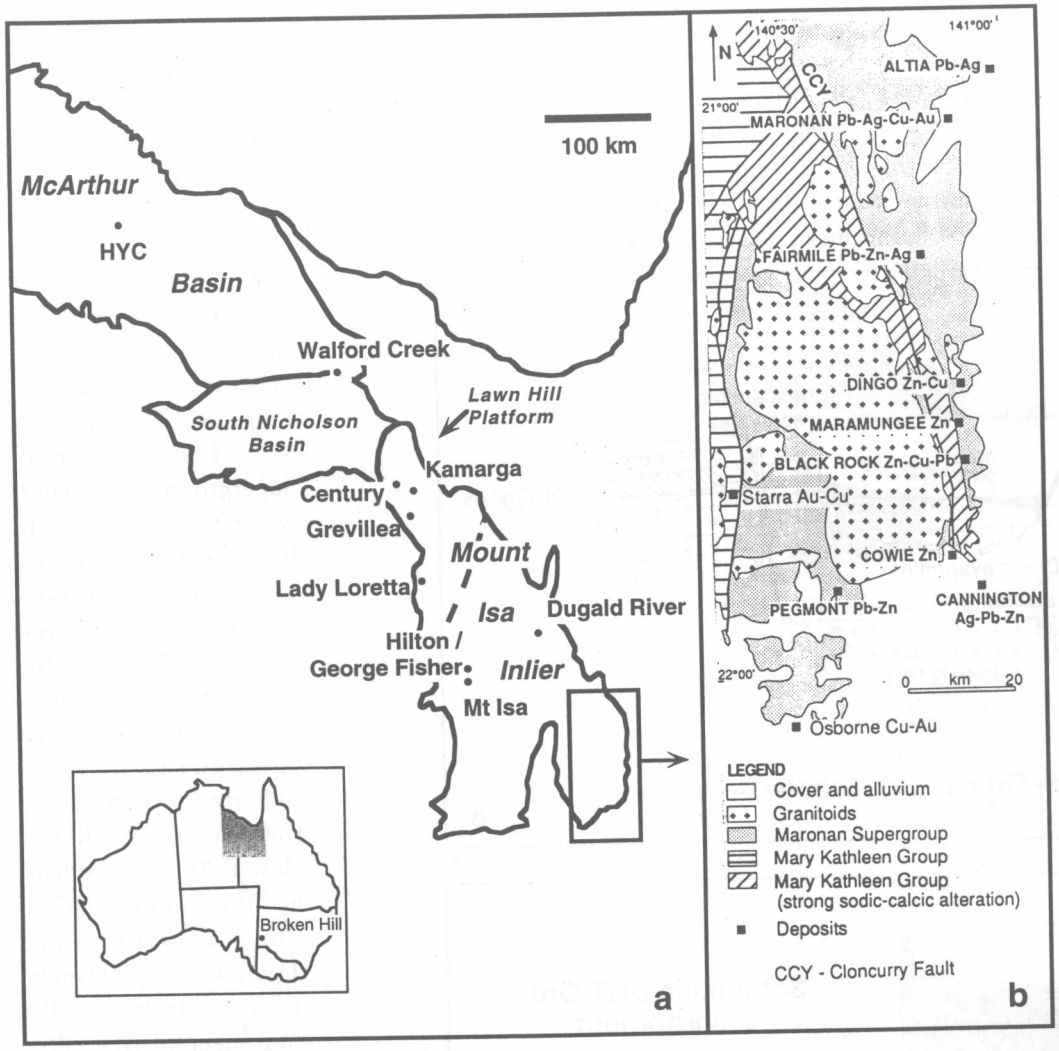


Figure 3 a) The Mount Isa Inlier and southern McArthur Basin showing the locations of important sediment-hosted Zn-Pb-Ag deposits; b) The Cloncurry Orogen showing the location and geological setting of Broken Hill-type deposits and prospects (after Williams et al., 1996).

The discovery of the Cannington deposit (45.3 Mt of 11.1 % Pb, 4.4% Zn, and 500 g/t Ag) in 1990 by BHP Minerals, vindicated the old comparisons with Broken Hill, and injected feverish excitement into Maronan Supergroup exploration. The discovery, coined "La Plateada" by BHP (Skrzeczynski, 1993) was essentially geophysical, based on a follow-up drilling of a small aeromagnetic anomaly within a large magnetically quiet region under ~40 m of Great Artesian Basin (Mesozoic) sediment cover. However, BHP geologists were targeting the area because of their strong belief in the metallogenic comparisons with the Broken Hill district.

Current research is focused on the genesis of the Broken Hill-type deposits in the Maronan Supergroup, with the greatest efforts at Cannington itself. Careful documentation by Bodon (1996) has shown that the deposit has a pre- to syn-metamorphic gangue assemblage of pyroxenoids, Mn-garnet, olivine, graphite and base-metals, but this is severely overprinted by a syn- to post-D2 calc-silicate metasomatic assemblage of almandine, hedenbergite and quartz, which was associated with, at the very least, significant base-metal remobilisation that may account for the fabulously rich silver content.

The contrasting assemblages have fueled two very different interpretations of the deposit genesis, with implications for Broken Hill-type deposits in general: (1) pre-deformational formation within an immature setting, possibly in the diagenetic environment to account for the abundant metasediment alteration, and followed by significant metamorphic fluid reaction in situ (Bodon 1996, Walters and Bailey, in press), and (2) an epigenetic model, in which no pre-metamorphic component is recognised, and mineralisation formed "entirely from alteration processes late in the geological evolution of the Cloncurry district" (Williams et al., 1996).

The epigenetic view is supported by very large-scales of high temperature saline fluid flow that occurred during D2 to D3 on the western margin of the Maronan Supergroup, and which certainly moved vast amounts of metal. Research by workers from the AGCRC has documented terrain scale east-dipping thrust faults below the Maronan Supergroup that may have facilitated this fluid movement (O'Dea et al., 1997). AMIRA project P438, lead by Peter Pollard and Pat Williams of James Cook University, has endeavoured to characterise the types of fluids involved, and their possible connection to granite intrusions, a task which has long been enthusiastically supported by Lesley Wyborn of the Australian Geological Survey Organisation.

Stratiform sediment-hosted Zn-Pb-Ag deposits

This important group of deposits (Fig. 3) accounts for the majority of Australia's current Zn, Pb and Ag production, with operating mines at Mount Isa, Hilton, Dugald River, and HYC (McArthur River). They will continue their dominant position into the 21st century with mining development underway at the Century deposit (100 million tonnes); mining of high grade parts of the small Lady Loretta deposit due to commence in early 1998; and feasibility studies nearing completion on the large George Fisher deposit near Mount Isa.

With the exception of Dugald River, all these deposits are located in the Mount Isa Inlier 'Western Succession' or the southern McArthur Basin (Fig. 3), and these areas have been the focus of intense research activity in recent years. Since 1992 the Centre for Ore Deposit Research (CODES SRC) at the University of Tasmania has carried out a major multidisciplinary research project aimed at determining the primary geological, geochemical and structural controls on the location and timing of formation of these deposits.

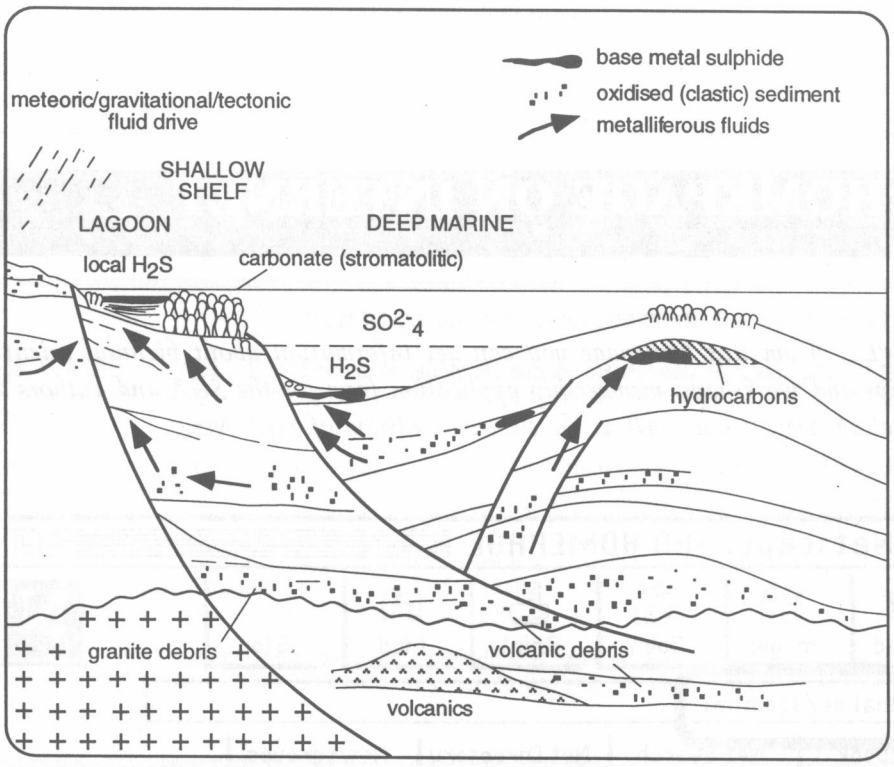


Figure 4: Schematic showing important geological components of an exploration model for Australian stratiform sediment-hosted Zn-Pb-Ag deposits (after McGoldrick and Large, 1997).

Finance for the multimillion dollar project has come from AMIRA (Project P384/384A) and the ARC. The research has led to a more detailed understanding of the genesis of the HYC and Lady Loretta deposits, and to the development of empirical lithogeochemical and isotopic vectors for these deposits (Large and McGoldrick, 1997). Computer modelling of brine chemistries and water-rock interactions has yielded new insights into metal transport and deposition processes. Textural evidence from different deposits indicates that some form as syngenetic accumulations of base metal sulphides at the basin floor, while others form in the unconsolidated sediment as porosity infill and/or replacement. The Century deposit is thought to have formed during late diagenesis at depths of up to 1000 m during the first stages of basin inversion (Broadbent et al., 1996). Regardless of the precise timing, these deposits have clearly formed early in the geological evolution of their host sedimentary basins, and the CODES project has used integrated structural, sedimentological and geophysical studies to determine key elements of the basin architecture and evolution responsible for base metal mineralisation (Fig. 4).

In a complementary project AGSO, through their Northern Australian Basin Resource Evalution program (NABRE-rhymes with sabre), have begun to apply modern sequence stratigraphic principles to the Mount Isa and McArthur Basins. In the absence of biostratigraphic control and detailed seismic profiles, this project has made novel, extensive use of gamma-ray logs of surface exposures and drill-core. This approach, combined with new, high-precision ion probe zircon dates, is yielding a much more realistic lithostratigraphic framework for the northern Australian late Palaeoproterozoic to early Mesoproterozoic sedimentary sequences.

Conclusions

Charles Rasp probaly would not recognise Broken Hill today, but 'the rush that never ended' to find and exploit Australia's mineral wealth continues. The era of stumbling over outcropping base metal 'giants' is probably over. However, sound scientific research into known deposits and their geological setting (in the broadest sense), will help 21st century explorers to locate the hidden quarry they seek.

Much of the work referred to here will be appearing in two special publications due out in 1998. The first of these will be v. 44 n. 1 of the Australian Journal of Earth Sciences which is a thematic issue entitled 'Geology and mineralisation in the Proterozoic Carpentaria Zinc Belt of northern Australia', and later in the year an Economic Geology Monograph covering many aspects of the geology and mineralisation of the McArthur Basin and Mount Isa Inlier will be released.

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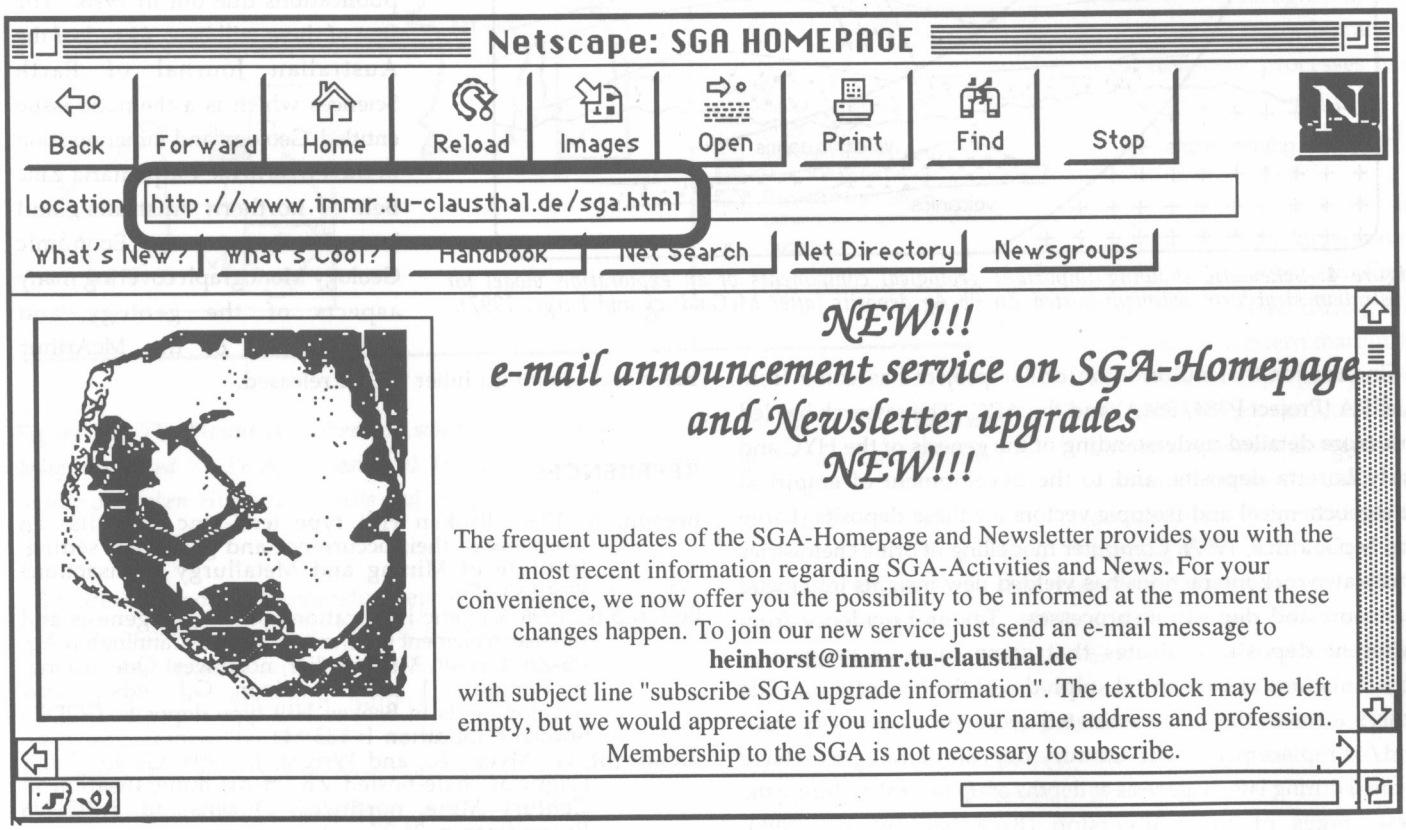

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The Pb-Zn-As-Tl-Ba-deposit at Lengenbach, Binn Valley, Switzerland - Petrogenesis based on combined geochemical and isotopical (U,Pb,Rb,Sr,S,O,C) investigations by M.D. Knill. Beitraege zur Geologie der Schweiz, geotechnische Serie, Lief. 90, 1996. 87 p. (includes numerous color figures). Orders: Schweizerische Geotechnische Kommission, ETH-Zentrum, 8092-Zuerich, Switzerland: 35 SFR, (about 28 US$).

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November 6 - 9

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★November 20-21

XXVII. KOLLOQUIUM FÜR PROSPEKTION UND EXPLORATION. "Umwelt- und Qualitätsmanagement bei der Gewinnung und Verarbeitung mineralischer Rohstoffe", Berlin, Germany - Contact address: Mr. Gadow, Technische Universität Berlin, Institut für Angewandte Geowissenschaften I, Fachgebiet Lagerstättenforschung, Sekr.BH 4, Ernst-Reuter-Platz 1,10587 Berlin; phone: +49 30 314 23 389; fax:+49 30 314 26 591; e-mail: mindeposbg.tu-berlin.de

★December 14-18

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1998

★January 5-6

MDSG ANNUAL MEETING, University of Greenwich, London, England - The next Annual General Meeting of the Geological Society of London's Mineral Deposits Studies Group will take place on the 5th and 6th of January 1998 and will be hosted by the University of Greenwich. The meeting will take place at the School of Earth & Environmental Sciences, on the University's Medway Campus at Chatham Maritime. The meeting will cover all aspects of research into mineral deposits; from exploration, through exploitation to environmental remediation. The format will follow that of past years, with a mixture of sessions covering both specific and general topics. Abstracts (maximum of two A4 pages) can be submitted by post or by email. The deadline for submission of abstracts is the 7th of November 1997. Potential delegates should contact one of the convenors before October 8th by email or at the address shown below.
Convenors: Iain McDonald (mi08@gre.ac.uk); Simon Dominy (ds11@gre.ac.uk); and Andy Bussell (bm06@gre.ac.uk), MDSG-98 School of Earth & Environmental Sciences, University of Greenwich, Chatham Maritime, Kent ME4 4AW, U.K.
A second circular with registration details will be sent out to potential delegates during October.

★January 19-21

MINERALS COLLOQUIUM 1998, Ottawa, Canada - Contact address: Geological Survey of Canada, Room 686, 601 Booth Street, Ottawa, Ontario, Canada KIA 0E8; phone: +613 992 1600; fax: +613 996 9820; e-mail: colloq98gsc.nrcan.gc.ca; internet: http://www.nrcan.gc.ca/gsc/mrd/colloq98.htm

★February 14

19TH MINERALOGICAL SYMPOSIUM, "FLUORITE AND OTHER ALPINE MINERALS", Tucson Gem and Mineral Show, Auburn,USA - Contact address: Robert. B. Cook, Department of Geology, 210 Petrie Hall, Auburn University, Auburn, AL 36849; phone: +334 844 4282; e-mail: cookrobmail.Auburn.edu

★February 20

"Witwatersrand and Vredefort - Metamorphism and Mineralization", University of Cape Town, South Africa - Organized by the Witwatersrand Interest Group of the Mineralogical Association of South Africa, together with the Geological Society of South Africa and possibly also the SGA. Deadline for one-page abstracts is 15 December 1997. Contact address: Dr. Hartwig E. Frimmel, Dept. Geological Sciences, University of Cape Town, Rondebosch 7700, South Africa; phone: +24-21-6502901; fax: +24-21-6503783: e-mail: hef@geology.uct.ac.za.

★February 23-25

INTERNATIONAL CONFERENCE ON AIRBORNE ELECTROMAGNETICS, Sydney, Australia - Contact address: Airborne EM Conference Secretariat, c/o Well Done Events, P.O.Box 1758, North Sydney, NSW 2059, Australia; phone: +61 44 460 318; fax: +61 44 460 319; e-mail: judypwelldone.com.au

★February 26-28

88TH ANNUAL MEETING OF THE GEOLOGISCHE VEREINIGUNG E.V., SWISS GEOLOGICAL SOCIETY, SWISS MINERALOGICAL AND PETROLOGICAL SOCIETY."Geological Dynamics of Alpine-type Mountain Belts - Ancient and Modern", Berne, Switzerland. Contact address Prof. Dr. Albert Matter, Geologisches Institut, Baltzerstrasse 1, CH-3012 Bern; phone: +41 31 631 8767; fax: +41 31 631 4843; e-mail: amattergeo.unibe.ch.

★March 9-11

19TH INTERNATION COURSE ON GROUNDWATER MANAGEMENT: "MODERN APPROACH TO GROUNDWATER TRACER INVESTIGATIONS: METHODS AND MODELS", Zürich, Switzerland - Contact address: Dr. Fritz Stauffer, Institute of Hydromechanics and Water Resources Management, ETH Hönggerberg, CH-8093 Zürich, Switzerland; phone: +41 1 633 30 79 (75); fax: +41 1 633 10 61; e-mail: stauffer@ihw.baum.ethz.ch

★March 24-26

INTERNATIONAL CONFERENCE ON COAL SEAM GAS AND OIL, Brisbane, Australia - Contact address: Conference on Coal Seam Gas and Oil, c/o Intermedia Convention and Event Management, P.O.Box 1280, Milton, Queensland 4064, Australia; phone: +61 7 3369 0477; fax: +61 7 3369 1512; e-mail: csgo98im.com.au

March 30-April 3

9TH INTERNATIONAL SYMPOSIUM ON WATER-ROCK INTERACTION, Taupo, New Zealand - Contact address: Dr. B.W. Robinson, Wairakei Research Center, Institute of Geological and Nuclear Sciences, P.B. 2000, Taupo, New Zealand; phone: +64 7 374 8211; fax: +64 7 374 8199; e-mail: wri9@cns.cri.nz

April 13-17 *SGA-COSPONSORED*

7TH INTERNATIONAL KIMBERLITE CONFERENCE, Cape Town, South Africa - Pre- and post-conference field trips: 6-12 and 19-24 April - Contact address: James Gurney, 7IKC, Dept. of Geological Sciences, University of Cape Town, PB, Rondebosch 7700, South Africa; fax: +27 21 650 3783; e-mail: 7IKC@GEOLOGY. UCT. AC.ZA; internet: http://www.uct.ac.za/depts/geolsci/7IKC/

★April 14-17

MAGMATISM AND MINERALIZATION IN ARCS AND OCEAN BASINS, WITHIN GEOSCIENCE 98, Keele University, Staffordshire, U.K. - Contact address: Dr. P. T. Leat (principal convenor), British Antarctic Survey, Madingley Road, Cambridge CB3 0ET, UK; phone: +44 1223 25 14 32; fax: +44 1223 36 26 16; e-mail: p.leat@bas.ac.uk

April 14-18

GEOSCIENCE 98, Keele University, Staffordshire, U.K. - Contact address: The Conference Dept., The Geological Society, Burlington House, Piccadilly, London, WIV OJU; phone: +44

171 434 9944; fax: +44 171 439 8975; e-mail: conf@geolsoc.cityscape.co.uk

★April 20-24

EUROPEAN GEOPHYSICAL SOCIETY. DEGASSING OF HIGH-LEVEL MAGMA CHAMBRES AND THE EVOLUTION OF HYDROTHERMAL-MAGMATIC SYSTEMS, Pisa, Italy. Call for papers - Contact address: Paolo Fulignati, Dipartimento di Scienze della Terra, Universita di Pisa, Italy; phone: +39 50 847274; fax: +39 50 500675; e-mail: fulignatidst.unipi.it

★May 13-15

IV INTERNATIONAL CONFERENCE ON CLEAN TECHNOLOGIES FOR THE MINING INDUSTRY, Santiago, Chile - During EXPOMIN'98. Contact address: M. Sanchez, Dept. Metallurgical Eng., Universidad de Concepcion, Casilla 53.C, Concepcion, Chile; phone: +56 41 204241; fax: +56 41 243418; e-mail: msanchez@buho.dpi.udec.cl; internet: http://www.met.udec.cl/eventos.html

May 15-17

MINERALOGICAL ASSOCIATION OF CANADA SHORT COURSE, "MINERALIZED PORPHYRY-SKARN SYSTEMS", Quebec, Canada - Contact address: David Lentz, New Brunswick Geological Surveys, PO Box 50, 495 Riverside Drive, Bathurst, N.B., Canada E2A 3Z1; phone +1 506 547 2070; fax: +1 506 547 7694; e-mail: dlentz@gov.nb.ca

★May 18-20

SWEMP 98, FIFTH INTERNATIONAL SYMPOSIUM ON ENVIRONMENTAL ISSUES AND WASTE MANAGEMENT IN ENERGY AND MINERAL PRODUCTION, Ankara, Turkey. First announcement and call for papers - Contact address: Prof. Gunhan Pasamehmetoglu, Mining engineering Department, Middle East Technical University, ODTU,06531 Ankara, Turkey; phone: +90 312 210 2654; fax: +90 312 210 1265; e-mail: gunhanrorqual.cc.metu.edu.tr

May 18-20

GAC-MAC 98, Special Session on Ore Deposits in Mafic and Ultramafic Rocks, Quebec City, Canada - Contact address: Sarah-Jane Barnes, Université du Quebec à Chicoutimi.

★June 1-3 *SGA-SPONSORED*

5TH ANNUAL SHORT COURSE ON "MAGMATISM, VOLCANISM AND METALLOGENY", Brest, France - Organized by Steve Scott (University of Toronto), Thierry Juteau (l'Universite de Bretagne Occidentale: UBO) and Yves Fouquet (IFREMER). Other instructors include Nick Arndt (Rennes University), Harold Gibson (Laurentian University), Roger Hekinian (IFREMER) and Rene Maury (UBO). Sponsored by the SGA, IFREMER, Conseil General du Finistere and UBO. Contact address: Professor Thierry Juteau, Dépt. des Sciences de la Terre, Université de Bretagne Occidentale, 6 avenue Le Gorgeu, B.P. 809, 29285 Brest Cedex, France; phone: +33 298 01 61 75; fax +33 298 01 66 20; e-mail: juteau@univ-brest.fr

★June 1-4

PACROFI VII, PAN AMERICAN CURRENT RESEARCH ON FLUID INCLUSIONS, Las Vegas, Nevada, USA - Contact address: UNLV Continuing Education / PACROFI VII, 4505 Maryland Parkway, Box 451019, Las Vegas, NV 89154-1019, USA; phone: +1 702 895 3394; fax: +1 702 895 4195; e-mail: baker@ccmail.nevada.edu

★June 3-5

INTERNATIONAL SYMPOSIUM CORDILLERA DE LOS ANDES. GEOLOGICAL AND MINING POTENTIAL.THE NEW TECTONIC AND METALLOGENIC APPROACH, Mendoza-Argentina - Contact address GRK Catamarca 31, Piso 12, Depto.D, 5500-Mendoza-Argentina; phone: +54 61 200673; fax: +54 61 202330; e-mail: grkcpsarg.com

June 29-July 2 *SGA-COSPONSORED*

8TH IAGOD/CODMUR INTERNATIONAL PLATINUM SYMPOSIUM WITH THE THEME "PLATINUM - GENESIS TO BENEFICIATION", Rustenburg, South Africa - Excursions to the Great Dyke, Zimbabwe, Bushveld Complex, South Africa. Contact address: Mrs Elmarie Walker, Conference Co-ordinator, South African Institute of Mining and Metallurgy, PO Box 61127, Marshalltown 2107, South Africa; phone: +27 11 834 1273/7; fax: +27 11 838 5923; e-mail: saimm@iafrica.com

★July 7-10

GEOCONGRESS 98, Pretoria, South Africa - Contact address: Secretary of Geocongress '98, P.O.Box 798, Pretoria, 0001 South Africa; fax: +12 841 1221; e-mail: eaucampgeoscience.org.za

★August 5-8

COM/IMA/MAC SHORT COURSE, MODERN APPROACHES TO ORE AND ENVIRONMENTAL MINERALOGY, Ottawa and Guelph, Canada - Contact address: Louis J. Cabri; phone: 1-613-995-4073 CANMET; fax: 1-613-996-9673 555 Booth Street; e-mail: lcabri@nrcan.gc.ca Ottawa, CANADA K1A 0G1

August 10-14 *SGA-COSPONSORED*

IMA '98 (17TH GENERAL MEETING OF THE INTERNATIONAL MINERALOGICAL ASSOCIATION), Toronto, Canada - Contact address: Dr. Eva Schandl, Secretary to Organising Committee, Dept. of Geology, University of Toronto, Earth Sciences Centre, 22 Russell Street, Toronto ON, M5S 3B1 Canada; phone: +1 416 978 7084; fax: +1 416 978 3938; e-mail: ima@quartz.geology.utoronto.ca. First circular with response form are available on the IMA98 web site at: http://www.geology.utoronto.ca/IMA98 (see page 16 for details).
Within IMA '98 a symposium, cosponsored by SGA, will be held in honor to Tony Naldrett on the theme "Mineral Deposits Associated with Mafic and Ultramafic Rocks", Toronto, 10-15 August 1998. (Organizer: Prof. C. Michael Lesher, Department of Geology, 202 Bevill Research Building, University of Alabama, Tuscaloosa, Alabama 35487-0338 USA.

August *SGA-COSPONSORED*

10TH QUADRIENNIAL IAGOD SYMPOSIUM, Broken Hill, Australia - Contact address: Prof. I. Plimer, Dept. of Geology, University of Melbourne, Parkville, Vic 3052, Australia; phone: +61 3 344 6520; fax: +61 3 344 7761; e-mail: ian_plimer@muwayf.unimelb.edu.au

★September 1-12 *SGA-COSPONSORED*

INTERNATIONAL IGCP-373 FIELD CONFERENCE, ANATOMY AND TEXTURES OF ORE-BEARING GRANITOIDS OF SIKHOTE-ALIN (PRIMORYE REGION, RUSSIA) AND RELATED MINERALIZATION, Vladivostok, Russia - Contact address: Dr. Galina Gonevchuk, far East Geological Institute of FEB of Russian Academy of Sciences, 159, Prospect 100-letya, Vladivostok, 690022, Russia; phone; +7 4232 318 750; fax: +7 4232 31 78 47; e-mail: fegi@online.marine.su or Dr. Reimar Seltmann, GeoForschungsZentrum Potsdam (GFZ) Telegrafenberg A50, D-14473 Potsdam, Germany; phone: +49 331 288 1433; fax: +49 331 288 1436; e-mail: setm@gfz-potsdam.de (see page 17 for details)

★September 21-24

IGCP 373 INTERNATIONAL CONFERENCE, GENETIC SIGNIFICANCE OF PHOSPHOROUS IN FRACTIONATED GRANITES, Perslák, Czech Republic - Contact address: Karel Breiter, Czech Geological Survey, Geologická 6, 152 00 Praha 5, Czech Republic; phone/fax: 420 2 581 73 90; e-mail: breiter@cgu.cz; internet: http://www.cgu.cz/p/p.htm

(☞ to page 18)

WISH TO ADVERTISE FORTHCOMING EVENTS?

Send your announcements to:

SGA News, Département de Minéralogie, Université de Genève, Rue des Maraîchers 13, CH-1211 Genève 4, SWITZERLAND
fax: +41 22 320 57 32
e-mail: SGANEWS@sc2a.unige.ch

(See page 2 for details concerning the format of the documents to be sent)

ANNOUNCEMENTS

MAGMATISM AND MINERALIZATION IN ARCS AND OCEAN BASINS, A Symposium to be held as part of Geoscience '98, Call for Abstracts

Keele University, Staffordshire, U.K.

16-17 April 1998

This two-day, multidisciplinary symposium forms part of the second biennial Geoscience meeting of the Geological Society, to be held on 14-17 April 1998. Magmatic arcs, back-arc basins and ocean ridges are regions of prolific volcanism and hydrothermal activity, and contain many types of globally important metal deposit. This symposium invites contributions on the field setting, structural, geophysical and geochemical characteristics of subaerial and submarine volcanic sequences, in ancient and present-day settings, and their associated hydrothermal alteration assemblages and mineralization. The meeting is aimed at industry as well as academic interest. It is envisaged that papers from the symposium will form a thematic publication. A post-meeting field-trip (17-20 April) will examine the Ordovician volcanic sequences of the Snowdonia marginal-basin caldera, North Wales, and nearby porphyry, volcanic-exhalative (Parys Mountain) and vein mineralization.

Keynote and invited speakers are:
Peter W Lipman (USGS) Continental are volcanism and caldera formation, Southern Rocky Mountains, USA
Jeffrey W Hedenquist (GSJ) Diversity of alteration and mineralization in subaerial volcanic arcs
Martin C Sinha (Cambridge) Magmatic and tectonic evolution of the Lau back-arc basin
Peter M Herzig (Freiberg) Magmatic contributions to seafloor hydrothermal systems in arcs and back-arc rifts
Wayne D Goodfellow (GSC) Magmatism and mineralization in an active rift, Middle Valley, Juan de Fuca Ridge
The symposium is sponsored by specialist groups of the Geological and Mineralogical societies (Volcanic and Magmatic Studies Group and Mineral Deposits Studies Group) and the British Mid-Ocean Ridge Initiative (BRIDGE).

Convenors: PT Leat, RCR Willan (British Antarctic Survey), HM Prichard (Cardiff), K Harrison, (Leeds)

The abstract deadline is 15 November 1997. For abstract submission, and to express interest in the symposium or field-trip, contact the principal convenor:
Dr PT Leat, British Antarctic Survey, Madingley Road, Cambridge, CB3 OET, UK, Tel: 44-1223-251400; Fax: 44-1223-362616; e-mail: p.leat@bas.ac.uk
Note: NERC-supported students who submit an abstract can apply for free registration.

To receive further information on Geoscience '98 and registration details, contact: Conference Department, The Geological Society, Burlington House, London, W1V 0JU, UK; Tel: 44-171-434 9944; Fax: 44-171-439 8975; email: harrisona@geolsoc.org.uk http://www.geolsoc.org.uk

The Geological Society is registered charity No. 210161 7/10/97

COM/IMA/MAC SHORT COURSE, OTTAWA '98 MODERN APPROACHES TO ORE AND ENVIRONMENTAL MINERALOGY

Ottawa, Canada

August 4, 5, 6, 7 (4 days) and August 8 (1 day) 1988
Immediately preceding the 17th General Meeting of IMA in Toronto (August 9-14, 1998)

Sponsored by the Mineralogical Association of Canada, the Commission on Ore Mineralogy (IMA), and Natural Resources Canada, the course will highlight hands-on experience with specialized laboratory equipment in the Booth Street complex of Natural Resources Canada - Canada Centre for Mineral & Energy Technology and Geological Survey of Canada (CANMET & GSC); on August 8, a limited number of attendees will visit the Scanning Proton Microprobe in Guelph (about 5.5 hours drive from Ottawa, and one hour from Toronto). The course should be of interest to a wide spectrum of earth scientists that use ore mineralogy in their research or applied work. These include research economic geologists, exploration-oriented mineralogists, process mineralogists, environmental mineralogists and related disciplines as well as students who would like the opportunity of learning more about some specialized equipment and applications of concern to them.

Topics include: specimen preparation, ore microscopy, textures of ore minerals, crystal chemistry, cathodoluminescence, trace-element analyses (by electron microprobe, proton microprobe, ion microprobe, laser ablation-ICP-mass spectrometry), isotopic analysis using high-resolution SHRIMP, image analysis, variable pressure SEM, environmental mineralogy, mineralogical balances by dissolution methodology. Laboratory sessions include ore microscopy, a fully-automated SEM-based image analyser, a partial pressure SEM for humid samples, a Secondary Ion Mass Spectrometer, cathodoluminescence, the SHRIMP laboratory and the Guelph PIXE laboratory.

Principal lecturers: Louis Cabri, Iain Campbell, Alan Criddle, Chris Hayward, Simon Jackson, John Jambor, Gilles Laflamme, Pertti Lamberg, Rolando Lastra, Greg McMahon, Bruce Robinson, Chris Stanley, Richard Stern, Richard Taylor, David Vaughan.

For further information: Louis J. Cabri Tel: 1-613-995-4073 CANMET; fax: 1-613-996-9673 555 Booth Street; e-mail: lcabri@nrcan.gc.ca Ottawa, CANADA K1A 0G1

Registration: Limited to 15 professionals ($495) and 10 students ($195), on a first-come basis. Please complete registration form and send with payment to: Mineralogical Association of Canada Meriline Postal Outlet 1460 Merivale Road Ottawa, CANADA K2E 1BI; phone. & fax: 1-613-226-4651

Accommodation: Please contact directly Carleton University's Tour & Conference Centre: Tel.: 1-613-520-5609; fax.: 1-613-520-3952
The university residences are within a 15 to 20 minutes walk from the Booth Street Complex.

Registration Form for Pre-IMA Meeting Short Course"Modern Approaches to Ore and Environmental Mineralogy"to be held in Ottawa from August 4 to 7.
PLEASE NOTE: Registration will be limited to 15 professionals ($495) and 10 students ($195) because of limited space in the laboratory sessions. Registration will be on a first-paid, first-served basis. A short course volume will be provided to the registrants.

5TH ANNUAL SHORT COURSE ON "MAGMATISM, VOLCANISM AND METALLOGENY"

Brest, France

SGA-SPONSORED

June 1-3, 1998

An in-depth examination with lectures and hands-on practical sessions of magmatic and volcanic processes and their ores in continents, ocean basins and island arcs from a geological, petrological and geochemical point of view. Organized by Steve Scott (University of Toronto), Thierry Juteau (l'Université de Bretagne Occidentale: UBO) and Yves Fouquet (IFREMER). Other instructors include Nick Arndt (Rennes University), Harold Gibson (Laurentian University), Roger Hekinian (IFREMER) and Rene Maury (UBO). Sponsored by the SGA, IFREMER, Conseil General du Finistere and UBO. CONTACT: Professor Thierry Juteau, Dépt. des Sciences de la Terre, Université de Bretagne Occidentale, 6 avenue Le Gorgeu, B.P. 809, 29285 Brest Cedex, France Tel (33) (0)298 01 61 75, Fax (33) (0)298 01 66 20, Internet: juteau@univ-brest.fr

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ANATOMY AND TEXTURES OF ORE-BEARING GRANITOIDS OF SIKHOTE-ALIN (PRIMORYE REGION, RUSSIA) AND RELATED MINERALIZATION, International Geological Correlation Programme (IUGS/UNESCO-IGCP), International Association on the Genesis of Ore Deposits (I.A.G.O.D.), International IGCP-373 Field Conference

Vladivostok, Russia

SGA-COSPONSORED

Co-organized and co-sponsored by Russian Academy of Sciences

(RAS, FEB RAS) and Society for Geology Applied to Mineral Deposits (SGA)

1-12 September 1998

Jointly organized by:
Far East Geological Institute, Far East Branch, Russian Academy of Sciences, 690022 Vladivostok, Russia, IGCP-373 Project, c/o GeoForschungsZentrum Potsdam (GFZ), Telegrafenberg A50, D-14473 Potsdam, Germany.

Sponsored by:
A.V. Chernishov, head of mine-geological department of "Boron" joint-stock mine company; Y.T. Gurulev, General director of "Primorgeophysics" company; V.I. Kosenko, deputy of administration head of Kavalerovo district; N.F. Kosterev, general geologist of Geological Committee of Primorsky krai; G.I. Potapenko, general geologist of "Dal'polymetal' company

Organizations contacted for sponsorship:
Russian Academy of Sciences, Far East Branch (FEB RAS), Russian Ministry of Sciences and Technology Policy, Russian Foundation for Fundamental Research (RFFR), International Association on the Genesis of Deposits (IAGOD, WGTT), Society for Geology Applied to Mineral Deposits (SGA), Society of Economic Geologists (SEG)

Contact address:
Dr. Galina Gonevchuk, Far East Geological Institute of FEB of Russian Academy of Sciences, 159, Prospect 100-letya, Vladivostok, 690022, Russia; phone: 7(4232) 318 750; fax: 7(4232) 31-78-47; E-mail: fegi@online.marine.su

Dr. Reimar Seltmann, GeoForschungsZentrum Potsdam (GFZ); Telegrafenberg A50, D-14473 Potsdam, Germany; phone: +49 331 288 1433; fax: +49 331 288 1436; E-mail: seltm@gfz-potsdam.de

IMPORTANT DATES

November 1, 1997	Pre-registration
January 1, 1998	Second Circular
March 31, 1998	Submission of Abstracts
April 30, 1998	Reviews of Abstracts
May 31, 1998	Registration and Payment, Definitive Abstracts
September 1-12, 1998	Field Conference

LANGUAGE: The official language of the field conference will be **English**. At the field excursion a few contributions in Russian language will be simultanously translated.

VISA: Participants need Russian visa. Formal invitations will be sent from the Organizing Committee to the applicants after registration. Further details on visa, travel, and climate will be distributed in the 2nd Circular.

REGISTRATION FEES (all inclusive: catering, accomodation, excursion travel): **ca. 800 US$.**

FIELD CONFERENCE TOPICS
* Geochemistry, mineralogy and petrography of ore-bearing granites, their anatomy and textures.
* Geotectonic and metallogenic evolution of the Russian Far East
* Mineralization and alteration processes in selected ore districts: case studies.

Major excursion routes will be in the Kavalerovo and Dalnegorsk districts of South Primorye (scheme).
The field team will stay at the hotel in Kavalerovo town. The way to Kavalerovo from Vladivostok takes about 1 hour by airplane or about 12 hours by bus.

SOCIETY OF ECONOMIC GEOLOGISTS STUDENT RESEARCH GRANTS AVAILABLE IN 1998

Students of mineral resources throughout the world may apply for thesis research grants available in 1998 from the Society of Economic Geologists Foundation and the Society of Economic Geologists. Grants from the Hugh E. McKinstry Fund are awarded to support research with a substantial field component. The Hickok-Radford Fund awards grants for field projects in arctic, sub-arctic, or other challenging field areas. A third group of student research grants is in part funded by gifts from BHP Minerals. These provide funds for research in economic geology that focuses on new descriptive data on ore deposits, mining districts, and on topical subjects.

The 1998 awards total US$40,000. Individual grants range from US$500 to US$3,000 and are intended to fund specific graduate thesis research expenses. Application forms may be obtained from the **Chair, SEG Student Research Grants, 5808 South Rapp Street, Suite 209, Littleton, Colorado 80120 USA.**

phone: +1 303 797 0332; fax: +1 303 797 0417; e-mail: socecongeol@csn.net
Forms are also available on the web: httP://www.mines.utah.edu/~wmgg/SEG/html

Application must be postmarked by 31 March 1998, and awards will be announced by 1 May 1998.

from 15: FORTHCOMING EVENTS

★September 22-23

INTERNATIONAL MEETING OF GOLD EXPLORATION AND MINING IN NW SPAIN, Oviedo, Spain - Field trips (24 and 25 September) to the mines of Valle-Boinás, Carlés, Salave and the gold prospect at the Navia river.
Sponsored by the Facultad de Geología de Oviedo, Rio Narcea Gold Mines, Ltd., San Diego Gold Minery Ltd., Siemcalsa and Universidad de Oviedo. Contact address: Dr. Daniel Arias Prieto, Facultad de Geología, C/ Arias de Velasco s/n, 33005 Oviedo (Spain); phone: +34 8 5103 109; fax: +34 8 5103 085; e-mail: darias@asturias.geol.uniovi.es; internet: http://www4.uniovi.es/es/D-Facultad

★October 21-23

"MARINE RESEARCH MEETS LAND EXPLORATION", Day's Inn, Toronto, Canada - The contribution of ocean drilling and seafloor research to the exploration for base and precious metals on land. Additional sessions on marine diamonds and a variety of topics on marine mining. Sponsored by the International Marine Minerals Society for the 29th annual Underwater Mining Institute organized by Steve Scott (University of Toronto), Richard Moore (Falconbridge) and Richard Garnett (Valrik). Contact address: Mrs. Karynne Chong Morgan, UMI Conference Coordinator, 811 Olomehani Street, Honolulu, Hawaii 96813-5513, USA; phone: +1 808 587-5320; fax: +1 808 587-5325; e-mail: klei@compuserve.com

October 26 - 29

SEG MEETING, Toronto, Canada, in cooperation with Geological Society of America.

1999

★August 22-25 *SGA-SPONSORED*

5TH, BIENNIAL SGA MEETIN, London, U.K. - Contact address: Dr. C. J. Stanley, Dept. of Mineralogy, The Natural History Museum, Cromwell Rd., London, SW7 5BD, U.K.; fax: +44 171 938 9268; e-mail: cjs@nhm.ac.uk (see page 20 for details)

★September 12-16

SUDBURY '99, MINING AND THE ENVIRONMENT II. First announcement and call for papers - Contact address: Sudbury 99, Centre in Mining and Mineral Exploration Research CIMMER), Laurentian University, Sudbury,Ontario P3E 2C6 Canada; phone: +705 673 6572; fax: +705 673 6508; e-mail: cmoshernickel.laurentian.ca

SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS

SGA Membership Application Form

I would like to become a member of the Society for Geology Applied to Mineral Deposits (SGA) and to receive my personal copy of Mineralium Deposita. Current fees are: i) Regular Member **98.00 DM,** ii) Junior Member* (up to 4 years after last academic degree, Ms. Sc., Ph.D.) and Senior Member* (after retirement) **68.00 DM,** iii) Student Member* (max. 4 years, up to Ph. D., **38.00 DM,** iv) Corporate Member **294.00 DM.** They include the annual subscription to Mineralium Deposita (corporate members, three copies). Do not send money now: you will be invoiced.
*Certificate required

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Are you a member of the Society of Economic Geologists? (If yes, no sponsors are necessary) ❑ Yes ❑ No

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*Certificate required

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Place and date .....

Two SGA Sponsors*

Name, place, date, signature

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*If you have difficulty in finding sponsors, send this form to the Executive Secretary and your application will still be considered.

Send the Membership Application Form to:
Dr. Maurice Pagel
SGA Executive Secretary
CREGU, B.P. 23,
F-5401 Vandoeuvre-lès-Nancy Cedex, France
Tel.: +33 83 44 19 00
Fax: +33 83 44 00 29
e-mail: pagel@cregu.cnrs-nancy.fr

Join the SGA now...

The Society of Geology Applied to Mineral Deposits was established in 1965 by an international group of economic geologsts. Its Journal *Mineralium Deposita* is now recognized as a premier international mineral deposits journal.

GOALS

-The promotion of science of mineral deposit geology
-Personal contact of its members in order to exchange knowledge and experience
-Organization of scientific meetings, field trips, workshops. For these events, SGA members have reduced registration fees and in certain cases may apply for travel grants
-Cooperation with other scientific societies, especially with SEG and IAGOD
-Publication of *Mineralium Deposita* and scientific volumes

MEMBERSHIP

Membership in SGA is open to all persons interested in economic geology, mineral resources, industrial minerals and environmental aspects related to mineral deposits. SGA is an international society with global membership in over 50 countries. Members have reduced registration fees in SGA-sponsored events and in certain cases are eligible for travel grants. Subsides for publication of color plates in *Mineralium Deposita* also may be applied. Current membership fees are listed on the left-side column of this page.

MINERALIUM DEPOSITA

Editors: David Rickard (Cardiff, UK) and Richard Goldfarb (Denver, CO, USA).
Mineralium Deposita publishes papers on all aspects of the geology of mineral deposits. It includes new observations on metallic and non metallic minerals and mineral deposits, mineral deposit descriptions, experimental and applied inorganic, organic and isotope geochemistry as well as genetic and environmental aspectsof mineral deposits. *Mineralium Deposita* is published bimonthly. Fast publication: *Mineralium Deposita* publishes *Mineral Deposita Letters* within 3 months and regular papers normally within 4 months after manuscript acceptance and usually 6-9 months after manuscript submission.

..and receive
***MINERALIUM DEPOSITA* & *SGA* NEWS!!!**

Additional information in the SGA homepage on Internet:
http://www.immr.tu-clausthal.de/sga.html

First Circular

SGA

SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS

5th Biennial Meeting - LONDON 1999

"Mineral Deposits: Processes to Processing"

Science and technology applied to mineral formation and breakdown, mineral processing and environmental problems

August 22 to 25, 1999
Imperial College / The Natural History Museum

The 5th Biennial SGA meeting will be held in London, and the organizing committee invite offers to lead pre- and post- meeting field excursions, put on workshops or short courses, and organize scientific sessions. We also invite offers of sponsorship from industry for a range of activities, Icebreaker Party, Conference Dinner, Workshops etc. or to enable students and scientists from poorer countries to attend.

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To express an interest and to receive the second circular (May 1998) and final circular (February 1999) please fill in the linked form and send it by post, fax, or e-mail to the address given:

Dr C J Stanley (SGA), Department of Mineralogy, The Natural History Museum, Cromwell Road, LONDON, SW7 5BD, United Kingdom. Fax: +44 (0)171 938 9268.
E-mail: cjs@nhm.ac.uk

Details will also be posted on the SGA home page at: http://www.immr.tu-clausthal.de/sga.html

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5th BIENNIAL SGA MEETING: PRE-REGISTRATION FORM (Please type or use BLOCK letters)

Title..... First Name .....
Last Name .....
Institution .....
.....
Address .....
.....
E-mail .....
Fax..... Telephone .....

I am very likely to attend ❑
I am likely to attend ❑
It is possible I will attend ❑ the 5th Biennial SGA meeting

❑ I will require hotel accommodation (more than 40 GBP per night)
❑ I will stay in student halls of residence (25 to 35 GBP per night)

I offer to organize:
❑ pre/post meeting field excursion to .....
❑ workshop on .....
❑ short course on .....
❑ scientific session on .....

My company is interested in sponsoring:
❑ Icebreakers Party .....
❑ Conference Dinner .....
❑ Workshops .....
❑ Scientific Session on .....
❑ Short Course .....
❑ Student attendance .....
❑ Scientists from NIS etc. .....

I am a *student/scientist from a World Bank designated poorer country and it is likely that I will require *full costs/ accommodation and/or registration fee/ subsidy to enable me to attend the meeting.

* delete as appropriate