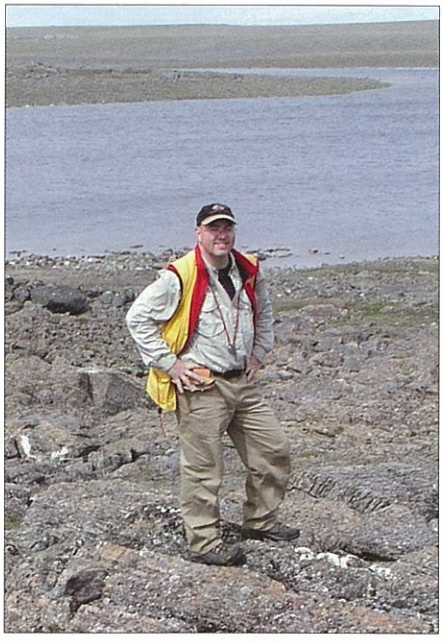
ore solutions

Newsletter of CODES, the ARC Centre of Excellence in Ore Deposits at the University of Tasmania

Discovering Jeff Foster

CODES is pleased to welcome Associate Professor Jeff Foster to the role of leader of the Discovery Program. Jeff brings to the position a wealth of experience and a world-class reputation in Cu-Ni ± PGE sulfide systems. This, allied with a thorough understanding of mineral economics and commercial business development, should allow him to further raise the Discovery Program's research profile. Although primarily recognised for work on magmatic sulfide systems, Jeff has published or presented on a variety of topics, including sediment-hosted gold, the relationship between diamondiferous kimberlite, ultramafic lamprophyre and komatiite, and the relationship and potential importance of peak-metamorphism in the development of Broken Hill-type mineralisation.



Jeff Foster in northern Canada.

Jeff comes to CODES from the GeoDiscovery Group, Queensland — a successful Australian-based mineral exploration consultancy backed by experienced industry professionals — where he has been a director and principal geologist for the past nine years. Before that, he was Senior Project Geologist — New Business Development for BHP Minerals Discovery Australia for three years and Project Geologist — Exploration Division/ KNO for Western Mining Corporation Australia for 10 years. With over 20 years' experience within the minerals sector, including research, exploration and evaluations in North America, South America, Europe, Eurasia, Asia, Africa and Australia, Jeff is well-equipped to lead the Discovery Program's research team in new pursuits.

Jeff, a self-confessed 'man of action', has a vision for the Discovery Program that includes placing the program in a pivotal position around which the Location, Formation, Recovery and Technology programs can unite for strategic, tactical and holistic research. Some of Jeff's intended research directions for the Discovery team include:

- Lithogeochemical and isotopic indicators for Cu ± Au ± Mo porphyry systems and IOCG systems: variation through time and space and key exploration indices
- Emie Bluff, Carrapateena, Prominent Hill to Olympic Dam: regional and local structural controls on genesis
- Voisey's Bay three-dimensional plumbing and possible relationship to the development of a ~1.3 Ga flood basalt province
- Integrated 3D geological, geophysical and geochemical model for the Platreef: implications for genesis and processing
- Melt inclusions in olivine from Jinchuan: implications for genesis and exploration
- Udokan and the development of the Palaeoproterozic Circum Siberian Craton sedimentary basins: deformation, metamorphism and links to Noril'sk-Talnakh.

Jeff's previous involvement in exploration and research programs in Sweden, Finland, Russia, Canada, Brazil, the USA, South Africa, Botswana, China, India and Australia will serve him well in leading these, and other, world-class research proposals for CODES.

With Jeff's experience in attracting funding from the minerals industry and involvement in a number of initial public offerings, CODES can look forward to an expanding Discovery Program and new research initiatives. These will further build our copper,

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nickel, gold and zinc capability, and our developing diamond and strategic metals (e.g., uranium, platinum and palladium) capability. And, in the longer-term, will enable us to add iron ore, bauxite, oil, gas and coal research strings to our bow.

By becoming a CODES Program Leader, Jeff is leaving behind his beloved Queensland Reds, trading Queensland's warmth for Tasmania's seasons, and fully embracing Goethe's challenge: 'Whatever you can do, or dream you can, begin it. Boldness has genius, power and magic in it'. We're sure Jeff will go forth and 'foster' outstanding collaborative relationships with industry for our Discovery Program.

MOVING IN

Sandrin Feig started post-doctoral research with CODES in June. Sandrin has recently graduated with a PhD from the University of Hannover, Germany, where he investigated the effect of water and oxygen fugacity on phase equilibria of primitive tholeiitic basalt magma chambers at crustal temperatures and pressures. He will be working in the AMIRA P962 Ni project, led by Leonid Danyushevsky. His research will focus on improving the understanding of the (pre-) intrusive evolution of mafic/ultramafic parental magmas that form layered magmatic complexes with special emphasis on the timing and causes of sulphide saturation and segregation.

Victor Galvan arrived in May 2007, from Mexico, to begin a CODES PhD project with Dave Cooke and Bruce Gemmell on an epithermal gold deposit in Mexico. His project is aimed at investigating the relationship between eruptions of the Upper Volcanic Sequence pyroclastic rocks, related sub-volcanic intrusions and the epithermal mineralisation event in the Sierra Madre as well as formulating a series of key district drivers in this significant Ag-Au epithermal province of northern Mexico.

Martin Jutzeler arrived in June 2007, from Switzerland, to begin a CODES PhD volcanology project with Jocelyn McPhie and Sharon Allen. Martin completed a Masters thesis at the University of Lausanne, studying the Ayagaures Ignimbrite on Gran Canaria, Canary Islands, under the guidance of Hans-Ulrich Schmincke. His PhD research will examine the behaviour of submerged eruption plumes using data from facies analysis of a variety of submarine pyroclastic successions. The project includes fieldwork campaigns at several locations where submarine pyroclastic facies are well-exposed, including New Zealand, Japan, the western USA and Vanuatu.

Hot on the heels of being awarded a PhD from UTAS, **Lyudmyla Koziy** has begun work with David Selley, Stuart Bull and Rosss Large on fluid modelling of the Central African Copper Belt.

Zen Miles recently commenced a traineeship with ITSoil, CODES information technology support group. Zen is very enthusiastic about computers, and enjoys building them as well as pulling them apart.

Helen Scott has joined CODES as a finance officer, to work with Chris Higgins and Di Steffens. Helen worked as an English instructor in Japan, as well as a high school science and maths teacher in Burnie before joining the team at CODES.

Tony Webster started with CODES in January 2007 as the Minerals Tertiary Education Council (MTEC) Senior Lecturer and Masters Program Coordinator. Tony began his career as an underground sampler and mine geologist on the Golden Mile in Kalgoorlie and went on to spend 18 years in the mining industry, working at both junior and senior levels in and around underground base metal and gold mines, in production, resource definition, exploration, heritage assessment, environmental and research roles. Tony completed his PhD on the Broken Hill orebodies at UTAS in 2004 and spent a year teaching at the WA School of Mines in Kalgoorlie before returning to Tasmania.

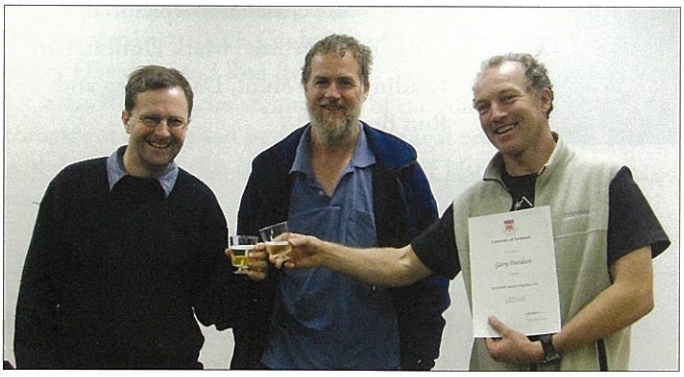
MOVING ON

CODES farewelled **Somboon Khositanont**, visiting research fellow from the Department of Mineral Resources, Thailand, in typical style (with Tim Tams*) on 24 July 2007. Somboon, undertaking a PhD with the Chiang Mai University (Thailand), visited CODES between mid-March and late July to work on gold and base metal mineralisation in Thailand in relation to variable tectonic settings. During his stay he used a variety of CODES analytical techniques in conjunction with fluid inclusion microthermetry to classify tectonic settings and styles of mineralisation. We look forward to Somboon's return in 2008 when he will continue his analytical work.

* decadent chocolate biscuits

Top teachers recognised for excellence

Three of CODES/School of Earth Sciences staff received recognition for their teaching prowess in the UTAS 2006 Awards for Teaching Excellence. Nominated by the toughest of critics, their students, Mark Duffett, Michael Roach and Garry Davidson each took out an award which acknowledges their teaching innovation, dedication and enthusiasm. Mark's and Michael's area of expertise is in teaching 'Introduction to Geophysics' and Garry's is in 'Earth Resources, Environments and Evolution'.



Mark Duffett (left), Michael Roach and Garry Davidson toast their success.

CODES sponsors new mining industry leaders

CODES proudly sponsored 14 students from the AusIMM UTAS Student Chapter to attend the AusIMM New Leaders' Conference, 'Mining – The Big Picture' in Brisbane on 2–3 May 2007. Topics discussed ranged from climate change, risk management, safety, women in mining and personal experiences through to pursuing a career in the industry.

The National Mining Games, held concurrently, saw Tasmania enter its first team in this event, the 'Tassie Truggers'. The games consisted of nine industry-related events: rail set, mucking, drilling, timber set, ventilation, specific gravity, face tie-in, safety and rock identification. To their credit, the Tassie Truggers achieved extra points for vigilant observation, adherence to safe practices and strong teamwork. The team members thoroughly enjoyed themselves, finding it a valuable, fun and educating experience.

Alex Richards, Amanda Geard, Mark Hotson, Rod Campbell and Luke Williams proudly display their CODES sponsor shirts.

CODES PLANS TO SUCCEED!

CODES hosted its annual Science Planning and Advisory Board meetings on 19 and 20 June 2007.

The Science Planning Meeting saw 50 local, national and international researchers and sponsors converge on the CODES conference room for a full day of summaries of the year-to-date and strategic discussion concerning the year ahead. Meeting participants heard from CODES Director Ross Large, research and graduate training program leaders: Tony Crawford, David Cooke, Bruce Gemmell, Steve Walters, Leonid Danyushevsky, Tony Webster and Jocelyn McPhie before morning tea. The remainder of the day was devoted to the industry perspective (with John Holliday from Newcrest and Angela Lorrigan from Zinifex) and future research directions (including new opportunities in Southeast Asia, sediment-hosted gold research, porphyry-epithermal transitions and EnviroGEM).

The Advisory Board Meeting discussed CODES activities, research program highlights, new appointments, international linkages, finances, publications, postgraduate education, developments in technology, new research directions and the current shortage of geoscience graduates.

Both meetings went extremely well and there were many very positive comments from our industry supporters about the depth and quality of research at CODES. We were particularly pleased to report the overwhelmingly supportive response from our industry sponsors for the CODES proposed undergraduate scholarship scheme for earth sciences students. We were able to secure generous support for 10 new scholarships in the earth sciences and look forward to the calibre of students these scholarships will attract.

Reinvigorated for another year of world-class research and development, graduate training and fun, the CODES team thanks everyone involved in the Science Planning and Advisory Board meetings and looks forward to reporting on progress at next year's gathering.

Enjoying the chilly Tasmanian winter sunshine during a break in the 'Ore deposit geochemistry, hydrology and geochronology' short course held in June 2007 were Masters Coordinator Tony Webster (front row, second from right), Masters students, CODES PhD students and industry participants.

'Next Generation' takes out the prize!

Seven teams entered the SEG Student Chapter quiz night on 17 July. This year's event, hosted by Grand Question Master Tony 'The King of Trivia' Crawford saw many teams falter at the alter of history, sport, geography, people and world music trivia. And the winner was (drum roll) … the 'Next Generation' (pictured, L-R), Tony Webster, Mark Duffett, Anya Reading, Julie Hunt, David Rigg and Ron Berry.

CODES PhD students win Geoscience BC scholarships!

CODES PhD students Adam Bath and Heidi Pass have each been awarded a prestigious Geoscience BC Scholarship worth $5000. Geoscience BC is an industry-led, not-for-profit, applied geoscience organisation working in partnership with industry, academia, government and communities to fund applied geoscience projects with the objective of attracting mineral, and oil and gas exploration to British Columbia.

The ten scholarships were open to students across Canada and Australia registered in an MSc or PhD program working on a mineral or oil and gas exploration-related topic in British Columbia.

Applicants were scored on their education and work experience, thesis project, career goals and aspirations and on referees' comments. A panel of geoscientists from industry and academia reviewed applications and preference was given to applicants whose projects were deemed to have the greatest potential benefit to exploration in British Columbia and whose research and career interests are primarily directed towards the exploration sector, either mineral or oil and gas.

Adam is working on the Lorraine and Mt Polley alkalic Cu-Au porphyry deposits in north-central and south-central British Columbia, where he is undertaking detailed mapping/logging and geochemical sampling. The aims of his field campaign are to better document and understand the magmatic rocks and their relationships to mineralisation. Adam will also undertake detailed geochemical/petrological analysis of the igneous units that he samples. This will provide the basis for his subsequent detailed mineralogical/melt inclusion study, which will attempt to resolve the details of volatile exsolution and subsequent mineralisation from the intrusions.

Heidi's research project, 'Chemical and mineralogical zonation patterns in alkalic mineral systems – implications for ore genesis and mineral exploration', will investigate the geochemistry within and around alkalic porphyry and epithermal deposits in Mt Polley, British Columbia, and Cowal, New South Wales. Heidi's research will address what the sources and compositions of mineralising fluids for alkalic porphyry and epithermal deposits are; what the principal ore-forming processes are; what the genetic links between the alkalic porphyry and epithermal environments are; and what exploration implications can be determined from the geological and geochemical features of these mineral deposits.

For more information about Geoscience BC, the scholarship opportunities, and the scholarship winners and their projects, visit www.geosciencebc.com.

Geoscience BC

DIGGERS & DEALERS 2007

Tony Crawford attended the three-day Diggers and Dealers Forum in Kalgoorlie-Boulder, Western Australia, in August on behalf of CODES. The 15th Diggers and Dealers Forum attracted 1700 mining delegates from all points of the globe. Developed by the late Geoffrey J. Stokes to combine presentations by mining and exploration companies with a trade exhibition from mining, exploration and service sectors, the Diggers & Dealers Forum has become a major mining event each year.

Newmont Mining's Pierre Lassonde, keynote speaker at the forum, indicated demand for gold jewellery in China and India has never been stronger, comparing current global economic conditions with those in the 1970s when the price of gold shot up by 2300 per cent. Pierre, a highly respected gold 'bull', predicted that in a year's time the price of gold per ounce will have three zeros after the first number – 'I am just not sure what that first digit will be'.

Tony reported that there is a desperate need for graduate geologists and geophysicists across Australia and globally. Interest in the CODES Honours and Masters Short-Courses is continuing to grow, placing CODES at the forefront of training the next generation of geologists for the continuing boom. A number of companies, including majors and several small cap exploration groups, have responded to Tony's invitation to provide potential Honours projects to CODES students for 2008.

A Trifecta of Talent!

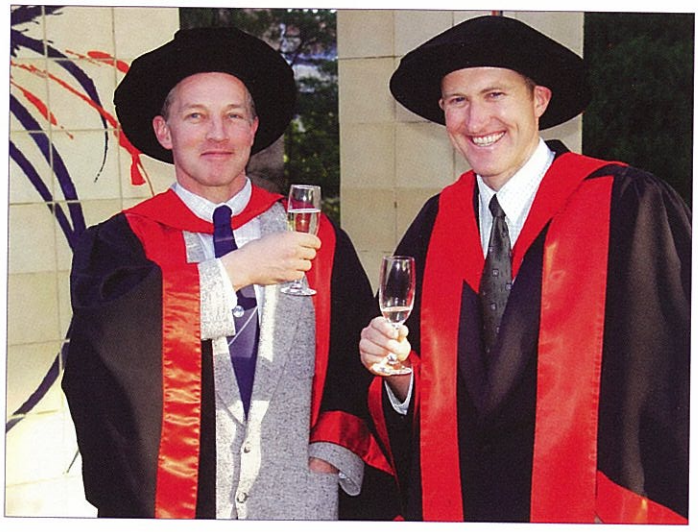
Three CODES students graduated with PhDs at the University of Tasmania graduation ceremony on 11 August.

Lyudmyla Koziy ('Numerical simulation of the ore forming fluid migration in the sediment-hosted stratiform copper deposit, Zambian Copperbelt') who was supervised by Ross Large, David Cooke and Stuart Bull, has since taken up a post-doctoral position with CODES.

Steven Lewis ('Focussed hydrothermal alteration in upper crustal oceanic faults on Macquarie Island') is now with Geoscience Australia in Canberra. His work was supervised by Garry Davidson and Ron Berry

Carlos Rosa ('Facies architecture of the volcanic sedimentary complex of the Iberian pyrite belt, Portugal and Spain') has a post-doctoral position at the University of Lisbon. His supervisor was Jocelyn McPhie.

Well done from all at CODES!



Bottoms up: Dr Garry Davidson (left) toasts Dr Steve Lewis on his graduation day.

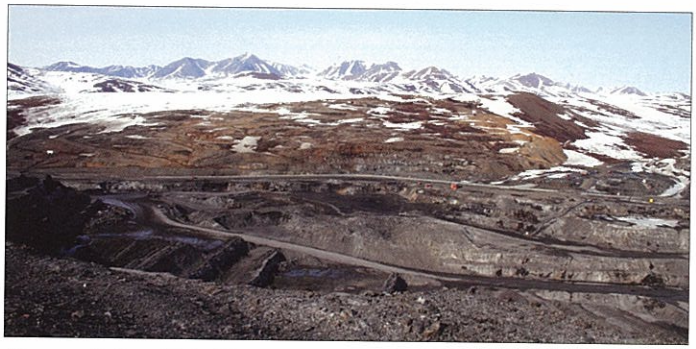
GeM^{III} Team at the Red Dog Mine

The AMIRA P843 GeM^{III} project (geometallurgical mapping and mine modelling) continues to expand and generate industry support with 18 sponsors and life of project funding in excess of $8 million. Collaboration with the JKMRC a world-leader in mineral processing research at the University of Queensland remains a cornerstone of the project together with collaboration with the CSIRO HyLogging group (infra-red based logging technologies) and the WH Bryan Centre (geostatistics and mine planning) at the University of Queensland. Associate Professor Steve Walters leads the project as part of a joint appointment between CODES and the JKMRC with a team of over 25 researchers across the four research institutions. The project is already delivering a range of hardware and software outcomes into the strongly emerging area of geometallurgy.

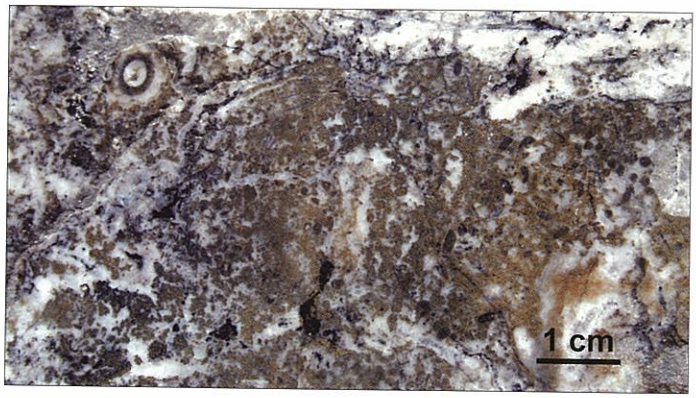
As part of the GeM site deployment program, a team of GeM researchers spent time at Teck Cominco's Red Dog mine in northwest Alaska in mid-2007. Red Dog is a high-grade stratabound Zn-Pb deposit of Carboniferous age which is the world's largest producer of zinc concentrate with an ore grade of 18–19% Zn. While current production of 3 Mt per annum is from the Main Pit deposit, the satellite Aqqaluk deposit immediately north on the Main Pit is due to be brought on line over the next 4–5 years. This will replace Main Pit production and the feasibility program currently underway at Aqqaluk is the focus of geometallurgical research being carried out in the GeM project.

The GeM team spent ten days on site examining recent drill core from Aqqaluk and conducting a sampling program. The high-grade nature of the mineralisation and diverse textures including excellent preservation of vent fauna makes the deposit a challenging and often spectacular study site. Many of the sulphide textures relate to replacement of massive barite lenses and stockwork veining of silicified black shales in the footwall sequence.

A large batch of core samples was subsequently shipped to Australia and is undergoing extensive mineralogical and physical testing. This includes petrophysical logging using the GEOTEK core logger and systematic automated optical and MLA microscopy



View north from Main Pit to orange weathered surface expression of Aqqaluk deposit covered with drill pads, Red Dog.



Outline of fossil worm tube (upper left) in siliceous ore with pale brown sphalerite and pellet-like areas of black pyrobitumen, Aqqaluk deposit, Red Dog.

at CODES; together with a range of comminution and flotation testing at JKMRC. This work is linked to new approaches for processing performance modelling within the GeM project designed to provide predictive indices of throughput and recovery which can be used in mine planning and optimisation.

The GeM project would like thank Teck Cominco for their hospitality and assistance during the sampling program, particularly Tom Krolak, Brigitte Lacouture and Nicki McKay. For more information on the overall GeM project contact Steve Walters (stevew@utas.edu.au) or Alan Goode of AMIRA (Alan.goode@amira.com.au).

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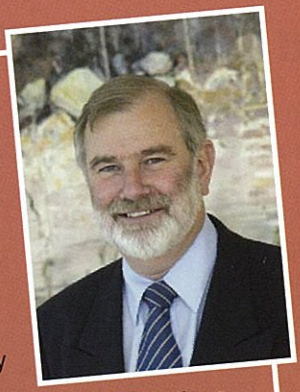

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es on the farm and I remember as a teenager
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and Chris Haslam)
a classmate under Mawson, was the professor of
Adelaide (Arthur Alderman) so when I had to pick
ence subject at uni, geology seemed an obvious
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CEOs, professors and chief g
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**Featured are the pathways of
geologists among CODES sp**

John Holliday

Current position
Chief Geoscientist, Western Pa
Mining Limited
Qualifications
BEc (Sydney) and a *BSc Hons*
Original (pre-geology) asp
'Confused.'
What or who turned you o
'After my first degree, I worked
mid-twenties learning to be a g
outdoors and travelling so the
was a field assistant for a mine
so I applied for his job, got it, t
to the bush in a Landcruiser th
the life for me so the only way
degree. In my last year at Mac
for a job with BHP, got the job
service (since BHP Gold beca
great bloke and I really by s
AMIRA meeting lunches.'
Future aspirations
'To enjoy life.'

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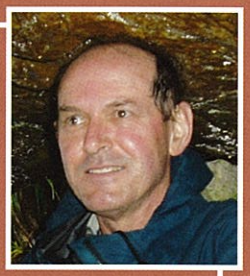

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geology?
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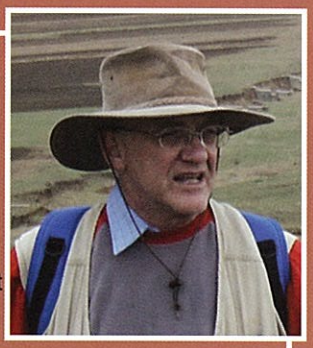
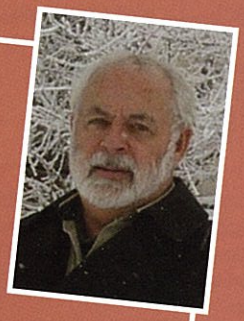
Noel White



Current position
Consultant geologist (after 35 years of employment with BHP) ***Qualifications***
BSc (Chemistry/Geology) – 'Chemistry was my youthful passion, but that waned while my interest in geology grew. At the end of my Bachelor's degree I decided I wanted to do an additional Honours year, but I had to decide in what. At that point I finally decided to be a geologist rather than a chemist, a decision I have been thankful for ever since.'
PhD Economic Geology (UTAS) – 'I won a scholarship from BHP to move from my first university, in Newcastle (New South Wales), to the University of Tasmania in Hobart. That was the point at which I shifted finally to economic geology, as my research was on mineralisation in the southern end of the Cambrian Mount Read Volcanics, host to several important deposits further north.'
Original (pre-geology) aspirations
'Travel to places the tourists never see — where you see the real countryside and meet real people.'
What or who turned you on to geology?
'In my childhood my family moved around several small towns as required by my father's work. We finally settled in Newcastle, an industrial city north of Sydney in New South Wales. BHP had trainee cadetships in metallurgy which I took up in 1964 when I finished high school.'
Future aspirations
'To live in a warm city (after living in cold, dreary London).'

Tony Brown



Current position
Director, Mineral Resources, and State Chief Geologist, Tasmanian Government
Qualifications
BSc(Hons) in geology/geophysics, and PhD in petrology/geochemistry.
Original (pre-geology) aspirations
'To work at the Woomera Rocket Range in telemetering of rockets and satellites — needed a science degree in maths and physics on top of my Telecommunication Technician's Certificate.'
What or who turned you on to geology?
- Prof Carey with his first-year geology lectures, so I took on geology in second year
- Rick Varne with his igneous geology lectures during second year
- failing maths at the end of second year — no Wave Theory, no Physics III.'

Future aspirations
'To help facilitate the development of interactive, four-dimensional geological models and publish all information gathered before obtaining my present position.'

GEOLOGY/EARTH SCIENCES SCHOLARSHIPS
FOR COMMENCING AND CURRENT STUDENTS

Barrick Scholarship in Mineral Exploration
This scholarship is funded by Barrick to encourage first-year earth sciences students to pursue the Bachelor of Science (Economic Geology) with Honours course.
Eligibility: Available to a full-time student with first-year geology, chemistry and physics pursuing a Bachelor of Science (Economic Geology) with Honours course. Vacation employment with Barrick over the summer may also be available.
Amount: $12,000 second year, $16,000 third year, $20,000 honours year.
Duration: Up to three years

CODES Economic Geology Scholarships
Four scholarships have been funded by CODES at UTAS to encourage students to undertake geoscience units on topics relevant to the minerals industry.
Eligibility: Available to students undertaking geology or geophysics units, with an ITI of 95 or greater.
Amount: $3000
Duration: One year

CODES PhD Scholarships
Several scholarships are provided by CODES at UTAS and funded by the ARC and industry for students to study within one of the five major programs of the centre: location, formation, discovery, recovery or technology.
Eligibility: Available to students undertaking PhD research in the field of geology, geophysics or geochemistry with relevance to the location, formation, discovery or recovery of ore deposits. Applicants require either an MSc in geology/geophysics or a first or upper second-class honours degree. Some experience in the minerals industry is preferred but not essential.
Amount: $20,000 to $30,000 per year depending on qualifications and experience
Duration: Three and a half years

Larry Knight Memorial Scholarship
This scholarship has been endowed by the Australian Government in memory of Larry Knight, who was killed in the Beaconsfield Mine disaster in April 2006.
Eligibility: Available to an Australian citizen or permanent humanitarian refugee who can demonstrate financial need and is undertaking a course related to the mining industry (e.g. mining engineering, geology, etc). Also, applicants should demonstrate an interest in the mining industry in their application.
Amount: $13,000 per year
Duration: Up to four years.

Mineral Resources Tasmania/CODES Scholarship in Economic Geology
This scholarship is funded by Mineral Resources Tasmania and CODES.
Eligibility: Available to a full-time student undertaking the Bachelor of Science (Economic Geology) course and intending to complete honours.
Amount: $6000 first year, $8000 second year, $10,000 third year, $16,000 honours year.
Duration: Up to four years

Newcrest Mining Ltd Scholarship in Exploration Geology
This scholarship is funded by Newcrest Mining Ltd, to encourage Bachelor of Science students to pursue honours in geochemistry, geophysics or economic geology.
Eligibility: Available to a third-year student undertaking an honours project relevant to Newcrest. Vacation employment over the summer is available.
Amount: $10,000
Duration: Two years (third year and honours)

Newmont Geoscience Indigenous Scholarship
This scholarship is funded by Newmont Mining Corporation to encourage indigenous students to undertake the Bachelor of Science (Economic Geology) with Honours course.
Eligibility: Available to a full-time student. Preference will be given to indigenous Australians. Offered as a one-year honours scholarship to non-indigenous students.
Amount: $10,000
Duration: Up to four years

St Barbara Ltd Scholarship in Mineral Exploration
This scholarship is funded by St Barbara Ltd and was established to encourage students to undertake the Bachelor of Science (Economic Geology) with Honours course.
Eligibility: Available to a full-time student with an ITI of 95 or greater.
Amount: $15,000
Duration: Up to four years

Steve Balcombe Hobart Water Scholarship
This scholarship is offered by Hobart Water in honour of its former chair, Steve Balcombe.
Eligibility: Available to a talented Tasmanian student commencing full-time study in an area that is relevant to Hobart Water's core activities - engineering, environmental science or earth science. Vacation work opportunities may be available with Hobart Water.
Amount: $3000 per year
Duration: Up to four years

Tasmanian Government/ Mineral Resources Tasmania Scholarships
This scholarship is funded by Mineral Resources Tasmania and was established to encourage students to undertake geology at UTAS.
Eligibility: Available to a full-time student undertaking geology units.
Amount: $3000
Duration: One year

Tasmanian Government Mining Honours Scholarships
Three scholarships are funded by Mineral Resources Tasmania and were established to encourage geological research at CODES on topics that are relevant to the Tasmanian minerals industry.
Eligibility: Available to students undertaking research in the field of geology, with relevance to the Tasmanian minerals industry. Specialisation in one or more of: ore deposit geology, igneous petrology, volcanology, structure, sedimentology, geochemistry or geophysics. Applicants require at least a credit average in geology units at the second or third year levels.
Amount: $5000 to $8000 depending on qualifications and experience
Duration: One year

Tasmanian Government Mining PhD Scholarship
This scholarship is funded by Mineral Resources Tasmania and was established to encourage geological research undertaken at CODES on topics that are relevant to the Tasmanian minerals industry.
Eligibility: Available to a student undertaking research in the field of geology with relevance to the Tasmanian minerals industry. Specialisation in one or more of: ore deposit geology, igneous petrology, volcanology, structure, sedimentology, geochemistry, geophysics. Applicants require either an MSc in geology/geophysics or a first or upper second-class honours degree. Industry experience is very useful but not essential.
Amount: $18,000 to $25,000 depending on qualifications and experience
Duration: Three and half years

AusIMM Scholarships
The Australian Government and Rio Tinto are offering scholarships to earth sciences graduates. Go to www.ausimm.com.au for more information.

RioTinto Scholarships
Rio Tinto offers scholarships to students entering their second year of study in geoscience units at UTAS. Go to the student programs secdtion at www.graduates.riotinto.com.au for more information.

CLOSING DATE FOR CODES SCHOLARSHIPS: 30 NOVEMBER 2007

For more information and applications: www.utas.edu.au/scholarships

A very good year for Dima

Scientists worldwide agree that the holy grail is an article in *Nature*. Some achieve this after more than a decade of research and, if they're lucky, managing to have a *Nature* or a *Science* article accepted. CODES has an exceptionally high achiever in Dima Kamentsky. This year Dima has published three research papers in *Nature*, one in *Science* and a further 14 research papers in other internationally peer-reviewed journals (and the year isn't over yet!).

Dima's *Nature*- and *Science*-worthy research includes: 'Metal saturation in the upper mantle' (*Nature* in press); 'Chlorine isotope homogeneity of the mantle, crust and carbonaceous chondrites' (*Nature* 446); 'Survival times of anomalous melt inclusions: Constraints from element diffusion in olivine and chromite' (*Nature* 447) and 'The amount of recycled crust in sources of mantle-derived melts' (*Science* 316).

Dima has recently returned from 14 weeks overseas. While in Israel he worked with Professor Oded Navon (Hebrew University in Jerusalem) on melt/fluid inclusions in kimberlitic olivine and diamonds, and with Dr Evgeniy Vapnik (Ben Gurion University of Negev) on the ancient mud volcanoes in Israel. Field work, for CODES/AMIRA P962, on the Yoko-Dovyren ultramafic-mafic intrusion in the north Lake Baikal area was followed by a visit to the Institute of Geochemistry in Irkutsk to continue collaborative work on the Siberian kimberlites and kimberlite-hosted megacrysts and mantle xenoliths. At a conference on ultramafic-mafic complexes, held at Chernorud ('Black Ore') near Lake Baikal, he presented talks on the Macquarie Island ophiolite and the magmatic-hydrothermal transition. Following the conference he visited the Institute of Experimental Mineralogy in Chernogolovka to initiate collaboration on experimental studies of eclogite melting.

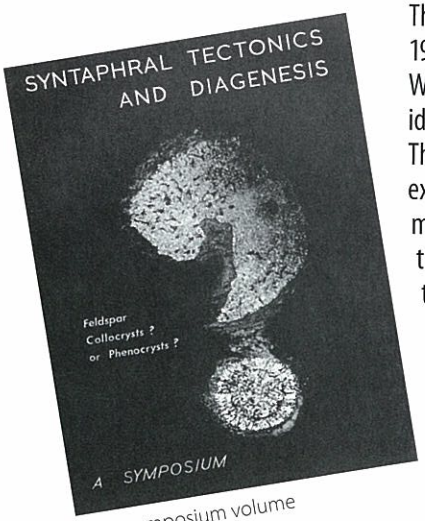
Dima Kamenetsky caught in a mid-summer snow storm while working in Siberia.

Answers to photo jumble on page 12. Left side: Tony Crawford (top), Peter McGoldrick, Dave Cooke, Ron Berry. Right side: Bruce Gemmell, Jocelyn McPhie, Garry Davidson, Ross Large.

A symposium

SYNTAPHRAL TECTONICS AND DIAGENESIS — 44 YEARS ON

22–23 November 2007
CODES, University of Tasmania



1963 symposium volume

The symposium 'Syntaphral Tectonics and Diagenesis' was held at the University of Tasmania in mid 1963. It introduced the observations, work and philosophy of John Elliston to the geological community. While the geological ideas, backed by strong chemistry, are still the subject of much discussion, these ideas and the philosophy behind them were very important in ore discovery, definition and exploitation. The philosophy said that conclusions should only be drawn from observation and evidence. This was well expressed by 'never assume', i.e. conclusions and decisions should be based on first principles before moving on to probabilities. John Elliston led the Peko and Geopeko exploration team from the mid 1950s till the mid 1980s, and then consulted to industry for a further 20 years. The exploration results from teams where he was involved were quite outstanding, many orebodies were discovered, and many aspects of the applied science and technology are now the basis of industry best practice throughout the world. The program addresses the science, technology and philosophy developed over approximately 50 years and updates concepts formally introduced 44 years ago.

Speakers include John Elliston, Ross Large, T W Healy, Rob Ryan, Dima Kamenetsky, John Davidson, Jacob Rebek, Brian Williams, Bob Richardson, Andrew Browne, Kim Wright, R L Stanton and Ian Gould.

For more information and registration see codes.utas.edu.au

SEG student chapter tours Japan

Armed with Japanese yen, a Lonely Planet guidebook and rock hammers, six CODES students arrived at Osaka's Kansai airport in mid-July to begin a seven-day excursion to the world-class epithermal gold deposits, active volcanoes and geothermal fields of the Kyushu District of southern Japan.

Student Chapter fundraising for the trip included a bowling evening, quiz night and numerous wine tastings with generous additional financial support from Teck Cominco, Newcrest Mining Ltd, AngloGold Ashanti, Rio Tinto, Newmont Gold Corporation, CODES, and the SEG.

The Student Chapter was very honoured to have exceptional field guidance from the internationally renowned geologists Professor Eiji Izawa (Kyushu University), Professor Sachihiro Taguchi (Fukuoka University) and Associate Professor Tetsuya Nakanishi (Kyushu University Museum).

Kyushu is home to Japan's largest geothermal power station, Hatchobaru; with a total capacity of 110 MW, it accounts for 25% of Japan's total geothermal energy supply. Acid sulfate steam-heated zones occur above a water-dominated hydrothermal system that represents a modern analogue to low-sulphidation epithermal gold mineralisation in the Kyushu district (e.g. Hishikari).

The group hiked to the summit of Kuju Iwo-yama (~1100 m), an active andesitic volcano with high temperature (>300°C) fumaroles, solfatara, and sulfur mounds formed from liquid sulfur eruptions and a few participants took the opportunity to taste the Kuju magmatic water (~pH 1.5). Kuju Iwo-yama represents an area of active high-sulfidation geothermal activity and associated advanced argillic (silica-alunite-kaolinite-smectite) alteration, zoned around the highest temperature fumaroles.

Driving south through the Kyushu District, around the Aso Caldera, one of the largest volcanic calderas in Japan the next stop was the active Naka-Dake andesitic stratovolcano. At the caldera's centre, was a spectacular blue-green crater lake with a typical pH <0.5 (no tasting here!). Further south, a visit to the highly active Sakura-Jima volcano (literal translation 'cherry blossom island') located on the southern rim of the Aira Caldera, was restricted to the lower flanks, before taking the ferry across Kagoshima Bay to the Nansatsu district.

High-sulfidation epithermal gold deposits of the Nansatsu district include Kasuga and Akeshi mines, which have produced ~27 tonnes of gold. Gold mineralisation is generally restricted to intensely silicified zones within the host Tertiary-Quaternary calc-alkaline andesites which unconformably overly sandstone and mudstone of the Cretaceous Shimanto Supergroup. The Nansatsu District mines are relatively small-scale operations with ore transported by sea to smelters in northern Kyushu, thus reducing the environmental impact on the immediate surroundings of these mines.

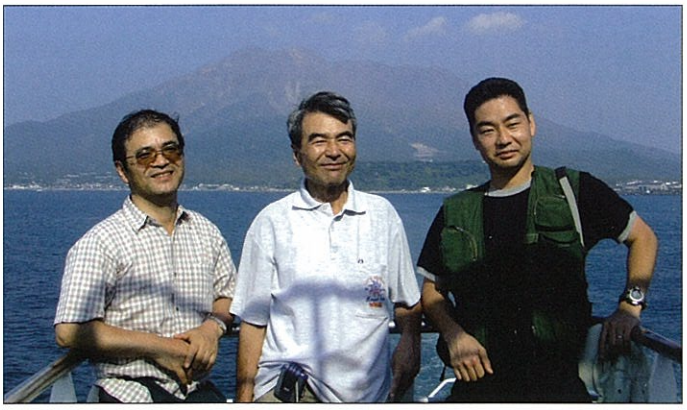
For many participants the visit to the iconic Hishikari low-sulphidation epithermal gold deposit was the highlight of the trip. Annual production of 190,127 tonnes at 39.4 g/t and total contained gold (both mined and reserves) estimated to exceed 264 t (8.5 Moz) contribute to the iconic status of Hishikari, renowned for its bonanza grades known to exceed 3000 g/t Au.

CODES group in Japan: Back row (L-R) Nathan Fox, Anita Pahbakar, Jackie Hobbins, Natalee Bonnici, Wojciech Zukowski, Janice Li, Corrie Chamberlain, Fraser McCorquodale, Yuki Tohma. Front row (L-R) Dr Goko, Heidi Pass, Mark Menzies, Sang Dinh, Professor Izawa, Associate Professor Nakanishi, Professor Taguchi.

Two veins were visited during the underground mine tour, the first, Keisen No. 3 vein of the Sanjin Deposit, displayed excellent 'ginguro' textures, consisting of finely banded electrum and sulfide with Au grades locally exceeding 1000g/t Au. The second vein, Daisen No. 2 vein of the Hanjo Deposit consisted of spectacular bladed quartz (after calcite) within quartz-adularia-smectite veins, a texture indicative of boiling hydrothermal fluids.

Traditional pottery techniques, unchanged for over 300 years, were seen in the Onta village of northwestern Kyushu, where hydrothermally altered volcanic rocks provide clay and other natural materials are utilised to develop the unique glazes of the famous Onta Pottery.

The trip's success was in part attributed to the spectacular geology and the opportunity to visit such a vast array of geological phenomena in a relatively small area, but mostly to the guidance received from Professors Izawa and Taguchi and Associate Professor Nakanishi. Their in-depth geological knowledge contributed to the understanding of the system as a whole; without their contribution this trip would not have been possible.



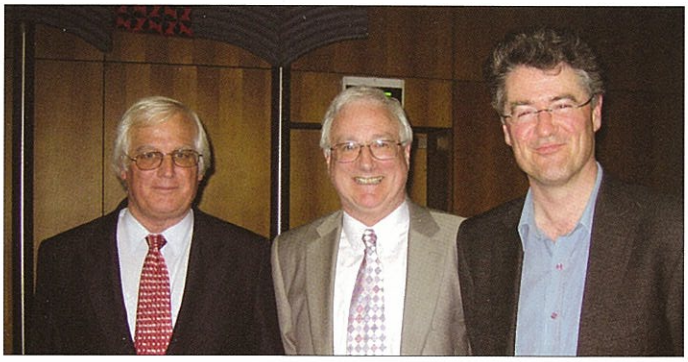
Professors Izawa and Taguchi and Associate Professor Nakanishi with Mount Sakura Jima in the background.

THE GREAT DEBATE

Is global warming directly related to human activities or is it a natural phenomenon that is part of Earth's cycle through time? The Geological Society of Australia (Tasmania Division) and CODES hosted Ian Plimer and Nathan Bindoff to debate just that on 14 September at UTAS.

Nathan Bindoff is Professor of Physical Oceanography at the University of Tasmania, and CSIRO Marine Research Laboratories, Director of the Tasmanian Partnership for Advanced Computing and Project Leader of the Antarctic Cooperative Research Centre's Modelling Program. Ian Plimer is Professor of Mining Geology and Emeritus Professor at The University of Melbourne. He has published more than 130 scientific papers and 6 books, the most recent of which was *A Short History of Planet Earth* (ABC Books) which dealt with time and climate change.

Open to the public, more than 250 people attended the debate, chaired by Ross Large. Nathan won the coin toss to present his case for an anthropogenic cause of current global warming trends while Ian followed to present the case for warming as part of the Earth's natural evolutionary cycle. An open forum followed in which the public was able to ask questions of both scientists.



Debaters (L-R): Ian Plimer, Ross Large and Nathan Bindoff.

CELEBRATING MULTICULTURALISM AT THE 'MELTING POT'

CODES proudly co-sponsored the International Students' Committee 'Melting Pot 07' event at the University of Tasmania in August. This colourful event encouraged a celebration of the diverse ethnic backgrounds of the UTAS student community through spectacular entertainment — Taiko drumming, Indonesian 'plate dancing', Chinese lute performances, break dancing, Aboriginal singing and salsa dancing (Tony Crawford was seen 'busting a few moves') — and a wondrous display of food.

Sang Dinh, CODES PhD student, enjoying himself at the 'Melting Pot07'.

Over 1000 people attended, with representatives from UTAS staff and students, government officials, local communities and schools. CODES, a melting pot in itself, was very pleased to sponsor such an event and we look forward to 'Melting Pot 08'.

THE ORIGIN OF ROCKS AND MINERAL DEPOSITS
— using current physical chemistry of small particle systems
by John Elliston

This e-book contains a 756 photographs of mineral structures and textures that can be seen in rocks, drill cores and mineral deposits. Many of these patterns and structures have puzzled geologists for years. They reflect the properties of the particulate systems and ore forming processes in the original massive deposits of fine sediment particles that have now become lithified and crystallised to rocks. It has been found that principles more recently developed in colloid science, rheology and surface chemistry now provide explanations for all the textures illustrated and the origin of mineral deposits.

This e-book provides an opportunity for everyone to look at the evidence in the rocks and mineral deposits in the light of modern physical chemistry and recognise that it:

- could establish Australian leadership in the Earth sciences
- provides an understanding of the formation of ore deposits
- gives exploration managers an indication of the likelihood of ore occurrence
- can be used to improve the cost effectiveness of exploration up to 300%
- will create renewed interest in the Earth Sciences
- will result in more interesting geology courses
- makes features in outcrops, drill cores and mine openings simple to understand.
- opens the way for better Earth science research outcomes.

to be launched at the 'Syntaphral Tectonics and Diagenesis – 44 years on' symposium

Elliston Research Associates Pty Ltd.

This project is proudly supported by

An Australian Government Initiative

AusIndustry

Rock textures and structures similar to those in this e-book and the 4800 examples from which they have been selected can be seen by everyone in polished building facings, ornamental stonework and natural rock outcrops. This book will greatly increase our understanding of all geological phenomena.

A copy of this book will be provided to each participant at the symposium 'Syntaphral tectonics and diagenesis — 44 years on'. Copies of the Australian Preview Edition of "The Origin of Rocks and Mineral Deposits" will be available after the symposium — book price $75.

MASTER OF ECONOMIC GEOLOGY

THE MOST COMPREHENSIVE MASTERS
IN MINERAL EXPLORATION AND MINING GEOLOGY
ANYWHERE IN THE WORLD

The Minerals Geoscience Masters Program is supported by the Minerals Council of Australia. The program is designed for geoscientists with different levels of professional experience. It offers a highly regarded degree and a world-class opportunity to gain a thorough up-date of economic geology and mineral exploration skills. It comprises a varied range of short courses presented by both international and Australian experts, hands-on practical experience, field excursions and an opportunity to undertake research.

This coursework Masters program is for geoscientists who want to gain a thorough up-date on advances across the spectrum of economic geology applied to mineral exploration. The course is offered jointly between the University of Tasmania (CODES), the University of Western Australia (CET), James Cook University (EGRU), Monash University (VIEPS) and Australian National University (CRC LEME).

Course structure The Masters course can be completed in either of two ways:

Option 1 requires the completion of six units of coursework and a minor research thesis. Four of the units must be completed at CODES, the remainder are completed at other participating universities. Duration: 18-24 months full time; up to 30 months part time (flexible in recognition of industry participants).

Option 2 requires the completion of eight units of coursework, at least four of which must be undertaken at CODES. Duration: 12-18 months full time; up to 30 months part time (flexible in recognition of industry participants).

Course content Each of the participating universities offers up to five courses in rotation over a two-year period. Each course is of two weeks' duration.

Course offered by CODES are:
- Volcanology and mineralisation in volcanic terrains
- Brownfields exploration
- Ore deposit models and exploration strategies
- Ore deposits of South America (Chile, Peru)
- Ore deposit geochemistry, hydrology and geochronology

Fees UTAS charges a course administration fee of $2000 per unit for enrolled Masters students, and for international students is $AUD17,800 pa (approx $USD14,500). International students should contact the Masters Co-ordinator (see details below). There are some additional costs associated with field-based courses. Entry qualifications: BSc (Hons) or BSc with at least two years' industry experience.

The National Masters Program is funded by the Minerals Council of Australia, DEST and the host institutions (UTAS, JCU, UWA).

For further information contact
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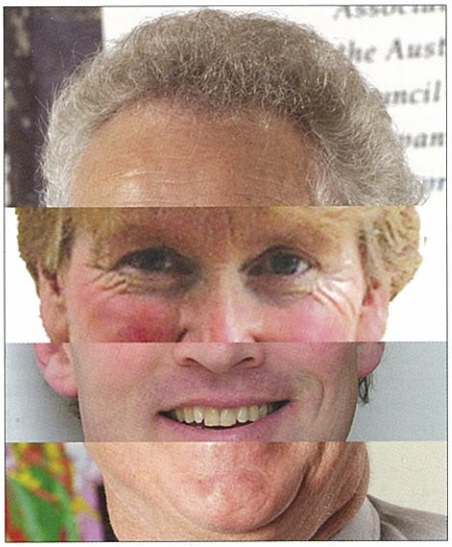
www.codes.utas.edu.au/masters



Are you a quiz night contender? Take the test - name the CODES staff pictured above. (Answers on page 9).

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Australian Government
Australian Research Council

Ore Solutions banner: Multistage tectonic-hydrothermal breccia, Palmerejo epithermal Ag-Au deposit, Chihuahua, Mexico. Note clasts of early-formed pyrite and wallrocks cemented by late stage quartz and kaolinite.

another Pongratz Production 2007