Howard Williams (Brock U) presented a stick-slip model for kink band formation in shear zones and faults.

K.M. Bethune (grad. student, Queen's U) displayed an analysis of stress orientation in a gentle fold of the Valley-and-Ridge Province, Central Appalachians. S.G. Hwang (grad. student, UNB) displayed complex implications of shear zones in the Shelburne-Berrington area, Nova Scotia. C. Hy (UNB) showed quartz vein history in the Tangier area from the eastern shore of Nova Scotia. C. Moreton (grad. student, UNB) showed major structure controls on the B-zone ore body, Heath Steele Mines, Newcastle, New Brunswick.

Echelon fracture sets in felsic rocks of the Killarney Complex were displayed by Paula MacKinnon (grad. student, McMaster) and Paul Clifford. Pierre-Yves F. Robin (U of Toronto) showed a new method of dealing with the representation and evaluation of circular orientation data. The theoretical basis and method of dating geological events from ESR (electron spin resonance) signals in quartz was displayed by W.M. Buhay (grad. student, McMaster), H.P. Schwarcz (McMaster) and P.M. Clifford.

On a more regional scale, J.E. King (GSC) showed contrasting styles of basement involvement in the metamorphic-internal zone of the Wopmay Orogen. C.K. Mawer displayed a poster illustrating some aspects of the tectonic history of the northern Appalachians. B.H. O'Brian (Dept. of Mines and Energy, Newfoundland) showed auriferous mylonite zones in southwestern Newfoundland. R.M. Stesky (U of Toronto) showed lineaments and faults of the Ontario Grenville Province.

Graham Borradaile has offered to host the next Canadian Tectonics Group Meeting in Thunder Bay. If you wish to receive the first circular, contact: Dr. Graham Borradaile, Dept. of Geology, Lakehead University, Thunder Bay, Ontario, Canada P7B 5E1.

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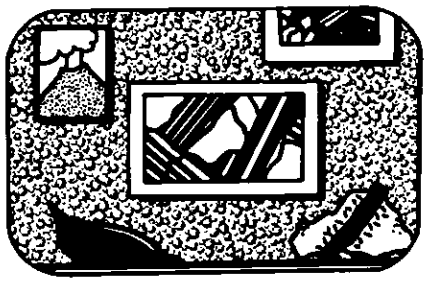

Friends of the Igneous Rocks: First Meeting

T.H. Pearce
Department of Geological Sciences
Queen's University
Kingston, Ontario K7L 3N6

On 6 September 1986, the first meeting of "Friends of the Igneous Rocks" was held at the University of Calgary. The meeting was attended by J. Nicholls, L. Lee, M. Stout (U of Calgary); T. Pearce, P.L. Roeder, A. Kolisnik, P. Scowen (Queen's); K. Russell (U of British Columbia); C. Scarfe (U of Alberta). The informal association was organized by a steering committee of K. Russell, J. Nicholls, P. Roeder and T. Pearce. The first meeting was ably hosted by Jim Nicholls and was held in a relaxed and open manner. Individuals were invited to give an informal presentation on their present research interests. There was considerable discussion of the work presented and, judging from the variety and topical nature of the work which was presented, igneous petrological research in Canada is in a very healthy and active state. Highlights of the presentations are described below.

J. Nicholls began the day's session with a discussion of problems involved in some statistical attempts at reproducing natural data by so-called randomly selected data. Attempts have been made by some statisticians (e.g. Rollinson and Roberts, Contributions to Mineralogy and Petrology, 1986) to "prove" that trends in ratio diagrams (i.e. Pearce diagrams) could be solely due to random data. It was shown that if the random data are constrained to have the same means and variances as a natural data set, then the random data will be constrained to reproduce the natural trends. The conclusion remains that trends in Pearce diagrams which test for magmatic fractionation are valid.

The present writer added to the discussion with comments based on a manuscript now in review. He introduced the concept of "available space" defined as the n-dimensional space outlined by permissible stable phases for any given state of a system. Any other space is "forbidden space" by definition and it is therefore impossible for data to fall within it. All natural data must fall within the available space and random data must completely fill the available space in a random manner. Needless to say, the present writer agrees that the trends in Pearce diagrams are valid. A correct null hypothesis is that data must randomly fill the available space.

P.L. Roeder reported on some work on chromium solubility in basalts which is being conducted in collaboration with Ivan Reynolds of Rhodes University. Using the famous 401 basalt, they found that, as is the case with ferric iron, chromium 3^+ is not very soluble in basaltic melts. Reporting new results (some obtained only the previous week), Roeder has modelled the solubility of chromium in basaltic melts at 1200 and 1300°C for a range of oxygen fugacities. Chromite may, therefore, be useful for determining P_{O_2} and total pressure in basalts. An interesting observation that came out of this work is that some mid-ocean ridge basalts have plagioclase which appears to have nucleated on chromite. Professor Roeder speculated that this might have something to do with the interchange of aluminum between the chromite and the adjacent melt as a function of pressure.

The intermediate mixed lavas of Volcan Popocatepetl in Mexico are being studied by Angela Kolisnik of Queen's University. She is using the Laser Interference Microscope at Queen's to study zoning in pyroxene and plagioclase phenocrysts. Reversely zoned orthopyroxenes with a more magnesian rim of enstatite deposited upon an inner resorbed core of hypersthene (with a difference of 14% En) is consistent with magma mixing. Some orthopyroxene even has oscillatory zoning reminiscent of plagioclase. This may be the first recorded appearance of such zoning. Plagioclase with several inner "spikes" of more calcic composition is also consistent with a mixing hypothesis and various models of mixing processes are being evaluated. The zoning stratigraphy in some microphenocrysts of plagioclase can be locally correlated from one phenocryst to another. However, for the most part, the assemblage of plagioclase phenocrysts appears rather heterogeneous. In thin section and in some hand specimens, two different phases can actually be seen as dark and light parts of the rock with different degrees of crystallinity.

After lunch at the local student eatery, the writer reported on several current projects. Using a newly developed, simplified theory of zoning (from a manuscript currently in review), it is theoretically possible to determine the distribution coefficient and the extent of the system from which a crystal has grown. This work, it is thought, has implications for determining the size of cells during magmatic mixing events. Some crystals of plagioclase, for example, have zoning patterns consistent with growth in a very large (even open?) system. Another project involving A.H. Clark, P.L. Roeder and I. Wolfson concerns the application of Nomarski interference contrast in reflected light to the

petrography of silicate rocks. The method uses etching of polished surfaces to develop a microtopography which is then enhanced by Nomarski differential interference contrast (see Clark *et al.*, American Mineralogist, 1986). Another project on the pumice from the 18 May 1980 eruption of Mt. St. Helen's (work done in conjunction with J.K. Russell and I. Wolfson) will produce a study of volcanic plagioclase using the normal petrographic microscope, the Laser Interference Microscope, Nomarski interference contrast, and the electron microprobe.

C. Scarfe of the University of Alberta then presented some recent work he has done on the melting of peridotite at very high pressures (Scarfe, Nature, 1985). This work was done in Japan — the current world leader in such experimental high pressure technology. This work has implications for basaltic magma production from the Archean to the Recent periods. There was speculation that this work may have important implications for a possible magma "ocean" or completely liquid layer in the early Earth. Scarfe presented plans for a state-of-the-art high pressure laboratory in Alberta which would be one of two in North America.

K. Russell of the University of British Columbia described his current work on the modelling of magmatic processes with thermodynamic heat flow equations. Using finite difference methods, he has modelled the cooling of a dyke and lava lakes (especially the Makaopuhi). One preliminary conclusion is that massive precipitation of a phase such as plagioclase may produce thermal effects similar to those of convective overturn. The two effects might therefore be easily confused.

A recent study of chromites from the Kilauea Iki lava lakes (1959 eruption) was reported by Pam Scowen. In this electron microprobe study, she analyzed chromites contained almost exclusively in olivine phenocrysts. Chromites which were deeply imbedded in olivine retained their eruptive composition, while chromites near the surface of the olivines were altered by diffusive interaction with the melt. Rapid quenching retains the eruptive composition of the chromites while diffusion increases Ti and Fe while decreasing Mg, Cr and Al. The inclusion of chromite in olivine, therefore, does not always preserve the original composition.

After a wine and cheese event (held in T.H. Pearce's motel room) and a subsequent postmortem, it was decided that the meeting was eminently successful and should be repeated. The happy petrologists then dined at the Unicorn in downtown Calgary and continued discussions until late in the evening.

Next year, T.H. Pearce has volunteered to host the meeting at Queen's University. Depending on the number of participants, it is planned to offer either a demonstration or an informal short course in laser microscopy and other types of interference imaging, including Nomarski. Applications from researchers in igneous petrology will be welcomed, but it may be necessary to limit the number attending in order to keep the meeting informal.

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