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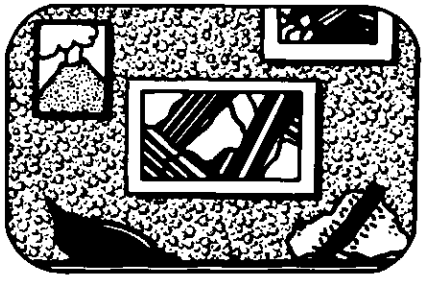

# Friends of Igneous Rocks: Fifth Annual Meeting

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The 1990 meeting of Friends of Igneous Rocks, organized by Roger Nielson, was held 26-28 August at Oregon State University. The main aim of Friends of Igneous Rocks is to allow igneous petrologists to meet and discuss their current research in an informal atmosphere. The meeting in Corvallis brought us close to a centre of igneous activity in both the literal and figurative sense, because Corvallis lies within the Cascades and provides the impressive number of igneous petrologists in the region with stimulating surroundings.

The focus of the first day's talks was on quantitative modelling of igneous processes. Kelly Russell (U of British Columbia) led off with a talk on thermodynamic modelling of magma mixing. His modelling emphasized the point that we cannot simply assume that during mixing of two magmas the extensive variables can be modelled by a linear equation. Thus, the product of two magmas, which were both saturated with a phase (*e.g.*, olivine), may not be saturated with this phase and we may see resorption of the phase.

Roger Nielson reported on some experimental work carried out by himself and by his students on partition coefficients for REE between silicate melts and pyroxenes, and for Ti, Ta, Nb, Sr and Hf between silicate melts and magnetite. The REE experimental work indicates that the REE enter pyroxene by coupled substitution with Al. The partition coefficients for Ti, Ta, Nb, Zr and Hf into magnetite show a positive linear correlation. Preliminary work on partition coefficients for these elements into ilmenite and rutile indicates similar results. Thus, crystal fractionation of these oxides or their retention in the source during partial melting will not change the ratios between these elements, contrary to popular theory. Finally, Roger introduced us to his recent attempts to model cumulates using *"in situ"* crystallization.

Tom Pearce (Queen's U) presented a talk in which he managed to combine the two great interests in his life: chaos theory and the Normalskie technique. Tom is hoping to use nonlinear dynamic equations (*i.e.*, chaos theory) to describe the distribution of the zoning in plagioclase crystals and, as every scientist knows, truly understanding a phenomenon begins with a quantitative description. Tom also presented an elegant defence to the charge that spurious correlations may be produced by Pearce element ratio plots because both axes use the same element as the denominator.

Sarah Barnes (U du Québec à Chicoutimi) discussed some problems in quantitative modelling of cumulate rocks, such as how to estimate the composition of the original magmas, how to estimate the degree of fractionation of the trapped liquid component, the different effects of Rayleigh and equilibrium fractionation on the composition of the cumulate and the possibility that the trapped liquid and the cumulate phase are not in equilibrium.

Jim Nicholls (U of Calgary) reported on recent work by himself and Mavis Stout on some unusual volcanic rocks from the Snake River Plain, which appeared to defy any attempt at classification. Jim also described a technique developed at the University of Calgary for estimating the mode of a rock by using a microprobe to carry out one second counts on a 20μ grid pattern over 2.5 $cm^2$. Mavis and he believe that this method gives a more accurate estimate of the mode than normal point counting.

Dave Christie (Oregon State U) described an intriguing, 400 km long break in the mid-ocean ridge south of Australia, where the ocean floor is 300 m deeper than normal. The geochemistry and isotopic signature of the volcanic rocks change abruptly at the break. Rocks to the west of the break resemble the Pacific Ocean floor basalts, while rocks from the break resemble Indian Ocean floor basalts. Thus, the break in the ridge is interpreted to represent the site where the Indian and Pacific mantles meet.

Graham Nixon (BC Geological Survey Branch) described the enigmatic platinum-rich rocks found within the Alaskan-type Tulameen Complex and the platinum nuggets found in placers around the Complex. One unusual feature of the Tulameen rocks is that the platinum is present as platinum-iron alloys rather than being associated with sulphides, as is normally the case. The presence of these alloys produces rocks unusually rich in platinum relative to the other platinum-group elements. In a rather elegant piece of detective work, Graham and Louis Cabri have shown that the nuggets found in the placers are derived from the chromitites layers of the Tulameen Complex.

In the most energetic presentation of the meeting, Dana Johnson (U of Oregon) described his work on three topics: partial melting of high-Mg basalts to produce high-Al basalts, partial melting of pelite to produce peraluminous granites, and oxidation of lherzolite xenoliths in an alkali picrite.

Finally, Tark Hamilton (Geological Survey of Canada) described Recent volcanic rocks of the Queen Charlotte Islands. These rocks range in composition from basalt to basaltic andesite, and resemble continental margin basalts of the Atlantic Ocean.

The third day of the meeting was devoted to a field trip led by Ed Taylor and Britt Hill (both from Oregon State U) to the Recent (0-30 Ma) volcanic rocks of the high Cascades. The particular volcanic centres that were examined, Three Sisters and Broken Top, range in composition from basaltic andesite to rhyolite, with a distinct break in composition between 67% and 72% $SiO_2$, *i.e.*, there are no rhyodacites present. Britt interprets this composition break as evidence that the rhyolites are not derived from the andesite magma by crystal fractionation and suggests instead that the rhyolite formed by partial melting of the lower crust. To a geologist working on deformed and metamorphosed igneous rocks in the Canadian Shield, these unmetamorphosed, undeformed, well-exposed volcanic rocks were most impressive, but also most confusing. My reaction at the first outcrop was "these can't be andesites; everyone knows that andesites are green, not black".

Friends of Igneous Rocks would like to thank Roger Neilson for hosting this year's meeting and invite igneous geologists to next year's meeting at McGill University, Montreal, to be hosted by Don Francis.

Accepted, as revised, 15 October 1990.