of 1 mm as expected if it is the 2.7 K black-body relic of the fireball phase of a big bang Universe. The efforts of J. V. Narlikar (Tata Institute, Bombay) to explain this background as starlight thermalised by large graphite 'whiskers' ran into heavy criticism.

Ground-based astronomy had its moments too, with F. F. Gardner of CSIRO, Australia, L. T. Little of the University of Kent, and A. Gillespie of QMC reporting on molecular line studies (formaldehyde, H_2O and CO respectively) and P. E. Clegg reporting on Queen Mary College's 1 mm continuum studies of galactic sources, galaxies and QSOs.

The theoreticians produced a variety of models of dust-clouds and HII regions, disagreeing wildly over the composition, shape and size of the dust grains, ranging from ice and silicates to formaldehyde polymers, from spheres to whiskers and snowflakes, and from 0.1 μm to 1 mm in size. Clearly much work remains for both observers and theoreticians in this exciting field.

Rock fabrics

from Robert W. Cahn

THE British Standard Conference is organised by a learned or professional society, lasts 2.5 days, has two parallel sessions, costs £25 in registration fees alone, involves a pricey conference dinner, is attended mostly by academics and industrial scientists whose institutions are still willing to pay up, and evokes a British Standard Response to the effect that, with luck, just one paper will be really interesting to the British Standard Conferee. I claim a little artistic licence—the British Standards Institution has not yet, so far as I know, laid down a standard for the BSC—but all seasoned scientists will recognise the gestalt.

Some weeks ago, in mid-May, I had the good fortune to take part in a very different kind of conference in the Geology Department at Imperial College, London. It lasted one day, cost £0.50 to attend, had a single session, and was organised entirely by a graduate student, K. McClay, on behalf of a group of graduate students and university staff (the Tectonic Studies Group); the audience consisted of a sprinkling of British and foreign academics and a lot of students, post- and undergraduate alike. The topic was "Fabrics and Textures in Rocks".

The term 'fabric' in a petrographic context denotes both preferred orientations in populations of crystal grains (what metallurgists term 'texture') and the shapes and mutual dispositions of matrix grains and subsidiary phases (what metallurgists term 'morphology'). Texture arises from mechanical deformation of rocks under pressure and resultant recrystallisation when the temperature is high enough. The processes involved must be related to those that generate deformation textures and annealing textures in metals; the Tectonics Group evidently recognise this, because the two opening speakers (I. L. Dillamore of the British Steel Corporation and R. W. Cahn of Sussex University) were invited to outline the present state of metallurgical knowledge on the two kinds of textures. The geologists present showed an impressive familiarity with the mathematical techniques used to interpret the genesis of deformation textures or the processes that arise during annealing of deformed metals. Thus G. Lister of the Geological Institute, Leiden, dealt with deformation textures in quartzite and S. White of Imperial College with recrystallisation mechanisms in the same rock, both drawing extensive metallurgical parallels.

Other contributors (E. Rutter and W. Shaw of Imperial College and R. G. C. Bathurst of Liverpool University) reviewed textures and fabrics of limestones, dolomites and marbles. D. J. Barber and H. R. Wenk (Essex University) applied electron microscopy to these rocks; this technique has only recently proved feasible for petrography, following the introduction of the ion-beam thinning technique, and it seems likely to prove as fruitful here as it has done in metallurgy.

The petrographer has the advantage over the metallurgist that he can examine his (optically anisotropic) minerals by transmitted polarised light, with the aid of a universal stage. Students of quartzite use this approach to determine a 'partial texture', that is, the distribution of the orientations of *c* axes both from one grain to another, and between different parts of the same grain: in this way, detailed textural and morphological information on a population of over 100 grains can be obtained within a day's work—information that would take a metallurgist, working with X rays and optical microscopy, or with electron microscopy, many weeks to assemble. Dr White in particular, using the *c*-axis technique, was able to draw on metallurgical experience to prove the close similarity of the processes that generate high-temperature textures in quartzite.

The remaining speakers, from Leeds and Leiden, dealt with more complex minerals, such as slates and peridotites. Here again, metallurgical processes such as strain-induced grain-boundary migration were identified.

One of the quartzite specialists spoke a few weeks later at a British Standard Conference (good of its type!), devoted to textures in metals: to a witness who was able to compare the two occasions, it was plain that the geologists were much more ready to learn from metallurgical insights than metallurgists were willing to interest themselves in geologists' problems and techniques. This is a pity, because the two groups have much to contribute to each other.

Nuclear pores

from J. R. Tata

ONE of the many mysteries surrounding the organisation and function of the cell nucleus is how this organelle maintains concentrations of ions and small molecules (especially nucleotides) higher than those in the surrounding cytoplasm, while, at the same time allowing the large ribonucleoprotein precursors of polyribosomes to pass into the cytoplasm. The characteristics of the double nuclear envelope are such that some specialised site at the nuclear surface must regulate the nucleo–cytoplasmic transactions. A likely candidate for this function is the 'nuclear pore complex' (see Franke and Scheer in *The Cell Nucleus*, vol. 1, 219, 1974 for an excellent review). Although cytologists have for a long time known about the existence of pores on the surface of the nucleus, virtually nothing is known about their chemical nature and function.

Ultrastructurally, the size (diameter 600 ± 150 Å), but not the number, of nuclear pores is remarkably constant in all eukaryotic cells. Franke's group have done considerable work in defining optimal conditions for observing these structures by electron microscopy of intact cells and of isolated nuclei and nuclear membrane preparations. A well known ultrastructural feature of the nuclear pore is the 'annulus' of non-membranous material surrounding both the inner and outer rims of the pore (Callan and Tomlin, *Proc. R. Soc.*, **B137**, 367; 1950; Afzelius, *Expl Cell Res.*, **8**, 147; 1955). What is particularly interesting about the annulus is its characteristic eight-fold symmetry arising from eight 'annular granules' with diameters of 100–250 Å (Roberts and Northcote, *Nature*, **228**, 385; 1970; Franke and Scheer, *J. ultrastruct. Res.*, **30**, 288; 1970). The space within the pore is often seen to be filled with varying amounts of an 'amorphous' material as well as fibrils of about 50 Å diameter, themselves sometimes studded with smaller granules of 50–100 Å. Not surprisingly, several models for the structure of this complex ensemble have been proposed.

Blobel's group at the Rockefeller