in the nepheline syenite. It was usually found associated with quartz and sometimes with leucosphenite. Chemical analysis (in per cent) is: SiO_2—62.11, TiO_2—16.99, Al_2O_3—0.2, MnO—0.02, CaO—0.46, Na_2O—15.20, K_2O—0.1, P_2O_5—0.20, H_2O^+—0.17, F_2—0.76, total Fe—2.25, sum = 98.46. It is tetragonal with a = 10.721Å, c = 7.938, space group $I4/m$. The powder diffraction pattern of the St. Hilaire narsarsukite is identical to that of material from Greenland and Kola Peninsula, U.S.S.R.

THE OCCURRENCE OF KYANITE, ANDALUSITE, PYROPHYLLITE AND KAOLINITE IN LOWER PROTEROZOIC (HURONIAN) ROCKS OF ONTARIO

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Kyanite, andalusite, pyrophyllite and kaolinite are present in quartzites of the upper part of the Lorrain Formation in the Whitefish Falls region of the Sudbury District of Ontario. The quartzites were mylonitised during a regionally developed phase of secondary deformation. Kyanite grew during the later stages of the mylonitisation, whereas andalusite appears to be post-kinematic and is therefore considered to have grown at the same time as post-secondary-deformation biotite and garnet in nearby pelitic rocks. The replacement of kaolinite by both kyanite and andalusite is commonly observed in the quartzites, but there is no evidence to suggest that andalusite has replaced kyanite, both minerals appearing to co-exist in equilibrium.

The occurrence of kyanite-andalusite-kaolinite quartzites in the Huronian is yet one more point of similarity between the Lower Proterozoic rocks of Canada and Scandinavia tending to support correlation of the Penokean and Karelian orogenies occurring ca. 2,100 m.y. ago.

ELECTRON MICROSCOPY AND DIFFRACTION ON KAOLINITIC CLAYS

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Samples from a sedimentary kaolinitic clay deposit, located near Mexico City, contained fine kaolinite conglomerate, irregular hexagonal crystals, long and thin curved rods, thin irregular plates often with rolled edges, and small cylindrical crystals with hexagonal-like edges. Upon hydration, the latter disappeared, the thin irregular plates increased, and the long rods remain unaltered. Non-textural single-crystal electron diffraction patterns on the different phases, with intensity measurements and structural factor computations indicated disorders that could explain the morphology of the minerals.

PETROGRAPHY OF AN ALKALI-SILICA REACTIVE ROCK IN THE CANADIAN SHIELD

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Sand-gravel deposits along the Montreal River in the Canadian Shield are characterized by an abundance of greywackes and argillites. Routine acceptance tests of samples for concrete aggregates did not indicate the presence of harmful constituents. The quick chemical reactivity test performed on these samples and on crushed drill

cores consisting of greywackes, argillites and related rocks from a generating station proposed site nearby, was also negative.

However, the long-term test with mortar bars containing these materials showed distinct expansion and formation of silica gel, indicating susceptibility to alkali–silica reaction in concrete, although the maximum acceptable limits for expansion, according to the Ontario Hydro and the ASTM Standard Specifications for Concrete Aggregates, were not reached.

The alkali–silica reaction, with conspicuously developed silica gel, was identified also in an old deteriorated concrete dam, 30 miles distant, in which local gravel and sand were used as aggregates. In drill cores, large pieces of a relatively uniform varved argillite from the foundation rock were found in the concrete. Mortar bars made with these argillites interlaminated with greywackes showed expansion equivalent to the maximum permissible limit. The test confirmed that argillites and varieties of greywackes grading to argillites are alkali-reactive.

To our knowledge this is the first indication that argillites are alkali-reactive although they are closely related to phyllites and slates, some of which are known to be reactive.

MORE PRECESSION GONIOMETRY

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The precession x-ray diffraction camera has been used as a goniometer to identify neighbouring twins in staurolite. It can also be applied, in combination with the stereographic net, to the solution of problems of crystal orientation: (1) Orienting a crystal when the two arcs of the goniometer head are not horizontal and vertical. (2) Ascertaining the relative orientations of intergrown crystalline species. (3) Determining the various orientations of quartz grains in a petrographic thin section. In each case the necessary information is obtained from one ordinary adjustment photograph, taken with a small precession angle ($\mu = 10°$) and unfiltered radiation.

A CHEMICAL AND X-RAY STUDY OF OMPHACITIC PYROXENES

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The cell constants of analysed omphacites, mainly from eclogitic rocks of Austria, Italy, Switzerland, U.S.S.R., France, Newfoundland, Norway, and the U.S.A. have been determined using x-ray powder diffraction techniques and a least squares programme written for an IBM 7040 computer. Of a total of fourteen samples, five represent new analyses determined by wet chemical, x-ray fluorescence, and electron microprobe techniques. The remaining analyses are from the literature. Cell constants for four samples have also been taken from the literature.

The complex chemistry of these pyroxenes makes representation in terms of their theoretical end-member molecules difficult. Attempts have been made to correlate their cell sizes and chemistry using the methods proposed by Yoder & Tilley (1962), Niggli (1946), Eskola (1921), Smulikowski (1960), Church (1967), and Huchenholz (1965). None of these methods are entirely satisfactory in that they do not conveniently represent all possible end-members.