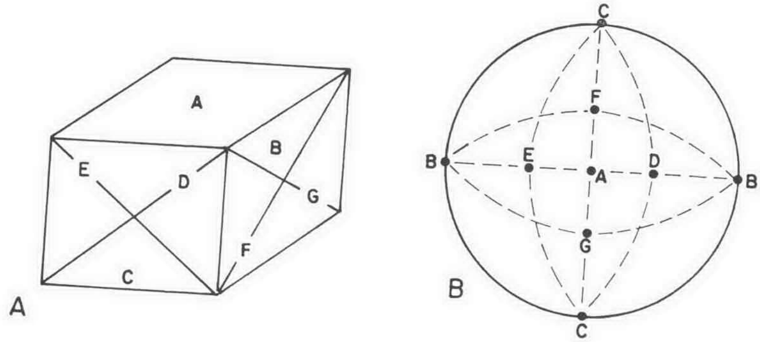
"well" mount. Of course no x-ray method is reliable when applied to very coarse-grained rocks. To ensure a representative collection of grains, rocks should have an average grain size of no greater than 1 mm diameter. With 4° slits the area irradiated by the x-ray beam at 100° 2θ (upper limit of scanning needed for most patterns) is 150 mm^2, and there will be approximately 190 grains irradiated by the beam. Material of coarser grain can be used if the section is mounted on an oscillator plate, such as found in the Norelco pole figure device. Another way to overcome the problem is to scan several different sections of the same orientation and average the resulting intensity measurements.

The theory of the technique is best illustrated by the determination of the position of a strong a-axis maximum by construction. The example is one ac-



STRONG REFLECTIONS

	HKL	ϕ	SECTION
1	210	13° 06′	A, G
2	211	24° 45′	G, D
3	322	31° 33′	G
4	101	38° 27′	G
5	130	54° 24′	E
6	102	57° 48′	G, F, D
7	122	61° 29′	—
8	132	64° 43′	E
9	113	67° 35′	E
10	133	70° 14′	F
11	134	73° 55′	—
12	041	90° 00′	—
13	061	"	D
14	020	"	B

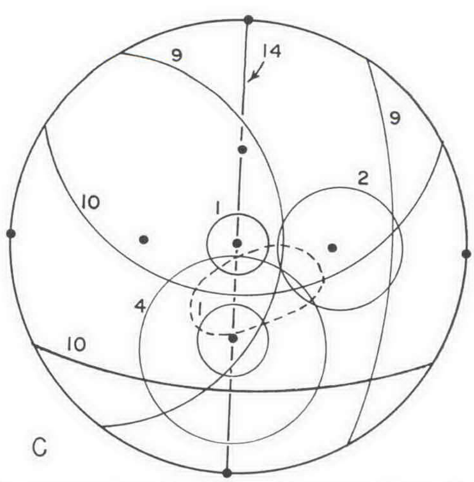


Fig. 2. Method for determination by construction of point maximum position: *A*, hypothetical sample showing the sections used; *B*, equal angle projection showing poles to sections of sample with section A as primitive circle section; *C*, seven small-circles representing crystallographic planes of anomalously strong intensity plotted on equal angle projection to show position of point maximum in sample.

tually carried out for a dunite from Cypress Island, Northwest Washington.[2] This rock has an average grain size of 1 mm (diameter) and therefore at 75° 2θ (maximum 2θ needed for olivine patterns) the number of grains irradiated is roughly 248. Figure 2A schematically illustrates the sample cut in the form of a cube having four cuts inclined 45° and two cuts 90° to surface A. In this example surface A corresponds to the plane of the stereographic net. The poles to sections A through G are shown on the stereographic net, figure 2B.

The rock slices cut parallel to planes A through G were inserted into the sample holder of the goniometer in the usual way, and the chart records taken. The slices were scanned from 16 to 75° 2θ at 1°/min, using 4° divergence and scatter slits and 0.006-in. receiving slit. The chart speed was 1 in./min. Lead sheet with a rectangular opening 1X2 cm was placed on top of the sample to insure a constant low-angle area of irradiation (fig. 1). A special holder allowing adjustment of sample height was constructed for friable material or irregularly shaped fragments.

A direct indication of the amount of preferred orientation in the fabric cannot be gained from the absolute magnitude of the peak heights or peak areas alone. Therefore, the intensity for a particular reflection from the rock slice was divided by the intensity value for that reflection from the powder pattern, since the latter should represent complete random orientation of grain. Problems are encountered in obtaining completely unoriented powder material, however, especially from minerals with good cleavages. Of the four mineral types studied thus far—quartz, calcite, olivine, and mica—only the calcite and mica presented difficulties. The first determination of the Yule marble fabric showed that preferred orientation of grains in the powder pattern introduced anomalous effects in the center of the diagram (T-section) along with the expected point maximum. A second trial, using intensities based on a pattern by Swanson and Fuyat (1953) gave considerably better agreement with the optical data. A better way to solve this problem might be to modify the powder intensities obtained experimentally with those calculated with structure factor data. Future work with this technique will include the use of calculated intensities.

The material for the powder samples was derived in all cases from the rock under study so that impurities that would reduce the intensities of the desired peaks obtained from rock slices would also effect the powder intensities. In this respect care must be taken to see that reflections from impurities do not interfere with those of the mineral under study.

As stated previously the data for the dunite study were obtained by scanning rock slices A through G (fig. 2A). Upon examination of the diffraction pattern taken from rock slice D it was found that the olivine 211 peak was one of the strongest present in the pattern, it being 2.8 times as intense as the corresponding powder peak. In order to locate the possible positions for the a-axis maximum in the rock from the intensity of the 211 peak one must first know the angle between the a-axis and the normal to 211. This angle, along with

[2] This specimen was donated to the writer by C. B. Raleigh, Institute of Geophysics and Planetary Physics, University of California, Los Angeles.