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A POINT-COUNTER FOR MODAL ANALYSIS OF STAINED ROCK SLABS

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Interest in recent years has been directed toward macropoint counting of stained rock slabs (Jackson and Ross, 1956; Plafker, 1956; Emerson, 1958). The instrument to be described in this article was developed for point counting stained slabs and offers considerable versatility toward

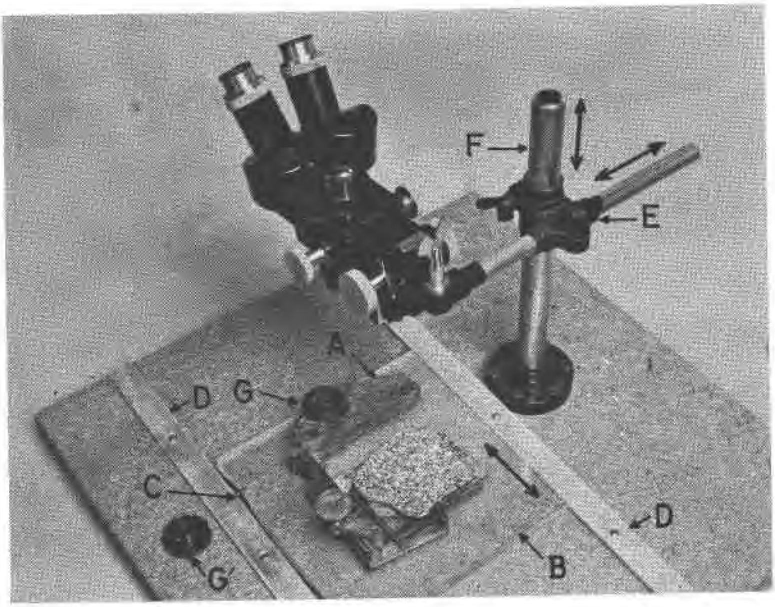

FIG. 1. Point-counter shown with a stained slab of granite in place. The arrows indicate the directions of movement for positioning the equipment.

that purpose. The components of the counter are a plate of fiberboard, a mechanical stage and a binocular microscope (Fig. 1).

The mechanical stage, which is simply an enlarged version of a standard petrographic model, can be constructed in a machine shop. The drive for the movement in both the N-S and the E-W directions was provided by a rack and pinion gear that were available commercially. The length of the racks determines the amount of the translation and consequently of the maximum area that can be counted. The major problem in the construction is the machining of the guides that bear the weight of the sample holder.

The mechanical stage (A, Fig. 1) is mounted upon a plate of clear plastic (B) that can be slid in a N-S direction. A flat spring (C) provides sufficient pressure to hold the plate fixed between its guides (D) during counting. E-W adjustment is allowed by loosening the clamp on the pipe (E) that holds the binocular microscope. Adjustments in these two directions allow the rock slab to be positioned under the microscope. Gross vertical adjustment is accommodated by sliding the microscope up and down on the vertical pipe (F).

The rock slab is pressed into modeling clay on the mechanical stage and levelled. The area to be counted is outlined and positioned by moving the plastic plate (B) and the microscope. If the area of the slab exceeds the area covered in one positioning of the mechanical stage, the slab can be repositioned as necessary for complete coverage.

The counting interval is varied by interchanging one notched wheel (G) for another (G′). The wheels pictured were machined with different notch intervals around their peripheries. The wheels are rapidly interchanged by means of a single set screw.

Slabs of granitic rocks were originally stained by the method of Bailey and Stevens (1960) which colors K-feldspar yellow and plagioclase red. Our experience showed, however, that the plagioclase stain was unnecessary. If the K-feldspar stain only is used and the stained slab is sprayed with clear lacquer, the yellow alkali feldspar, the frosty-white plagioclase, the vitreous clear quartz, and the yellowish-green biotite are readily distinguished from each other.

Although the point-counter was developed specifically for medium- and coarse-grained rocks, it can be used with most even textured holocrystalline rocks. Holocrystalline rocks with a grain size as small as 0.5 mm can be counted under a medium power objective.

Chayes (1956) has discussed the theory of point-counting and described how a chosen precision can be maintained within a suite of granitic rocks. The stained-slab technique is particularly applicable to coarser grained rocks for which a large area must be counted. For this model, a total area of 30 cm^2 may be counted with one positioning.

The study of granitic rocks requires large numbers of analyses. Chayes (1956) pointed out that modal analyses can be obtained at little expense whereas the cost of chemical analyses would be prohibitive. Heier (1961) shows that surprisingly good chemical analyses can be calculated from the modes of granitic rocks. The accuracy of these calculated chemical analyses can be improved by using the x-ray method of Orville (1960) to determine the composition of alkali feldspars.

Modal analyses of stained slabs in which the minerals are easily distinguished offer the following advantages:

1) It is practically a necessity for coarser grained rocks and may be just as significant as a chemical analysis of these rocks.

2) Counting stained slabs is quick (about one hour per hand specimen

for cutting, staining and counting), inexpensive and useable by anyone who has a rock saw.

3) Large numbers of analyses for the statistical study of rock variation such as that of Whitten (1961) on granitic plutons can be made almost anywhere.

4) Little training is required in order to recognize the minerals of most rocks, so that counting may be performed by relatively unskilled personnel.

5) Counting through the binocular microscope reduces eye strain.

The principal disadvantage is that the various accessory minerals cannot be recognized. This disadvantage and the construction cost of this apparatus are far outweighed for rocks in which accurate estimates of the various accessories are not desired by the obtainability of the numerous modal analyses that can be determined for the time and expense of a single chemical analysis.

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THE COMPOSITION OF BAVENITE

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In recent papers by Fleischer and Switzer (1953) and Switzer and Reichen (1960) chemical analyses of bavenite and "pilinite" are consid-