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LAYERED BASIC INTRUSIVE ROCKS OF THE WICHITA MOUNTAINS, S.W. OKLAHOMA

H. E. HUNTER
Department of Geology, Harpur College, State University of New York, Endicott, New York

ABSTRACT

Basic igneous rocks crop out along the axis of the Wichita Mountains of southeastern Oklahoma. Five stratigraphic units have been distinguished on the basis of mineralogical and textural features. The three lower units which have been mapped at a scale of 1 inch to 1000 feet are discussed in this paper. The lowermost unit includes alternating layers of troctolite and anorthosite with olivine gabbro at some horizons. The second unit consists predominantly of anorthosite in which poikilitic pyroxene crystals ranging from 6 inches to 3 feet in diameter are randomly distributed. Enclosed plagioclase grains are of the same size and composition and show the same degree of preferred planar orientation as the grains outside the intergrowth. Some larger grains have cores of more calcic plagioclase. The third unit comprises anorthosite, gabbro, olivine gabbro, and troctolite. Poikilitic pyroxene grains from one-quarter to two inches in diameter enclose plagioclase grains which are fine-grained and anhedral in contrast to medium-grained, subhedral plagioclase outside the intergrowth. Plagioclase within the pyroxene is randomly oriented whereas in most specimens plagioclase in the enclosing rock shows some degree of preferred planar orientation.

Textures correspond closely to examples cited in the classification proposed by Waner, Brown and Wadsworth in 1960. Texturally the troctolites are adcumulates to mesocumulates and the gabbro containing large poikilitic pyroxene is an extreme example of a heteradcumulate. There is some question whether adcumulus growth could have been restricted to a narrow zone at the interface between crystal mush and magma. The small poikilitic intergrowths appear to have formed by simultaneous crystallization of plagioclase and pyroxene. Later adcumulus and/or intercumulus growth enlarged some of these clusters to approach the size and texture of the intergrowths in the lower units.

INTERNAL STRUCTURE OF A DIFFERENTIATED TESCHENITE INTRUSION, PROSPECT HILL, NEW SOUTH WALES

H. G. WILSHIRE
U. S. Geological Survey, Paducah, Kentucky

ABSTRACT

Internal structures of a 350-ft thick, dish-shaped teschenite intrusion are of four main types: (1) lineation, parallel to contacts, of minerals in the basalt margins, in picrite within 100 ft of the lower contact, and in dolerite and olivine-rich dolerite within 80 to 120 ft of the upper contact; (2) flow layers, which differ in mineral proportions and fabric, in the basalt margins and picrites within 80 ft of the lower contact; (3) rhythmic layering of felsic and mafic rocks inclined to abrupt changes in slope of the basalt-shale contact and to internal contacts between different rock types; and (4) deformation of pegmatite and other schlieren by slip along subsequently healed fractures at a high angle to basalt-shale contacts or by slip along planes parallel to the schlieren.

Progressive decrease in perfection of lineation away from contacts and occurrence of lineations in "complementary" (dolerite) as well as "cumulative" (picrite) rock types indicate an origin by viscous flow. Flow layers are considered to have formed by mechanical concentration of olivine during viscous flow and accompanying fabric variations by volatile redistribution over pressure gradients formed by slip along laminar flow planes. Rhythmically layered units are considered to result from tension fracturing accompanied by concentration of vapor-rich magma and reciprocal diffusion between layers. Deformation of schlieren was caused by initial injection processes because schlieren over and under a deformed one are undisturbed.

Response to viscous flow of material making up 49 to 60 per cent of the intrusion and of rock types representing the most acid differentiates indicates that the rate of intrusion was slow relative to the rate of differentiation.