

## Pre-Cambrian Rocks of Central Colorado: Their Correlation by Means of Heavy Mineral Analyses

Richard H. Jahns

*Northwestern University, Evanston, Illinois*

That part of the Front Range which forms the eastern margin of South Park, Colorado, is composed of three distinct rock types, all of pre-Cambrian age. The oldest of these, the Idaho Springs formation, is a series of highly metamorphosed sediments, and is intruded by granites of the Pikes Peak and of the younger Silver Plume batholiths. Because of difficulties in distinguishing certain facies of the granites by the ordinary field and petrographic methods, an attempt has been made to find in their heavy mineral suites any peculiarities or outstanding features which might aid definite identification. The correlations of these Front Range intrusives with similar rocks in the Sawatch Range to the west, as studied by Stark and Barnes,<sup>1</sup> were also tested by the same method.

Study of twenty-two widely spaced samples has shown that both batholiths bear essentially the same heavy minerals. Moreover, this similarity extends to individual peculiarities in the minerals, as, for example, the anomalous optic properties of the titanite and apatite in both rock types. Careful evaluation of the significance of each mineral encountered has focused attention on three "primary" species, apatite, zircon, and titanite. Each is an early crystallizing mineral, presumably unaffected by assimilated crustal material or by pneumatolytic action, and there most accurately represents the batholithic magma at its time of emplacement. The frequency distribution of two of these diagnostic minerals, zircon and titanite, presents a striking contrast between the Pikes Peak and Silver Plume granites. Titanite is relatively abundant in the former, zircon in the latter. Not only do these contrasting distributions appear consistent in all samples studied, but they are also characteristic of the similar rock types in the Sawatch Range.

Although the detailed data necessary for definite conclusions are thus far lacking, it is suggested that quantitative studies of primary heavy mineral assemblages are of great value in the identification or correlation of outcrops of the Pikes Peak and Silver Plume granites in central Colorado, particularly in those exposures near the contacts of the two batholiths.

<sup>1</sup> Stark, J. T., and Barnes, F. F., The correlation of pre-Cambrian granites by means of heavy mineral analyses: *Geol. Mag.*, vol. 72, pp. 341-350, 1935.