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Donald E. Livingston
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OLDER PRECAMBRIAN ROCKS NEAR THE SALT RIVER CANYON CENTRAL GILA COUNTY, ARIZONA

DONALD E. LIVINGSTON

Geochronology Laboratories, University of Arizona, Tucson, Arizona

INTRODUCTION

Older Precambrian rocks are exposed along the Salt River from just upstream of Canyon Creek to below Horseshoe Bend. The river bed is cut in granitic, volcanic, and contact-metamorphosed sedimentary rocks. In many places the contact relations are obscured by a cover of Tertiary(?) volcanic and sedimentary rocks. Most of the Precambrian exposures are southeast of the river, in and near the area known as the Bronco Ledges (Darton, 1925, p. 228-230.). Regional strikes and trends of contacts are northeast, parallel to the river, and dips are southeast. Strikes and dips can easily be measured on vitrophyre shards in the volcanic rocks, and on bedding in the orthoquartzites and shales. Sedimentary structures show that the southeast-dipping beds are not overturned.

The oldest rock unit is a volcanic porphyry upon which were deposited orthoquartzites and then shales. This section was then intruded by the Ruin granite, and the whole group of rocks was eroded to a relatively smooth surface before the deposition of the younger Precambrian Apache group.

VOLCANIC ROCKS

The oldest formation so far observed is an acidic, porphyritic plagioclase vitrophyre. Subparallel, dark vitrophyric shards form an eutaxitic texture, indicating that the rock is an ignimbrite of probable explosive origin. In four localities, strikes of 28°, 72°, 52° and 67° azimuth were measured on the shards with southeast dips of 30°, 45°, 61° and 31°, respectively. The thickness of exposed outcrop indicates that this formation is more than 3,000 feet thick. This wide exposure is cut by at least one fault of unknown displacement, but the attitude of the fault is such that it crosscuts the exposure and would not tend to repeat stratigraphic sections.

In thin section, the rock is porphyritic, with quartz, potassium-feldspar, and plagioclase (An_{20} - An_{40}) crystals in a devitrified groundmass. Minor amounts of amphibole and biotite are present . The plagioclase phenocrysts are partially sericitized, and the biotite is strongly chloritized. Opaque minerals, where present, are magnetite.

Two samples were run on an X-ray diffractometer and the major mineral phases indicated are quartz, plagioclase (An_0 - An_{20}) and biotite.

SEDIMENTARY ROCKS

An orthoquartzite is in depositional contact upon the older ignimbrite. The contact is subparallel with the eutaxitic banding and strikes northeast. No conglomerate or residual material has been observed at the contact. Shale beds are intercalated with the quartzite, and become more abundant in the upper portions of the sedimentary section. Cross bedding and oscillation ripple marks up to one foot in wave length are well developed, and leave no doubt that the beds are not overturned. These rocks have not been closely investigated at present, but appear to measure several thousand feet in thickness. Along the southeast they are bounded by their contact with the intrusive Ruin granite.

RUIN GRANITE

This rock intrudes the volcanic-sedimentary rock sequence along the southeast side. So far, only the sedimentary rocks have been observed in contact with the granite. This rock is probably the same as described by Bishop (1935) in the Richmond Basin, and by Bejnar (1952) in the Ruin Basin.

Petrographically, the granite is a coarse-grained biotite-quartz monzonite with large microcline phenocrysts. The microcline phenocrysts measure up to two inches in their greatest dimension and are porphyroblastic in texture. They are late in the paragenetic sequence, and commonly poikilitically enclose the earlier formed plagioclase, quartz and biotite. Dark xenoliths occur, but have the same mineral assemblage as the quartz monzonite, although the percentage of dark and light minerals is different.

ISOTOPE CHRONOLOGY

At the present time, two whole-rock samples of the rhyolite have been analyzed by the Rb-Sr method for age determination. These samples indicate ages of 1,390 and 1,350 m.y., with a possible maximum of 1,500 m.y.

Four analyses by the Rb-Sr method have been completed on whole-rock, plagioclase, potassium-feldspar and biotite samples from the Ruin granite. These analyses give concordant ages of 1,300 ± 30 m.y. Using these data, and the age of a diabase intrusive from Sierra Ancha (Damon, et. al., this publication), a Precambrian chronology for this area can be constructed as follows:

EVENT	TIME (m.y. ago)
1. Eruption of rhyolitic lavas	1,400 - 1,500
2. Deposition of quartzites and shales	
3. Intrusion of Ruin granite	1,300 ± 30 m.y.
4. Deposition of Apache group sedimentary rocks	
5. Intrusion of diabase dikes and sills	1,140 m.y.

Some disagreement in age is apparent for the Ruin granite between the K-Ar age in the Sierra Ancha (Damon, et al., this publication) and the Rb-Sr ages southeast of the Salt River. Only more investigation will indicate if the discrepancies are due to analytical errors or to inadequate field observations.

CONCLUSIONS

Correlation of the rhyolite and quartzite with the Red Rock rhyolite and Mazatzal quartzite in the Mazatzal Mountains (Wilson, 1939) and the Natural Bridge area (Darton, 1925, p. 234-235) seems reasonable at this time. If the correlation is correct, then it appears that most of the Precambrian sediments of Arizona, including the Mazatzal and Apache groups, were deposited within a span of time comparable to the Paleozoic Era. These sedimentary and volcanic rocks appear to have been deposited upon an igneous and metamorphic terrain that is about 1,700 m.y. old (Damon, et al., this publication).

These data are of a preliminary nature and more work is planned for the near future. K-Ar and Rb-Sr techniques will be further employed and coordinated with other geochemical and field techniques.

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