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NYE Co. Antelope Spring Cactus Spring

CACTUS RANGE

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Topography and Geography

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The Cactus range lies between Stonewall and Cactus flats. To the north its outlying hills are separated from the Monitor Hills by Ralston Valley; its low southern portion is buried beneath lava flows of Pahute Mesa. The range as defined is 22 miles long and has a crest line coursing northwest. The low central part is almost cut in two by gently sloping valleys filled with alluvial material. To the north of this median line the range culminates in Cactus Peak, a symmetrical cone 7550 feet high and a landmark visible for many miles. The highest peak of the range south of the center line is a black massive mountain 7600 feet high.

Pinon and juniper grow sparsely on the higher parts of the range south of the median line, and the tree Yucca abounds on the lower hills and upper alluvial slopes. Good grazing is found on the alluvial slopes next to the mountains and in some of the valleys. Cactus Spring has a daily flow of about 500 gallons of clear cold water. The water of Alkali Spring is cool, but slightly saline. Several other small water holes are reported to the west and north of Alkali Spring. Antelope Spring flows from 300 to 400 gals. of cool palatable water daily, and two smaller evanescent springs are situated in gulches to the south within 1/2 mile of Antelope Spring.

GENERAL GEOLOGY

The succession of formations exposed in this range, from the base up, is as follows: Pogonip limestone, Eureka quartzite, Weber conglomerate, granite, diorite porphyry, hornblende-biotite latite, earlier rhyolite, biotite andesite, augite andesite, later tuffs (?), later rhyolite (?) and basalt.

Sedimentary Rocks

POGONIP LIMESTONE. A small exposure of dary-gray fine-grained limestone, surrounded by alluvail deposits, occurs in the broad valley 3 miles south of the Goldfield-Cactus Spring road. This limestone is cut by numerous small white calcite veins. On lithologic grounds it is probably the Pogonip limestone of Ordovician age. Bowlders of similar limestone are embedded in rhyolitic tuffs nearby and fragments of limestone and jasperoid are inclosed in the rhyolite at severa places and in a granite porphyry in the northern part of the range. These fragments were probably derived from Orodvician or Cambrian limestones.

EUREKA QUARTZITE. Two miles southwest of Antelope Spring an area of quartzite lies unconformably below the surrounding rhyolite. This is a fine to medium-grained quartzite of white, yellow or red color and is cut by small stringers of white quartz. From its lithologic character it is considered to be the Eureka quartzite (Ordovician).

WEBER CONGLOMERATE. 3 miles west of south of Cactus Spring a mass of rusty looking sedimentary rocks ½ mile in diameter, protrudes through rhyolite. About 150 feet of conglomeratic beds, with the matrix of sand and small pebbles thoroughly cemented, are exposed. Embedded in this matrix are many beautifully rounded pebbles of green and black flint and jasperoid, while quartzite, and black limestone. The roundness of the pebbles, the largest of which are 4" in diameter, indicates a long period of attrition and the conglomerate is probably of marine origin. Prior to their inclusion in the conglomerates the pebbles, probably derived from Cambrian, Ordovician, and Silurian rocks, were cut by quartz and calcite veinlets and the limestone silicified to jasperoid. The conglomerate is thus much younger than the Pogonip limestone, but s nce it contains no granite or diorite pebbles it is believed that it is of Carboniferous age and that it is to be correlated with the Weber conglomerate of the Belted Range.

Igneous Rocks

Post-Jurassic granite porphyry and granite. Midway between Cactus Peak and Cactus Spring is a small area of granite porphyry that is poorly exposed, but lithologically distinct from the surrounding rhyolite. The pinkish-gray rock is of well developed porphyritic habit, with a finely crustalline groundmass. The phenocrysts, which exceed the groundmass in bulk, are pink gla ssy feldspar tablets up to 3/4 inch in length, a few smaller quartz grains, and fairly abundant biotite flakes. In it are fragments of Paleozoic sedimentary rocks. Under the microscope the groundmass is seen to be a microgranitic mosaic of orthoclase and quartz with here and there a little plagioclase and biotite. The orthoclase phenocrysts, many of which have zonal structure, are in places twineed according to the Carlsbad law. Quartz, biotite, and a few plagioclase phenocrysts are associated. Magnetite and zircon occur as accesory minerals. Both quartz and orthoclase phenocrysts show undulose extinction, which in certain instances is rather strongly developed. The plagioclase phenocrysts and the feldspars of the groundmass are turbid through kaolinization. This granite porphyry closely resembles some of those of post-Juriassic age. Inclusions of a siliceous granite occur in rhyolite at a number of places.

Pre-Tertiary diorite porphyry. 2 miles north of Antelope Spring is a small area of greenish-gra diorite porphyry. The rock has a well-developed porphyritic texture; small gray striated feldspars, grayish-green altered hornblendes, and much smaller black micas lie in a fine-grained groundmass. Under the microscope the groundmass appears as a fine microgranitic mosaic of plagioclase and some orthoclase. Of the phenocrysts already mentioned both plagioclase and hornblende are much altered, the plagioclase and hornblende are much altered, the plagioclase being sprinkled with epidote, calcite, and zoisite, and the hornblende being more or less completely replaced by epidote, chlorite (ripidolite, in part), and calcite. Illmenite and apatite are accessory minerals. This rock is practically identical with the older pre-Tertiary diorite porphyry of the Lone Mountain foothills.

Hornblende-biotite latite. On the west side of the Cactus Range, north of Wellington and south of the median line of the range, low rounded bosses of a much altered greenish-gray rock protrud from beneath the younger rhyolite. The dull groundmass contains biotite plates, white or pale-green areas, apparently altered feldspar, and dark-green areas, probably altered hornblende, while the weathered surfaces show numerous casts of these phenocrysts. The rock contains many well-rounded pebbles, some of grayish-white quartzite (Eureka?), others of the diorite porphyry last described. The largest pebbles are 3 inches in diameter. The latite appears to have flowe out upon an old erosional surface covered by well-rounded pebbles. Under the microscope the groundmass shows as a glass, now, however, much altered and composed of epidote, calcite, quartz and orthoclase. The plagioclase phenocrysts are almost completely altered to epidote and calcit with less chlorite, quartz, and zoisite. The hornblende phenocrysts are altered to the same minerals, although zoisite is as a rule absent. Biotite is replaced by chlorite in association with sagenitic webs of rutile. The phenocrysts and groundmass have thus been altered similarly, although the secondary minerals of the phenocrysts are coarser in grain than those of the ground mass.

Wherever the contact with the rhyolite was seen the latite appears to be the older, a view supported by the absence of rhyolite pebbles in it and by the intense alteration and deformation which it has suffered. Petrographically the latite is rather similar to the later andesite of Tonopah but mineralogically it is more closely allied to the monzonite porphyry of the Kawich Range; it is therefore tentatively considered the effusive equivalent of that formation and is thus probably of Eocene age.

Earlier rhyolite. The most widespread formation of the Cactus Range is a rhyolite which occurs in flows. Throughout the range it appears to bear similar relations to the other Tertiary rocks and in the main probably represents a single period of rhyolitic volcanism. More detailed work may, however, prove that some of the rhyolites near Cactus Peak are younger than those of the central and southern portions of the range.

The rhyolites vary among themselves in color, in character of groundmass, and in the relative abundance of the various phenocrysts. The predominant type is a white or gray rock of lithoidal or glassy groundmass, in which are embedded abundant medium-sized, slightly smoky quartz and glassy orthoclase phenocrysts; biotite phenocrysts are small and inconspicuous or absent. Other phases of the rhyolite are black, purple, or red in color. The phenocrysts of quartz are typically corroded grains, although some exhibit the dihexagonal pyramid and prism. Wavy flow bands of slightly different color traverse the groundmass. In many beds irregular fragments of rhyolite are inclosed in a matrix of similar rhyolite, showing that portions of the magma were solidified prior to cessation of movement in the flow. The presence of well-rounded pebbles of Paleozoic rocks in the basal portions of the rhyolite indicates that the surface upon which the lava flowed was covered by such pebbles.

Microscopic examination of several thin sections shows these rocks to be normal rhyolites. The ground mass is a brown glass, and many of the phenocrysts are fractured by flow. One or two acidic plagioclase phenocrysts are present in some sections. Biotite in some instances is altered to chlorite and epidote or muscovite. Accessories are rate, although apatite and ilmenite occur.

On weathering the feldspar phenocrysts are removed and the quartz protrudes slightly. In some portions of the range the rock has the smooth contours of weathered granite, but in the vicinity of Cactus Peak the greater resistance to erosion of certain bands gives a bedded aspect to the series.

Vertical columnar parting is well developed through cooling on Cactus Peak, while on the Goldfield-Cactus Spring road horizontal hexagonal joints occur. The rhyolite is so similar to that of the Kawich, Reveille, and Belted ranges that it is considered to be also of early Miocene age.

Four areas of slightly consolidated rhyolitic sandstones and congrlomerates occur in the Cactus Range. Two are on the northwest border of the range near the Cactus Spring-Tonopah road, a third is situated 2 miles southwest of Cactus Spring, and in a fourth area these rock underlie the augite andesite on the east side of the range. The tuffaceous sandstone, which is well bedded and white or greenish in color, is but slightly consolidated and breaks down readily into a deep sandy soil. Interbedded with the sandstones are conglomerates which, in the area southwest of Cactus Spring, contain bowlders of Paleozoic limestone 3 or 4 feet in diameter. These beds are tentatively considered rhyolitic tuffs deposited in local basins dur ing the rhyolitic extrusion. It is recognized, however, that these sediments may in reality the Siebert lake beds, in which case the earlier rhyolite of Cactus Range is of late Miocene age and is to be correlated with the later rhyolite of the Belted Range.

BIOTITE ANDESITE - Dikes and flows of biotite andesite are widely distributed in the southern part of the Cactus Range, but do not appear to extend far north of the Goldfield-Cactus Spring road. In dikes and irregular intrusive masses and possibly in flows this rock covers considerable areas southeast of Cactus Spring, apparent dikes cut the rhyolite at Wellington, and an andesite flow caps the highest mountain in the southern half of the range. Other areas of biotite andesite occur northeast of Antelope Springs, and a traverse from Wellington to Antelope Springs crossed numerous areas of this rock too small to show on the present map. Dikes of biotite andesite occur on both sides of the Goldfield-Cactus Spring road, but these also are too small to indicate on the map.

The biotite andesite is everywhere more or less altered. The freshest rocks have a dark-gray groundmass in which are embedded abundant medium-sized phenocrysts. Striated feldspars of white color and in many cases of zonal growth are more conspicuous than the altered graying-green biotite and hornbelndelike mineral. More altered facies are greenish gray or purplish red in color. The andesite breaks into sharp joint blocks which on further alterati develop spheroidal weathering. Under the microscope this rock appears to have had originally a pilotaxitic groundmass. Plagioclase phenocrysts are common and grade in size into the laths of the groundmass. One or more orthoclase phenocrysts are present in the majority of slides. Biotite is now a pseudomorph of chlorite, calcite, epidote, quartz, and sagenitic rutile. Aggregates of chlorite, epidote, calcite, and quartz surrounded by reaction rims of magnetite appear in some cases to have the form of a pyroxene and in others that of an amphibole. Probably both minerals were originally present. These pseudomorphs, like the plagioclase phenocrysts, grade into groundmass microlites of similar form. Magnetite is a common accesor;

The biotite andesite cuts the rhyolite in dikes and caps it in flows; inclusions of rhyolite occur in the andesite, and near some of the rhyolite masses the phenocrysts of the andesite become smaller. The andesite, then, is younger than the rhyolite, and from its altered condition it is believed to be older than the augite andesite and basalt. It closely resembl the andesite of the Goldfield hills and may be contemporaneous with it. If so, it is probably of early or middle Miocene age.

AUGITE ANDESITE - A flow of dark-gray andesitic rock overlies the tuffaceous facies of the earlier rhyolite 2 miles north of Antelope Springs. In the dense groundmass are blackish-gre pyroxene and amphibole columns which reach a maximum length of one-eighth inch. The rock breaks into sharply jointed blocks, in the interstices of which some epidote has developed. Microscopic examination shows that this is an augite andesite with glassy groundmass in whic are numerous plagioclase laths, pyroxene crystals, and magnetite grains. Augite phenocrysts with slight zonal structure and twins parallel to the orthopinacoid are abundant. The augite is remarkably fresh, although a little secondary epidote and chlorite is locally present. A few brown hornblende phenocrysts, some of them outlined by a reaction rim of magnetite, also occur. Apatite and magnetite are present as accessory minerals.

The augite andesite forms a flow which is apparently younger than the rhyolite and, to judge from its fresh condition, is probably also younger than the biotite andesite. In the Great Basin the pyroxene andesites are of late Pliocene-Pleistocene age, and their formation usually immediately preceded that of the later basalts.

LATER RHYOLITE (?) - One mile northeast of Cactus Peak are some low hills of purplish-gray roc with rather large feldspar crystals. Tuffaceous beds underlie the igneous rock, and the two rocks are probably to be correlated with the younger tuff and the youngest rhyolite of the Goldfield hills. It is by no means impossible that the same series underlies the basalt in the west slope of the range.

BASALT - The hill 5 miles southeast of Antelope Springs is composed of rhyolite apparently overlain by basalt, and several hills along the edge of the range on the Cactus Spring-Silverbow road are composed of a similar rock. The dissected mesa slopes on the west side of the range north of Wellington appear from a distance to be a northward extension of the basalt ic rocks of Pahute Mesa. Probably to be correlated with the basalt is a reddish-brown vesicu rock which caps a low dome 1½ miles north of Cactus Peak. These basalts appear to overlie th rhyolite and they are probably of late Pliocene or early Pleistocene age.

STRUCTURE

The Cactus Range is predominantly formed of Tertiary rocks unconformably overlying Paleozoic sedimentary rocks and granites and diorite porphyries probably of post-Jurassic age. The small areas of Paleozoic sedimentary rocks are gently folded in a manner comparable probably with the folding of the Stonewall Mountain Paleozoic rocks. Minor normal faults were observ in all the Tertiary lavas, although they are much more abundant in the rhyolite and other ol er formations than in the younger. The rhyolite in places is tilted at an angle of 30 deg., but it was not determined whether the tilting ~~wx~~ is due to faulting or to actual folding.

ECONOMIC GEOLOGY

Wellington, formerly called O'Brien's Camp, is situated on low rounded hills in the south-western portion of the range, 11 miles south of Cactus Spring. Claims were first located in August 1904, and when visited July 1905 several men were doing development work.

The country rock, the earlier rhyolite, is considerably kaolinized and silicified in the vicinity of the veins and is heavily stained by limonite. The rhyolite is apparently cut by dikes of altered biotite andesite of purple color. Both rocks along a zone striking N. 70 Deg. E, are cut by quartz veins, many of which strike parallel to the extension of the zone and dip northward. The larger veins are from 2 to 4 ft. in width. Connecting these are numerous quartz stringers, which course in all directions, in many places cementing crushed portions of the rock. The quartz is semitransparent, crystalline, and for the most part white, although locally intensely stained by limonite and manganese dioxide. Vugs with smal quartz crystals are very common, as is also crustification. Minor veins of calcite were observed. Differential movement has occurred parallel to some of the veins, and much of the quartz is intensely brecciated, while minor faulting across the strike was noted in several places. Microscopic examination shows that the brecciated fragments were first rimmed by fringes of quartz, the interstices being later filled by calcite and limonite. The values reported are largely gold, silver consituting but 1/20th of the assay value. The ore is free-milling and the gold is in close association with limonite. The quartz and the contain ores were deposited in joints in the interstices of breccia and along small and possibly lar fault fissures. The veins have been faulted and the quartz crushed. Only ores oxidized by surface waters have as yet been encountered.

The Cactus Mining Company has a shaft in silicified rhyolite 3/4ths of a mile south of Cactu Spring. Coarsely crystalline white quartz veins, with many vugs, cut the rhyolite, and thes on surface outcrops are heavily stained by iron compounds. Pyrite and chalcopyrite are sparingly present in the quartz and to a less degree impregnate the surrounding rhyolite. Free gold is reported. Both fissure filling and replacement of the country rock have occurr To the north of Alkali Spring some quartz veins cut iron-stained kaolinized and silicified rhyolite. Prospectors report that the quartz carries low-grade values.

Over a considerable area south of the Goldfield-Cactus Spring road, beneath the north end of the andesite flow, which caps the high mountain south of the median line, and in several sma er areas the rhyolite has been silicified and kaolinized. Quartz veinlets occur in some of these areas. Masses of hematite and limonite outcropping 2 miles S. 60 deg. E., of Cactus Spring may be the gossan of a pyrite vein. Malachite stains occur on joint surfaces in the biotite andesite 1/2 mile southeast of Cactus Spring.

CACTUS FLAT

Cactus Flat lies between the Cactus and Kawich ranges. Its center is occupied by a series of playas with north-south trend, which during very exceptional rains merge into one another. they are from 5330 to 5350 feet above sea level, and are surrounded by low sand dunes. In this valley the Recent detrital deposits may be thick. The valley from the Cactus to the Kawich Range across Cactus and Gold flats illustrates the steeper slope of valleys near large and high mountain masses and the gentler grade near small and low hills.