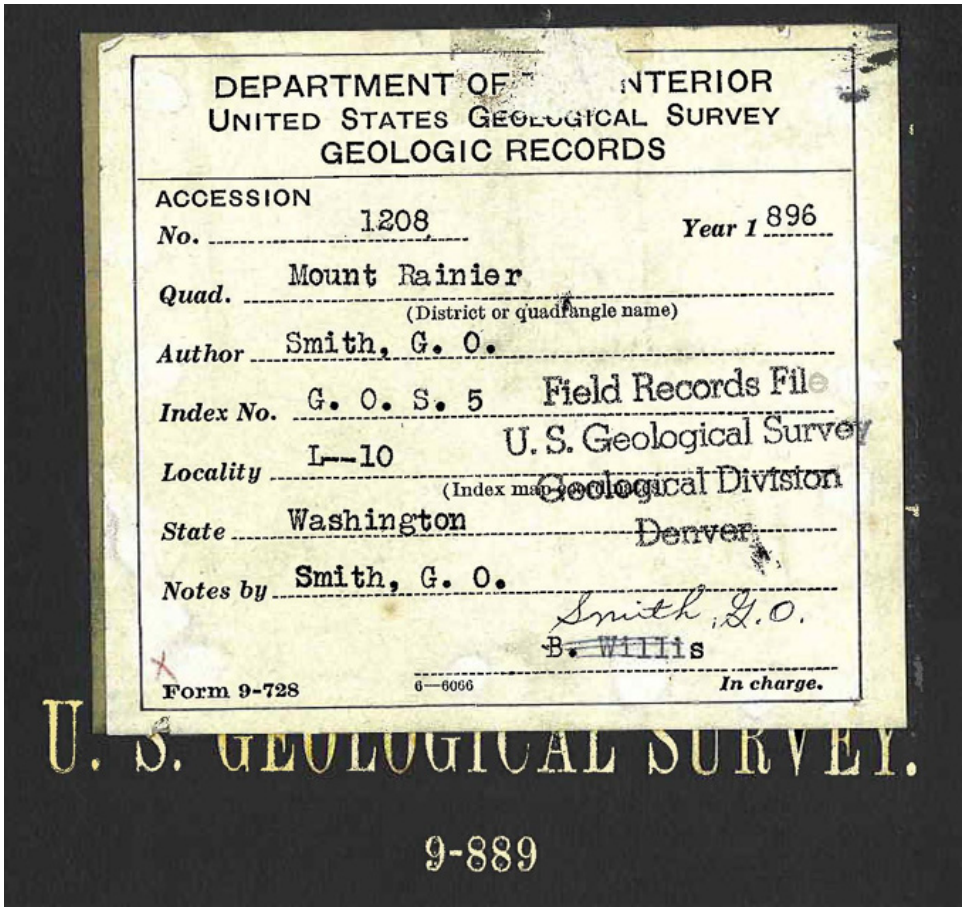
# Mount Rainier Reconnaissance Notes




This is transcription of the notes in the field book of George Otis Smith during the expedition of Mount Rainier, July 15-31, 1896. The report of the expedition was written by Israel Cook Russell, who with Bailey Willis and George Otis Smith were tasked with the work of assessing the glaciers and rock of Mount Rainier. The report of the expedition, including the narrative, glaciers and rocks were published in the 18th Annual Report of the U.S. Geological Survey, 1898, Part II, pages 349-423.

The transcription is the best that could be done from the handwriting in the original field book and all errors are those of the transcriber and not Mr. Smith. And anyone finding errors can submit them to me (scott@wsrphoto.com). Original transcription November 8, 2008. Updated April 7, 2009.

# Mount Rainier Reconnaissance Notes

Passing up Carbon River. At the mouth of Cayada Creek is a biotite hornblende granite rather coarse grained and somewhat resembling the granite of the Cascades (specimen not taken). [1, 2]

At Chenuis Falls a finer-graine holocrystalline rock appears as an aplitic phase of granite probably, though (tho') it may be complex granitic sandstone, specimen not taken as did not return this way. [3, 4]

Four or five miles further up the Carbon River coarse pryoclastic were noted in the cliffs on the north side of the river. There rocks closely resemble the rocks collected west of these on the Spray Park trail last year.

At the foot of the Carbon Glacier, the rocks of the Mother Range are seen to be plainly bedded volcanics. Crescent (Mt) to the east appears to be of the same characteristics. The mother range when seen from the south shows to be same structural chacters, the flows approaching close horizontal bedding.

July 22, #201. A gray andesitic with rough texture is the predominant rock on the spur below the main mass of Mt. Rainier and between the Winthrop and Carbon Glaciers. It is feldspathic, but varies, #202, somewhat in relative amounts of the feldspar and parting constituents. Flaggy and scoriacous phases noted, also flow breccia. Platey parting the more prominant. This type of andesite characterizes the "V" south of Moraine Park. [5]

Granite is found at an altitude of 7,000 - 8,000 feet east of the Carbon Glacier and in Moraine Park, where it forms prominent topographic features. Above the lateral moraine of the Carbon Glacier at this point, it is the only rock, #203, in the place, and though (tho') badly jointed still retains glacial grooving. Against this granite are piled the blocks of various lavas. In places where the talus forms a granite point crosses the slope covered with a these andesitic blocks, the granite appears to have intrusive relations but the general relations seem rather those of of an old irregular surface of granite upon which the lavas were poured forth. This granite ridge, which extend eastward from the Carbon Glacier, explains the abundance of granite boulders in the bed of the Carbon River.

The granite contains rather more hornblende in the east slope, #204, and is everywhere a hornblende granite rather than a biotite granite.

On the east edge of Moraine park, the granite grades into a rock with more of a diorite aspect, #205. With this the lava is in contact, only 45 feet of the actual contact being hidden by the earth which has filled in the space left by the disintegration at the contact plane. The lower part of the andesite is scoriarous, #206, but immediately above is compact, #207, and in general composition like that to the southwest, #201-202,

some olivine however being present. Above this the andesite is plating flaggy, the parting plane being approximately parallel to the horizontal contact with the older rocks, but very irregular, the curved surfaces suggesting synclinical troughs.

The granite ridge in Moraine Park, reaching an altitude of over 7,000 is overlooked by the volcanic rocks of the Sluiskin Mountains and the ridge west of the Winthrop Glacier. Furthermore, the contact with the volcanic rocks observed is south of the highest point of the granite ridge, which runs at about a right angle to the Carbon Glacier. These relations show that the Rainier lava were formed over a right of granite on this side of the volcanic center, standing at a considerable elevation; one comparable with that of the granite of the Cascade(s) (Mountains), which rocks closely resemble that seen in Moraine Park. This portion of the granite platform of Mount Rainier presented topographic features of some importance as seen in the irregularities of the contact plane, differences of elevation which would be seen to be even greater, were in not for the work of erosion.

July 23, #208-210. On the SawTooth, the “V” between the Winthrop and the Emmons Glaciers green and red lava are found, showing bedding which slopes gently from the summit of (Mount) Rainier. Fragmental material, also occurs interstratified with the lavas. These fragmental beds are very coarse agglomerates with boulders like the underlying lava, but also fragments of the other lavas. The lava streams as seen in the cliff section are often lense shaped. The alteration of the lavas and pyroclastics is several times separated, and the exposure of the pink agglomerates on the northwest side the point is exceedingly fine.

July 25, #211-212. Mount Rainier, summit and edge of crater, about 2,000 feet in diamater, covered with loose blocks of various lavas, the most abundant type being a black loose textured andesite with promenient feldspar phenocrysts.

Gilbratar Rock is composed of emerging lavas and fragmentals. Here the most promenient lava is a dark andesiste rock, with glossy feldspar phenocrysts abundant and resembling somewhat the lavas of SawTooth. The bedding of the lavas is nearly horizontal.

July 26-27, #213. On the south end of Little Tahoma “V” black lava with large phenocrysts of feldspar is found. Here the prismatic parting is very finely exhibited, the blocks often resembling pigs of iron in size and shape. They are piled in varying positions, curving masses of such block being observed just above the Cowlitz Glacier.

A light red and a gray andesite of much the same composition are found to the north on the same “V”. At the same point these grade into each other so that they are seen to be simply phases of the same flow.

On Little Tahoma itself occur lavas, agglomerates and breccia which are rather recent appearing. There is much of the sandstone parting on some of the rocks here. A radial dike was observed near the point between the glaciers. The coloring of the

surfaces of the blocks of lava and the general appearance of the cliff faces on Little Tahoma may indicate fumeral action at this point.

In the Emmons Glacier, #216, several nunataks project and a gray andesite resembling #201-202 occur in the nunatak visited.

Along the east slope of (Mount) Rainier in the Parks and on the gentle slopes there are accumulations of light brown pumice, #217, seemingly rather red in compound. This was first noted in Moraine Park, and in the interior of Little Tahoma "V" was especially abundant, long slopes being wholly covered the fragments of pumice even reaching 8-10 inches in diameter. The question of the source of the pumice was not answered definitively by an facts observed.

A dark purple compact rock, #218, with the texture of a porphyrite rather than of an andesite was collected on Thompson's Peak.

July 29, #219. Granite was found on the east side of Carbon Glacier, forms a low knob behind the moraine.

This rock, #220, though (tho') was dioritic in appearance appears in the nunatak in the east and stagnant portion of the glacier.

These occurrences of the older plutonic rock indicates a small ridge below and parallel with the one in Moraine Park.

July 30. The Guardian Rocks show a red scoriacious basaltic lava, see specimen collected last year, overlaid by the more compact gray lava. Ropy lava is quite prominent at the 9,000 foot level on Ptarmigan Ridge. These Guardian Rocks show the usual inclination of bedding and the like the SawTooth, Little Tahoma, Cathedral and Gibraltar Rocks are doubtless remenants of a "V", which was interglacial in position and origin.

The ropy lava, #221, of Ptarmigan Ridge may be in part ejected bombs. It is highly basaltic and quite unlike any lave seen elsewhere.

Below the red basalt lavas which make up the Guardian Rocks is a spotted light gray rock, #222, exposed on the slopes toward the Willis Glacier.

On the point overlooking the Willis Glacier at about midway of its course is a light gray andesite porphyry, #223, much more crystalline than most of the Rainier lavas. Like the other gray rocks it shows a plating, jointing and cracking sound when struck.

The lavas and pyroclastic sheets usually dip away from the present summit, thus making the present cone sculptured from a much flatter cone. Some exceptions occur in the Cowlitz Glacier region where there are peaks with bed horizontal or even dipping toward the head of Crater Peak. Also lense shaped lava flows noted and thus some

apparent unconformable relations. This usually observed where the lava flows interbedded with the agglomerates.

The steepest dip of lava flows noted was that in the Amphitheater where in the dividing spur, the dip seems to be about 30 degrees, from the summit. In outlying ridges and peaks, the bedding is quite flat.

The distribution of the rock types as observed on the slopes of (Mount) Rainier seems to be radial, probably indicating eruptions of streams rather than sheets. These streams must have been quite extensive, enough to include large segments of the suite, comparable in area with the interglacial “V’s”.

In the collection of rocks on the slopes of (Mount) Rainier, doubtless only a very small portion of the successive lava flows are to be observed since the present cone is not sufficiently different in slop from the original cone from which is has been carved. At the Amphitheater at the head of the Carbon Glacier, a good section is exposed, but a detailled study at this point would be difficult. On the southwest side of Ptarmigan Ridge the rock is observed to show only slight variation for considerable vertical and horizontal range, which is perhaps the best case of radial distribution of the lavas.

## Notes to Transcription and Text

Note 1.-- This is a transcription of the 1896 field notes by George Otis Smith documenting his work in the expedition with Bailey Willis and Israel Russell on the exploration of the glaciers and rocks of Mount Rainier, and published in the 18th Annual Report of the USGS in 1898. The transcription is the best that could be done from the handwriting in the original field book and all errors are those of the transcriber and not G.O. Smith.

Note 2.-- See the narrative for the return trip July 28-31 when the expedition party split into two teams to take the Carbon River trail and the Mowich (Grindstone) trail back to Carbonado.

Note 3.-- Geologists Bailey Willis and G.O. Smith conducted field work in the north and northwest area around Mount Rainier during the summer of 1895.

Note 4.-- Some words have been replaced or inserted due to shortening or missing words in the text of the field notes by the G.O. Smith

Note 5.-- Rock samples are numbered by G.O. Smith in the field book and were inserted along the margins or in the text in the field book. They have been transcribed where they best fit the description associated with the sample.

Note 6.-- Updated for typo’s and correction of place name for Mother (Mountain) Range.