

PRELIMINARY REPORT OF GEOLOGY ALONG PART
OF TUCANNON RIVERMARSHALL T. HUNTING
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For many years there have been recurring notices of mining and prospecting in the Blue Mountains in Washington, but activity there seemed to be sporadic and of little economic importance. No extended geologic study of the area had been recorded; consequently, in 1936 when the Preliminary Geologic Map¹ of the state was published the pre-basalt rocks of the Blue Mountain region were insufficiently known to permit their being mapped. However, three areas of pre-basalt rocks outside of the Blue Mountains but within the four southeastern counties were mapped at that time. One area of about 20 square miles east of Johnson, mapped as Mesozoic intrusive, included Bald Butte Ridge called by Hoffman² a stock of the Idaho Batholith. Ten miles west of Johnson in the Snake River canyon at Granite Point a small patch of granitics was also mapped as Mesozoic intrusive. In the third area, comprising a small tract just south of the junction of Grande Ronde and Snake Rivers and a second tract 5 miles north of that junction, greenstone and limestone were mapped as Carboniferous in conformity with mapping on the Idaho side of the river. Other exposures of pre-basalt rocks were known, and the existence of still others was suspected. Among these is the exposure recently reported by Baldwin³ in eastern Columbia County in the valley of the Tucannon, a tributary to Snake River. The lithologic and stratigraphic relations of these and other rocks already mapped are now being studied in connection with economic investigations in the area.

The exposures along Tucannon River have been developed by the river's deep erosion through the thick basalt cover overlying the pre-basalt land surface. According to Russell⁴ Tucannon River is a consequent stream on the upwarded basalt flows. In eastern Columbia

County the river flows northerly and falls at the rate of about 85 feet per mile, which is approximately the direction and degree of dip of the Columbia River basalt flows through which it cuts. The northward dip of the flows probably is the result of post-basalt uplift in the Blue Mountains immediately to the south. The Tucannon and other rivers with their tributaries have completely dissected the uplifted basalt plateau leaving interstream ridges of fairly uniform heights. The relief from river level to ridge tops averages 2000 feet, river level at Tucannon Forest Guard Station being 2600 feet above tide. Slopes are steep and are moderately forested with pine. Underbrush is not thick and unforested areas, in most cases south slopes, are grass covered.

Of the two pre-basalt rock exposures studied to date one is largely within section 15, T. 9 N., R. 41 E. on both sides of Tucannon River which here flows approximately N30°E. This exposure is nearly pear-shaped, with 1½ miles length and 1 mile maximum width. The stream lies to the southwest, up stream on the Tucannon, which bisects the pear longitudinally. A maximum elevation, 3600 feet above tide, in the exposed pre-basalt rocks is reached at the easternmost point of the exposure, at the basalt contact. The rocks of this exposure have a total relief of 1300 feet.

The second exposure is 1½ miles north of the other in section 3 and entirely on the west side of the river. It is ½ mile long by 600 feet wide, and has a relief of 300 feet.

The locations of at least four other exposures in the area are known, but they have not yet been visited. Near the head of Cummings Creek, a tributary to Tucannon River, is an occurrence of granitic rock, and pre-basalt rocks are known to outcrop along

Panjab and Sheep Creeks, other tributaries about 8 and 10 miles respectively upstream from Cummings Creek. Pre-basalt rocks are reported⁵ about 35 miles down the Tucannon near Starbuck.

The scattered distribution and small size of exposures, together with the great relief in the pre-basalt rocks of some exposures, points to a rugged mountainous pre-basalt topography, only the highest points of which are now exposed by erosion.

Discontinuity and scarcity of outcrops in many places, coupled with the massive character of many of the strata, make structure and stratigraphic determinations somewhat less secure than could be wished. However, outcrops and mine workings in the eastern half of the pear-shaped exposure indicate a succession, from bottom to top, of several massive and laminated black and gray chert and massive black argillite beds about 25 feet thick interbedded with greenstones of about the same thickness, overlain by several hundred feet of black and gray cherts, black and olive argillites, and light colored argillites and cherts. Across the river in the southern portion of the exposure essentially the same succession of strata is found. In all these strata a regional trend N60°E is generally maintained. On the east side of

the river dips, predominantly to the southeast, range from 70°SE to 80°NW, but on the west side the dips, also in both directions, are predominantly steep to the northwest. This reversal of dip, coupled with the similar succession of strata both eastward and westward from the river, suggests a sharp, nearly closed anticlinal fold the axis of which lies partially in and nearly parallel to Tucannon River valley. Unless there is unrecognized repetition of strata by folding or faulting, a stratigraphic thickness of more than 1000 feet has been exposed.

The rocks of the northern portion of the eastern half are lithologically different from those in the remainder of the pear-shaped exposure. Of the northern rocks the lowest stratigraphically are hard, massive, greenish and grayish sandstones striking generally N30°W and dipping 50°NE. The sandstone, at least 300 feet thick and possibly much thicker, is overlain by several hundred feet of greenstone. The lithologic and structural differences between these and the rocks to the south are the basis for the postulation of an unconformity between the two. In the absence of better evidence the lower dips, less shearing, and slightly less induration of the northern rocks are taken to indicate their younger age.

The smaller exposure in section 3 is made up of dark green foliated rocks. The foliation strikes in general N55°W and dips 50°NE, which is almost parallel to the bedding in the sandstone in the northern portion of the exposure to the south. The rocks of the northern exposure have been insufficiently studied to make clear their relations to the others, but the suggestion is that they are of sedimentary origin and a part of the younger series.

WORKS TO WHICH REFERENCE IS MADE

¹ Preliminary Geologic Map of Washington, to accompany Bull. 32, Wash. Division of Geol., 1936.

² Hoffman, M. B., The geology of Bald Butte Ridge, Washington, Jour. Geol., Vol. 40, pp. 634-650, 1932.

³ Baldwin, E. M., in written communication to H. E. Culver, Nov., 1939.

⁴ Russell, I. C., A reconnaissance in southeastern Washington, U. S. Geol. Survey, Water Supply Paper 4, p. 23, 1897.

⁵ Long, T. B., in personal communication.