Satas ridge... I have adopted this name for the prominent east and west ridge of basalt separating the drainage of Satus creek from that of Topinish creek.

The highest peak on the ridge is named Satus peak on the maps published by the North Transcontinental Survey and has an elevation of 3,000 feet above the adjacent valleys.

Satus ridge is very similar to the west arm of Horseheaven fault and begins at the west in the rugged basaltic region separating that drainage of Yakima river from that of Klickitat creek. The ridge crosses this rugged, deeply dissected region, the general trend of which is north and south, at right angles, forming an east and west ridge which at once attracts the attention of being different from the surrounding topography due to the erosion of an upheaved mass that is without any well defined form.

The great fault scarp on leaving the highlands is prolonged into the valley to the east and divided it like a wall. The ridge holds its characteristic form for 25 miles and ends in a low point which passes beneath the level sage brush covered plain, close to the Yakima river and about five miles from a short, sharp uplift known as Snipes mountain, in the center of the valley.

Satas ridge is monoclinal with an average dip at the crest of 8 or 10 degrees. The dip soon decreases to the eastward however and the strata merge with the gently tilted rocks in the deeply dissected region drained by Satus creek. The north side of the ridge is steep and bold and is formed of the broken edges of the inclined basaltic strata. In all of its principal features it agrees with the Horseheaven and Rattlesnake uplifts, already described.

On following the ridge eastward I found that the monoclinal structure was well defined to within about five miles of its eastern terminus, where a low pass occurs which is crossed by a wagon road.
On following the ridge eastward I found that the monoclinal structure was well defined to within about five miles of its eastern terminus... where a low pass occurs which is crossed by a wagon road. At this pass and thence eastward to the end of the ridge the rocky forming the edge of the thrown black, that is the beds beneath Topinosh valley, are bent upward and form a secondary ridge along the base of the main escarpment.

The uplift is there really a fold which has been partially broken down by weathering. The outer layer of soft beds have been mostly cut away leaving an interstratified sheet of basalt variously inclined and in places standing in relief. South of the wagon pass the interbedded basalt arches over the top of the ridge from the east and forms a flat table on the summit with light colored lake beds beneath it. A sketch section of the ridge at this locality is shown.

Farther east the covering of lake beds and of interstratified basalt has been more completely removed but occurs at intervals all the way to the end of the ridge, either on the gentle southern slope or at the base of the steep northern escarpment.

If weathering had not taken place the ridge would be a long, narrow, monoclinal uplift formed by the upheaval and tilting of the south side of a great fault which decreased in throw toward the east and changed to a monoclinal fold before disappearing beneath the plain. The weathering of this uplifted ridge and the falling of landslides from its steep northern face has produced the secondary topographic features which now give variety to the primitive form.

Fossils...

On the crest of the ridge near Fort Simcoe there are large stumps of fossil oaks and pines projecting thee or four feet from the surface of lapilli which showered down about them from some neighboring volcano and buried them in the position in
which they grew. They stand at right angles to the gently sloping surface in which their roots are inclosed. The stumps are now exposed at the surface owing to the removal of several hundred feet of John Day beds which interstratified sheets of basalt from above them and are relics of a great forest as similar fossil trees are found at about the same horizon in the rocks at points scores of miles apart throughout central Washington.

During the intervals between the eruptions of the various thick sheets of Columbia lava the surface of the previously formed layer was disintegrated sufficiently to form a soil on which forests grew, only to be buried beneath the next succeeding shower of volcanic ashes and lapilli; this layer in turn became buried beneath subsequent lava flows. Heated waters percolating through the rocks dissolved the woody tissues and replaced them, atom by atom, with silica. In this way the grain of the wood, as well as the knots and even the most minute pores and ducts, has been accurately reproduced in stone. When sections of the fossil wood, ground down until they become thin enough to be translucent are examined under the microscope, the minute structure is as faithfully shown as if a thin shaving had been taken from a living tree. Millions of years have passed since the fossil wood was formed and the species which it represents no longer live.

On the steep northern escarpment of Satas ridge there have been many landslides caused by the breaking away of portions of the face of the fault scarp. Two of these are of large size and of such a recent date that the scars they left are fresh in appearance and unclad even with lichens. These breaks seem to have been formed within the past few years, but on inquiring of the Indians living in the adjacent valley, I found that they did not know when they were formed and had no traditions concerning them.

The larger of the slides referred to is situated about five miles southeast of
Fort Simcoe and will be called the Simcoe landslide, the smaller is some 15 miles further east and may be plainly seen by travelers over the Northern Pacific railroad after passing Topinish station in going east and will be called the Topinish landslide.

Simcoe landslide—The mass of rock which broke off from the face of the ridge and formed the Simcoe landslide is about half a mile long and ploughed out onto the plain for a distance of nearly a mile. At the foot of the steep broken scarp left on the face of the ridge there is a deep narrow valley, bound on one side by the mountain and on the other by the backward slope of the mass which fell.

In this basin there is a lake about two acres in extent without surface outlet. The mass which fell is broken and exceedingly irregular, but slopes from the steep ridge near the base of the mountain down to a thin edge at its outer margin.

The tract of country covered by the fallen mass is redely semi-circular, but somewhat pointed at the center of the curve. About its outer margin and forming a rude semicircle of irregular hills, looking like the terminal moraine of a small glacier, is the material pushed ahead of the mass which fell. These hills are from 200 to 250 feet high with very steep outer slopes. The material ploughed up is composed of loose rocks, volcanic lapilli and lake beds. In this material the trunks and branches of fossil trees occur in considerable number. The singular topographic forms produced by the slide have been but slightly modified by erosion, as the rain falling on the disturbed tract finds its way out through the loose rocks and forms springs about its lower margin. A valley, which existed previous to the landslide was obliterated by it, but is still clearly marked below the outer, moraine-like hills.

The features described above may be recognized in the illustrations forming Plate III and IV. The first is a general view taken half a mile in front of the pushed-up ridge, from the face of which the view is taken.
above this is the steep scarp left on the mountain face. Plate IV is a nearer view of
the precipice left by the side which is now largely covered by talus slope.

Topinish landslide—This is smaller than the one near Fort Simcoe and did not
force up an outer moraine like ridge. The mass which fell is piled in confused heaps
and ends in a low slope. A general view of the slide taken from the left bank of
Topinish creek is presented in Plate V. Another view taken from above looking down
on the confused piles of loose stones composing the fallen mass is shown in Plate VI.
The scarp in the foreground in this view is the backward slope of the fallen mass.
Topinish creek was turned from its course by the slide and now makes a broad bend
in order to get around it.

Geological notes:

In this section of the country practically all of the rocks are black compact
Columbia lava and light colored sediment of Lake John Day which rests upon it.

The attention of the reader will be occupied principally in tracing the deforma-
tions by faulting and arching that the Columbia lava has undergone; in noting the
results of erosion which has removed the John Day beds from the uplands and in many
instances cut deep trenches in the lava beneath. The mountains are composed
essentially of basalt and many of the valleys are still deeply filled with lake beds.
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Satus ridge is very similar to the west arm of Horseheaven fault and begins at the west in the rugged basaltic region separating that drainage of Yakima river from that of Klickitat creek. The ridge crosses this rugged, deeply dissected region, the general trend of which is north and south, at right angles, forming an east and west ridge which at once attracts the attention of being different from the surrounding topography due to the erosion of an upheaved mass that is without any well defined form.

The great fault scarp on leaving the highlands is prolonged into the valley to the east and divided it like a wall. The ridge holds its characteristic form for 25 miles and ends in a low point which passes beneath the level sage brush covered plain, close to the Yakima river and about five miles from a short, sharp uplift known as Snipes mountain, in the center of the valley.

Satas ridge is monoclinal with an average dip at the crest of 8 or 10 degrees. The dip soon decreases to the eastward however and the strata merge with the gently tilted rocks in the deeply dissected region drained by Satas creek. The north side of the ridge is steep and bold and is formed of the broken edges of the inclined basaltic strata. In all of its principal features it agrees with the Horseheaven and Rattlesnake uplifts, already described.

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The uplift is there really a fold which has been partially broken down by weathering. The outer layer of soft beds have been mostly cut away leaving an interstratified sheet of basalt variously inclined and in places standing in relief. South of the wagon pass the interbedded basalt arches over the top of the ridge from the east and forms a flat table on the summit with light colored lake beds beneath it. A sketch section of the ridge at this locality is shown.

Farther east the covering of lake beds and of interstratified basalt has been more completely removed but occurs at intervals all the way to the end of the ridge, either on the gentle southern slope or at the base of the steep northern escarpment.

If weathering had not taken place the ridge would be a long, narrow, monoclinal uplift formed by the upheaval and tilting of the south side of a great fault which decreased in throw toward the east and changed to a monoclinal fold before disappearing beneath the plain. The weathering of this uplifted ridge and the falling of landslides from its steep northern face has produced the secondary topographic features which now give variety to the primitive form.

Fossils...

On the crest of the ridge near Fort Simcoe there are large stumps of fossil oaks and pines projecting three or four feet from the surface of lapilli which showered down about them from some neighboring volcano and buried them in the position in
which they grew. They stand at right angles to the gently sloping surface in which their roots are inclosed. The stumps are now exposed at the surface owing to the removal of several hundred feet of John Day beds which interstratified sheets of basalt from above them and are relics of a great forest as similar fossil trees are found at about the same horizon in the rocks at points scores of miles apart throughout central Washington.

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Simcoe landslide—The mass of rock which broke off from the face of the ridge and formed the Simcoe landslide is about half a mile long and ploughed out onto the plain for a distance of nearly a mile. At the foot of the steep broken scarp left on the face of the ridge there is a deep narrow valley, bounded on one side by the mountain and on the other by the backward slope of the mass which fell.

In this basin there is a lake about two acres in extent without surface outlet. The mass which fell is broken and exceedingly irregular, but slopes from the steep ridge near the base of the mountain down to a thin edge at its outer margin.

The tract of country covered by the fallen mass is redely semi-circular, but somewhat pointed at the center of the curve. About its outermargin and forming a rude semicircle of irregular hills, looking like the terminal moraine of a small glacier, is the material pushed ahead of the mass which fell. These hills are from 200 to 250 feet high with very steep outer slopes. The material ploughed up is composed of loose rocks, volcanic lapilli and lake beds. In this material the trunks and branches of fossil trees occur in considerable number. The singular topographic forms produced by the slide have been but slightly modified by erosion, as the rain falling on the disturbed tract finds its way out through the loose rocks and forms springs about its lower margin. A valley, which existed previous to the landslide was obliterated by it, but is still clearly marked below the outer, moraine-like hills.

The features described above may be recognized in the illustrations forming Plate III and IV. The first is a general view taken half a mile in front of the pushed up ridge, over the top of which the surface of the fallen mass may be seen:
above this is the steep scarp left on the mountain face. Plate IV is a nearer view of the precipice left by the side which is now largely covered by talus slope.

Topinish landslide—This is smaller than the one near Fort Simcoe and did not force up an outer moraine like ridge. The mass which fell is piled in confused heaps and ends in a low slope. A general view of the slide taken from the left bank of Topenish creek is presented in Plate V. Another view taken from above looking down on the confused piles of loose stones comprising the fallen mass is shown in Plate VI. The scarp in the foreground in this view is the backward slope of the fallen mass. Topenish creek was turned from its course by the slide and now makes a broad bend in order to get around it.

Geological notes:

In this section of the country practically all of the rocks are black compact Columbia lava and light colored sediment of Lake John Day which rests upon it.

The attention of the reader will be occupied principally in tracing the deformations by faulting and arching that the Columbia lava has undergone; in noting the results of erosion which has removed the John Day beds from the uplands and in many instances cut deep trenches in the lava beneath. The mountains are composed essentially of basalt and many of the valleys are still deeply filled with lake beds.