These blocks present smooth surfaces, although in general they are rhomboidal in form. Some are cracked into several pieces, which are quite detached, but have evidently at one time formed part of a whole.

If these blocks were derived from the granitic belt to the east, as I believe all the other boulders on the plains to have been, then they must have travelled at least from 400 to 450 miles. From the fact however, that they are almost on the western verge of the drift deposit, and that the boulders imbedded were found as a rule to diminish in size in that direction, it may be that the presence of these large blocks is due to very different agencies, different at least in the time of their occurrence.

Close in, along the base of the mountains, neither on the high plateaus or in the profound valleys by which these are traversed, was there observed any traces of the drift, or its dispersed erratics. Within the outer range of the mountains, which are comparatively low and wooded to their summit, the valleys are occupied by immense deposits of rounded shingle, composed of fragments of the various rocks which have been found to compose the mountains. This shingle, which in some places is loose, and mixed with a large proportion of sand and gravel, in others is cemented by calcareous matter into a solid conglomerate. It fills up the valleys not only along the edge of the mountains, but also right into their interior, forming beautifully marked terrace levels along the streams. This is well exhibited on the north branch of the Saskatchewan, where these deposits skirt its wide valley for nearly 70 miles of its course through the mountains, expanding where it widens so as to form extensive plains, as at the Kootanie plain, and always affording a margin of level ground along the river, rendering the road very practicable.

Towards the upper ends of the valleys the calcareous matter of these deposits so increases as to replace altogether the shingle, when it becomes a fine gritty calcareous mud of glistening whiteness. This same deposit has a much larger development in the valleys on the west side of the watershed, forming terrace levels in exactly the same manner. I observed no shingle beds with it there, however, that apparently being replaced by fine sand and gravel.

In the valley of Bow River, there is much less of this calcareous matter in the deposit, it having more of a loose sandy nature, and except at the entrance to the valley in the neighbourhood of the Bow fort, rarely exhibiting the terrace levels.

In the smaller gorges, where streams come down from the mountains, it is replaced by an angular "brecchia," of which patches cling in the most singular positions. This latter deposit is most likely of the nature of glacier maraines, although it is found wher no glacier occurs anywhere in the neighbourhood. I found, however, that the glaciers in the chain had, at one time, extended a considerable degree beyond their present limits, and therefore, at that time they possibly may have existed in portions of the mountains where now there are none.

The terrace deposits seem to reach pretty nearly the same altitude in different parts of the mountians viz., about the height of 1,000 feet above the level of the plains at their eastern base.

I found that, in crossing the different heights of land, the easiness of the pass corresponded with the degree to which these deposits had remained untouched, owing to peculiarities in the form of the valleys. In the case of every height of land, whether of those examined by Captain Palliser or by myself, with the single exception of the Vermillion pass, the slope is gradual to the east, but to the west the descent is with extreme rapidity. This arises from these deposits, having being scooped out close up to the rocky nucleus of the height of land, by currents acting from the western side of the chain, while on the east the erosion has been much more feeble.

How much this may depend on the difference between the width of the valleys which pass through the flanking chains on the east side of the height of land form those on the west, I am not prepared to say, until the nature of the country to the west has been ascertained.

Currents acting on the chain while submerged, would of course be greatly modified in their action by any such differences.

Respecting the age of these deposits I am in doubt. They extend towards the east along the river valleys, at least shingle deposits of the same nature are found at a considerable distance from the mountains, in the valleys of the north and south branches, and of the Red Deer River. Its relations to the drift has not been distinctly ascertained, as the boulders which mark its presence are only in that district of country found on rounded knolls away from the rivers.

From observations made last summer on the south branch, and during the winter on the north branch of the Saskatchewan taken with those of this season, I found that the group of sandy clays with crystals of selenite and concretionary nodules of ironstone, which latter contain fragments of cretaceous fossils, extend from the Snake Portage (which is in lat. 54°, and long. 111° 30′ W. nearly) upon the north branch, in a south-south-easterly direction to the elbow of the south branch, the distance in a straight line between these two places being 240 miles. The north branch, which flows from the Snake Portage to south-east, exhibits in its banks sections of these clays until they disappear under the great depth of drift at the Eagle Hills, thus crossing this formation very obliquely, it forming a strip of not more than 60 miles in breadth; whether this strip be continuous or not cannot be ascertained, as the high plains which lie between the arms of this great river, nowhere are cut to a sufficient depth to reach their level.

It is difficult to observe any dip, but I think they must have a slight inclination to north-east. At the Snake Portage these clays are of a clear blue colour, soft, and having selenite crystals in tolerable abundance. At Fort Pitt and at the elbow of the south branch they have much the same character,