

of the elements, and in the desolation around. Lo! from out of yon low arch, in the Place of Tombs, gleam two fiery eyes, and forth stalks into the lightning the fell hyena. With bristling mane and grinning teeth, the obscene monster glares at you, and warns you to secure a timely retreat. Another appears, bearing in its jaws a loathsome human skull, which it has found in the caravan track. You shudder as you hear the bones crack and grind between the powerful teeth, and gladly shrink away from the repulsive vicinity.

The home of the great Siberian stag is among the most magnificent scenery in the world. Search for him amidst the bold precipices of the Altaian chain, where enormous mountains of primeval formation are split and cleft into the wildest ravines, and where cascades fall in snowy foam down the terrible gorges bounded by sheer cliffs that almost meet far overhead, and shut out the light of heaven. Here is a little dell, embosomed in the mountains, as full of flowers as an English garden,—irises and columbines, primroses and peonies, of many rich hues and of kinds unfamiliar to us, and of a luxuriant growth which reaches up to a man's shoulders;—then a tiny basin of clear water, intensely black from its unruffled stillness and its fathomless depth. Now the traveller crosses a sharp ridge, crowned with colossal needles of naked granite, where the furious gale, shrieking and howling through the crevices, threatens to hurl horse and man a thousand fathoms down;—then he passes into a forest where not a breath waves the tops of the ancient cedars.

It is a region where animal life is not very abundant, but where the framework of the world itself stands revealed in unrivalled gorgeousness. The cliffs are here of crimson or purple porphyry, as brilliant as the dyed products of the loom, there of dark-red granite seamed with thick veins of pure rose-coloured quartz, transparent as glass. Here a vast, uncouth column of black basalt rears its fused cylinders from the midst of a narrow ravine; and here a vast precipice appears of white marble, as pure as that of Paros. Rocks of all hues, bright red, purple, yellow, green; of all combinations of colours, white with purple spots, white with blue veins, brown with pale green streaks, pale crimson with veins of black and yellow, are scattered about in unheeded confusion; while, above all, the rich and splendid jasper rises in enormous masses, as if it were the vilest rock, yet glittering in gorgeous beauty,—mountains of gems. Here is one of a dark sea-green, with cream-coloured veins; there a mass of deep violet; and here a ribbon-stripe, marked irregularly with alternate bands of red, brown and green; and yonder is a huge heap of shattered blocks of the richest plum-purple, transmitting the light in sparkling lustre through their translucent substance, as they lie where they have been tumbled down from their beds by the force of the torrent, and presenting the most agreeable contrast between their own deep, rich, imperial hue, and that of the yellow-green moss that springs in cushion-like tufts from their angles and crevices.

(To be continued.)

The Geology of Canada.

(From the London Saturday Review.)

The Provincial Government of Canada has lately issued a volume embodying, with much new matter, the condensed substance, of all the previous annual reports which from time to time have been published by the authority of the Colonial Legislature since the establishment of the Geological Survey of Canada in 1843. The preparation of this bulky octavo of nearly a thousand pages has been carried out by the indefatigable director of the Survey, Sir William Logan; and the style in which the work has been got up, the precision of the drawings, and the accuracy of the wood-cuts, may almost challenge comparison with the execution of similar scientific productions on this side of the Atlantic. There has been a steady persistence in the conduct of this remarkable Survey, honourable alike to the successive Governments that have encouraged it and to the officers who have carried out the work. No other Colonial Survey has ever yet assumed the same truly national character, and the day may come—if ever the "Imperial Colony" shall claim and attain independence—when the scientific public of a great nation, looking back upon the earlier dawnings of science in their land, shall regard the name of Logan, a native born, with the same affectionate interest with which English geologists now regard the names of our great geological map-makers, William Smith and De la Beche.

Neither practical men, in the vulgar sense of the term, nor men of science will ever doubt the value of this anatomizing of the

physical structure of Canada. But if, in the colony or elsewhere, there is any one so shortsighted as to doubt the wisdom of spending money on researches which do not always suddenly tell on the pockets of the community, let him consider that, in addition to positive benefits, the more negative results of such a Survey have a distinct practical utility; for many a hopeful and unwary speculator, if he will but believe what is expressed by the colours on a geological map, will save himself from the prosecution of undertakings which end in disappointment and ruin to himself and his associates. But on higher grounds than these, the effect of the encouragement of science in a rising country is surely not to be despised. The foundation of such a Survey is like the foundation of those noble Universities which have already arisen in the colony, elevating the tone of society by the admixture of a learned and scientific element, commanding the respect of the intellect of their own population, of those "at home" in the old country, and of foreign savans all over Europe. That far-seeing Government which knows how worthily to execute so great an undertaking may also well command respect. The following are among the more important results set forth in the recently published volume.

When Sir William Logan commenced his investigations in Canadian geology, nothing was definitely known in that country with regard to the rocks underlying the older palæozoic or Silurian series. The granitic and gneissoid rocks, both in Europe and America, had been studied lithologically rather than geologically; and though, from the days of Hutton downwards, the theory of metamorphism has been gradually establishing itself, yet even now there are men called geologists who cannot persuade themselves that almost all the gneissic rocks of the Scottish Highlands are merely metamorphosed Lower Silurian strata, and that similar masses in the Alps are the altered representatives of the secondary rocks of the Jura, and some of them even of the Eocene Age. As early as 1844, Sir William recognised a great system of altered strata, forming the oldest known rocks of Canada, and perhaps of the world, unless those of the Lewis and the extreme north-west of Scotland may be in part their equivalents. These in Canada had previously been regarded as unstratified, and Sir William was the first who successfully applied himself to the study of their structure. Extending from the coasts of Labrador into the regions of the Far West, contorted and disturbed in the extremest degree, a very wilderness of dreary swamps, forests, rivers, and innumerable lakes, the difficulties to be overcome in the examination of the Laurentian rocks were very great. They have nevertheless been described, and their constitution has been analysed over great areas, and Sir William has discovered—what will be new to most geologists—that these antique rocks include two great series, with an aggregate thickness of probably not less than from 40 to 50,000 feet. Of these, interbedded with the gneiss and quartzite, the oldest includes at least three bands of limestone, equal in extent and thickness to many of the separate formations of more recent periods, one band alone attaining a thickness of more than 1,000 feet. In old times, when geologists drew upon their imaginations for their facts, so-called primary limestones such as these were necessarily considered to be unfossiliferous; but of late, since the metamorphic theory of rocks has taken root, sound reasoners have begun to surmise that all stratified limestones of great extent and thickness must have been formed from the life and death of organic bodies, and a few geologists were therefore more pleased than surprised when the Director of the Canadian Survey announced the discovery of forms in the Laurentian limestones resembling corals of the genus *Stromatopora*. No one who has thoroughly realized the geological meaning of metamorphism will be surprised at the rarity of organic remains in the altered limestone, when it is remembered that, even if originally entirely formed, like our own Carboniferous limestone of organic bodies that lived in the seas of the time, yet if these organisms "retained their calcareous character," their organic structure would "be almost certainly obliterated by crystallization, and it would be through the replacement of the original carbonate of lime by a different mineral substance that there would be any chance of the forms being preserved." In the fossils discovered, the layers of the possible *Stromatopora* "are composed of crystalline pyroxene, while the interstices are filled with crystalline carbonate of lime."

At an early period of the Canadian Survey, a great group of crystalline rocks was distinguished by the predominance of Labradorite and similar triclinic feldspars, and rumours are abroad among geologists (though not published in this volume) that the recent investigations of Sir William Logan have shown that they belong to a younger series, which rests unconformably upon the more ancient Laurentian gneiss, and attains a great but as yet unknown thickness. The suggestive significance of this fact will