

SCIENCE.—SUPPLEMENT.

FRIDAY, MARCH 12, 1886.

THE ROCKY MOUNTAINS AS SEEN FROM THE CANADIAN PACIFIC RAILWAY.

THE foot-hills of the Canadian Rockies are not like those of the south, — huge piles of sandstones, bristling with 'monuments,' and hirsute with sparse forest. After a few smooth, grassy benches and rounded hills, here come precipitous ranges of real mountains, scarcely less imposing than those of the central mass. Trees among the outer benches are rare. You see some willows, a hemlock, and the stubbed *Pinus albicollis*, which is not good as timber. Near Calgary the first of the magnificent Douglas spruces present themselves, — those gigantic and valuable timber-trees, for which the north-west coast is famous. They are of small size here, and stand in little clumps in the ravines.

The Rocky Mountains at this point have trended so far westward, that here they are overtaken only in the meridian of Salt Lake. The first line of heights is a rank of bluffs with almost vertical faces, each ledge marked by well-kept snow, which stretches away northward in orderly array. This is the Palliser range. The most prominent point of it is a forward-set peak visible from a wide radius of plains. In shape it is like a pretty tall stump, or the lower half of a lighthouse, and is called the Devil's Head; but the Indians, with better discernment, say it is the Devil's *neck*, and have a story about the disappearance of the head it once sustained. Behind the Palliser is the slaty Sawback range, from beyond which comes the Bow River, through deep cuttings.

In these foot-hills lives a small Indian tribe, of Dakotan stock, termed Stonies, who are fine-looking fellows and good hunters. They came there within a generation or two, and never go out on the plains except in war-raids against the Crees or the half-breeds, to whom they have given much trouble. The Hudson's Bay company set up its southernmost trading-post among them a few years ago, called the Old Bow Fort; and close by they now live on a reservation, the station for which is Morleyville.

Though the mountains here seem grand enough, having a sublimity not easily equalled among any of the loftier ranges southward, yet they must be spoken of as 'depressed' north of the boundary, since the tallest peaks do not much exceed 11,000

feet above the sea, and none of the passes are over half that. There are several fine passes over the first range, between the parallels of 49° and 53°. The southern one is Kootenay, much used formerly by the Indians, then Howse's, then that where the Kananaskas heads, then the one taken by the Canadian Pacific railway up the Bow and across to the valley of the Kicking Horse, and lastly the Yellow-head, or Leather pass under latitude 53°. Many of the principal peaks in this range were long ago named Balfour, Forbes, Hooker, and Brown, by the lamented botanist Douglas, after English men of science.

The breadth of the Rocky Mountain system (six hundred miles) in the middle United States is narrowed northward, until in Canada it consists of three compact serrations. The easternmost bounds the plains, and stretches from the sources of the Missouri to those of the Peace and the Yukon. Its eastern face presents a bold front; but its western flank is more broken up, and, not far from the boundary line, gives source in two 'mother-lakes' to the mighty Columbia, which thence flows northward in a powerful stream until it has passed the fifty-second parallel, nearly two hundred miles north-west of its starting-point. Then the mountains upon its left break down; and the Columbia, turning sharply around their head, moves straight southward on its course to the sea. Stretching north and south between Kootenay lakes and the great bending of the Columbia, stands the magnificent second range of mountains, — the Selkirks.

The course of the Columbia after it has turned southward around the head of the Selkirks is beset by lofty walls as before, for west of its banks rises a third chain, called the Gold range, whose farther slopes feed the Fraser and Okinakane. Thus three unexplored, lofty, and glacial ranges of mountains, and two first-class river-crossings, opposed themselves to the engineers of this railway when the northern route was abandoned and the present line accepted.

The profile of the Rockies seen at the eastern entrance is extremely irregular. There is no stately line of granite domes, nor bristling quartzite peaks, nor symmetrical volcanic cones: the sky rests upon a jagged wall, every elevation having some angular and abrupt form quite unlike its neighbor.

All this grandeur of outline, which gives a tenfold savage aspect, is intensified by the excess

of snow and ice borne winter and summer upon their naked heads,—the most striking fact in their scenery, a description of which cannot be attempted here.

The Bow River, at the point where it breaks through its 'gates,' is a swift, deep stream of pea-green water. We follow it for several miles through a low forest, which occupies a large valley parallel with the main range, and between it and an outlying one, which is somewhat analogous to the parks of Colorado. Near the southern end of this valley is the station Banff,—the locality of a huge sulphur-spring. This occupies a pit which has a chimney-like entrance, and broadens below into a chamber of considerable size. In the bottom of this boils up a powerful spring strongly impregnated with sulphur, and almost too hot for bathing. The interior of the cavity abounds in masses of crystals, splinter-like, brittle, translucent amber in color, and extremely beautiful, which, fortunately, are carefully protected by the owner. That the spring was formerly more copious, is shown by the oven-shaped tank it has built up more than forty feet above the present surface of the water.

Just beyond the impressive berg named Castle Mountain, which, like most of its fellows, has as many curious forms as you can find changed points of view, in the valley of the Bow River, the traveller gets sight of the first of the great glaciers which are a distinguishing feature of the scenery in the Rocky Mountains of British Columbia. It is a broad, crescent-shaped river of ice, the farther part of which is concealed behind the lofty yellow cliffs hemming it in. You seem to be almost on a level with it, and near at hand; but it is a dozen or more miles away, and fully fifteen hundred feet above you.

The forest is not noteworthy until the top of the pass (altitude about five thousand feet) is reached, when the eye gazes across miles of magnificent evergreens, filling the great depression through which the young Kicking Horse rushes from cataract to cataract, down to the westward. The Cathedral and Mount Stephen represent the supreme heights of the continental divide at this point. They are magnificent mountains, and surrounded by scores like them, unspeakably precipitous, rugged, and noble. On every side, as you make your way along, stand great cliffs, bearing prodigious weights of clear ice or almost equally solid and glittering masses of snow. In spite of this ruggedness, the gradient adopted by the railway is surprisingly low, and trains will be able to run at great speed; a schedule allowing only seventy-two hours between Montreal and the Pacific going into operation next May.

It is rather farther down from the summit on the western side than on the eastern. The exit is made through a narrow cañon, picturesquely filled by the turbulent stream; and beyond, with the grandest surprise, you emerge upon the valley of the Columbia, and are face to face with the long, splendid range of the Selkirks.

Crossing the Columbia on a fine truss-bridge, the railway runs down its margin, close under the steep, wooded foot-hills of the Selkirks. Several miles below, it turns into the narrow gateway through which the Beaver finds a straitened exit (like all the streams of this region), and ascends its gorges by ingenious engineering to the summit of the range, thirty-four miles (by rail) west of the Donald crossing, and 4,350 feet above the sea.

The principal difficulty in construction, along this part of the line, was occasioned by the many torrents which come down the very steep mountain-side, often in splendid cascades. To span these fierce torrents by bridges or culverts which should not fail, required great skill and liberal expenditure.

Among these bridges is the loftiest wooden structure of its kind in the world. It crosses Stony Creek,—a noisy rill at the bottom of a V-shaped channel cut deeply into the soft rock of the hillside; and the track is no less than 295 feet above the water. This bridge is supported upon two towers of wooden crib-work, erected upon masonry the foundations of which are solid rock 75 feet below the surface. This bridge is about 750 feet long, cost \$250,000, and was built in a very short time. It is exceeded in height by only one railway-bridge in the world,—the iron one lately put up at Kinzua, Penn.

The approach to the summit is through a narrow passage between enormous precipices, down one of which pitches a waterfall several hundred feet in unbroken height, white and dusty like snow; and at the summit the glacier of which it is the outlet comes into view.

This glacier has an area of several miles, and its head cannot be seen from the pass. It is wedge-shaped, and in August was so dusty white, where the surface had been honey-combed by the sun, or powdered by the frequent storms, that it was not easy to say where it ceased and the inclined snowbanks lying under the shelter of the huge black combing began. Streaks, patches, and marbling of vivid blue (or, in some lights, green) could always be detected, however, where the solid ice was exposed; and the whole picture was irresistibly attractive. The foot of this glacier is approximately 7,350 feet above the sea, and is overlooked by Carroll's and two or three neighboring peaks, towering three thousand feet higher.

A little to the westward are other smaller and more easily accessible ice-masses, which plainly show a recent retreat; and two miles west of the summit one comes into view of the greatest of the visible Selkirk glaciers. It is overlooked by the stately monolith of Syndicate Peak, and the ice comes curving down to within a mile of the railway, feeding a copious stream. It is only about a thousand feet above the level of the rails; and, when a trail has been cut through the thickets in the ravine, it will be very easily reached, though one should no more attempt to go upon it without proper ice-creepers, ropes, etc., than he would in the Swiss Alps. I predict that the Agassiz glacier, if I may so name it, will be as famous an object of adventurous pilgrimage in a few years as any in Europe.

ERNEST INGERSOLL.

THE ORIGIN OF HUMAN RACES AND TYPES.

ONE of the most inexplicable subjects in the evolution of man has been his racial persistency. The teachings of Agassiz are yet familiar, and the thorough and abundant testimony of Morton, Nott, and Gliddon has demonstrated the permanency of the great races of mankind. The peculiar physiognomy of the Jew stands out as clearly in the early Egyptian records as at the present day. Food, climate, the most diverse environmental conditions, all appear to cause but little modification in racial type. The evidence from his earliest known periods of existence throws but little light upon his immediate origin, and the opponents of evolution have long found great satisfaction in the few proofs of lower affinity that his fossil remains present. Certainly there must have been factors in his earliest development that we have not yet taken into account. When and where did the African, the Caucasian, the Malayan races first become fixed, and why have the causes that long ago led to their differentiation ceased to be active? An answer to this question, deserving consideration, has lately been attempted by Moritz Wagner (*Kosmos*, 1886, p. 23).

It has long been recognized that one of the strongest factors in the artificial production of new varieties is in-and-in breeding, — the repeated crossing, within narrow limits, of the progeny of related parents. It is rarely in any other way that the impression of peculiarities can be combined and not antagonized in the offspring. All breeders or growers are aware that the organism, be it vegetable or animal, acquires with every such repetition greater plasticity and capability of change, and that it can arrive at a con-

siderable degree of differentiation only when free crossing is hindered or prevented for a sufficient length of time for these variations to become fixed, and not dissipated. In nature, strong proof of the same law is afforded by the faunal and floral peculiarities of regions isolated by natural barriers. The Galapagos and the Hawaiian islands, notwithstanding the uniformity of climates and general conditions, show striking diversities in animal and plant life among themselves, — the result of crossing among nearly related forms. Isolation, from whatever cause it may be due, throughout all animal and vegetable life, brings almost inevitably variation, due to the limitation of crossing, and the consequent fixation of characters.

But, in both of these respects, man has, in all his known history, been strikingly at variance with all other members of both the animal and vegetable kingdoms. In him alone, among all living creatures, exists the instinctive aversion to crossing between near blood-relations, — an aversion that predominates in every grade of civilization, from the cultivated races to the Eskimo, Hottentot, or Australian. Indeed, among the lowest tribes, the aversion is often strongest, and incest not unfrequently is punished by death. Most assuredly, man will not form an exception to a law so potent for change among other animals; and we see, in this custom of marriage between those unrelated, the most important factor in the production of varieties removed, and we can understand the difficulty of the formation of new races. The very acceptance of man's origin recognizes the certainty that some time in his development this instinct has been acquired. In the earliest period it did not exist, and he was then subject to the same laws of variation as the ape and the dog. It was to this period that the chief divisions of mankind evidently date.

Every thing goes to indicate that man's origin extends back far into the pliocene age; and evidently in his early stages he differed little, in his habits, from wild animals of the forest. Without clothes and habitation, he depended upon the free gifts of nature for food and shelter, without family instincts, and, what seems to be a necessary concomitant, without any sexual aversions whatever. With the great climatic changes of the glacial period, all this was changed. The struggle for existence became bitter: sustenance, shelter, and clothes had then to be acquired by the exercise of brain and hand. Migrations to the most favored and isolated locations were the inevitable result, and the necessity of protection of offspring became the contingency of existence. Family life took the place of more brutal instincts,