

course, to a considerable extent supplied by Mr. Patton himself. (See vol. vii., pt. 2, page 309.) The *Phyllopoda* in the list appended to Mr. Patton's paper were described by Mr. Etheridge, jun., and Mr. Woodward, in the *Geological Magazine* for 1872-73; *Palaequilla Pattoni*, by Mr. Peach; and *Fissodus Pattoni*, by Mr. Etheridge, jun.

In addition to his ordinary work and his scientific pursuits, Mr. Patton took a great interest in matters relating to the social well-being of the district, the great success of the local Co-operative Society being due largely to the assistance he afforded it in its early days. He was above all of a most kind-hearted and simple-minded disposition, but so retiring and unobtrusive in all his actions that of him it might truly have been said in the words of Goldsmith, "He did good by stealth, and blushed to find it fame."

In conclusion, I may be permitted to state that though my acquaintance with Mr. Patton only began in the year following the Glasgow Meeting of the British Association, it quickly ripened into friendship, and consequently I formed the medium through whom so many of his rarer specimens were brought under the notice of the members. Mr. Patton has left to mourn his loss a wife and family, and I would, in conclusion, suggest that a motion of condolence with them in their loss be passed to-night, and an extract from the minutes be sent by the Secretary to Mrs. Patton.

NO. XV.—THE GEOLOGY OF THE TERRITORY OF IDAHO, U.S., AND THE SILVER LODE OF ATLANTA. BY JAMES THOMSON, F.G.S.

[Read 11th December, 1884.]

[SUMMARY.]

THE Territory of Idaho is situated on the north-west extremity of the United States of America. It is bounded on the south by Utah, on the west by Oregon, on the north-west by Washington, on the north by British Columbia, on the east by Montana, and on the south-east by Wyoming. Its geological phenomena are varied and interesting. Immediately after crossing the boundary between Idaho and Utah there is an extensive sheet of vesicular lava, which extends for 340 miles across the territory in rolling undulations

which resemble Atlantic waves. The long axes of these ridges trend from south to north, and are here and there broken by circular depressions which prove on examination to be the mouths of extinct volcanic craters. Around their margins the lava is covered by a thin vitrified crust with minute undulations, like the ripple marks on a sandy shore, which are deflected in every direction, indicating that the flow of lava had been in some way obstructed.

The Snake River, resembling with all its turnings and windings the coils of an enormous serpent, has cut a deep channel, and its escarpments present an unbroken face of vesicular lava. Near the surface the vesicles are minute—in this respect like recent pumice-stone—but become larger and more irregular as we descend in the sections. Near the middle of this dreary waste, turning to the east at Mountain Home, the rough pathway lies across the surface of the lava for fully 30 miles. About midway the party crossed a series of mountains, trending south by west, the volcanic rocks being vesicular and rudely columnar, the columns variable, and usually from ten to twelve feet in diameter. Further to the east a descent was made into a plain, which seemed to be a vast extinct crater, with numerous miniature craters scattered throughout the main depression. On the northern margin the igneous rocks become more and more compact, merging into felspathic porphyry, which ultimately as dykes is seen piercing the granitic ranges of the neighbouring portion of the Rocky Mountains.

At the junction the party descended for about 3,000 feet into Lime Creek Valley, through which the South Bosie River flows, the pathway being along its banks. In the bed of the river were found boulders, representing the petrological history of the surrounding country—porphyries varying from compact cream-coloured varieties to deep greyish-blue ones, and running into vesicular dolerite, besides the different kinds of granite of which the mountains of the district are composed. On emerging from this valley one of the deep “gulches” or ravines which intersect the mountains in every direction was entered. On either side the slopes are all but precipitous, rising from 3,000 to 5,000 feet overhead, and covered with gigantic pines of from 200 to 300 feet in height, which grow up to 9,000 feet above sea-level. The rocks are granitic, and are traversed in all directions by quartz veins, cut and pierced in places by the porphyry formerly spoken of. The path for about 15 miles ran over mountains and through forests

and deep "gulches" of the most varied character. At one part we were in the depths of the forest, while at the next opening we looked down into a "gulch" several thousand feet deep, while beyond the intervening depression we saw the perpetually snow-clad peaks rising from 10,000 to 12,000 feet above sea-level.

Such is the track until Rocky Bar, our destination for the night, was reached. In this part of the world there is no twilight—the sun sets, and we were all but instantly enshrouded in the deepest darkness. Having travelled so far across the lava plains, over the mountains, down into and along the margins of numerous "gulches," and through deep forests, there was no reluctance to end the day's work.

In the grey dawn of the next morning, at half-past five o'clock, the party were again on the road, taking first through the "city," which consists of a few scattered and irregularly built wooden shanties, placed on both sides of a deep "gulch," which is bounded by mountains 3,000 to 4,000 feet high. After an eight-mile journey through country similar to that previously crossed, the path began to ascend the Hogsback Mountain, which is clothed with tall pines up to the 9,000 feet level, and on reaching the summit the scenic aspect was found to be fine beyond description. On the north are first seen the Sawtooth Mountains; on the east we look up to Prospect Peak, from 10,000 to 11,000 feet high; on the west is a "gulch" about 4,000 feet below, with various lateral "gulches." Beyond the nearer mountains are seen the peaks of the snow-clad Blue Mountains. If all this outlook is varied in its physical aspect, no less so is its accompanying vegetation, from the great pines on the mountain slopes to the trembling aspens clothed in their rich autumnal tints, ranging from deep bluish-green to numerous shades of pale green, yellow, and even deep gold colour, whilst amongst other members of the vegetable world there are many other varieties of tint, from pale brown to blood-red. Above, below, near and far, all is clothed in nature's own wild and beautiful colouring.

Once more we proceed down the edge of a "gulch," near the bottom, the way in the distance seeming to be closed by a barrier extending across it, and ascending far up the sides. It is a gigantic dyke of felspathic porphyry, serrated and pinnacled along the top. The descent is steep until we reach the dyke, when we turn sharply round, and on looking up from the other side we

realize its magnitude and appreciate its great height. It pierces the mountain side, and is exposed to view for fully 1,000 feet upwards. The banks of the Middle Bosie River are now reached, and here, as in many of the "gulches" already passed, Chinamen were industriously at work at what is termed "placer" gold digging, which is simply washing the sandy and gravelly detritus brought down from the higher levels by natural causes. These Chinamen earn, it is said, from two to twenty dollars a day, even in spots that have already been washed by men of other nationalities. An examination of the wash-dirt led to the conclusion that the whole region here is more or less impregnated with gold.

The party at last reached its destination—Atlanta city—situated on the west side of Atlanta Mountain, and on the east side of the Middle Bosie River. It is surrounded by the Sawtooth range of mountains, the name of which was suggested by the presence of numerous bosses and dykes of felspathic porphyry ejected through the grey granite, of which these mountains are composed. The later igneous rock, where it came into contact with the granite, has altered it and rendered it more or less friable, and becoming disintegrated by weather and other abrading influences, it has been afterwards washed down to the valleys by melting snow and by rain, leaving the igneous rocks projecting in pinnacled masses, serrated on their upper edges.

Atlanta Mountain stands isolated from all other eminences, and reaches a height of fully 1,600 feet above the surface of the central depression from which it rises, its altitude above sea-level being from 7,000 to 8,000 feet. It occupies an area of about four square miles, the Middle Bosie River which flows on its north and the Yuba River on its south side forming a junction at its western extremity. It is formed, like the surrounding mountains, of a grey granite, containing large crystals of felspar. Along the summit there is a large fissure, extending from the eastern to the western side, which has been produced by the local disturbance caused by the eruption of the igneous rocks formerly referred to. This fissure was originally fully 50 feet broad, and has subsequently been more or less filled up with decomposed granite and quartz, containing a variable percentage of both gold and silver, and termed in the district "low grade ore." This is pierced in various directions by lodges of silver ore, more or less intermixed with gold. Along the lateral margins of the central lode of high grade ore

there are numerous lateral fissures of various dimensions, which also contain the precious metals. The fissures near the eastern extremity converge inwards in a slanting direction towards the central area of the great central fissure vein; while those on the western side also converge inwards to the centre from the opposite direction, indicating that the centre of the main fissure is the focus or principal body of the precious ore. The great main fissure extends from the Buffalo Mine on the east to the west for 8,000 feet, and gold and silver are present throughout the entire distance. In a tunnel cut on the bank of the Yuba River to the south of Atlanta Mountain, the precious ores were found at a depth of 1,600 feet beneath the surface.

It will thus be seen that here there is a continuous lode rich in the precious metals 8,000 feet in length and 1,600 feet in depth, and where proved by the Yuba tunnel 70 feet broad. If the lode is as broad throughout its entire length, an important problem is suggested as to how such a fissure became charged with the precious metals.

NO. XVI.—A SHORT NOTICE OF THE LATE MR. JAMES COUTTS.
By JOHN YOUNG, F.G.S., V.P.

[Read 15th April, 1886.]

I AM sorry to have again to bring before the Society this session another loss it has sustained by the death of our respected friend Mr. Coutts, which took place on the 19th March last, in the 76th year of his age. He was a member of the Society for the last eleven years, but was long previously known to many of us who were also members of the Natural History Society, of which he had been a member for nearly 20 years. Although his studies in natural science were taken up only after he had considerably passed the prime of life, yet he showed an enthusiasm in pursuit of them that was worthy of a younger frame. During all his membership he was a most regular attender of the meetings and excursions, and his familiar form will on these occasions be missed by all his friends.

Mr. Coutts attended my Class of Geology in the Mechanics' Institution for nearly ten sessions, and at the age of 66 or 67 he presented himself at the Government Science and Art Examina-