ART. LVI.—*Notes on a New Feature in the “Comstock Lode;”*
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THERE is probably no metalliferous vein in the world which excites a greater interest than the “Comstock Lode” of Nevada, whether regarded from a scientific point of view, as the largest and richest argentiferous vein yet discovered, or from an

economical standpoint, as the source for many years past of an immense proportion of the silver, and a considerable fraction of the gold added to the circulation of the world; and the details of its geological character as developed, therefore acquire an importance not possessed by those of less prominent deposits.

The Virginia Range is a due north and south branch of the Sierra Nevada system of mountains. On the eastern slope of Mt. Davidson, the chief peak of the range, were found the outcroppings of the vein which have been followed somewhat to the north, and a long distance to the south of that mountain, and shown to possess a total length of four miles in the general direction of the Virginia Range. Decidedly the most important portion of the Lode—that in which the celebrated "Gould and Curry," "Hale and Norcross," "Ophir," "Consolidated Virginia" and "California" mines as well as others have been opened—lies at the base of Mt. Davidson, and is included within the limits of Virginia City.

It is well known to those who have had occasion to make themselves familiar with the Comstock lode* that throughout that portion of the vein which lies in Virginia City, the west or foot wall is a continuation of Mount Davidson, and consists, like the mass of that mountain, of syenite, while the east wall is a porphyry, more nearly described as trachytic greenstone, or propylite, with which the country was overflowed during the Tertiary period. The direction of the fissure subsequently filled by the vein matter of the Comstock, was plainly determined by the previously existing surface of contact between the syenite and propylite, which naturally offered less resistance to rupture than the solid mass of either adjoining rock. This is clear from the fact that for over a thousand feet from the surface, only insignificant masses of either rock were found on the side of the vein opposite to that of which they are especially characteristic. So strong was the influence of the direction, both in strike and in dip, given to the fissure by the presence of this comparatively weak surface of contact in the rocky mass, that the fissure extending in both directions away from Mount Davidson into solid propylite, unaccompanied by syenite, retained the strike, (nearly north and south,) and the dip (from 35° to 50° ,) of the Virginia portion, almost unaltered.

This very clearly defined influence of the contact surface, was of itself good reason for supposing that the fissure in Virginia must follow the dividing plane between the syenite and propylite to a very considerable depth, and not improbably to one beyond the reach of mining operations. Nevertheless, although the subject has been very wisely left in abeyance by the geologists who

* Vide von Richthofen, "The Comstock Lode, San Francisco, 1865," and "U. S. Geological Exploration of the 40th Parallel," Vol. III.

have publicly discussed the Comstock, it cannot have escaped any of them that the fissure could not indefinitely follow this contact; for the propylite is recognized by them as a volcanic rock which has overflowed the older syenite, and therefore, unless we should make the highly improbable assumption that the syenite, (which in Virginia is plutonic,) the propylite, and the vein matter emanated successively from a single fissure in the earth's crust, a lowest point in the contact between the underlying syenite and the overlying propylite must eventually occur, from which the fissure would naturally descend toward the seat of the force by which it was caused. From the most depressed point in the contact surface, the fissure would pass into the underlying, or syenite rock, and doubtless out of it farther below, into whatever might underlie it in its turn.

From the point where the fissure leaves the contact between the two species of rock, its dip would in all probability be controlled by circumstances very different from those which decided it in the position lying near the croppings; for from the point at which the seismic shock impinged upon the lower surface of the syenite, the fracture must have followed the direction of least resistance, or presumably a straight line, and the shortest line from the point in which the subterranean force encountered the syenite, to the upper surface of that formation; and a moment's thought will serve to show that, apart from local and altogether incalculable irregularities in the lower surface of the rock, this line could continue in even approximately the direction of the present dip, only in case the syenite not only formed a cone above the general level of the country, but filled a vast depression below it as well. The passage of the lode into the syenite would therefore naturally be accompanied by a change in dip, toward the perpendicular.

In May last I made observations, repeated and extended in August, which seem to establish beyond question the hitherto unnoticed fact that the lower workings of the mines in Virginia City, have reached the point at which the fissure passes from the contact surface between the syenite of Mt. Davidson and the country propylite, into the underlying syenite. The depth below the surface at which the change occurs is not very far from 1500 feet.

The details of these observations would scarcely be of general interest away from the Pacific Coast, while the conclusion drawn will probably be considered as amply justified by the following general results of examination, viz: The east wall of the lode in the lower levels (1400–2300 feet) wherever struck between the north end of the "Ophir" and the south end of the "Chollar Potosi," a distance of over a mile, is syenite; that in the three mines, of the eight within these limits, in which for fear of water the East

Clay has not been pierced, good grounds (presence of included syenite and absence of included propylite) exist for believing that the hanging wall is syenite :—that although the east country syenite has been pierced in a number of places, both vertically and horizontally, to a depth of several hundred feet, no other formation has been reached, nor any indication that the limits of this have been approached ; on the contrary, this eastern syenite is apparently as solid as Mount Davidson itself :—that wherever the relations between the walls of the fissure have been most completely exposed, the occurrence of syenite on the east wall is accompanied by a very decided increase in the angle of dip.

The last point is most clearly shown in the Ophir, where on the 1700 feet level the walls are almost exactly perpendicular, as shown by the very complete prospecting on that level.

The Gold Hill mines seem nowhere to have reached the syenite, as was to be expected, since from the conformation of the country, the syenite, if it underlies the porphyry in Gold Hill as well as in Virginia, will probably be met with only at a much greater depth.

To establish the exact line of the passage of the vein from the propylite into the syenite, would of course require a specially authorized examination of the mines ; since a majority of points in which the east wall has been struck are hidden from view, either by the closure of drifts no longer essential to the working of the mines, or by timbering in the shafts, etc.

Many important deductions might be based upon a change in the conditions of the Comstock lode, which must be fraught with exceedingly important consequences to the greatest mining interest of the Pacific coast ; but I prefer to confine myself to submitting the fact of this remarkable, and at this time most unexpected, alteration in the character of the vein.

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