

It is clear that, after the gradual introduction of the tin and other substances, the second rent (*b b*) was produced by another fracture accompanied by a displacement of the rocks along the plane of *b b*. This new opening was then filled with minerals, some of them resembling those in *a a*, as fluor-spar (or fluuate of lime) and quartz; others different, the copper being plentiful and the tin wanting or very scarce.

We must next suppose the shock of a third earthquake to occur, breaking asunder all the rocks along the line *c c*, fig. 711; the fissure in this instance, being only 6 inches wide, and simply filled with clay, derived, probably, from the friction of the walls of the rent, or partly, perhaps, washed in from above. This new movement has heaved the rock in such a manner as to interrupt the continuity of the copper vein (*b b*), and, at the same time, to shift or heave laterally in the same direction a portion of the tin vein which had not previously been broken.

Again, in fig. 712 we see evidence of a fourth fissure (*d d*), also filled with clay, which has cut through the tin vein (*a a*), and has lifted it slightly upwards towards the south. The various changes here represented are not ideal, but are exhibited in a section obtained in working an old Cornish mine, long since abandoned, in the parish of Redruth, called Hucl Peever, and described both by Mr. Williams and Mr. Carne.\* The principal movement here referred to, or that of *c c*, fig. 712, extends through a space of no less than 84 feet; but in this, as in the case of the other three, it will be seen that the outline of the country above, *d, c, b, a, &c.*, or the geographical features of Cornwall, are not affected by any of the dislocations, a powerful denuding force having clearly been exerted subsequently to all the faults. (See above, p. 69.) It is commonly said in Cornwall, that there are eight distinct systems of veins which can in like manner be referred to as many successive movements or fractures; and the German miners of the Hartz Mountains speak also of eight systems of veins, referable to as many periods.

Besides the proofs of mechanical action already explained, the opposite walls of veins are often beautifully polished, as if glazed, and are not unfrequently striated or scored with parallel furrows and ridges, such as would be produced by the continued rubbing together of surfaces of unequal hardness. These smoothed surfaces resemble the rocky floor over which a glacier has passed (see fig. p. 127). They are common even in cases where there has been no shift, and occur equally in non-metalliferous fissures. They are called by miners "slicken-sides," from the German *schlichten*, to plane, and *seite*, side. It is supposed that the lines of the striae indicate the direction in which the rocks were moved. During one of the minor earthquakes in Chili, which happened about the year 1840, and was described to me by an eye-witness, the brick walls of a building were rent vertically in several places, and made to vibrate for several minutes during each shock, after which they remained uninjured, and without any opening, although the line of each crack was still visible.

\* Geol. Trans. vol. iv. p. 139; Trans. Roy. Geol. Society, Cornwall, vol. ii. p. 90.