

X.—*On Elvan Courses.*

By JOSEPH CARNE, Esq.

MEMBER OF THE SOCIETY.



THE general and indefinite meaning attached to the principal names given by the miners to the stones of most frequent occurrence in the Cornish mines, has been often observed and regretted by mineralogists who have visited Cornwall. For instance—*spar* means not only calcareous spar, and fluor spar, but quartz. *Peach* is either chlorite, or mica, if the latter has a tinge of green. *Flucan* is either a white, or a greenish clay, no matter of what kind. *Growan* is decomposing granite, sienite, or even porphyry. *Cockle* is either schorl, or hornblende. *Killas* is proper grauwacke, or argillaceous shistus, or slate. The indefinite use of this term occasioned, not long since, a paper war between two eminent Scotch mineralogists, both of whom were right

in their application of the term, but incorrect in supposing it to apply to one substance only. Of the word *capel*, it is almost impossible to give a definition, as it refers rather to situation than to substance.

The term *elvan* shares the fate of those already mentioned. It is a stone which frequently occurs in the mines of Cornwall; but so various in its appearance and composition, as well as in its relative situation, and more particularly in its apparent effects on metallic veins or lodes, that whilst in some mines it is regarded as an ill omen, it is hailed in others as the harbinger of riches.

Elvan occurs in Cornwall in inclined strata, which are scarcely horizontal enough to be called beds, and yet this is the only name which can strictly be applied to them. The miners call them channels, or courses; and by the latter of these terms I shall hereafter describe them. Most of the quarry-stone used in building is procured from the top of these courses.

As far as they have been discovered, the elvan courses have the same inclination as the adjoining rocks, and are undoubtedly of the same primary formation: for there appear no marks of a more recent formation in the rocks above the elvan, than in those below it. The lodes also are found to pass through the elvan, in the same manner as through the killas or the granite.

Elvan courses have been most frequently

found in killas: this, however, is no proof that they do not as often occur in granite; but the most productive lodes being in killas, greater search has been made there, and, in consequence, more elvan courses have been discovered.

They have an east and west direction, or they vary but little from those points. They generally underlie rapidly towards the north; much more so than the lodes, which are therefore frequently found to intersect the elvan courses in depth. The point, however, of the greatest importance to us as miners, is, to ascertain the modes in which lodes are affected by coming in contact with elvan courses. These are various.

In the first place—the lode passes through the elvan as through the killas, without any apparent alteration; as in the Weeth Copper Mine in Gwinear, where the elvan course is twenty-four feet wide, and inclines or underlies north, four feet and a half in every fathom. The lode enters the elvan without being disturbed, and continues in size, quality, and hardness, just the same as in the killas. This elvan is hornstone porphyry with quartz.

2ndly. The lode, on entering the elvan, becomes suddenly impoverished, and lessened in size; or, as the miners term it, wrung together. This is the case in Rosewall-hill tin mine in Lelant; where, in a granite country, an elvan course has lately been discovered 150

fathoms under the surface. Its width has not been ascertained. It underlies north-east, about ten feet to a fathom in depth. The lode, which had previously been eighteen inches wide, and rich in tin, quickly dwindled to four inches, and contained very little tin; and even that was of a quality much inferior to what it yielded when in the granite. The elvan here appears to be a close-grained granite, with hornblende and chlorite: very different from the granite of the country, which is of a very large grain.

3rdly. The lode, on entering the elvan, is divided, and becomes much harder than before. In Huel Ann copper mine, in Phillack, the lode, which was presumed to be the same as that of Huel Alfred, presented, whilst in the killas, such favorable appearances, as to make the adventurers confident of possessing a second Huel Alfred. On its entering the elvan, however, their expectations were entirely blasted. The lode was divided into three parts, and became so hard as to oblige the adventurers, after an ineffectual struggle, to relinquish their pursuit. The width of this elvan was never ascertained. It consists principally of very compact chlorite.

4thly. Instances are not infrequent where the lode, on entering the elvan, not only becomes smaller and less rich, but the elvan becomes mixed with the lode. This is the case in Crenver, Huel Abraham, and Huel Sarah, three adjoining copper mines in Crowan:

In these mines, the elvan course varies in width from one to three fathoms, and underlies in some parts six, and in others even eighteen feet to a fathom in depth, towards the north-west. Its bearing is north-east and south-west. The lode, which is about two feet and a half wide; bears east and west, and underlies south, two feet in every fathom. However rich it may have been in the killas, it becomes small, poor, and often divided into small branches, in the elvan; and the elvan appears to be one of the component parts of the lode. This elvan is a mixture of quartz and mica, and, in some parts, of chlorite.

5thly. In other instances the contrary effects are seen. The lodé, on entering the elvan, increases not only in size, but in goodness. Huel Alfred copper mine in Phillack, furnishes a remarkable instance of this kind. The elvan course here is fifty fathoms wide; it bears north-east and south-west, and underlies north-west six feet in every fathom. The lode, which underlies north only two feet, produced some ore whilst in the killas; but on entering the elvan it became much richer, and increasing in goodness as in depth, it at length yielded ore sufficient to give the adventurers a profit of one hundred and forty thousand pounds. Its width in the killas was from six to nine feet, but in the elvan it gradually increased to twenty-four feet. At the depth of 120 fathoms it left the elvan and re-entered the killas;

and from thence it gradually diminished in size, until at the depth of 150 fathoms it was only ten feet wide. It declined also in goodness as soon as it left the elvan. After pursuing it a little deeper, its poverty obliged the adventurers to abandon the concern. Near the surface, this elvan appears rather granitic, but in the deeper parts it is decidedly hornstone porphyry.

6thly. In some mines, the lode, on entering the elvan, becomes not only larger and better, but sends forth small branches which penetrate the elvan on both sides. In the eastern part of Huel Vor tin mine, in the parish of Breage, there are two elvan courses. The northern course, which is the largest, is twenty feet wide, bears north-east and south-west, and underlies north nine feet to a fathom in depth. The lode which underlies north only a foot and a half, was productive in the killas, but much more so in the elvan. In the former, it was two feet wide, but in the latter it increased to five feet, and in some parts branched through the elvan in such a manner as to impregnate the whole of it with tin, and to induce the workmen to take it away even for twenty feet in breadth. The lode is still in the elvan. Near the surface, this elvan appears to consist of decomposed felspar and quartz. A little deeper, hornstone appears. In the deepest part of the south elvan, the hornstone is compact, and in some instances slaty. The latter, it is

supposed, has not been found in any other part of Cornwall. This elvan course has been traced on the surface five miles, from Tolmenor in Breage to Porkellis in Wendron.

7thly. An instance occurs in West Huel Fortune copper mine in Ludgvan, where, in some parts the lode becomes larger and better, and continues entire in the elvan; and in other parts of the same elvan, it is divided into minute branches, called by the miners *strings*, which are still so rich, as to be nearly as valuable as the lode, where it is undivided. This elvan, although decomposed in the higher parts, is, in the deepest level, hornstone porphyry.

Lastly. In Chacewater tin and copper mine in Kenwyn, there are at the surface, two elvan courses a little distant from each other. From their colour, one is called the white, and the other the black elvan. At the depth of about sixty fathoms they unite, and continue in union as deep as they have been seen. The course formed by this union is about six fathoms wide, underlies five feet and half to a fathom in depth, and bears about 20° north of east and south of west. This elvan course, without being at all intersected by, or united to, a lode, is full of small veins of copper ore, which cross it at angles of nearly 45°. Before the union of the two courses, both of them were crossed by these small veins; but after the union the elvan became softer, and the ore richer. That

these rich branches can proceed from no ordinary copper lode, appears from the dipping of the elvan towards the east, where it is completely covered by killas, whereas a lode would have continued through the killas as well as through the elvan.

In the midst of this elvan course, are often discovered small unconnected beds, called by the miners floors, of red elvan, quite distinct from the other, but still intersected by the copper veins. This is an instance of a singular kind; and by favour of Mr. Samuel Moyle, I have procured specimens of the different sorts of elvan, crossed by the veins of copper. The white appears to be decomposed felspar and quartz: the black, hornstone, with quartz and chlorite: and the red, hornstone, perhaps as fine as Cornwall can produce.

Had there been sufficient time for enquiry, many other mines might be, and perhaps still may be adduced, in which the appearances of the elvan courses would corroborate and illustrate the circumstances already mentioned.

It is presumed, however, that these instances comprize nearly all the different modes in which lodes appear to be affected by elvan courses; except, perhaps, in a few minute and unimportant particulars.

I have purposely said nothing of elvan courses which have no known connexion with metallic veins. It may, however, be stated in general that, particularly in a killas country,



wherever there is a quarry, of which the stone differs from the killas, *there* is certainly an elvan course; and by way of specimen, the surface of one may be seen for some length, at low water, just at the back of Penzance pier.

From the whole we may easily perceive the difficulty, not to say the impossibility, of forming any theory of universal application to elvan courses as connected with lodes.

Should a theory hinge on the courses being more or less horizontal or vertical, it is overthrown by a comparison of those of Huel Vor and Rosewall-hill. In both the inclination is great, and towards the same point; yet in one case the lode becomes richer, whilst in the other it is almost wholly unproductive.

If a theory turn on the consideration whether the elvan course underlies towards the same point as the lode, or towards the opposite point; this is settled by comparing the courses of Rosewall-hill and Crenver. In the former, the elvan course and the lode both underlie towards the north. In Crenver the elvan underlies north, and the lode south, whilst the lodes in both are equally poor.

Should the different component parts of the elvan courses be made the cause of the different circumstances of the lodes, let the Huel Alfred elvan be compared with that of Crenver: they nearly resemble each other: and yet in the former the lode was immensely rich, whilst in the latter it was good for nothing.

Gratifying, therefore, as it would be to scientific men to discover some general law applicable to the apparent effects of elvan courses on lodes, these are, and perhaps will long continue to be, subjects in which the experience and the practical knowledge of the miner are his only guides; and these he has in fact, in this as in many other cases, found far superior to the best merely theoretic rule which could possibly be established.