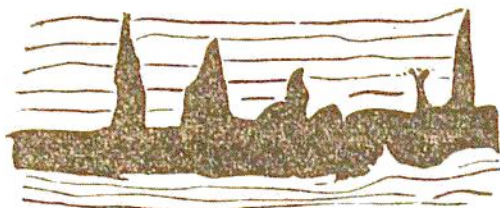


Fig. 413.



the Marsden's lode, showing both an opening, *e*, partially filled with galena, and the composite structure of some of the lodes. *a* is the cap rock, *b* a layer of blende, *c* of pyrites, *d* of blende, and the galena in the opening, *e*, is twelve inches thick. This lode is what is called a flat sheet.

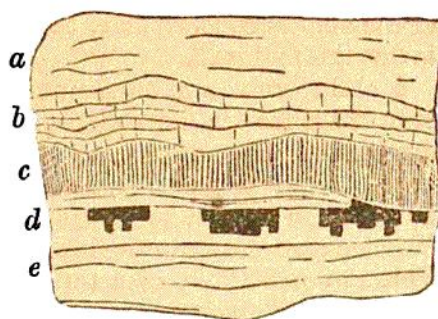
These deposits are generally completely isolated, having no connection with each other laterally or vertically. Nor do they extend definitely downward.

Ores in the form of Beds.—The ores of iron sometimes occur in lodes, but more frequently as beds interstratified with sandstones, schists, etc. Tin, lead, and copper are rarely found associated with these beds of iron, but not in large quantities.

These beds are undoubtedly of sedimentary origin.

Alluvial Deposits.—Gold, platinum, and tin are often found in gravel and sand. The same forces that removed the gravel and sand from the ledges also washed away the ores from the veins, and deposited them as a part of alluvium. It is much more profitable, in general, to obtain gold and platinum from alluvium than from the original veins.

Fig. 414.



ORIGIN OF METALLIC VEINS.

1. Werner supposed that metallic veins were fissures filled by aqueous infiltration from above.

2. Hutton supposed that metallic veins were filled by melted matter injected from beneath. It is probable that many metallic veins were thus produced.

3. Professor Sedgwick supposes some metallic veins to have been produced by chemical segregation from the rock in which they occur, while that was in a yielding state; just as nodules of flint were segregated from chalk, or crystals of simple minerals from the rocks in which they are now found imbedded.

4. Mr. Fox and M. Becquerel refer the origin of many metallic veins to electro-chemical agencies which are operating at the present day, to transfer the contents of veins even from the solid rocks, in which they are disseminated, into fissures in the same. The former of these gentlemen has shown conclusively that the materials of metallic veins, arranged as they are in the earth, are capable of exerting a feeble electro-magnetic influence; that is, they constitute galvanic circuits, whereby numerous decompositions and recompositions, and a transfer of elements to a considerable distance may be effected. He was induced to commence experiments on this subject, by the analogy which he perceived between the arrangements of mineral veins and voltaic combinations. And he thinks if such an agency be admitted in the earth, it shows why metallic veins, having a nearly east and west direction, are richer in ore than others; since electro-magnetic currents would more readily pass in an east and west than in a north and south direction, in consequence of the magnetism of the earth. M. Becquerel has shown that even insoluble metallic compounds may be produced by the slow and long-continued reaction and transference of the elements of soluble compounds by galvanic action. He has also made an important practical application of these prin-