decomposed splinters. This is evidently the result of a very complex metamorphosis, which Groddeck has observed also in the quicksilver deposit of Avala in Servia. The cell-walls, which represent the fillings of cracks in a shattered limestone, have been subsequently changed to calamine, and covered with botryoidal clusters of that mineral (Fig. 86).

Calamine is frequently formed by atmospheric agencies above the ground-water level, and is a frequent accompaniment of lead- and zinc-deposits in limestone.

Space does not permit the description here of the manifold deposits in Belgium, Rhenish Prussia, Westphalia, Upper Silesia, Sardinia, Algiers, &c., which are, moreover, not known to me by personal observation. The text-books of Cotta, Groddeck, and Phillips give some account of them, and refer to sources of more detailed information.

Laurium.—It is only in recent periods that the features of the extensive mining region of Laurium in Greece, worked two thousand years ago, have been described. Although various kinds of deposits are represented, most of them belong under the present head.

In the Camaresa district, a series of nearly horizontal, non-fossiliferous limestones and crystalline schists is cut by a number of eruptive dykes, and suddenly assumes on the north-east a steep dip, probably indicating a considerable dislocation. The whole group is traversed by a number of ore-veins which, in the schists, are often rich enough to pay for mining. But the main mass of the ores lies on the contact between limestone and schist, and extends into the former in separate bodies or shoots. At the so-called second and third contacts, the bodies have a prevailing funnel shape and a vertical position. Fig. 87, an illustration from Huot, shows the apexes of the funnels to point on one contact upward, and on the other downward—but, in either case, into the limestone, according as it overlies or underlies the schist. The first form may be explained by the pressure of the ascending solutions. The second, as shown in this figure, is perhaps somewhat ideally sketched; at least the sections of this third contact given by Cordella show ore-bodies following the contact-plane itself.

According to Fig. 88 (also from Huot) the ore-bodies are funnel-shaped in north to south section, but from east to west have a flat westward pitch, which is hard to explain unless it represents some kinds of cleavage parallel to the dislocation already mentioned. Below the second contact, which carries chiefly lead, there are (at the Jean Baptiste shaft, for instance, according to Cordella) great masses of calamine, the secondary origin of which from zinc-blende is doubtful, since it would involve the assumption that the ground-water zone had extended to this depth. As to the present subterranean water-level, the descriptions at hand contain only the statement that the region generally is very dry, and that the ancients, who mined to the depth of 394ft., had no water to hoist. With regard to the structure of the galena deposits, there were in the exhibit of the Cie Française des Mines de Laurium, at the Paris Exposition of 1867, masses of galena, blende, and pyrite showing distinct stratification, but it was not ascertained from which deposit they came.

Which of the various eruptive rocks of the district (eurite, porphyry, diabase, serpentine, trachyte) gave occasion for the ascending springs which brought up the ore cannot as yet be determined.

The minerals accompanying the products of decomposition in such deposits, particularly of calamine, are naturally often limonite and other ores of iron. In many countries these play an independent part, being often formed by the metasomasis of limestone, as proved by the irregular masses of the deposits and the contained fossils transformed into ore.

Alsace.—An instance is furnished by the so-called *bohneisenerze* of Alsace and adjacent regions which have been described and correctly explained by Daubrée.

At Liebfrauenberg, irregular lean beds of this character, composed principally of limonite, but scarcely workable with profit, lie on both sides of an anticlinal of Vosges sandstone, and are covered with alluvium. In one place, however, near Goersdorf, an undecomposed body of pyrite and mispickel occurs instead of limonite.

Cumberland.—In Cumberland, limonite deposits occur on the contacts of the Carboniferous mountain limestone, both with the overlying millstone grit and with the underlying Silurian schists. They are connected with fault-fissures, on both sides of which they appear, as shown in Fig. 89, taken from a paper by Mr. J. D. Kendall.

Carniola.—The Alps offer some remarkable examples of *bohneisenerze.* These occur, according to A. von Morlot, in the region of Woechin in Carniola (known for its iron-ores and bauxite) in the dolomite and limestone mountains only, and either in the form of beds under the dolomite detrius, or in clay, in the caverns of the dolomite. Fig. 90 is a section showing the latter form. In this case the flatter-lying cavern was partly filled with lime detritus and clay up to its connection with a higher vertical cavern, while the latter was filled with *bohnerze* enclosed in loam, and had been mined, according to Morlot, to the considerable depth of 820ft. Here and there a nucleus of pyrite is found in the iron-ore. The beds and mass-deposits of bauxite associated with limonite sometimes show also the "bean-structure."

(c.) *Deposits in Crystalline Schists and Eruptive Rocks.*

Without entering here upon a discussion of the subject of regional metamorphosis, it may be remarked that, as a rule, the older a rock is the more changes it will be found to have undergone; yet that these changes do not advance in all places uniformly. Many Cretaceous and Tertiary formations of the Alps pretent a high metamorphosed, and therefore ancient, appearance; while many Silurian formations—as, for instance, that which surrounds St. Petersburg—have been so little altered that the fossil shells which they contain still have the mother-of-pearl lustre. Some regions, in a word, have been more strongly attacked than others, through causes which we will not here pause to consider; and when we follow the stratified groups downward, we come upon the various crystalline schists, often traversed by eruptives, and showing no longer any trace of the clastic sediments, which have been wholly transformed to crystalline masses. We cannot hope to find petrified organisms in these masses; but the occurrence of disorganized organic material in the