sufficient to warrant the expression of an unqualified opinion on this subject. One thing, though, is certain, that if the deposition of the chalcopyrite had its origin from ascending gases, vapors, and solutions, then it is only reasonable to suppose that the ore bodies would maintain continuity to considerable depth, whereas if the origin is from descending waters charged with copper, which have percolated through the cooling mass of magnetite, it would be equally as reasonable to expect that such ore bodies would not maintain continuity except to such depth as channels extended through which the waters could percolate.

There is one phase of this problem, though, which must not be overlooked. It is a fact that so far as my observations have gone no chalcopyrite occurs outside of the mass of magnetite, and at the point where the magnetite disappears the chalcopyrite also disappears; therefore the conclusion presents itself that the magnetite must be to a very great extent responsible for the chalcopyrite associated with it, otherwise one would expect to find the copper ore below the magnetite just as it is found below the gossan outcroppings derived from limonite.

In several instances which have come under my observation there is no question but that this class of ore bodies possess very considerable commercial value provided they are situated close to salt water, but where the question of transportation by means of long surface or aerial tramways has to be considered, operators, because of lack of confidence in the permanency of such ore bodies at depth, hesitate to make the necessary investment to perform sufficient development work required to block out a large enough tonnage of ore to warrant the installation of expensive tramways.

The fact that along the coast the zone of oxidation on the present surface is extremely shallow except in some isolated locations has also undoubtedly influenced operators and tended to increase their lack of confidence in this particular class of ore bodies. There is no use denying the fact that many deposits belonging to this class have the apearance of being the lower portion of a lenticular mass, the upper portion of which has been carried off by erosion, but up to the present time in every instance where development has been attempted, operations have been suspended at the point where the ore body had pinched, and no exploitation carried on to determine whether other lenses occur.

3.—The third class of ore bodies, that in which chalcopyrite ore occurs at the contact of crystalline limestone, slate or schist and igneous rocks will probably prove to be the most important because of being the most extensive and permanent occurrences of copper ore along the coast.

In this class of deposits the chalcopyrite generally occurs in a magnetite gangue, as well as in a gangue composed of garnetiferous felsite. Usually only one wall is well defined, especially so is this the case when the gangue is garnetiferous felsite. In such cases the limestone wall is well defined and considerable gouge occurs between the ore and the limestone, but on the opposite side the solid ore gradually gives place to garnetite carrying a fair percentage of ore, which in its turn grades into perfectly barren garnetite, thereby giving the impression that the mode of deposition of the ore was by replacement and that apparently the garnetite had a stronger influence in the formation of the ore body than the limestone. Owing to the solubility of the limestone one would look for masses and pockets of ore to occupy caves in that rock, but I have only noticed such as very exceptional occurrences. Usually the limestone shows an almost perfectly clean and regular cleavage plan on which the gouge lying between it and the ore body has formed.

Where slate or schist forms a contact with igneous rock and the ore body occurs in the contact the deposits, though of lenticular structure, are nearly always of exceptionally great dimensions. As illustrations of this fact there are the Britannia mines on Howe Sound about, 40 miles north of Vancouver, the Beatson group on La Touche Island, Alaska, and the Gladhaugh mine at Ellamar, Prince William Sound, Alaksa.

On the first-named of these properties the main ore body, known as the Mammoth Bluff, has been cross-cut more than 100 ft., the tunnel having been driven in ore all the way. This ore is extremely low grade in both copper and gold values, and occurs in a highly silicious gangue and should really be classed as iron pyrites carrying a percentage of chalcopyrite sufficient to give it commercial value providing a successful concentration can be made. While this Mammoth Bluff ore body is the largest in extent on the property yet there are other ore bodies of much higher grade ore but more limited in extent. The Mammoth Bluff is practically a huge mass of ore about 600 ft. long, 200 ft. high and has been cross-cut upwards of 100 ft. These dimensions are taken from the base to the apex of the bluff, and nothing is yet known relative to the depth. In fact, no sinking has been done on the property, unless quite recently.

The property known as the Beatson mine on La Touche Island, Alaska, is apparently destined to become the most important copper mine in Alaska, because the ore body possesses both great extent and high grade. A bluff of ore occurs here from which shipments in 250-ton lots have yielded an average of about 10% in copper. Under this bluff a cross-cut tunnel has been driven which determines that the ore body is about 200 ft. in width. From this tunnel an upraise has been made to the floor of a quarry in the face of the bluff. This upraise is made in ore. A second cross-cut tunnel is being driven at a level 100 ft. lower than the upper one, but has not yet been driven far enough to intersect the ore body, but when this has been done, if the conditions on that level are as favourable as on the upper one, where a drift has been run in ore about 150 ft., there can be estimated a probable tonnage almost, if not quite, equal to that