Gold Mining Simplified.

A somewhat incredible gold story has appeared in the U. S. *Press* to the effect that Mr. Bob Paul, of Township No. 10, Cabarrus county, N.C., went to the Charlotte mint for the purpose of having his gold dust coined, and told this tale:

"On my farm is an old gold pit that was dug by an English miner, as tradition says, during the revolutionary war. The same authority says that this miner took $15,000 from this pit in gold, and being satisfied with his wealth, abandoned the pit and went back home, leaving the mine full of rich ore. The people of the neighborhood worked the mine at different times, but it was finally neglected and forgotten. Weeds grew up around it, and the rains partly filled up the excavation. During the past winter I was troubled with mud in my front yard, and at the suggestion of my wife I went and hauled three cart loads of sand and gravel from the old pit-hole and scattered it over the yard. Last Monday, while walking over the gravel, I noticed a glittering object, and on picking it up I found that I had a nugget of virgin gold, weighing an ounce. I examined further, and the sand and gravel proved to be rich in gold. I carted the three loads to a branch near by, and 'panned out' gold valued at $325. I then went to the mound taken from the pit, and got a bushel of the ore and pounded it to dust in a mortar, and obtained gold to the amount of $125."

After hearing the story and seeing the $500 in gold, Mr. Eli Hinson, a wealthy citizen of Mecklenburg county, offered Mr. Paul $50 a bushel for the 2,060 bushels of sand and gravel lying at the mouth of the pit-hole. The offer was promptly refused. The story about the Englishman is said to be true by a doctor 50 years old, who lives near Mr. Paul. Experts have gone into the mine, and a full supply of modern machinery will be put in.

On a Possible Genesis of the Canadian Apatite.

By G. Henry Kinahan, M.R.I.A., &c.

(Read before the Geological Society of Manchester.)
Continued from page 11, *Vol.* 3, *No.* 4.

In the S.W. of Galway and the S.W. of Mayo these rocks also occur (*Lettermullen* and *Croaghpatrick beds*); but in these places the bands are of less width, while the rocks are not as well exposed: those seen are, however, more similar to the Canadian rocks, being more altered.

There are also in West Galway two other bands of more or less similar rocks; one, the younger (highest strata in the *Great Micalyte series*), being the uppermost member of the group of rocks that appear to be the equivalents of the Arenig rocks (Upper Cambrian) of Wales; while the older is a group in the supposed Lower Cambrian (*Ophiolyte* and *Dolomyte series*). In the latter there are some peculiar calcerous or allied rocks, exactly similar to some of those met with in the vales of the Du Lièvre and the Gatineau. In the Co. Donegal there are also similar bands, but of even less widths; they, however, are interesting on account of the rocks in them. The exact age of these is not yet satisfactorily worked out, but in the "Geology of Ireland" it is suggested that they are probably of Cambrian or Cambro-silurian age.

Certain limestones and dolomytes, in these groups of rocks in S.E. Ireland, Galway, Mayo and Donegal, also in other Irish localities that need not now be specially enumerated, are very curious, entangled in, and associated with, basic eruptive rocks [*Gabbro, Granitone, Euryte* (Daubuisson) or *Hybrid rocks* (Durocher) and allied rocks], also with quartzites or greissen (*quartz rock* or *reef quartz*). This connection of cilicious and calcerous rocks with eruptive rocks induced me some years ago to suggest that they were probably adjuncts of vulcanicity (*Geology of Ireland, chap. XII. and XIII., and prior papers*); while, since then, subsequent explorations seem to add strength to the suggestion, as rocks of these kinds occur in such intimate relations to eruptive rocks that they could not be ordinary sedimentary accumulations, but must have come into their present position in solution, or have been injected therein; the first, however, is more probable than the last.

The similitude between the Irish association of rocks, if the limestone w replaced by apatite, and those in the vale of the Du Lièvre forcibly presented itself when the latter was first seen, while subsequently, examination strengthened it.* An examination of the "back" of the lodes and bunches exhibited a color similar to that of rocks which, in Ireland, give indication of the presence of phosphoric acid, although in some cases very faint. This seems to suggest, considering the relative state of the rocks, those of Canada being more metamorphosed than the Irish ones, that there might be an affinity between them; while further examination and consideration appear to strengthen the impression.†

It should also be mentioned that in some of the Irish eruptive rocks, which apparently belong to those called *Eurgte* by Daubuisson or the *Hybrid rocks* of Durocher; there seems to be small quantities or traces of phosphoric acid.‡ This appears to be an important consideration, as will be presently mentioned.

The inquiry in connection with the home rocks is as yet far from being complete. After I learned the "gossan colour" of the apatytes, which was previous to my going to Canada, I have not had an opportunity of examining any but submetaphoric rocks, in which the pyroxene is little if at all changed; while according to the researches of G. H. Williams, of Baltimore, in the associated eruptive rocks of the apatites of the vale of the Du Lièvre, and also in Scandinavia there is a paramorphoses of the pyroxene and the felspar, the first "being more or less changed into hornblende and the latter into wernerite." Nevertheless, the home researhes, up to the present, appear to suggest that in the Irish submetaphoric rocks there has been a limited paramorphoses of limestone into apatite.

From what has been observed in Canada and in Ireland, I would venture to suggest that *it is possible the present Canadian apatites were originally limestone or allied rocks, the change to apatite being due to paramorphoses, which at present cannot be satisfactorily explained.* Such a suggestion seems allowable, when we consider that the paramorphoses of pyroxene, into hornblende, although known to take place, cannot as yet be explained. An objection that may be raised is,—Where did the phosphoric acid come from? If, however, it can be satisfactorily proved that in some or many of the unaltered Irish eurytes this acid is present, this objection would in a great measure be answered. Because if in the Irish assembly of submetamorphic rocks there are found phosphoritic eruptive rocks and limestones associated, while in the Canadian metamorphic rocks apatite and non-phosphoritic eruptive rocks are similarly related, it may be supposed that the additional action to which the latter were subjected was such as to allow the phosphoric acid to replace the carbonic acid.

In addition to the similitude between the form and occurrence of the limestone and apatite, there are other circumstances that may add weight to the previous suggestion, besides showing that other characteristic minerals of Canadian Archæan Rocks may be also the products of metamorphic action. Not however to excessive metamorphism, that is, an excessive change that took place at one time, or in one period of time; but to successive alterations, due to periods of metamorphic action, with intervals of greater or less duration between each. Rocks of such a great age as the Laurentian should necessarily be subjected to such vicissitudes; as during the lapse of time since they were first accumulated, they must sometimes have been at great depths below the surface of the earth, while at other times they were at or near it; therefore it appears safe to conjecture that the change they underwent during the first period of metamorphic action was subsequently augmented by the action of latter periods. Artificially, graphite can be produced by heat, so also can specular iron ore; if therefore in the Canadian rock, when submetamorphic, there were graphitytes, pyritilytes, pyrrhotilytes, with ferriferous limestones, and schists, as found in the Irish rocks, there would have been rocks that, by subsequent alteration, should change into the graphite-schist and other graphite producing rocks, the "specular schist" and other iron ores; while it might be also suggested that the metamorphoses of pegmatyte would further develop its minerals, and by concentration increase the size of each individual mineral; thereby accounting for the great size of the crystal of mica and other constituents of the Archæan pegmatytes.

It may appear presumptuous in a person, not a chemist, to put forward some of the above suggestions, still, as during the last six or eight years I have been studying the possible or probable genesis of apatite, they may be excusable. Besides, from my knowledge of Irish rocks, and also of rocks in a few English and Scotch localities, I suspect, now that special attention is directed to the subject, that apatitic rocks will be discovered in different localities; nor would I be surprised if some of them were of commercial value.

In the Atlantic States, from Maine to Virginia, 65,000 long tons of land plaster and 60,000 tons of stucco, total 125,000, were made in 1884, of which nearly all was from Nova Scotia gypsum.

The Austrian product of the money metals for the calendar year, 1884, was as follows: Gold, $15,670, and silver, $1,267,142. This is a somewhat larger product of both metals than that of 1883. The gold product of Hungary is not included.

A Russian Expert Expedition.—The Russian government proposes sending experts to Turkestan, to study the turquois mines on the Persian frontier. The same commission will visit the sulphur deposits recently discovered near Khiva, and the lignite mines and petroleum springs in the district of Ferghana.

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* Regular lodes of dolomyte and calcite occur in Irish eruptive rocks: also veins of bastard limestones, with *one wall* merging at the other side into the country rock,—such lodes and half-lodes that I call to remembrance are, however, mere bagatelle to the Canadian lodes of apatite.

† Phosphoric acid in small quantities is frequently found by chemists in limestones and dolomytes. It would, however, be necessary to know the exact localities where such limestones and dolomytes came from in order to determine whether the rocks were an ordinary deposit or subsequently partially altered. This is an important point: as unless special localities where such apatite limestone came from is known, they ought not to be brought in as evidence "that many limestones contain apatite."

‡ These rocks weather with a partial gossan colour of the Canadian apatite.