

off. In this way a lot of 100 acres will sometimes show five, ten or more pits, often on as many beds, from twelve to twenty feet deep; each of which may have yielded one or more hundred tons of apatite, and has been abandoned in turn, not from any failure in the supply, but because the mineral could be got with less trouble and cost at a new opening on the surface near by.

These conditions are scarcely changed when miners, without capital and unprovided with machinery for hoisting or for pumping, are engaged, as has often been the case, to extract the mineral at a fixed price per ton. These, having no interest in the future of the mine, will work where they can get the material with the least expenditure of time and labor, and often will quit the opening for some one which is more advantageous. The very abundance and the value of the mineral mined has thus led to its careless, wasteful, and unskilful exploitation. It is the working of these causes, in the way just explained, which has thrown undeserved discredit on this mining-industry, and, more even than the injudicious schemes of speculators and stock-jobbers, has retarded its legitimate growth.

It is evident that the proper development of these deposits will require regular and scientific mining in place of the crude plan of open pits and trenches, which, from causes already explained, has hitherto, with few exceptions, been followed. As a basis for calculation in mining, it becomes necessary to establish some data as to the production and the value of the apatite-layers which we have described. The specific gravity of the mineral, as deduced from many specimens of massive Canadian apatite, is from 3.14 to 3.24. If we assume 3.20, this will give for the weight of a cubic foot of apatite almost exactly 200 pounds. A fathom of ground, carrying a bed or vein of apatite one foot in thickness, will thus contain thirty-six cubic feet, or 7200 pounds of apatite; equal to a little over three and one-fifth tons of 2240 pounds each. Allowing the fractional portion, equal to nearly seven per cent., for loss in mining (it will be noted that coarse and finely-broken apatite are equally merchantable), we shall have as the net product of a layer of apatite for a fathom of ground mined, three gross tons for each foot in thickness.

The apatite of these deposits is generally greenish in color, often clear sea-green, but more rarely reddish-brown in tint. The massive varieties are sometimes coarsely crystalline and cleavable, but sometimes finely granular. The veins often yield crystals of large size.

The mineral is essentially a fluor-apatite, containing not over two