earth and timber. By probing the marsh with an iron rod, the workmen find where the solid timber lies, and then removing the surface sods and roots, they manage to work in the mud and water long one handed saws and cut off the logs, which then rise and float, as the timber is not water-logged at all, but retains its buoyancy, and the removal of that nearest the surface releases that which is below and it rises in turn so that a new supply is constantly coming up to the workmen. In this way a single piece of swamp, which is below tide-level, has been worked for fifty years past, and still gives profitable returns.

A very interesting paper on the chemical formation of metamorphic rocks was read by Mr. Hunt. A letter of Sir R. Murchison on the crystalline rocks of the North Highlands of Scotland, and a note of Mr. Salter on fossils found at Durness attracted great attention. The following paper on the dressing of metallic ores by Professor Silliman will prove interesting to our readers.

Professor Silliman gave a brief description of a new system of dressing Metallic Ores. The Professor said the object of his remarks was to describe the general principle of a system of ore dressing, devised and put in practice at the Copper Mines of the Bristol Mining Company at Connecticut, under his own direction. The main features of this system are the perfect separation of the finer portions of the product of stamping and crushing, commonly known as "Slime Ore," from the coarser portions, without the aid of sieves or screens,—the application of the well known system of jigging directly to the stamped ore, which has hitherto been incapable of this mode of treatment. The adoption of such mechanical arrangements has rendered the whole process of oredressing one continuous and self-sustaining system, in which human labor bears an exceedingly small ratio to the result obtained, compared with any system hitherto devised. In this system, the waste or refuse material is disposed of exclusively by gravity and moving water, without handling, while the ore is brought up to the highest mercantile percentage, however poor the original ore may be, no appreciable quantity of ore escaping as the waste.

The first of the above results is accomplished by the use of a new and exceedingly simple hydrostatic apparatus, devised by Mr. Stadtmuller, Mining Engineer to the Bristol Mining Company. (A model and sectional drawings of the apparatus were here shown to the audience.) The efficient cause of the success of this apparatus is the movement of a current of water in an inverted cone of iron, having an annular space surrounding an inner cone. The ore is admitted at the top, and is distributed over a conical surface to meet the ascending current of water, which is so adjusted in volume and force by a proper valve, and by a nice proportioning of the parts, that all the finer and more muddy portions of the ore are carried over the upper lip of the apparatus, while at the bottom escapes, with a more forcible current of water, through an adjustable orifice, all the coarser ore and metallic particles. These are certainly free from all slime, and are dressed upon a continuous arrangement of self-acting jiggs, and are carried immediately to a percentage suitable for market. The proportion of the ore, (about one half,) which escapes at the upper portion of the hydrostatic cone, is treated by alternate subsidence in large conical vases, the denser portions from the bottom of which are dressed upon Bradford's ore separators, (a pan of copper having the reciprocal motion of the miner's shovel,) which have been found, when served with only the class of ores properly adapted to them, admirably successful and economical. The ores, too fine or small in size for the separator, are treated upon a large conical table of circular form, with a very gentle current of water spread in a thin sheet over the table, thus clearing the last traces of ore from the finer particles of sand with which they are mingled. This paper was illustrated by models and drawings, and by samples of the ore thus dressed, shewing in a very decided manner the beauty and efficiency of the system.

Prof. Chapman, of University College, Toronto, brought forward at considerable length his views on the origin of native metals in vein fissures. These views are at variance with those of the majority of chemists and geologists, at least in their application to the copper deposits of this continent. We give, therefore, an extended, and we believe faithful statement of Prof. Chapman's views from the *Gazette*.

"From the known fact that solutions of various metallic salts may be decomposed by voltaic agency, and the metal obtained in the simple state, it has long been a favorite theory with many geologists, that depositions of native metals, in veins, &c., are due to a similar cause. That such may be a perfectly legitimate conclusion in many instances, I am quite ready to admit; but, in applying this view to any particular case, it is necessary, unless the explanation is to be regarded as a mere theory of convenience, that certain collateral circumstances be not altogether excluded from consideration. If these circumstances oppose themselves to our theory, and remain by it altogether unanswered; nay, if but a single well-proved fact withhold its concurrence from the conditions demanded—surely it is more consistent with our obligations to scientific truth, that we abandon the theory at once—however plausible in itself, and however convenient in its application—rather than attempt to maintain it by keeping these opposing conditions out of sight, or by wilfully ignoring their value. Now, my object in the present brief communication, is simply to bring before the notice of the Section, certain facts, experimental and otherwise, which appear to me to prove most incontestibly, that, in nine cases out of ten, the so-called electro-chemical theory as explanatory of the organ of native metals in veins, is entirely fallacious.

We will take the case of native copper, under its known conditions of occurrence in the Lake Superior District and other parts of North America. The electro-chemical theory is constantly being brought forward in explanation of this particular case. As the copper is here, nominally, in intimate association with vast masses of erupted trap, it might naturally be inferred that the presence of both trap and copper was equally due to igneous action; or, where the copper occurs in small strings and arborescent masses apart from the trap, to a modification of this action, in volatilization and subsequent reduction of chlorid of copper or some other volatile compound. But the upholders of the electro-chemical theory, find these views apparently too simple for their approval. It is very possible that the copper may have originated by some other agency; but the following facts will, I think, shew that this unknown agency was not the electro-chemical principle, whatever else it may have been. The copper is very constantly found in the interior of zeolites or calc-spar, or surrounding crystals of the latter substance in such a manner as to shew that the calc-spar was solid before the solidification of copper—the copper often presenting the most sharply-cut impressions, even to the minutest striæ of the crystals of the calcareous spar. I mention this well-known condition of occurrence first, because it is commonly referred to as affording a strong proof of the deposition of the copper according to the electro-chemical theory, although nothing can really be more fatal to its reception.

The conditions of occurrence just alluded to, may, in the estimation of some, disprove the igneous origin of the copper; but equally do these conditions disprove its origin according to the other view. In the first place, it must be remembered that the zeolites, and carbonate of lime also, are *non-conducting bodies*; and hence that no deposition of metal can be made to take place upon them, by the electro-chemical process, unless their surfaces be first coated with graphite or some other conducting substance. This may be readily shown by the simple method of ascertaining the conductibility or non-conductibility of mineral bodies employed by Von Kobell. The substance under examination is to be placed in a solution of sulphate of copper, and touched by a slip of zinc, or a piece of zinc bent into a kind of tongs may be used to hold the mineral. A deposition of metallic copper will rapidly take place upon conducting bodies, such as pyrites, galena, graphite, anthracite coal, &c.. &c.; but not upon non-conductors, as quartz, the felspars, garnet, calc-spar, malachite, and other similar minerals.

This fact, when forced upon the attention of those who maintain the electro-chemical theory, has been allowed to be "an objection"; but that is not the proper term. It is an insuperable obstacle—nothing less—to the legitimate adoption of this theory; and until it can be satisfactorily explained away, to attempt to account for the origin of the copper by reference to the principle in question, is surely, to say the least, a mere waste of words. A few other objections to this electro-chemical hypothesis may be briefly touched upon. This hypothesis exacts necessarily a solution of the copper in some form or another.

Now, many of the minerals associated with these copper deposits —carbonate of lime, for instance,—are readily altered by immersion in cupreous solutions; whereas the crystals of carbonate of lime actually occurring with the copper, as well as those met with in its immediate neighborhood, exhibit no appearance of alteration, but retain on the contrary, their white color and original surface condition. By placing these same crystals for a short time in a solution of sulphate of copper, they become converted at the surface into malachite, or into a copper carbonate of similar aspect, more especially if the solution be kept at a moderately elevated temperature. Again, if the enormous deposits of Lake Superior originated in this manner, might we not reasonably look for the presence of vast secondary products, the results of the chemical decompositions which must necessarily have taken place. It is asking almost too much to assume that these secondary products may, from their