Scientific.

AN IMPORTANT DISCOVERY.

The scientific correspondent of a Montreal journal (probably one of the officials at the Paris exhibition), gives a very interesting account of a new process for obtaining steel from iron ore, discovered by a French chemist. We have no doubt the subject will be interesting to the scientific, and instructive to the general reader —

Among the curious scientific inventions which are brought forward at the Exposition the metallurgical processes of Adrian Chenot are entitled to a prominent place. The art of extracting metals from their ores is one which is so intimately connected with that of mining that it might have naturally been expected to have kept pace with the great progress of that science during the last century. Such however, has not been the case; and the processes which are to-day employed in melting the ores of Etna and the tin ores of Cornwall are essentially the same as those employed twenty centuries since by the Romans who then employed the same mines, the conquerors of the world and before them the Phœnician merchants, sought at the *Ultima Thule*, the same silvery metal, which now forms the stock in trade of their successors (of the Phœnician) Dorian, the Yankee tin peddlars—We may even say that in metallurgy, as in many other arts we have lost the secret of those olden times so much so that to-day the blades of Damascus are only known in history and the temper of the swords of King Arthur and his gallant knights is attributed to fairy skill. Well Adrian Chenot, skilful chemist and accomplished metallurgist at the same time, felt the reproach that all these facts cast upon modern science, and set himself at work with that enthusiasm and self-denial which alone accomplishes great things to remove this reproach and to endow his art with those rich advantages which his favorite science had already conferred upon so many of the other arts of life. He saw in the commencement that there were two great points to be kept in view—excellence and cheapness. In these days of cent per cent, the servant who neglects no sacrifice to mammon may win the favor of Olympus but not of the Exchange, and he learns not to overlook the all important question of economy. Now it is precisely in this respect that the art of metallurgy is the most behind hand. When the Roman wished a few tons of iron to mould swords and battle axes, and to fashion their armour, they asked no questions as to expense, and since wood abounded, labour was of little account; their only problem was to obtain strong bright steel, without regard to cost. But where our ancestors demanded a ton of steel or iron for their limited wants, we require a hundred, not only for our cutlery but for our cannons and balls, for our engines and our iron roads, to say nothing is high, wood is rare, and for coal we must sink expensive mines, and the eight tons of coal which are required to fit one ton of steel for the market, add immensely to the cost of the metal

Chenot's first question was, then, the economy of fuel. The smelter of iron has not only to reduce the oxyde which constitutes the ores to the metallic state but to fuse the metal; to accomplish the first, a moderate red heat only is necessary, but the subsequent fusion of the metal requires a greatly increased temperature and a vast expenditure of fuel. Nor is this consumption of coal the only objection to the fusion: the iron takes up certain impurities from the coal, which make it more fusible, it is true, but which give it the brittleness that characterizes cast iron. To remove these foreign materials and to give the iron that softness and toughness which enables it to be wrought at the forge, and serves to distinguish iron from all other metals; another long prolonged fusion and a peculiar process is required to convert the cast metal into malleable iron and finally to give to their product the fine edge, hardness, and elasticity which characterizes steel. The malleable iron must undergo a kind of operation in the furnace before it has realized that condition of highest excellence, which fits it for the cutler's art.

To produce at will malleable iron or steel directly from the ore, was then a great problem for the metallurgist; since he might hope by this means to reduce to one half or one third the amount of fuel and of labor; and Chenot soon found that, in attempting this, another most important economy was attained. In a word, the great heat requisite for the fusion of the metal, was no longer necessary, and it became possible to convert the crude ore into *wrought iron* and steel without ever once melting it. Such is the discovery which he now claims to have perfected, after twenty years of painful and self-denying labors, and which he now offers to the world.

I will endeavor, in a short space, to give you some idea of the nature of this process as I learned it from the inventor himself at his works at Chely, where this worthy representative of the old alchemists—venerable, bearded, and enthusiastic as they—labors, though with the agencies and instruments of modern science, which in many respects more than realize the wildest ideas of those early savants. Modern chemistry has taught us the use of gases of which the alchemists knew little or nothing. They looked upon them as immaterial essences or spirits which escaped their modes of research; and it is only within less than a century that we have learned to control these subtile powers and make them available to light our cities, inflate balloons, and serve a thousand other purposes of life. I indulge in this digression upon pneumatic chemistry, because it is solely by means of gases that Chenot obtains his surprising results. In the first place he makes use of gas as a source of heat. In his process the fuel is never brought in contact with the ore, which is enclosed in a huge upright case or crucible of fire-brick. It would be impossible to heat this great crucible in a uniform manner by any other fuel than gas, and here Chenot has made for the first time an economical application of a cheap and very common-able gas which has hitherto been known only in the laboratory of the chemist. When the air passes over a mass of ignited fuel, its oxygen combines with a portion of the coal, and is converted into a dense incombustible gas, known as carbonic acid, which is the ordinary product of combustion; but if this gas passes over an additional body of red hot coal it takes up as much more carbon as it held before, and and becomes combustible, burning with a pale blue flame, without smoke, such as may be seen playing upon the surface of an ignited mass of coke or authracite. By a peculiar construction of the furnaces, which receive a limited supply of air Mr. Chenot converts the whole of his fuel into this carbonic oxyde gas, which is conveyed by chimneys to the surface of the retort, and there being supplied with air, is burned for the purpose of heating to redness the