the great principle of incorporating it thoroughly with the soil, we see how this is done by the top dressing of grass land. Though lime be but sparingly soluble in pure water, yet we have seen that it is quite freely so in water charged with carbonic acid: when marl lies with the decayed leaves and stalks of grass on the surface of the meadow, this gas surcharges rain water, as soon as it falls, *dissolves* the lime, and carries it in a state of solution in the soil.

This is not the only way however in which it is mixed with the soil. A large quantity of lime, though not dissolved, is yet carried down the interstices of the soil mechanically, by the water which falls on it. In this way much of it will disappear from the surface, having become diffused through the soil.

The rationale of the application of marl to the surface is equally sustained, when we consider its physical condition in connection with its chemical qualities.

The lime which exists in marl is always in the state of carbonate, and hence subject to the same influences as common lime that has been burnt from shells or limestone, and become slakened.

There is however this difference, that the lime in marls is either in masses of comminuted shells, or in large fragments that have never been disintegrated. By atmospheric exposure on the surface they are subject to the action of water charged with carbonic acid.

The shells by alternate freezing and thawing crumble into finer particles, become more easily acted on by water impregnated with carbonic acid as this change progresses, and become entirely blended with the soil, fulfilling, perfectly, all the indications which first directed their use.

Under this head we will also speak of

MAGNESIA.

It is the oxide or rust of a metal called magnesium, and its necessity to fertile soils is supported by facts as well established, evidence as conclusive, and testimony as convincing, as those which show the use of lime, potash, or any other constituent.

Like lime, it loses its carbonic acid when exposed to a high degree of heat, and becomes caustic or *calcined* magnesia. It remains in this condition much longer than lime, as it imbibes carbonic acid with much more difficulty from the atmosphere. It also unites to water, but with much less intensity than lime, producing but a very slight degree of heat, whilst the union is being accomplished. Magnesia, for agricultural purposes, is obtained from a rock called dolomite, and is found associated with lime, both existing in the state of carbonate.

The proportion of lime and magnesia in this rock varies in the different localities, and even in different parts of the same rock; and the ratio of their ingredients is very variable, "since its omorphous substances crystallize together in all proportions." We can