

components of the soil, and I again commend them to my agricultural friends. I have now to add another important office of lime, which has been brought to light by the discoveries of Brustlein, referred to on page 27 of the present report. These prove conclusively the presence of lime in the soil absolutely necessary for the fixation of ammonia in the soil from its salts, although pure or caustic ammonia is detained in soils destitute of lime. But as ammonia, whether supplied to the soil either by natural means, or in manure, is *always* in the form of carbonate, sulphate, or some other salt, we have an additional reason for applying lime to our soils.

When lime is *evenly* distributed on the top of the ground, and harrowed in so as to remain within two or three inches of the surface, it is carried deeper by the rain water and diffused throughout the soil, rendering its *plant-food*, whether organic or inorganic, available, which was before inert. The most costly element in our fertilizers is ammonia, and we now find that by the proper use of lime we are enabled to economise and retain this important material in the soil in a state available to the roots of plants.

## 2.—SHELL MARL.

The first report contained a full account of the different kinds of marl existing in this State, with an earnest exhortation that this important material might be generally used in our tide water counties. It occurs in numerous places on the banks of streams convenient to navigation, and if proper arrangements were made for delivering it on board of vessels it might be cheaply delivered to all parts of our State lying contiguous to navigation.

It fulfills every purpose that lime does, besides furnishing the *indispensable phosphate of lime* in proportions varying from one or two to six and two-thirds per cent. It is an established fact that lands long cultivated are nearly always more in want of phosphates than any other of their inorganic constituents, and this is *more* than supplied in the quantity of marl usually applied, say two hundred to three hundred bushels.

I must refer to the first report for other matters of interest connected with marl, but I beg leave to repeat the opinion then given, that it is better to apply lime or marl upon a sod of clover or grass eighteen months or two years before it be plowed under.

There is a serious loss in plowing in lime, marl, and, in fact, almost every article used as manure, soon after it be spread upon the surface.