

mer, it cannot fail to become the grand desideratum of the day.

The Society of Arts offers a premium "for the production of ammonia or nitric acid from their elements, by methods which would admit of practical application;" and some time ago a paper on "A new Method of Manufacturing Ammonia" was read by Alexander Williams Neath, before a weekly meeting of the society, bearing closely upon the practical illustration of the subject before us; so that the progress of things is, at least, advancing in the direction of its ultimate solution.

In this work of scientific and practical inquiry, one of the chief difficulties experienced is the examination of those processes that take place below the surface of the soil. The facts of the case being imperceptible to the naked eye, the agriculturist and chemist are left to grope their way, as it were, in the dark, and to draw conclusions from scientific data, rather than practical. Thus when either breaks a clod, his olfactory organs unmistakably inform him of the escape of the sulphurous gases; and when he farther proceeds to examine from whence they are liberated, the question is all-but self-evident, that they must have been confined in the pores of the soil, along with air, while undergoing decomposition, and that in the process of cultivation fresh air is admitted and confined, along with the moisture, &c., the whole being subject to chemical laws not yet understood, as already stated. But inquiry cannot stop here; for the cracking clods, through the instrumentality of moisture absorbed and their own gravity, are seen bursting asunder into fragments, so that another question naturally arises, *How is the equilibrium of things affected by such means?* Are caloric, light, and electricity in any way distributed, so as to produce nascent nitrogen, and then ammonia, or sulphate of ammonia, or any ammoniacal compound, in the decomposition of the animal, vegetable, mineral, and gaseous matters thus pent up in the pores of the soil, or present in it, under the special circumstances of the case? The question here, it must be borne in mind, is not as to whether ammoniacal fertilizers are generated during the composition of animal and vegetable substances? that being a realized fact; but whether the presence of the other substances under consideration produces an increased supply, so as to account for the increased fertility of the soil experienced? an increased fertility which is proved by the heavier crops harvested. It is now an established fact that, under steam-culture, heavier crops are being produced, with less manure applied to the land than formerly; while the land itself continues to increase in fertility. Had the heavier crops been raised by exhaustion of manurial elements in the soil, the two sides of the balance-sheet would have tallied; but in practice it is otherwise. Hence the practical question that demands solution.

There is, however, another way by which an exact balance may be effected, without the natural production of ammoniacal fertilizers, in accordance with the above proposition. Thus

if, under horse culture, a waste of manurial elements takes place, then all that is necessary to render a perfect balance with the heavier crops now growing under steam culture, is a great economy of manurial elements in the natural laboratory of the soil at this season and during winter, as well as during spring and summer, when crops are growing. A great amount of water is consumed in the growth of heavier crops, and a larger quantity of oxygen abstracted from the atmosphere or air in the soil, while the decomposition of water is less. Consequently, under steam culture, less hydrogen is liberated in the soil than under horse culture; but the amount of nitrogen disengaged from the pent-up air is much larger.

That this latter solution of the question is true to a very large extent, is amply borne out by fact, the greater waste of manurial substances under horse culture being so self-evident as hardly to require proof. At the same time, there are innumerable cases of summer fallows and poor clay soils to which the solution is not applicable, so that farmers have no alternative left but too fall back either upon the old favourite theory of the clouds and electricity, or else have recourse to the more modern one under notice, of ammoniacal fertilizer being generated, by some unknown process, in the soil. Now, the reader will readily perceive that when an exception of this kind is once admitted, it must of necessity become the general rule; for, if ammoniacal fertilizers are generated in the exceptional soils referred to, they will be much more readily produced in the other cases where the process of formation is already in operation. Hence, the argument turns in favour of the proposition instead of against it.

Before discoveries in physical science are made, all inquiry in search of them must assume a matter of course partake more or less of a speculative character; and in this light the few dissenting observations just made on the natural production of ammoniacal fertilizers in land will it is hoped, be received. Whether such takes place in the soil in the manner stated or not, a clear case, besides, relative to the great economy of manurial element, has been made out in favour of the steam plough, more especially in early autumn tillage. And, if this greater economy the progress of discovery shall eventually add that of the natural production of one of the most valuable fertilizers now in use, the total advantage gained will be inestimable. We have purposely avoided detailed calculations as to the amount of nitrogenous element on either side of the balance-sheet as all such generally exemplify a great tendency to dogmatical empiricism than to practical usefulness. Some plants, it is said, exhaust ammonia; and hence in all probability, has the function of generating it within their organism: and why should not the soil possess a similar function, either before the seed is sown or else during the growth of plants—two distinct views of the question which ought not to be lost sight of in its investigation. When the steam plough enters the field, at this season