some small portion of the top of the soil gets burned and a few of the stones pulverized, and these, with what ashes we have from the wood, make a manure that sometimes gives a number of crops. But by making "burnt piles" we get the soil reduced wholesale and effectually. Now, to those who do not care to make any particular effort to get manure in this way, still I would offer some information in regard to burning various kinds of rocks—ordinary field stone as good as any other. All manurial substances, especially the morganic, are derived directly or indirectly from the different kinds of rocks. And this country contains all the necessary kinds. We hear a good deal about the benefits of lime and plaster; but Nova Scotia is nearly half covered, either in bed rock or boulders, with rocks that are, if anything, superior to lime or plaster as manures, when pulverised, and appear to be much more easily burnt. And perhaps half of the farmers need not go further than their own fields for these rocks. If they have any old decayed fencing, brushwood, stumps, windfalls, or other description of fuel, these are a first requisite; and for the rocks,—besides lime and plaster, we shall take conglomerate, well known by its appearance, and a reddish rock of which the Cobequid mountains are mainly composed, and the different kinds of gnaissoid or granitic rocks of the Province, east, west and south. We may also include some of the sandstones, and the trap of Kings and Annapolis Counties. These all, though containing more or less of combined silica and alumina, are in large part composed of the alkalies, and of course are rich in phosphate and sulphate material. I may particularly mention that the iron vein that runs full length along the south side of the Cobequid mountains is contained in or associated with a heavy band of mineral fully better than lime alone, and far more easily soluble.

But time and space are limited, therefore I must close. I have but touched on a magnificent field of interest to our farmers; but hope before long to address them upon another branch of the same subject fully as interesting.

CLOVERDALE.

ST. ANDREW'S AGRICULTURAL SOCIETY.

In accordance with a resolution of the above Society, passed March 1st, 1880, notice of which appeared in the April No. of the JOURNAL, the committee thus appointed imported two thorough-bred Durham Bulls from Ontario, at a cost of about three hundred dollars. They arrived here about the 1st of May, in fine condition, and were sold by public sale, to be kept for the benefit of the Society for three years. One of them, the "Marquis of Lorne," was purchased by our worthy Vice-President, for the district of Upper South River, and the other, the "Duke of Oxford," was purchased by Mr. Chisholm of Beauly. While writing on this subject it may not be too much to say that the Agricultural Society of St. Andrew's is doing good work, and that they now own four bulls that will compare favourably with any in the Province. It is to be hoped that the people of this district will manifest an earnest desire to improve their stock by giving a hearty support to our Society. The thanks of this Society are due to Mr. Thorpe of Fergus, Ontario, who, in connection with our enterprising agent, H. McDonnell, was instrumental in securing for us the celebrated stock referred to above.—*Com.*

THE increased use of phosphoric acid in Nova Scotia in the various forms of bone dust, superphosphate and special fertilizers, renders it desirable that our Agriculturists should study carefully its nature, and the circumstances which increase or diminish its efficacy when applied to the soil The following from the London *Agricultural Gazette* will be read with interest and profit:

Tricalcic phosphate is scarcely affected by pure cold water, and has no fixed degree of solubility in that liquid: a small part of the phosphoric acid is at first taken up by the water, the residual phosphate becoming gradually more basic and more insoluble. In water containing ammonia salts the phosphate is more readily dissolved, 1 part being taken up by 19,612 parts of water containing 1 per cent. of chloride of ammonium. In water saturated with carbonic acid gas the phosphate is much more soluble, 1 part dissolving in about 1789 parts of the liquid. This comparative ready solubility of phosphate of lime in water holding carbonic acid is, however, destroyed by the presence of carbonate of lime; in the presence of this substance the solubility fell to 1 in 45,915 parts of the liquid. These experiments being made on gelatinous, precipitated tricalcic phosphate, show the greatest degree of solubility of which this substance is capable.

As soon as we turn to phosphates sold in the market, we cease to be dealing with pure substances. The phosphates available for our use consist chiefly of phosphate of lime, but they often contain small quantities of other phosphates, and, in addition, more or less considerable quantities of substances which are not phosphates. Chemists have been apt to forget this mixed character of the natural phosphates, and to speak of them as if they had each a fixed degree of solubility; this, however, is not the case. When these natural mixtures are attacked by the water and carbonic acid of a soil, the ingredients of which they are composed are dissolved at different rates of speed, the most soluble ingredient being removed first. The experiments made with boneash strikingly illustrate this fact.

A sample of commercial boneash was analysed; a portion was then treated with successive quantities of water saturated with carbonic acid, each treatment lasting several days. The first extract contained phosphoric acid equal to 1 part of tricalcic phosphate in 1917 parts of water; in the second extract the solubility had fallen to 1 in 3110; and in the fifteenth was only 1 in 6043. The solubility even then had not quite ceased to fall. Experiments with another sample of boneash, in which the action was carried further, apparently showed that a permanent solubility of 1 in 6788 was finally reached after the more soluble matter had been removed.

It is quite evident from these results that a small part of the phosphoric acid in boneash exists in a form that is easily soluble, while the great bulk of the phosphate dissolves but slowly in water holding carbonic acid. The more soluble phosphate possibly exists as phosphate of magnesia, as the magnesia present was found to be chiefly removed in the earlier extracts. The principal phosphates of boneash appear from these experiments to have less than one-third the solubility shown by freshly precipitated phosphate of lime.

We have unfortunately no series of determinations showing the comparative solubility of the principal natural phosphates in water saturated with carbonic acid; such work carefully done would be of considerable value. Mr. C. P. Williams found that finely ground South Carolina phosphate dissolved at the rate of 1 part of phosphate of lime in 6544 parts of carbonic water. With finely ground bones the solubility was 1 in 5698; and with finely ground apatite 1 in 110,840. All experiments agree in regarding crystallised apatite as the most insoluble form of phosphate of lime. The phosphates of iron and aluminium are, when basic, almost completely insoluble in carbonic water. In the absence of an accurate series of experiments it is only possible to state generally that bones, boneash, phosphatic guanos, and South Carolina phosphate, probably rank among the most easily soluble of the undissolved phosphates at the farmer's disposal.

In speaking of the solubility of a phosphate it must not be forgotten that when distributed through a soil the phosphate may possibly be directly attacked by the roots of the crop, and taken up without any previous process of solution. The extent to which this may happen is probably very limited.

We will now glance briefly at the principles which should guide us if undissolved phosphates are employed as manure, reserving for another paper the discussion of the relative merits of dissolved and undissolved phosphates.

When a sparingly soluble substance is employed as a manure, it must, if it is intended to produce any marked effect, be applied—(1) in considerable quantity; (2) in very fine powder; and (3) great pains must be taken to obtain a thorough distribution of the manure throughout the soil. By proceeding in this way the manure is made to expose the greatest possible surface to the attack of the water of the soil and the roots of the crop, and the slowness of action resulting from its natural insolubility is as far as possible obviated. Mr. Ruffle has lately suggested that phosphates intended for use in an undissolved condition should be reduced to the condition of a "flour," passing through