and distribute, gratuitously, a copy to each of the cheese and butter-factories.

5th; The committee might, at the same time, recommend the legislature to adopt a law obliging the proprietors of these industries to make an annual report to the Department of Agriculture and Public Works founded on the above named schedules, under a penalty sufficient in amount to insure the execution of the law.

6th; The association of cheese and butter manufacturers of the province should receive an allowance, for the purpose of enabling them to send delegates to exhibitions and meetings abroad, and to assist them in publishing their reports, &c.

7th; The dairy school of Ste-Marie de Beauce should receive assistance from the government, in order that an experimental station may be established there, for the purpose of making researches as to the best methods of utilising the produce of our milch-cows; to aid in procuring apparatus, utensils, and implements of divers construction; to show the people the real value and efficacity of them, before introducing and recommending them for general use in the new factories.

8th; A special and general exhibition of the dairy-products of the province should be encouraged, and, at the same time, a general meeting of the butter and cheese makers of this country should be called.

9th; A museum of all the apparatus, utensils, and implements used in dairy-work, should be formed.

Your most obedient humble servant,

(Signed) S. M. Barré.

From the French.

First steps in Farming—Young Man's Department.

Dear Sir, Knowing you to be an authority I would respectfully ask for your opinion as to the value of limestone ground as fine as flour without having been burnt, as a manure for land. I ask this as I have read that some of the most valuable parts pass off in the process of burning.

Yours respectfully, F. C. Crean.

Strangely enough, the article I intended for this month's number will be a full reply to my friend Mr Crean's question. We will, then, proceed to consider the use of lime in agriculture.

And first, what is the shape in which lime is usually found? There are three principal forms of lime: carbonate of lime—chalk and limestone; sulphate of lime, or *gypsum*, called also *selenite;* and the phosphate of lime, of which we have spoken already. The sulphate, here called land-plaster, we will talk about later; at present, our business lies with the rock or limestone; for chalk, which, in England, forms the subsoil of large tracts of country, and is there used on the land either raw or burnt into lime, does not exist in the Dominion.

Limestone is a carbonate of lime; that is, it is a compound of carbonic acid gas and caustic lime. The carbonic acid is combined with the lime by so weak an attraction, that heat alone is sufficient to expel the acid and the trifling quantity of water which the limestone contains. If you will put a small piece of limestone into a cup, and pour *muriatic acid* upon it, the stone will be decomposed, and the carbonic acid will bubble up through the fluid, until the muriatic acid is fully combined with lime, and its powers entirely neutralised. Very strong vinegar will have the same effect. It is this deadly carbonic acid which causes the death of those persons, who, attracted by the warmth, incautiously sleep too near the kilns when in work.

I need hardly dilate on the manner of burning lime, and Mr Crean's question is already partly answered; for if, as is the case, burning limestone only dissipates the carbonic acid gas, we need not trouble ourselves about it. But whether it is better to burn or to grind limestone is another thing, and demands an argument.

If, as I suppose it sometimes is, the object be to reduce the stone into a state of the most intensely fine powder, to act as a mechanical agent in lightening heavy clay soils; if the expense of grinding be less than the expense of burning; and if the lapse of two or three years be no object; then, I think it would be permissible to grind. In Kent and other chalk districts, in England, large quantities of chalk are carted on to the land in the autumn; and when attacked by the frost, the pieces tumble into powder and become mixed up with the soil. But the effect is slow, and the haulage expensive. I have tried it, where the chalk cost me nothing, and I preferred paying sixpence a bushel for burnt-chalk, i. e. lime. I doubt whether any grinding, however fine, can equal nature's work in her laboratory. Take a freshly slaked handful of lime and see how light it is; how free from grit and harshness. It won't do. The principle is the same as that involved in the question so much debated last year: shall we grind our phosphates or dissolve them in acid? I give my voice for chemical decomposition.

But lime has more to do in the soil than simply to lighten it and make it more easily workable. If slaked lime is allowed to remain exposed to the air, the omni-present carbonic acid of the atmosphere enters into combination with it and brings it back to its original state of carbonate of lime: it has lost its caustic character, but still exists in a state of the finest possible powder.

Now, lime, in its caustic state, is a cooking agent; that is, it acts upon the organic matter in the soil, and helps to convert it into food fit for our crops. It also acts upon the inorganic matters, and, probably, liberates potash and soda from their dormant state, and renders them available for plant-food. But its most important action, this part of the soil is, according to Way, the assistance which it renders in the formation of the double silicates of alumina; and the way in which lime works in this way is very interesting: you will recollect, if you please, that clay is chiefly composed of *silicate* of alumina (v. journal for December 1881, p. 117), and professor Way's discovery of the double silicates should be still fresh in your mind. It seems that this silicate of alumina is a *gourmand*, or rather, a *gourmet:* it prefers one food to another; where it can find lime, it won't put up with soda, and it carries out its principles to the farthest extent. Thus, if a double silicate of alumina and soda exist in the soil, and lime should be brought in contact with it, the silicate of alumina gives up the soda and takes the lime instead, thus giving us silicate of alumina and lime. If potash be added, the lime is discarded and the potash taken up, because the silicate of alumina prefers potash, and we have by the transaction silicate of alumina and potash; but when the fairy ammonia makes her appearance all former loves (broken metaphor) are driven away, even the once loved potash, and we get silicate of alumina and ammonia as the fruits of the alliance.

Here we see caustic lime acting as a most valuable assistant to our own efforts. It is probably by its means and by the energy with which it works that the first change is wrought, and the double silicate of alumina and lime produced, after which, all the other steps are easy enough, and the grand object the fixing and retention of ammonia is gained.

Nitrate of potash, saltpetre, is also aided in its formation by a dressing of caustic lime, and I observe that, in the last volume of the *Highland Society's Journal*, Dr Aitken, the society's chemist, recommends, as a means of preserving the valuable constituents of a manure heap, the addition of $\frac{1}{100}$