snuff-box. This was of course an exaggeration, but I doubt not that in drying the *vraic* loses two-thirds of its weight.

A correspondent of the *American Agriculturist* says that "Sea-weed is rich in albuminoids, containing from 20 to 25 per cent." What these figures mean, I really cannot tell, as they would be equivalent to, as nearly as possible, 4 per cent of nitrogen, and the weed would be worth at least $9.00 a ton, which sounds absurd. In fact, it is very difficult to say wherein lies the value of weed as a manure, for both Johnston and Ure agree in saying that there is merely a trace of phosphoric acid; as for the alkalies, they are abundant enough:

	Sea-weed from Rona.	From Heisker.
Carbonate of soda / Sulphate of sodium }	55	85
Sulphate of soda....................	190	80
Chlorides of sodium and potassium	375	365
Carbonate of lime....................	100	240
Sulphate of "	95	—
Alumina and oxide of iron.........	100	90
Silica..................................	—	80
Sulphur and loss.....................	85	60
	1000	1000

Practically, however, there is no doubt about the value of sea-weed as a manure, and I prefer an ounce of practice to a ton of theory.

DE OMNIBUS REBUS.

Cotton seed meal.—Almost all our English dairy-farmers use cotton-seed-meal for the production of butter, and, as far as I know, successfully. Therefore, when I saw that, at the meeting of Agricultural Scientists, at Toronto, in August, Dr H. W. Wiley, of Washington, in his paper on "The influence of food on butter," stated that: "From the milk of cows fed on cotton-seed-meal a butter was produced which fell below the standard of good butter, and would at first sight appear to be adulterated with lard," I was not a little surprised. I do not see why a moderate ration of cotton-seed-meal should injure butter more than a moderate ration of crushed linseed, a pound a day of which, besides improving the health of the cow, I can say from experience adds greatly to the production of butter without injuring its quality.

Wheat in England.—The average (1889) wheat-crop in the United Kingdom is reckoned to be 31 bushels an acre, a little less than 9,400,000 quarters = 75,000,000 bushels. In comparing the *yield* of the crop with the *yield* of other countries, it must not be forgotten that, in England at all events, wheat is sown at least every fifth year on every arable field. In several counties in Scotland and Ireland, no wheat is grown, oats paying better.

Soil analysis.—All my readers know that I have no faith in the utility of soil-analysis. I agree, as I mentioned last month, with Ville, that the way to find out what the plant grown requires to perfect its growth is to make the soil analyse itself. A rather curious experiment has been made in England lately, which, though one should not generalise from a single instance, is not without interest:

The top foot of the soil of a field at Flitcham was found on analysis to contain as much potash as is present in 3 tons of the ordinary muriate of potash of commerce. Two plots of this soil were sown with barley. One of them was supplied with abundant nitrogenous and phosphatic materials for the crop, but without potash. The other had the same amount of nitrogen and phosphoric acid, plus 2 cwt. per acre of muriate of potash. The potash plot gave some 40 bushels per acre of barley, whilst the other gave practically none, for want of 2 cwt. of potash, although the soil contained comparatively so much of it. On writing to the chemist who made the analysis—a very eminent man in his profession—to ask how much of the potash of the soil was soluble or available, the answer was *all of it, more or less.* Now, did the crop result support the analytical judgment in any useful way? Again, this same soil gave on analysis a similar percentage of phosphoric acid to potash. In one case much less phosphoric acid. Yet when the phosphatic manure was withheld, and the potash manure sown, the crop of barley was infinitely superior to that upon the plot from which potash was withheld. And who would have thought it?

Superphosphate.—Again, I have to remark that it is a thousand pities farmers who write for information on the question of manures will persist in using the vague term *phosphate.* "I put so many pounds of phosphate on an acre," we constantly hear, the inquirer never giving any notion of the constituents of the manure he has been employing. Superphosphate, or dissolved phosphate, as it is sometimes called, is made especially to supply the crop with phosphoric acid and nothing else, though, owing to the mode of manufacturing it, there is always a considerable per centage of sulphate of lime—land-plaster—present.

The real benefit derived to the farmer from Liebig's suggestion is that rocks and stones containing phosphoric acid in a stubborn form are rendered soluble and fitted to supply food to plants by the simple addition of a cheap form of acid to the rough material. The process of manufacture is in short this: apatite, Carolina-rock, coprolites, &c, pass from the grinding rollers to the tank, a certain amount of sulphuric acid and water is added, the masher, as we brewers should call it, is started, an amount of heat is generated by the combination of the ingredients, accompanied by a pungent odour, the mixture is put away into a receptacle of some sort, and, after resting for a week or so, becomes dry enough for use.

During the process, a very remarkable change has taken place in the phosphatic rock: a large proportion of the phosphoric acid which had been insoluble in water has become soluble in that liquid. Take, for example the finest ground apatite you can find, and after mixing it with water, in any convenient vessel, add to it a little liquid ammonia: you will find no precipitate on the bottom of the vessel.

Now, go through the same process with a mixture of superphosphate—mineral phosphate dissolved in sulphuric acid—and after the addition of ammoniacal liquor you will observe that the solution has become a solid glutinous mass, consisting of what is called precipitated phosphate. Lime would have the same effect as ammonia.

You see, then, clearly, what is meant by soluble phosphate, and why superphosphate is valued in proportion to the quantity of phosphate rendered soluble in water it contains. Theoretically, a perfectly pure phosphatic rock, (one containing 100 °/o of phosphate), mixed with perfectly pure sulphuric acid, should yield 61 °/o of phosphate, the balance—39—being the acid employed. Practically, however, the raw material is never found pure: carbonate of lime, sand, &c., are constantly present. The carbonate of lime consumes acid enough to convert itself into sulphate before the phosphate can get attacked. Some part of the rock-phosphate is often found undissolved, and, in calculating the value of a superphosphate, the manufacturer should make no claim for this undissolved rock; the mere fact of its existence in the completed article proving it to be of a *peculiarly stubborn* charac-