

State,—add to this, the amount used by every family, also for mechanical and manufacturing purposes, and the aggregate would swell the amount almost past credence. Things cannot go on in this manner, and those who are wise in time may profit thereby.

BONES AND THEIR USES.

THE introduction and general use of bones in their various degrees of fineness form an important epoch in the history of agriculture. Their use had long been confined to the mechanic arts, as handles for utensils of various kinds, as buttons for our clothes, &c., and tons upon tons of the refuse of comb and button factories and the horn piths of the tanner, were allowed to waste, without contributing to the fertility and amelioration of the soil. Even when experiment and trial had fully shown their utility as a fertilizer, prejudice and ignorance still prevented their use. It was urged, and very plausibly, too, that they would breed worms in the soil, and thereby injure the growth of herbage—forgetting that the animal or insect that lives on animal flesh or substances, is, by the very nature of its organization, unable to derive its support from vegetables; and also ignorant of the fact that every species of the nutritive grasses or grains contains bone-earth in a greater or less degree. The fact has been known for centuries, that animals fed on land that has long been used for pasturage, would oftentimes manifest an inordinate craving for bones, ashes, or earth, even. The fact that they craved such things, led to an examination of their composition, and also, in connection with it, an analysis of the soils on which they had been pastured. Analysis at once revealed the fact that bone-earth, or phosphate of lime, was wanting in those soils; and as soon as the fields were sown with bone-dust, and time had been given for the herbage to be benefited by its application, the disease in question disappeared. Mr. LEVI BARTLETT, in the *Practical Farmer*, gives statements of similar series of facts occurring in his own experience.

Many accounts have been given in our agricultural journals, of fields which seemed to possess every element of fertility, the soil appearing to answer every condition requisite to the growing of crops, but which failed to yield a remunerative harvest to the cultivator. On analysis they were found to be deficient in phosphate of lime, or bone-earth.

It is a singular fact that in the analysis of the remains of the bones of extinct animals of former geo-

logical epochs, fluorine seems to be substituted in place of phosphorus, thus appearing to be isomorphous in its relations to lime and its compounds. Traces of fluorine are found in many of our vegetable productions as well as mineral; but such is the energy of its action on nearly every element which enters into the materials of a working laboratory, that it is extremely difficult to isolate it and examine its properties in detail. We may judge somewhat as to its power of chemical affinity, from the fact, that a fraction of a grain of fluato of lime is capable of deeply etching a large surface of a plate of glass.

Bones are composed of about one part of organic matter and two parts of inorganic or mineral matter. By the gradual decay of their organic portions in the soil, ammonia is furnished to the growing plant, and also lime and phosphorous to the seed.

Though so much has been said in former volumes of the *FARMER* as to their utility and efficiency as a fertilizer, yet we apprehend that hardly one farmer in ten is careful to save what bones he finds on his own premises—much less purchase them in a state suitable for immediate use. The duration of their effects depends upon the size into which they are broken: if an immediate and palpable benefit is wanted, pulverize them as finely as possible, or still better, by dissolving them in sulphuric acid (oil of vitriol) convert the insoluble phosphate of lime into the soluble bi-phosphate (superphosphate.)

The form in which phosphorous and lime are combined naturally, is one equivalent of each, constituting an insoluble salt; and while in this state, it is only as the phosphoric acid is slowly replaced by the carbonic acid ever present in the atmosphere, that it is unlocked from its combination, and made available.

In the form of what are called half-inch bones, their effects continue for many years, as is seen in the gradual supplanting of the coarser grasses by the finer and more nutritious kinds. For instance, white clover will not flourish if bone-earth be wanting in the soil.

Prof. SHEPARD found by an analysis of the cotton plant—seed and fibre—that 16½ per cent. of the dried plant consisted of phosphoric acid; of the fibre, 18.8 per cent.; of the seed, 47½ per cent. Also that potash, soda, lime and magnesia were present in large quantities. Hence, the process for restoring worn out cotton lands to fertility is evident. The inorganic elements removed by continuous cropping must be restored to mother earth before she can again yield her increase.

A writer in the *New England Farmer* gives na