

EDUCATIONAL AND SCIENTIFIC
DEPARTMENT.

THE APPLICATION OF SCIENCE TO AGRICULTURE.

No. III.

Before we enter upon the details of Agricultural Chemistry, it may be useful to give a brief and general statement of the nature and objects of this interesting and important branch of science. Chemistry, then, treats of the composition and decomposition of material things, and explains the laws by which their changes are governed. It has been ascertained that all substances, with which we are acquainted, possess two kinds of properties,—*Physical and Chemical*. Hence the distinction between Natural Philosophy and Chemistry. The former treats of matter in masses, and of motions that are perceptible to the eye, while the latter investigates the constituent parts of material objects, the force by which their minutest particles are held together,—involving changes and motions that are frequently too subtle to be detected by mere vision.

To illustrate this distinction, take a loaf of bread, and break it into pieces by the force of the hands; in this case it is evident no change has been produced, but of a *mechanical* kind,—the fragments into which the loaf has been broken, possess precisely the same qualities as did the undivided mass. But if the loaf be subjected to certain processes, by which the flour, water, yeast, and salt, of which it is composed, be separated from each other, and exhibited apart, here *chemical* changes are effected, which are widely different from those induced by mere mechanical force. A piece of chalk may be easily broken into smaller fragments by a hammer,—still no change in the composition of this substance takes place,—the change only affects the size and form of the original lump. But subject the chalk to a powerful heat, and the chemical forces will be brought into play, and a complete change in the composition of the substance will take place. The chalk will lose much of its weight by burning,—having the water and carbonic acid gas expelled, with which it was associated; and what remains will be caustic lime. By additional heat, even the lime may be separated into a gas and a metal—*oxygen and calcium*—which are the two elementary constituents of lime. Hence this substance in the nomenclature of chemistry is denominated the *oxide of calcium*.

Matter is arranged under two very distinct divisions, *organic* and *inorganic*; in both of which there are numerous objects, of the greatest importance to the farmer, and with the properties of which he ought to be intimately acquainted. The inorganic department of nature includes all that numerous class of objects, differing widely in external appearance, which do not possess the principle of life. The earths, stones, water, the atmosphere, &c, come under this denomination. They are devoid of life,—and of course of the vessels and organs which are necessary to the support of life; hence they are called *inorganic*. Widely different indeed is the other grand division of nature—the *organic*. Under this head are included all the numerous varieties of animals and plants,—from the minutest animalcule (myriads of which may colonize a leaf or a drop of water), to the huge elephant,—from the moss of a Siberian Desert, to the majestic forest of the torrid zone. The wonderful and mysterious principle of life, pervades the whole of the endlessly diversified class of bodies. They are in various degrees endowed with organs for procuring food, and for assimilating that food into their own structure. How widely different is the mineral. Possessing no organs of nutrition, the stone increases in bulk merely by the external deposition of its materials; directed only by mechanical and chemical forces. The vital power, however, which resides in the plant, and in yet higher degree in the animal, exercises a controlling influence over the entire economy of the subject, and modifies the ordinary laws of Chemistry and natural Philosophy to an extent which the most advanced state of science is wholly incapable of explaining. This fact, while it reads to the speculative philosopher a salutary lesson of humility, should produce in all minds a devout reverence for, and a humble dependence on, the Being, who is the author and giver of life.

Again, all bodies are divided by chemists into simple and compound. Simple bodies are homogeneous in their nature—that is, they consist of only one kind of particles, whereas compound substances are made up of two or more elementary or simple bodies. Whether a substance be simple or compound, can only be determined by experiment. It has taken a long time, in which a vast amount of labor and research has been expended, to bring chemistry to its present advanced state; and much yet remains to be accom-