

There can be no doubt, that the aid of the experimental sciences is necessary to the formation of a correct theory of agriculture. Not a step can be taken in the cultivation of plants or the rearing of animals, the explanation or rationale of which does not involve some important doctrine of chemistry or physiology. Now although such knowledge may be indispensable to the advancement of agriculture as a science, yet it by no means follows that an intimate acquaintance either with chemistry or physiology is necessary to the improvement of agriculture as an art. In illustration of this, let us appeal to facts. What single improvement in farming, among the many that have been made within the last half century, can be legitimately traced to mere scientific investigation? We cannot call to mind a single case. The improvements in breeding cattle—the introduction of turnip culture and grain crops—more suitable systems of rotation, adapted to different conditions of soil and climate; nay, even the discovery and application of most of the artificial manures, have all originated with, and have been carried out by practical men. And this is true, to a great extent, with all the principal arts of social life. The manufacture of porcelain, staining glass, dyeing, bleaching, calico-printing, &c., every one of which is strictly dependent on chemical laws, and most of which have been astonishingly improved and cheapened by the aid of modern chemistry; yet they all existed, and some of them in a comparatively perfect state, before chemistry settled down into a science. Indeed when we consider the very few years only with which even the name of this interesting and most important science has been associated with agriculture—when we call to mind that it was only about forty years since, that the immortal Davy first read his celebrated lectures before the English Board of Agriculture; and that afterwards the subject was almost allowed to go to sleep, both at home and abroad, until Liebig, some eight or ten years since, revived it from its slumbers, in his admirable Report addressed to the British Scientific Association; when these facts are impartially considered, the wonder is, not that chemistry has done so little for agriculture, but that in so brief a period, and amidst so many discouragements, it should have accomplished any thing of importance at all.

An imperfect analogy is sometimes instituted between agriculture and the arts, which tends to lead sanguine minds to indulge in visionary expectations, and say hard things against what is commonly designated the dulness and stupidity of practical farmers. The application of some of the numerous discoveries of modern chemistry to the arts of life, whereby production has been wonder-

fully cheapened, and not infrequently the quality equally improved, has been insisted on as proof and illustration of what may be hoped from agriculture when guided by the superior light of science. But there is a great fallacy involved in this reasoning. The processes of the manufacturer and those of the farmer are placed in a very different position with regard to the available aids of science, and consequently what can be predicated of the one, may not and indeed frequently cannot be of the other. For example: the manufacturer carries on his operations within doors; both science and art being in his case sufficiently understood and advanced as to enable him to control all the elements needful to the result. Not so the farmer; his operations are conducted out of doors, and subjected to all the uncontrollable elements of that variable and fickle thing called *weather*. Besides the analogy fails in regard to the nature of the products. The manufacturer is concerned in producing merely *inorganic* substances: he employs science just in that capacity in which she is enabled to afford the surest and greatest aid—that is, the production of new substances by the well-known laws of chemical combination. His is purely a matter of simple calculation. How widely different is the case of the farmer. His products are *organic*—that is, things produced by the wonderful and mysterious power of life—a force which no science can explain, and no human power control. Now it so happens, that organic chemistry, or the chemistry of life, is the most recondite and infinitely less advanced portion of that comprehensive science; a sure and broad foundation for the noble structure that will hereafter be erected, cannot as yet be said to be firmly laid; and after all, the nature and extent of the vital principle will most probably continue beyond the reach of mortal ken; yet this is precisely that department of chemical science which applies to the theory and practice of the farmer's art.

We come then to the conclusion, that a knowledge of chemistry, geology, &c., is not *essential* to the successful improvement of agriculture; but there can be no doubt that such knowledge, possessed by judicious and practical farmers, might form a valuable and important *auxiliary*. It should always be borne in mind, that agriculture is an art *per se*; and that accurate analyses of soil and organic products, involve duties belonging to the chemist rather than the farmer—they belong to the laboratory and not to the field. It is no doubt desirable that practical skill in husbandry should be combined with high scientific attainment, and the result would be unquestionably beneficial. Yet such cases, even in the most advanced countries, must necessarily be very few; the strict attention