

opened by the the ordinary routine of the farmer's daily life, of the intimate connection between what are termed the three great kingdoms of Nature! The animal could not exist without the vegetable, which in its turn depends upon the mineral. Thus he ascends from the dead earth to the living plant, on which is nourished the living, moving and sentient animal! In the breeding, feeding and general management of his stock, the manner in which these operations are conducted may be regarded as an unerring index of the state and progress of agriculture; and much of the success of the practical man will depend on the extent and correctness of his knowledge of the principles of Zoology and Animal Physiology.

Now, will it be maintained that agriculture is so simple a thing that any youth, however feeble his mind and sluggish his mental habits, can readily be made into a farmer, and that to engage in this pursuit, but little special information or training is needed, but simply a large expenditure of muscular force in accordance with a certain time-honored routine? This, unhappily, has been the prevalent feeling of the past, and it is still too much so at present; and I repeat, that it is to this low and fallacious estimate of the nature of agriculture and the qualifications of its pursuers, that much of its complained-of slow progress is attributable. We must rouse ourselves so as to take higher and wider views of this great art, which, instead of being the simplest, is one of the most difficult and complex, as it is unquestionably the most valuable, of the various industries of this brief and busy life.

I am aware that many fallacies have been committed by persons of sanguine temperament, earnestly desirous of correcting this low and degrading estimate of agricultural pursuits, by too strictly comparing its actual progress with that of some other arts. In order that comparisons may not be invidious, it is necessary they should be correct. It should be borne in mind that the marvelous progress made during the present century, in the cheapness and increased productions of textile manufactures, bleaching, dyeing, calico printing, etc., is in great measure due to the application of inorganic chemistry and improved machinery; the former science having attained to extraordinary development and exactitude during the past fifty years. The aid which chemistry renders the farmer, relates chiefly to the nutrition and growth of vegetable and animal life, termed organic, a department of the science having as yet but a very brief history, and the pursuit of which is beset with many and peculiar difficulties, and is subjected to rapid changes as in the progress of discovery, past errors become corrected and new truths established. The manufacturer, by availing himself of the certain aids of a more simple and advanced department of chemistry, and operating exclusively on dead matter, under well-defined physical conditions of temperature, light, moisture, etc., is placed in a

position almost absolutely to command whatever results may be desired. How different is it in these respects with the farmer, whose operations are exposed to and influenced by the uncertainty and variations of the weather, the changes in the natures of soils, often within very limited areas, and the complicated workings of that wonderful and mysterious force denominated *life*! In view, then, of these simple facts of the case, it would obviously be unreasonable, even under the most favorable conditions, to expect agriculture to advance with the rapid speed that has of late years characterized several of the manufacturing arts. The apparent anomaly, however, only strengthens and illustrates what I am desirous of impressing on this large and intelligent audience,—the necessity and advantage of *connecting practice with science*. The principles of the latter are as applicable to the farm as they are to the manufactory, and the many and peculiar difficulties which at present beset the pursuits of farmers in relation to the higher teachings and applications of science, should induce them more earnestly than ever to devote their lives to inquiry, patient observation and unflinching perseverance, welcoming with gratitude every ray of light which science may throw across their path, in the full assurance that, by degrees, present anomalies and perplexities of practice will be explained, and this noble art removed in great measure, if not entirely, out of the dark recesses of empiricism, into the cheering and health-inspiring light of a progressive science.

Having thus spoken of the connection between science and agriculture, and of the valuable aid the former has of late years rendered the latter, with a prospect of still greater benefits in time to come, I wish to guard myself against being understood as countenancing the erroneous and impracticable idea that an intelligent and improving farmer must, in the *professional* sense of the term, be "a man of science." Such an opinion this audience need not to be told is quite utopian. The progress of the natural and experimental sciences of the present day is so marvelously great that it requires the energies of a life to keep pace with almost any one of them. If youths, intended for farming, as a means of obtaining a livelihood, were placed in the laboratory to acquire and master the very delicate art of manipulation in the higher branches of organic analysis, with a view of becoming accomplished chemists, the time occupied in such studies and pursuits must preclude them from acquiring that practical knowledge and those business habits, apart from which, farming must, commercially at least, prove a disastrous failure. What is really needed, and what is, I think, practicable, is so to instruct our youth in the principles of science, as to enable them to appreciate the results obtained by scientific men, and advantageously cooperate with them in affecting practical improvements. The amount of scientific knowledge which such a view assumes is no contemptible modicum, and would demand years of patient study and careful observation of an active business life to acquire."