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PROGRESS IN AGRICULTURE

BY EDUCATION AND GOVERNMENT AID.

BY

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I.

THE rapid progress of American industries within the last decade, especially since financial uncertainties have ceased to disturb the political atmosphere, is a matter of common and almost trite remark and congratulation; and at the present moment the process of development seems likely to continue with a geometrical ratio of increase, both as regards manufactures and agriculture. The key-note originally sounded by the promoters of the Pacific railroads, "Attack the wilderness with railroads," has awakened gigantic echoes from the Dominion of Canada to Mexico. But the quality of the tone has somewhat changed. Mining, the original motive, however important still, is being overshadowed by the fundamental industry, agriculture, even in the land of gold itself, and in the heart of the "great American desert," which seems destined to become in its turn, for a time, the granary of the world. American commerce has carried coal to Newcastle, cutlery to Sheffield, hams to Westphalia, and grain to Russia. Our exports of breadstuffs, and even of the perishable article of fresh meats, are making such formidable competition for the European farmer that he would fain invoke against it the reenactment of protective tariffs, for whose repeal he gave the casting vote in the struggle with which the name and fame of Cobden are linked.

With the development and prosperity of the fundamental industry, all other industries flourish. The prosperous farmer is enabled to supply himself not only with the necessities of life, but also with luxuries, and to pay the tribute exacted from him by a protective

tariff on such primarily important articles as iron and steel; thereby giving extraordinary encouragement to the home manufacture of that and of other articles, and thus again indirectly causing fearful competition to the European manufacturer. Stinted in wages, or thrown out of employment altogether, the more ambitious portion of European laborers comes to swell the tide of immigration, as well as, in a fast increasing ratio, the industrial wave that sweeps westward, regardless alike of the terrors of "the desert," the rugged mountains, and the hostile Indian.

It is pertinent to inquire what the United States government has done and is doing toward the conservation, encouragement, and practical promotion of this stupendous interest, which involves, as direct producers, over one half of the population of the United States, and, indirectly, the essential conditions of the prosperity of the whole. The manufacturing and other industries have been assiduously fostered by protective tariffs, often far beyond the time when any such assistance was really needed, save for the enrichment of individuals; and such duties have often pressed heavily upon the interests of agriculture. The prosperity and progress of the latter industry, notwithstanding such disadvantages, were held to prove the needlessness of government aid; and for the first eighty-six years of the republic, almost the only direct recognition agriculture received at the hands of the general government was embodied in small subdivisions of the patent-office building and reports, and in very general and usually ill-observed instructions to government surveyors to note the agricultural capabilities of the regions surveyed by them. But most of

these notes remained, as a rule, pigeon-holed in the general land office.

Most prominent among the factors that have contributed toward the extraordinary development and prosperity of agriculture in the United States is, unquestionably, the great native fertility of soils, as yet unexhausted in the newer States and Territories, which are thus enabled to pour out upon the East and upon Europe the accumulated soil treasures of many ages. That these cannot hold out forever, or even for many years to come, is an inexorable law of nature; and the steady diminution of production per acre in the States east of the Mississippi River, resulting in their increasing inability to compete in the growing of cereals with the newer States, has long given warning that the experience of the Old World is being repeated on the new continent, and that the old and ever-recurring question is upon us of maintaining profitable production by means of systematic culture and returns to the soil.

Whether this question shall be allowed to assume the aspect of the menace that annually confronts the European agriculturist, — “No manure, no crops,” — or whether an ounce of intelligent prevention shall forestall the heavy burdens that will otherwise rest upon the coming generation and its industries, is the issue that must largely be determined by enlightened government action, in the face of the already inveterate bad habits of the vast majority of American farmers, that are, as usual, promptly adopted by the European immigrant. The ravaging of the virgin soils by heavy cropping without change, or even the slightest attempt at returns, followed by the “turning-out” of the “tired” land, and, too often, by the washing away of the surface soil from the hard plow-sole formed by shallow tillage, not uncommonly resulting in the definitive ruin of the land for agricultural purposes, is repeated more or

less in every newly settled region. Deserted homesteads, and melancholy old fields scarred with gullies, mar the face of the land in the rear of the pioneer farmer, and impose upon his steadier successor a heavy tax, in the way of reclamation, on soils that, if rationally cultivated, would not have felt the need of manure for scores of years. For want of the most rudimentary knowledge of agricultural facts and principles, the planters of the South have for three quarters of a century wasted nine crops of cotton for every one made, by failing to utilize the chief product of their fields — cotton seed — for returns to the soil, which needs but little more to maintain its full productiveness forever. Such a crying evil as this would hardly have been allowed to exist so long in any country less averse to the least semblance of paternal government, without something more than the faint warnings and remonstrances uttered from time to time in the periodical press, or in government documents. The great perfection attained by agricultural implements for large-scale culture, under the hands of American inventive skill, serves but to add to the rapidity with which the process of soil devastation is carried forward into new fields.

Apart from this primary and most serious problem, there are thousands of other questions, of less general importance but locally of equal interest, that confront the farmer, especially in the newer States, surrounded as he is by new conditions of soil and climate, with which he does not know how to deal, save in so far as his previous experience and good judgment may aid him. The farming of the first generation is usually a series of experiments, in which the native fertility of the soil is the saving clause between profit and loss. As the soil becomes less thrifty by wear, the second and third generations continue the course of experimenting as to crops and methods of culture giving the high

est profit under the local circumstances. Few, however, realize the best results that could be achieved with the means at command, and many are the disheartening failures, under the pressure of which the farmer abandons his "improvements," in search of the fabled "soil that never gives out," supposed to exist somewhere to westward. If the conditions of the best success, as ascertained by systematic investigation, had but been pointed out from the beginning, or if even the actual experience of the prosperous few had promptly been made generally known, how different would have been the history of agriculture in most of the States west of the Allegheny Mountains! If the measure of success has been great even under the tentative, unsystematic practice prevailing thus far, how much greater might it have been had the light of systematic scientific research been made to precede the industrial army, instead of following slowly in its rear, to show the causes of the results that have followed the blind experimenting of the vanguard! The work, however, is one that lies beyond the power of young communities or even States. Of late, one of the great railroad corporations¹ has thought it worth while to institute an agricultural survey of the regions through which its lines are to pass. But it seems peculiarly the province of the general government to take measures tending to remedy the omissions of the past, and to provide against their recurrence in the future.

The year 1862 will in this connection remain memorable in the history of American agriculture. The subject of a donation of public lands for the endowment of industrial colleges had been repeatedly mooted, and in 1857 a bill to that effect was brought before Congress by Mr. Morrill, of Vermont. But in the violence of political agitation at that

time, and on account of the especial opposition to the exercise of power by the Federal government, it did not become a law. The subsequent events, leading to the civil war, created a strong popular tendency in the reverse direction, in the Northern States; and this, concurrently with the consciousness of the need of popular support on the part of the government, resulted in the passage by Congress, and approval by the president, of two measures most important to agriculture: the creation of the Department of Agriculture as an independent bureau, and the donation to the States of thirty thousand acres of public lands for each representative, for the endowment, in each, of "at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

This beneficent act to promote the arts of peace, again championed chiefly by Mr. Morrill, and passed almost within hearing of hostile cannon, is entitled, whether by oversight or with a view to the conciliation of popular sentiment, "A bill for the benefit of agricultural colleges," — a title which does not do justice to its broad and liberal scope, and wise deference to the varied requirements of the different portions of the immense empire covered by its action. As a matter of fact, the impression conveyed in that title has in a great measure remained fixed in the popular mind and parlance, it being usually designated as "the agricultural college act:" and this has given rise to not a few misapprehensions and acrimonious discussions that a candid consideration of the act itself would have rendered superfluous.

¹ The Northern Pacific.

It was natural and proper that in the States in which agriculture was the overshadowing interest it should have taken precedence, both in point of time and allotment of funds, of the "mechanic arts;" and it was equally natural that in manufacturing States the latter should have claimed the lion's share, for the time being. The subdivision of the fund into two portions, applied to the establishment or farther endowment of separate institutions representing the two great industrial branches, has been preferred by two States, Massachusetts and Pennsylvania; while in the rest, both have remained united within one institution, newly established or preëxisting. It is not proposed to discuss in this paper the topic of instruction in the mechanic arts, but to deal first with that portion of the subject in which agriculture is directly concerned, and by the light of the experience had to consider what are and should be the functions of the United States Department of Agriculture.

One of the most salutary effects produced by the Morrill act was the lively interest and discussion respecting the proper organization of the new institutions to be formed under it, which arose wherever the law was carried into effect. A compact and impartial history of these first efforts, failures and successes, would be of great interest to educators, but is yet to be written: and it is perhaps too soon to attempt the task, since the actual outcome of the several plans represented in the different States is still subject to great differences of opinion.

As usual, two extremes have disputed precedence with each other, and, as usual, the final and best result will doubtless be found between them. On the one hand, it has been contended by many of those representing the colleges and universities that both the letter and intent of the law would be best carried out, and the greatest benefits conferred

upon the classes named in the act, by the establishment of schools of science in connection with the older institutions, already possessed of a large part of the *personnel* and appliances needful for teaching "such branches of learning as are related to agriculture and the mechanic arts, without excluding other scientific and classical studies." These appeared to require only the additional endowment in order to perform fully and advantageously the desired functions, and this mode of utilizing the endowments seemed the more expedient, because the funds realized from the congressional donation were in most cases obviously inadequate for the maintenance of institutions embracing all the educational branches called for by the act. Since the new institutions could not be numerous or extensive enough to educate the industrial millions, it was argued that they must aim first of all to educate the leaders of progress, to whom the most thorough liberal as well as scientific training ought to be given.

On the other hand, it was contended, chiefly by the industrial classes themselves, that such a connection would be likely to deprive them of the benefits of the act especially intended to be conferred upon them, and, while the "liberal" part of the education would doubtless be fully attended to by the older colleges thus additionally endowed, the "practical" would be either left out or restricted within narrow limits; that, in fact, the whole intent of the act was obviously in the latter direction; and that the object would be best served by the establishment of new institutions, separate and, if possible, remote from the influence of the traditional college, where "agriculture and the mechanic arts" were looked down upon as of inferior degree and dignity, and where those devoting themselves to their pursuit would be subjected to the sneers of their classical and literary fellow-students. Coupled with these views was,

usually, a demand for the enforcement of some manual labor upon the pupils, with the object of creating, or maintaining, a habit of work, and imparting that training of the hand and of the eye that is so essential to success in industrial pursuits, and which has been so conspicuously neglected in the traditional curriculum of education. Moreover, it was thought that these institutions ought to be and could be so constituted that "every farmer's son" could profit by their instruction. That is, they contended that the education of the millions, and *not* that of the leaders only, was to be compassed under the Morrill act.

The measure of truth contained in each of these contradictory propositions has rendered their respective advocates singularly tenacious of their respective views, and the result has been the adoption, in different States, of either plan, according to the predominant elements of the population; or, in some cases, according to the accident of finding some vigorous and capable hand to carry either into effect, — the first success varying accordingly.

It is not the object of this paper to discuss these experiments and experiences in detail or exhaustively. It is proposed to trace the general process of evolution, as exemplified now by one and then by another of the American colleges, whether established prior to, or in pursuance of, the Morrill act of donation. No single one, perhaps, could as yet be found to illustrate in its history, in a striking manner, *all* the several phases; but the attentive observer will be able to supply the examples, and will, it is thought, find the picture a truthful one.

So far as the colleges organized on what may be called the popular plan are concerned, their establishment was in most cases accompanied or followed by an outburst of popular enthusiasm, in consequence of which their ranks were

quickly filled, even to overflowing, thus giving to their advocates a basis for claiming an overwhelming success. It was proclaimed that at last the sons of the industrial classes had been given the opportunity for a sound "labor education," fitting them at once for their vocation, instead of simply preparing them to acquire it for themselves by weary experience. The workshop and the farm had replaced the lecture-room, in which pupils were as a rule unfitted for industrial pursuits, by having other ideas "put into their heads," so that they rarely returned to the farm.

The radical error of the position assumed by the advocates of the "popular plan" was that, in their eagerness to assert the high position which agriculture ought to hold in the estimation of mankind, they frequently overshot the mark, so as effectually to assert its lowliness, its inability to bear comparison with other pursuits by the light of a liberal education. In their anxiety to protect the agricultural student from possible snobbish sneers, arising from the antiquated idea that all manual labor is beneath the dignity of educated men, they proposed to make that idea a determining factor in the choice of the location, connection, and organization of the new schools, by withdrawing them as much as possible from contact with the existing centres of high culture. In this dignified seclusion they hoped to convince the pupils, uncontradicted, of the dignity of labor, — surrounding them with a dense "agricultural atmosphere," through which no other rays should penetrate. It was even proclaimed in an agricultural convention that "muscle must be put on a level with brain," and the sentiment was actually greeted with applause at first, though subsequently followed by energetic protest against such stultification of the cause of agriculture. This grave error, so diametrically opposed to the letter and spirit of the Morrill act,

has served long and well to sharpen the arrows of satire against the agricultural colleges, and to deter ambitious young men from entering them, even where a different system prevailed.

The institutions organized as scientific schools, and, as a natural consequence, in connection with preëxisting colleges or universities, by a simple amplification of the scope of scientific instruction, found themselves quite unembarrassed by numbers, even where there was a sincere desire to fulfill in every respect the intent of the act; which, unfortunately, was not always the case, thus creating much ill feeling, acrimonious discussions, and unwise legislation. To speak plainly, some of these institutions had to wait a year or two for the first student in the special departments; not counting a few cautious nibbles on the part of raw country lads, who needed but a short time to find out that their place was not there, the preparation obtainable in the country grammar school being quite inadequate to enable them to pursue understandingly the courses of instruction offered. There followed some years of unexciting *ête-à-êtes* of agricultural instructors with single students, or with the minimum number usually supposed to constitute a class; thus giving the teachers abundant leisure to reflect on the causes of this failure to appreciate the advantages offered. It may not be irrelevant to observe that the present paper owes its origin, in part, to a similar opportunity for reflection, and subsequent action thereon.

The results of these cogitations were very various, all perforce agreeing in the conclusion that there was little demand for agricultural education of the character offered, namely, that which is adapted to the training up of agricultural experts, — the *Oekonomen* of Germany. This fact was painfully apparent from the beginning, in the great, and in many cases for years insuffer-

able, difficulty of finding well-qualified teachers of agricultural science for the new institutions. Men had to be trained, or had to train themselves, especially for that purpose, as quickly as might be; and many have been the curious demonstrations of the difference between merely knowing how to do a thing by rote and the ability to teach students the why and wherefore. This was especially the case in the agricultural schools established on the popular plan, where "plain, practical farmers" were placed in charge of classes of boys who had grown up on farms, and who soon found that they were learning little beyond a somewhat improved handicraft, at the expense of half their time spent in field labor, differing but slightly from that to which they had been inured from childhood, on the home farm.

This, in fact, proved the turning-point in the popularity of the "labor" schools. After the first flush of enthusiasm, parents as well as sons began to gauge the benefits received under the system which gave half the pupils' time, or more, to manual labor, conveying little or nothing new after a few weeks' practice, and therefore of no educational value. It soon began to be said that the pupils were made to work for the profit of the college, with occasionally the additional intimation that they had to labor to "maintain a lot of professors in idleness," instead of getting an education, and that the parents might as well take them home, and get the benefit of that service themselves.

To this the advocates of the labor system replied that the farm work, instructive or not, was necessary to maintain the habit of manual labor; that if it were omitted the students would lose that habit, have their minds and tastes diverted from the farm, and would to a great extent take to other occupations in life.

The parents rejoined that they sent their boys to the college to get an edu-

cation, first of all ; to make them better farmers, if farmers they chose to be, but, above all, to be educated.

The first and early result of the controversy was that the pupils were paid wages, instead of working gratuitously, as at first ; and another tidal-wave of popularity set in. A farmer's boy was now given an opportunity to pay his way and get an education at the same time, so that the poorest could avail himself of the benefits of the college, with little or no expense to his parents.

This phase of the process of development has taken strong hold of the popular fancy, and is still among the first ideas broached wherever the subject of agricultural education is discussed among the farming population. The theory that after giving half or more of the day to sedentary mental study the rest can quite as beneficially be devoted to taking the needed physical exercise in the guise of remunerative farm labor as in the taking of walks, ball-playing, bicycling, or other games producing no obvious useful result, seems simple and incontrovertible ; the more, as such things have so often been done, and are constantly being done, by young men who, from obscurity, have risen to high positions.

The proposition involves, however, several fallacies that seriously interfere with the practical working of the plan, which, as is frequently the case in social problems, fails to take sufficiently into account that human nature of which boys have so large a share, as well as the fact that the *average* boy sent to the colleges, though legally entitled to the chance of becoming president of the United States, is far from being made of the sterner stuff from which Whitingtons and Franklins are evolved. He is to a great extent hopelessly obtuse in respect to the amusing features of plowing, hoeing, or weeding, and the more so the greater his familiarity with

them at home. He is perversely disposed to prefer a climb upon the most rugged hills and the most fatiguing athletic games, to the gentlest and most lucrative work in the cornfield or stable. He may be persuaded or compelled to conform his acts to the prescribed discipline ; but it may be gravely questioned whether, as a rule, such compulsion is conducive to a preference for the pursuit of agriculture as a life occupation, more particularly in the case of those boys whose natural ability would make them most influential in the cause of agricultural progress.

The gravest objection, however, is one that remains unperceived, in a great measure, even by those most immediately concerned, but which becomes glaringly apparent to the teacher who is not satisfied with merely going through his class exercises, but scrutinizes the results achieved when and after the pupil leaves the institution.

The *inadequacy of the time* usually given to the preparation for life in American colleges is a standing grievance, and one that all the ingenuity annually brought to bear on the revision of the curriculum by the college faculties has not and cannot overcome. The traditional four years' course cannot possibly be made to hold all that is now needed to be known by every well-educated man and woman, without omitting or weakening to utter inanity too much of the fundamental training needful to proper and well-balanced use of the mental faculties. To use a homely phrase, it becomes more and more impossible to "put that quart into the pint pot" that was amply large fifty years ago. This is most especially true of those courses embracing a considerable proportion of studies in the natural sciences, whose stupendous development and important applications to every-day life are so prominent a feature of our time.

As neither students nor parents can

at present, as a rule, be persuaded to prolong the term of education in college beyond the traditional four years, it follows that the student has no time to spare for anything that is not of educational value, or can readily be learned outside of the college. And it follows equally that the time spent in merely mechanical, uninstructional labor in the agricultural colleges detracts to that extent from the opportunities of the student, and stunts his education.

No pretense of nursing the "habit of labor" can offset this grievous, and in the course of the student's life usually irreparable injury; no special plea that, unless this course is pursued, his mind may be turned away from agriculture can stand for a moment. The colleges intended for "the liberal and practical education of the industrial classes" cannot legitimately be transformed into missionary establishments for the conversion of youth unto agricultural pursuits, by surrounding them with an opaque agricultural atmosphere. It is the duty of parents to afford their children the best opportunities within their means for a judicious selection of the life pursuit which shall be best adapted to their natural talents and tastes, and wise parents will rarely do more than to assist them in the selection, whether of a profession or of a companion for life. Nor will they be disposed to find fault with the schools or colleges that have given their *own* children the opportunity of recognizing the vocation that will make them most successful. It is not for the purpose of learning how to plow and hoe, but why to plow and hoe at all, and when and where to do it to the best advantage, that parents are willing to send their sons to the colleges. In any case, the "rubbing-in" of the purely mechanical part of the farmer's vocation is hardly calculated to inspire a preference in that direction, especially when the pupil is conscious that his education is thereby

curtailed. He is quick to perceive that, while "honest labor" dignifies the laborer *because* it is honest, it is not more dignified or honest because unintelligent, or such as can be performed as well by a steam-engine or a horse.

It cannot be questioned that it is precisely this aspect of farming — its supposed necessary association with hard, unintelligent, merely mechanical labor, unrelieved by any considerable use of the intellect — that has in the past caused it to be looked down upon as a pursuit unworthy of educated and intellectual men, and which still supports the same view, to some extent. An aversion to farming is often apparent among those engaged in it, and leads to the neglect of home life; and home adornment while such expressions by parents as "I don't want my children to drudge as I have done" go far towards promoting the hegira of the most ambitious portion of the young rural population to the towns and cities, — to the dry-goods counter, counting-house desk, and other overstocked occupations, of immensely inferior intellectual opportunities, but opening to them more or less the possibility of considering themselves an integral part of a polite community, and of participating in those recreations and amusements from which the physical and social isolation of an American farm would largely exclude them.

Another, and perhaps the most influential, cause lies in the character of elementary instruction, both at home and in the common school. The very existence of the latter has brought about a feeling, on the part of the parents, that they discharge their whole duty to their children by making them attend school; so that home instruction is almost laid aside, not only during the school years proper, but also at the time when the child's physical perceptions are most acute and wide-awake, — the time which the kindergarten system of

instruction utilizes so admirably in training and sharpening the naturally predominating interest in objective nature. When little or nothing is done in that direction at home, and the child finds, on reaching school, that the subjects so closely connected with home and farm life are almost totally neglected, the natural impression will be that they are inferior in importance to writing, reading, and arithmetic, and that the perception, knowledge, and handling of merely physical objects is of little educational or intellectual value. To this repression of the child's perceptive faculties by the time-honored scholastic system of teaching must be ascribed a far greater share in the lack of interest in agricultural education than can be compensated by any system of organization in the agricultural colleges. These can never do their best work upon material whose home and school education have combined to turn the taste away from agricultural pursuits.

Again, the rural village, to which the European peasant's son looks back with longing as the scene of his youth's enjoyments, is as yet an unknown quantity in the greater portion of the United States, and especially so in the properly agricultural regions of the Union, where farms are large and the dwellings separated by long intervals. The county towns and cross-roads hamlets, where on Saturdays a portion of the rural population congregates around the blacksmith's shop, variety store, and corner grocery, rarely offer any rational social enjoyment, even in temperance communities; while in the frontier States these gatherings not unfrequently exemplify Pandemonium.

The recognition of this comparative barrenness of the farmer's intellectual and social life in the large agricultural States has found practical expression in the "Grange" movement, which contemplates essentially coöperation for the social, intellectual, and professional im-

provement of the members, and through this the promotion of education, knowledge, and emulation, thereby securing the elevation of the farmer's calling and also rendering it more profitable.

The distinctively social feature of the order of Patrons of Husbandry, ministering to one of the greatest needs of our rural population, has enabled it to survive the probationary period and the mistakes into which its leaders fell at first in affiliating it with political parties; so that, after the first recoil, it is reviving and steadily extending on a more solid basis than before, and with less prospect of reaction. Its declaration of purposes and principles expresses well and forcibly the foremost need of American agriculture: not a holding-down of the aspirations of youth to the grindstone, by unremitting labor and a stunted education, like the peasant class of Europe; but the ennobling of the farmer's pursuit by the use of knowledge, under the guidance of a trained intellect, and the lightening of the burden of labor thereby, both in directing it into the most profitable channels, and in taking from it the sensation as well as the reproach of drudgery by rendering it intelligent.

Viewed from the stand-point of the avowed programme of the Grange, the labor-school plan is a step in the wrong direction, unless that labor is kept strictly within the limits of instruction, properly so called; and although this incompatibility has not always been recognized, and in many cases granges and grange conventions have passed resolutions expressing the reverse opinion, yet the steady tendency of the colleges has been toward the abandonment of all unproductive labor as a task incumbent upon the students, while, nevertheless, offering them every opportunity and inducement to engage in such labor of their own accord, for exercise, recreation, or profit, as the case might be. On the other hand, *instructive* labor

such as is given the pupil for the sake of illustrating and impressing upon him the principles he is or has been studying, can only exceptionally fulfill the regular requirements of a well-conducted "model" farm, and is frequently as little capable of being made profitable to the college as is the laboratory work of elementary students in chemistry. It cannot, therefore, as a rule, be compensated, a fact now distinctly set forth in the registers of several prominent agricultural colleges.

With the abandonment of obligatory unproductive labor, the project of making every student pay his college expenses while getting his education also falls to the ground. It is as incompatible with his acquisition of a sound education *within the four-year limit* as the financial success of a farm conducted with a view to the best general instruction is impossible. In other words, a good education is necessarily expensive and not lucrative, for the time being; and if the student spend half of his time in making his expenses, he will have to stint his education to a corresponding extent, or he must give a longer total time to it. The latter course would be the more needful, because in agricultural practice, involving so many varied and complex problems, a little rudimentary knowledge, badly digested, is often less serviceable than simple common sense and the following of good examples. We have here only the reassertion, on a different plane, of the principle of conservation of force, which forbids us to expect obtaining from a given amount of virtual energy more than its mathematical equivalent in work.

As to the exact amount of instructive manual labor that may be profitably required of the agricultural student, opinions and practice still differ considerably; but even here the obvious tendency is towards restriction rather than increase, in the older institutions origi-

nally organized on the labor plan. The facility with which any one thoroughly conversant with principles acquires the mere manual dexterity or handicraft forms a strong and increasingly appreciated argument against extending that portion of the too brief educational course beyond the point at which the pupil possesses a practical knowledge of the conditions and details involved in the successful performance of an operation, leaving to a subsequent "practical course," or to experience, the acquisition of actual dexterity.

This gradual abandonment of their extreme position by the labor schools, with an obvious approximation of their fundamental ideas to those of the scientific schools, has on the whole been followed by a reduction of numbers, but also by an unquestionable increase in their efficiency toward accomplishing the primary objects of the Morrill act. With the falling-off of that portion of their pupils that sought in them merely a cheap, low-grade education, with little reference to the pursuit or improvement of agriculture, there came the need of making a showing of *quality* as against mere numbers, in order to maintain their standing and claim to legislative aid. It was broadly argued that it was not the number of pupils on the college rolls, and subsequently returned to the plow, that would establish their claim to utility and support, but their influence on the progress of rational agriculture within their sphere of action. Hence their faculties were naturally pushed toward exerting that improving influence not only upon the sons, but also upon the parents themselves, by meeting them at fairs, farmers' institutes, conventions, and society meetings, and discussing with them their needs, failures, and successes. At the same time, the model college farm began to be utilized for experiments designed to determine questions of practical importance to agriculture in the various States,—questions

with which, perhaps, the farmers themselves had wrestled in vain for want of a full knowledge and command of the controlling conditions. A few successes in this direction at once created a stir of interest, as it came to be understood that the colleges might be made to confer benefits not only upon the rising, but also upon the existing generation; and this, in turn, reacted upon the number and quality of the students sent to the colleges for the purpose of securing the advantages that the knowledge taught there might be expected to confer.

In other words, the popular colleges gradually took upon themselves some of the functions of experiment stations, in investigating agricultural questions of at least local, if not general, interest. And here their action began to harmonize with the scientific colleges. While waiting for students to come, the latter had utilized their spare time in trying to awaken the slumbering interest of the rural population, and had found an effectual stimulant for the purpose in showing the latter the advantages, of a most substantial kind, that they might derive from the systematic scientific investigation of the mooted practical questions that were being long and contradictorily debated in their society meetings and agricultural periodicals. That is, they also began to constitute themselves experiment stations, and to meet the farmer on his own ground; and the practical demonstration of the utility of the knowledge they offered to dispense gradually began to fill the aching void of the agricultural lecture-rooms.

If we summarize the conclusions legitimately deducible from the experience had in the establishment and working of agricultural colleges in the United States, as to the wants of the agricultural population in respect to education, they might be stated thus:—

(1.) Education corresponding to that given in the peasant schools of Europe, impressing upon the pupil the *rules* and *practice* of agricultural operations by means of constantly repeated manual exercise, and at the same time giving him a merely elementary general education, proves unsatisfactory and unacceptable here, where there is no peasant class, whose pursuit, as a rule, passes hereditarily from father to son. Those who care for education at all desire something more than mere routine training.

(2.) Neither is there a considerable demand, at least consciously, for high scientific training in agriculture, apart from the need for teachers for the agricultural colleges, as is proved by the insignificant attendance on the schools of agricultural science unprovided with model or experimental farms.

(3.) The colleges of an intermediate character, combining more or less of actual farm labor with a fair amount of higher instruction in the sciences, are more or less numerously attended. A large proportion of their pupils, however, fail to pursue farming as a calling after leaving college, having resorted to the latter as a cheap and convenient high school rather than for professional study. On the whole, their influence in improving the methods of agriculture in their respective States has not been marked, *except in the case of those which have assumed to some extent the functions of experiment stations*, and as such have rendered assistance in the solution of practical agricultural problems. Otherwise they are in most cases petted on the one hand, and condemned as comparatively useless on the other, in public discussions, in the newspaper press, and in the legislatures, to which they must periodically apply for pecuniary aid to supplement their inadequate endowments.

II.

It would then seem that on the whole the people of the United States are not fully satisfied with anything that has thus far been offered them in the shape of agricultural education, and are slow to avail themselves of the benefits of the Morrill act. Yet the call for such education has been sufficiently loud and persistent to prove that there *is* a real want,—that “the shoe pinches somewhere.” May we not fairly conclude that the exact spot upon which the pressure comes has not been generally identified, and hence well-advised action for relief has not been taken?

The blame for the indifferent success that has attended their efforts has heretofore been freely and even angrily thrown upon the colleges by the vast majority of those interested; and the most modest suggestion that perhaps there is as yet not much real demand for agricultural education, properly so called, has met with derision, or denunciation as an intolerable heresy.

Some of the causes leading to this result, the roots of which lie deep in our social and educational organization, have already been alluded to. Remembering these, let us consider upon what basis a demand for professional agricultural education must needs be expected to rest.

It will be conceded that, unless the “improvement” of agriculture means *making it more profitable*, it will be of little avail to preach and teach it. On any other ground, the bulk of the farming population will place and ridicule it under the head of fancy or book farming. It is obvious, then, that so long as unexhausted soils and an abundance of “fresh” land shall enable the cultivator to obtain, even by the rudest tillage, what he considers abundant returns, his interest in agricultural improvement and education will be but slight, or more sentimental than practical. He may even contend loudly for the rights of farmers’ sons to a professional education; but he will fail to send his own sons to get it where it is offered, and employ them in taking in more fresh land for the home farm, with the view of settling each one on a “new place” hereafter. The all but universal prevalence of this feeling and practice in the newer States explains abundantly the almost necessary failure of their agricultural colleges to secure attendance upon their properly professional courses, no matter upon what system they may be organized.

Conversely, it is easy to understand the increasing interest in the teaching and practice of improved agriculture as we advance toward the older States, whence the inevitable and rapidly swell-

ing wave of soil exhaustion sweeps westward. As the "pinch of the shoe" tightens, and the soil fails to respond to the ruder touches of the plow, the farmer turns for relief to the experience of the Old World, embodied in agricultural science; and when we reach the well-worn soil of New England, we find on it one of the oldest of the agricultural colleges of the United States, and perhaps, the most firmly established as such in public esteem. Enthusiastically praised and loudly condemned by turns, and buffeted as severely by the changing tide of popular and legislative opinion as any of her younger sisters, the Massachusetts Agricultural College, guided by the hands of able men and steadied by the existence of an indisputable and genuine demand for the application of the higher art and science of agriculture, has become an influential factor in directing agricultural practice in New England; but even here, *especially so* since it has *assumed the functions of an experiment station*. The same cue has been vigorously taken up by Connecticut, and the services rendered by the agricultural department of Yale, under the management of Johnson and Brewer, have not only silenced the sneers often bestowed upon the comparative minuteness of their agricultural classes, but have given an impulse that has extended far southward and is bearing substantial fruits in North Carolina. It is rather singular that in this respect the great State of New York has until within a few months failed to respond adequately to the demands of the time. While the names of Caldwell, Law, and Arnold are familiar to the readers of agricultural journals in connection with much information and some investigations of high practical value, private experiment stations, established by public-spirited citizens, have anticipated Cornell in the practical recognition of the agricultural experiment station as a necessary factor in the promotion of rational agriculture.

The fruitful idea of the agricultural experiment station, where questions of local or general importance are systematically and thoroughly investigated under all the lights that science can give, and whence reliable results are directly and promptly communicated to those interested, touches the quick of the whole problem of the agricultural colleges in the United States. Their importance and usefulness in Europe in the elaboration and investigation of details is thrown in the shade by that which they should possess in a new country, where new and untouched problems of the most vital importance confront the farmer at every turn, — problems whose solution, even if covered by the general teachings of agricultural science, lie far beyond the reach of any but the trained investigator, provided with all the means and appliances that modern science can furnish. No agricultural college in the new States will need to bid for a cheap but hollow popularity by lowering its functions to that of a peasant school, to secure attendance of pupils, if it will but undertake to prove the value of the knowledge that may be acquired within its halls, by taking up and determining (not *ex cathedra* and dogmatically, but by patient, conscientious, and practical research) some of the many unsolved questions that the farmers of the State will bring before its instructors, so soon as it is known that such things will be attended to by them. The colleges will thus be performing the most important function within their power, under the circumstances: that of educating the fathers of the rising generation to a proper estimate of the value of the knowledge which is offered to their sons. Instead of the ceaseless wrangling as to the value and merits of any particular system of agricultural education, they will find themselves accomplishing that of whose value no one will raise a question, and securing that respect and appreciation of the use of intelligence and

science in agriculture which is not only the expressed intent of the Morrill act to foster, but also the most efficacious remedy for the indisposition of our youth to engage in farming, and for the prevention of the disastrous results threatened by exhaustive culture. It would be difficult to overestimate the importance of the last-named object, alone; but it will never be accomplished by mere preaching, unaccompanied by demonstrations, in the field itself, of the practical and financial feasibility and advantage of conservative and intensive culture, and of the cheapest and most available means for the maintenance or resuscitation of fertility.

But since these means and methods must vary with the climate, soils, and products of each region, the college should be in possession of accurate information on these points, or be able to obtain it. This involves the carrying out of agricultural surveys, properly so called; not merely geological and topographical surveys, with a few scattering notes and vapid generalities concerning the agricultural features and capabilities of a State, but an intelligent and detailed examination of each natural agricultural division or region, by persons specially qualified as agricultural experts.

Provisions for the carrying out of such investigations are on the statute-books of most of the States, in connection with the acts for geological surveys; but few and far between are the examples of a *bona fide* execution of the intent of this portion of these acts. The most recondite researches in almost every other department of science — geology, palæontology, mineralogy, ornithology, botany, ichthyology, and even conchology — have often had precedence over the most needful and elementary work bearing directly on agriculture; and the result has been painfully apparent in the premature or periodic cutting-off of state surveys, usually by the vote of

country members, who failed to see the practical benefits of the expenditure incurred. It is a curious fact that in the case of some States whose geological structure is known even to minute details, he who would obtain a general idea of their agricultural features must laboriously collate scattered data contained in state or United States reports, newspaper paragraphs, the advertisements of land companies, and information obtained by correspondence. The history of the work lately done in that direction, under the auspices of the tenth census, is pregnant with instruction on this point. It is interesting to note, also, that this neglect is in most cases directly traceable to the lack of agricultural experts qualified to carry out such work; and the inference is plain that if the agricultural colleges shall succeed in supplying this want, they will do yeoman's service in the cause of agricultural progress.

It is, however, painfully apparent that in most cases the means now at the command of the agricultural colleges of States where the experiment stations are most needed are quite inadequate to the full requirements of such work, in addition to the maintenance of a proper corps of teachers. As to agricultural surveys, they are even more out of the question, except in so far as the instructors may gradually acquire some knowledge of the State through personal visits, specimens, and correspondence, — a tedious and slow method, especially in the larger States west of the Mississippi River. These States, moreover, have become distrustful of the management and agricultural utility of state surveys, and are slow in giving adequate pecuniary aid to them. It seems to be a case in which enlightened intervention and substantial aid from the general government would be especially well applied; whether in the shape of additional endowments, or, in view of the uncertain policy of the several States in

the matter, by the direct coöperation of the United States Department of Agriculture with the several colleges.

The act establishing the Department of Agriculture recites that its "general design and duties shall be to acquire and diffuse among the people of the United States useful information on subjects connected with agriculture, in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants." A succeeding section specifies that such information shall be obtained by the commissioner "from books and correspondence, and by practical and scientific experiments, by the collection of statistics, and by other appropriate means within his power."

The very general wording of this act leaves to the commissioner a wide discretion in respect to the manner in which the intent of the law shall be carried into effect, and probably was intended to do so by its framers. In view of this, it is a curious fact that no qualifications as to special fitness on the part of the incumbent are prescribed; the selection being left entirely to the good judgment of the executive.

It can hardly be surprising that wide differences of opinion as to the proper scope and mode of action should have arisen in respect to the Department of Agriculture as well as the agricultural colleges. Like the latter, that department and those placed at its head have been highly extolled on the one hand, and roundly denounced for utter inefficiency and uselessness on the other. As in the case of the colleges, the truth is doubtless to be sought between the extremes. Much of what has been objected to is and has been due to causes lying outside of the department itself, in the political atmosphere of the country, and in the immense extent of the territory over which the benefits of the depart-

ment were to be spread by the aid of the small sums that have until quite recently been at its command. The inevitable great dilution of the effects produced under the circumstances could hardly fail to draw down upon the department the criticism of portions of the country, or of certain special agricultural industries, which for the time being found themselves neglected.

If we examine in detail the records of the department, as shown by the annual and special reports issued by it, we find that, so far as they go, the letter as well as the spirit of the law creating it has been fairly complied with. It is a common thing to hear these reports sneered at, and to find them in the receptacles usually provided for waste paper. But it is generally true that the sneering critics are those who would have little use for agricultural reports of any kind, and that the fault found is not as to what *is* in the reports, but rather what *is not* there; that is, they do not happen to contain anything that applies usefully to some particular region or circumstances.

As regards the former class of objectors, its only *raison d'être* is the unwise mode of distributing these and other government reports, chiefly by members of Congress, to or through persons whose only interest in them is the political or personal capital they can make thereby. Hence we find the plates of cattle and other domestic or useful animals, plants, fruits, implements, etc., which form part of the agricultural reports, figuring extensively in the nurseries and other recondite places of towns and cities, while the paper-mill is often a large-scale recipient of the depleted volumes. "As valuable and interesting as an agricultural report" is a saying that finds its natural origin in the wide distribution of these documents among those having no real interest in anything of the kind. It is sufficiently obvious that the required remedy for

this state of things is a greater diligence and conscientiousness on the part of members of Congress in getting these, as well as other government reports, directly into the hands of those for whom they are intended, instead of using them as lubricants for party machinery.

The class of objectors to the reports because of their omissions is more formidable, because having a real grievance resulting from the management of the work of the department. It will be useful, in considering this part of the subject, to institute comparisons with what other nations have done and are doing in the same direction. And in so doing it will be found that, while European reports are replete with accurate and laborious investigations of details of subjects long discussed, the American reports are remarkable for dealing largely with new and vitally interesting questions arising under the peculiar conditions of our agriculture; and are therefore read with interest by educated agriculturists in Europe, who are far from considering them, or the general work of the agricultural department, as being below the proper standard. Apart, then, from some weak papers, such as will occasionally find their way into much more pretentious publications, we need not be ashamed of the quality of the matter that has entered into the agricultural reports.

The adequacy of the department to the needs of the overshadowing industrial interest of the country is quite another matter, and the weakest point of the case. Its work has certainly not met the expectations entertained by the general public; and the causes assigned have been as various as the remedies proposed. Prominent among the reasonable grounds for dissatisfaction has been the management of the distribution of seeds and plants, provided for by the original act, that has absorbed a considerable share of the appropriations made

by Congress, and for years has loaded down the mails with thousands of packages of seeds that, even if "valuable," were certainly not "new" in any sense save that of having been grown the preceding season, and might have been purchased by any one desiring them at any country variety store, or at least of seedsmen or nurserymen, in any portion of the country to which they were adapted. This practice competed with legitimate trade, and alienated from the support of and coöperation with the department a professionally intelligent and influential class of men throughout the country. This overstepping of the proper limits and intent of the law was notoriously brought about under pressure from members of Congress who desired the seeds, like the reports, to act as lubricants toward reelection, or other party advantages; and were especially strenuous on the subject of full sets of flower-seeds, wherewith to conciliate the good offices of the female portion of their constituencies. Under the terms of the appropriation bills, the commissioners were to a great extent helpless in preventing this stultification of the department, without incurring the risk of a defeat or serious curtailment of their general appropriation; and while this indiscriminate, injudicious, and costly distribution has resulted in making known and bringing into use a not inconsiderable number of improved or new culture plants, the benefits derived therefrom thus far have been largely offset by the ill-will, and in part contempt, resulting from the transmission of seeds already in the general market, or obviously unadapted to the local climate. For in the impartial distribution claimed by members, cotton-seed was sent to New England, and Illinois-grown seed corn and California wheat each went back to their native climes. All the commissioners have commented more or less upon the evils of this system; and the firm stand taken

by the late commissioner Le Duc on this point secured for him the respect even of those who found fault with the somewhat "personal" character of his administration.

Apart from this obvious and legitimate cause of complaint, the objections to the management of the department have not been very definitely formulated, and are rather to be inferred from the propositions made for changes intended to render it more efficient.

The reasonable claim that agricultural interests should have a greater influence in the councils of the nation than has heretofore been the case has led to a movement which contemplates the elevation of the commissionership of agriculture into a cabinet office. It is supposed by the advocates of this measure that a position and vote in the cabinet would insure a more serious and liberal consideration of agricultural interests by the government. But it is not clear what practical object would be accomplished by this mere change of name, or increase of conventional dignity. The time when reforms could be accomplished by such easy means is past. It is not supposable that an afflatus of greater wisdom in the management of his department would thereby inflow upon the new minister, *ex officio*; and it would be difficult to point, in the political history of the United States, to any case in which agricultural interests would have been sensibly benefited by a cabinet vote. If it is the influence on congressional legislation that is contemplated, a much shorter and more direct way to reach the object is to send to Congress men who shall truly represent these interests; and this it is entirely within the power of farmers to do, without asking any legislation or consent of cabinet or Congress. It is the lack of a sufficient number of such men in the legislative halls, both state and national, that keeps the agricultural inter-

ests begging at the doors of the assemblies for the recognition and aid which they ought to be able to command. What more need be said on this point, so far as Congress is concerned, than that the senate committee on agriculture of the forty-sixth Congress was composed of five lawyers and two members who might be classed as agriculturists? — of whom, however, only one remains in the same committee of the forty-seventh session. In the House, enough just men have been found to form about one half of the corresponding committee. How can favorable and intelligent legislation on a special subject be expected of a body thus one-sidedly constituted?

Forming, as they do, a sweeping majority of the entire population, why is it that the farmers' vote is steadily given to men whose interests are not identified with theirs, and whose personal knowledge of the needs of the agricultural industry is limited to the most general and often misty ideas? The question has frequently been asked by the writer, as well as by others, when farmers complained of want of representation in the legislatures. The reply has not generally been clear or satisfactory, and it has mostly been left to the questioner to suggest that it is because farmers do not often find among their own number men sufficiently trained both in the science and art of agriculture and in the requirements of successful public life to hold their own, and effectually maintain the cause of their constituents, among the trained men put into the same field by other professions; and because they find that when they do send a "plain, practical farmer" to Congress, or to the legislature, his vote is usually the only manner in which his influence is exerted; if, indeed, amid the complexities of amendments to amendments, he does not unconsciously vote the wrong way.

What agriculture needs is not half so much a vote in the cabinet as intelligent, professionally well-trained repre-

sentatives in the legislative bodies; men qualified to be leaders in the agricultural as well as in the political field, by as thorough and liberal an education as is bestowed upon the representatives of the other professions. If the agricultural colleges should do no more than to educate leaders of this kind, they would render incalculable services to the cause.

But if professional training is needed for the representatives of agriculture in the halls of Congress, what shall we say of the qualifications that should be a prerequisite for the office of Commissioner of Agriculture? It is not enough that he should be an amiable gentleman and friend of the President, who has been more or less engaged in farming, and has some pet ideas or experiments in his mind. In or out of the cabinet, that officer should combine a thorough and comprehensive knowledge of the science and art of agriculture with high administrative capacity, and a wide acquaintance with the varied peculiarities and needs of the immense region that constitutes his field of action. In other words, he should be as thoroughly qualified professionally as the heads of the coast and geodetic or geological surveys; and when once found to be so, and satisfactory to the country, he should, like the officers just referred to, hold his office during "good behavior," and without reference to political parties or presidential terms. It is only under such conditions that men possessing the requisite qualifications will consent to hold the office, and that the benefits of an intelligent, well-considered policy, consistently carried out, can be realized. Under the system thus far prevailing, the incumbents have as a rule been removed from office just about the time when they obtained a good insight into the needs and proper management of the department, and became qualified to discharge their duties efficiently.

The definite organization of the De-

partment of Agriculture as a technical bureau, withdrawn from ordinary political changes, is of course incompatible with the holding of a cabinet position by its head; since each President must of necessity be free to choose his advisers. By parity of reasoning it might be conversely said that the holding of a cabinet office by the head of any properly technical bureau is incompatible with the efficiency of such department, unless the actual management is substantially left to a competent and efficient subordinate. But in that case the particular uses of a mere figure-head are not apparent. The leader *in fact* had better be also the responsible head.

It has farther been proposed to increase the efficiency of the Department of Agriculture by enlarging its scope so as to embrace not only the properly agricultural industries, but also all industrial branches cognate with it; including even the vitally important subject of transportation. As it is difficult to see just where the intricate correlations of industries would stop, under such a point of view, this would practically amount to the establishment of a "bureau of industries" of immense range and cost, if so equipped as to be effective; whereas, if it were not adequately organized and equipped, it would almost inevitably so diffuse and dilute the share given to agriculture proper as seriously to impair the modicum of efficiency and usefulness thus far attained by the department. The latter view was evidently the one taken of the matter by a committee of the National Grange that recently waited upon the present commissioner, to enter a protest against such project of enlargement; while still, however, insisting on the advancement of the commissioner-ship to a cabinet office. The position of the committee seems somewhat inconsistent; for on the one hand they express the wish to see the department

kept as closely and technically agricultural as possible, while on the other they desire to see that done which would render a strictly technical character almost impossible. Their action is proof conclusive, however, that the practical farmers agree with the scientific men of the United States in considering that there is ample matter within the lines of action at present prescribed for the Department of Agriculture; and that what is needed is that this wide field should be more fully and efficiently covered.

It will be proper to consider this field somewhat in detail, both as to the portions measurably covered heretofore, and those which have been slighted or omitted,

(1.) That portion of the work relating to the distribution of seeds and plants has already been commented on above. It has been enormously overdone as to quantity, improper selection, and indiscriminate distribution, and should undergo severe pruning in these respects, leaving to private enterprise whatever it is manifestly likely and adequate to accomplish. On the other hand, the department should give greatly increased attention to the introduction from foreign countries of new species and varieties of valuable culture plants adapted to the varied conditions of the different portions of the Union; and to this end it should be able to secure the assistance of consular agents abroad, not as a matter of individual good-will, but of duty imposed by the acceptance of the office, — if necessary, with such compensation as may be needful and just.

In this, as in other matters, the department should invoke the active coöperation of the agricultural colleges, both in respect to information as to local wants and adaptations, and in effecting a judicious distribution of seeds and plants.

(2.) In the collection of crop and com-

mercial statistics and monthly reports of the condition of crops, the department has done excellent work; but the geographical scope of that work needs to be greatly extended, the number of observers and reporters to be increased, and, above all, the publication expedited so that it shall not be behind private enterprise in point of time and accuracy, as has heretofore too often been the case. If the government printing-office cannot give precedence to these monthly reports, over other matter in hand, they should be printed elsewhere.

(3.) In the publication of treatises on agricultural subjects of immediate importance, whether newly written, translated, or simply republished, the policy of the department and the results achieved have been worthy of all praise, placing within reach of those interested the best information on the subjects selected. That this selection has not always been the best possible for the time being may, in large part at least, be ascribed to financial inability to command the services of the men needed for the tasks. Here, also, a material increase of activity is called for, so as to place the latest results of experience and investigation promptly within the reach of farmers. An annual report of agricultural progress everywhere, with references to sources, should be made a standing feature of the general report.

(4.) Of special work involving experiment and investigation, that referring to entomological subjects has been particularly useful and acceptable, especially when that portion accomplished by the entomological commission during its temporary separation from the department is counted in, as it should be. This subject is of such vital importance that a considerable increase of means for its energetic prosecution is pressing-ly called for.

(5.) The chemical work has been of a somewhat miscellaneous character; the means at command for the purpose, be

ing inadequate to the prosecution of extended investigations, have been largely given to the examination of specimens sent to the department. Considering the expenditure, however, a great deal of useful work has been accomplished. The investigations of sorghums and their products, and of forage grasses, form valuable contributions to practical knowledge. It is curious that examinations of soils have been almost entirely excluded from the list of subjects, under a somewhat antiquated impression of the inutility of wasting one's efforts on so complex and difficult a matter. This is a particularly unfortunate omission in the one country in the world where it is possible to observe soils leisurely in their original condition, as well as under the progressive phases of culture without the use of manures. It has remained for the Census Office to take the initiative in this important matter, also, in connection with the subject of cotton production. Considering that the question of soil exhaustion and maintenance of fertility by the cheapest means is fast becoming the prominent one in the States east of the Mississippi River, it can hardly be doubtful that the examination of this subject is among the most important services the agricultural department could render to practical agriculture. The problems to be solved necessarily involve such extensive comparisons, systematically made over a wide range of soils and climates, as to be out of the reach of individual or even state action, and peculiarly the province of the national Department of Agriculture. The prosecution of these and related researches will of course necessitate greatly enlarged means for chemical and physical work.

(6.) In connection with the more accurate definition of the several agricultural divisions of the country as to soils and climates, the subject of forestry should receive continual and close attention, both as regards the naturally ex-

isting forests and timber supply, and their replacement and increase by tree-planting in timberless regions. The reports on the subject made by Mr. Hough, however valuable, have but served to show the pressing need of farther work in this direction; and here, again, the Census Office has taken a timely and most important step forward, in the investigations placed under the charge of Professor Sargent, of Harvard.

(7.) The second section of the act creating the Department of Agriculture specifies, among the means to be employed by the commissioner for the acquisition of the useful knowledge to be diffused by him, the making of "practical and scientific experiments;" in other words, it charges the department with the usual and well-understood work of an agricultural experiment station. It is true that the means and appliances for carrying on such work on a scale commensurate with the wide field to be covered were exceedingly inadequate; but it is also true that, had those placed in charge of this trust appreciated to its full extent the importance and scope of the task thus set before them, and resolutely and intelligently applied themselves to its fulfillment, an impulse might have been given that would have been felt throughout the land, and would long ago have been echoed in every State by the establishment of local stations, instead of the few that have slowly struggled into existence under the pressure of enlightened local leaders, or as step-children of agricultural colleges. As in the case of the latter themselves, the undefined dissatisfaction that has hovered round the Department of Agriculture since its inception is mainly due to the fact that it has failed to appreciate adequately, and to minister to, the strongly-felt want of the American farmer for more information directly to the point, — information bearing not merely upon theoretical and future questions, but upon problems immediately

before him, and bearing within them the alternative of success or failure, crops or no crops. In a word, the department has failed to lead, and has barely even followed promptly, the movement of public opinion and demand in respect to agricultural questions, while sometimes taking vigorously in hand some single pet problem, and thereby showing what might be done from this central position with a keener professional insight, and with broader views.

That the grounds of the department at Washington are utterly inadequate to the needs of the most modest experiment station is obvious, and has been alluded to by all commissioners. The attempt made some time ago to obtain a larger plot of land for the purposes of the department, in the neighborhood of Washington, failed; and this is perhaps not to be regretted, as the tendency seemed to be to render the new domain subservient to the purposes of the vicious system of seed distribution, and the critical undertaking of a "model farm" of doubtful utility, especially under semi-political management. The reported results of the tea-farm experiment in South Carolina have cast another unpropitious shadow upon such projects. Yet it is difficult to see why, with a proper professional organization independent of party management, well-conducted experimental farms, under the direction of the commissioner, should not be as possible here as they are in Europe. And it can hardly be questioned that in the remoter and climatically widely different regions, such as the Pacific coast and the "arid" belt lying between the Sierra Nevada and the Rocky Mountains, the establishment of branch bureaus, under the care of assistant commissioners, is needed for the purpose of securing to them the advantage of an adequate consideration of their peculiar interests. In most of the States, however, no new or distinct experiment stations would at present need to be pro-

vided for, since they are already organized, in a greater or less degree, in connection with the agricultural colleges, under the care of a staff of professional men interested in the most direct manner in the successful performance of such experiments as, from the nature of the case, the national department would be likely to desire in their locality. These men would, as a rule, joyfully avail themselves of the opportunities afforded them by assistance from the department, rendered under conditions similar to those usually made by the Smithsonian Institution, so noted for securing the highest grade of work at the least possible cost.

The failure to seek and secure the active coöperation of the agricultural colleges is one of the most conspicuous omissions of the Department of Agriculture. Through them its most useful influence could have been exerted, and its most authentic information as to facts and wants obtained. For some years, a somewhat extended account of the operations and condition of these colleges formed a part of the report of the department; but that subject has since been left to the Bureau of Education, — properly, so far as the merely educational part is concerned, but improperly as regards the ignoring of the general work they have been doing in the improvement of agricultural methods and knowledge. To speak plainly, the national Department of Agriculture seemed to act, in a measure, as though the colleges and experiment stations were not in existence. Instead of assisting them and summing up their work, it ignored them sometimes even in the matter of distribution of seeds and department reports. Its traveling employees seemed at times to keep out of the way of the existing institutions, often laboriously gathering anew information already abundantly in the possession of the latter. If this was done or omitted under the impression that the colleges

or stations were indisposed to coöperate, so much the more would it have been incumbent upon an enlightened chief of such a department to seek them out, and stimulate them into active coöperation. Except in the matter of an occasional call for a convention, of which the commissioner was to be the conspicuous centre, and whose results have not been very apparent, the colleges have had but little attention from the department at Washington.

All this would be at once changed were the commissioner to become a technical expert, responsible not only officially to the government, but amenable to that rigorous and incorruptible tribunal constituted of his scientific and technical compeers, and under the standing menace of a loss of his professional reputation, which no whitewashing committees, in or out of Congress, could in any manner condone or undo. The substitution of the opinion and judgment of the republic of letters and science for that of the political one would constitute a self-executing measure of civil-service reform which would quickly sweep away the clogs and barnacles that have heretofore beset the progress of the department toward its highest usefulness. It would at once place it in a position of active and necessary reciprocal sympathy and coöperation with the agricultural colleges and experiment stations, and, through these, with the real wants of every portion of the agricultural domain. It would thus naturally and legitimately become the leading centre of agricultural information and progress, gathering up all the disconnected threads, now scattered from the Atlantic to the Pacific, into a radiating net-work,

conveying back and forth messages of mutual information and encouragement, by deed as well as by word.

The field is a wide and magnificent one, both as to the opportunities it affords, and as to the practical importance of the results that will reward its intelligent cultivation. It is so vast that the proposition to enlarge the scope of operations of the department by charging it with the duties of a general "bureau of industry" seems almost a satire upon its past history. Moreover, outside of the land office and the care of the Indian tribes (the latter, it is to be hoped, a subject soon to be eliminated from its executive responsibilities), the Department of the Interior would as naturally cover, under its general intent, a bureau of manufactures and mines as a bureau of agriculture.

If it should be contended that the carrying into effect of the system outlined in the preceding pages would necessitate too great an increase of expenditure, the answer is that if the present appropriation were to be tripled or quadrupled, it would yet bear but an insignificant proportion to the magnitude and commanding importance of the interests involved, and would be but a fraction of the millions annually wasted upon expenditures of at least doubtful general utility. The country can far better afford to do without a large proportion of the expensive party manoeuvres, investigating committees, and "jobs" designed for the manufacture of political capital, than to neglect any longer to foster the fundamental industry, by giving those who exercise it the fullest benefit of the lights that education and science can bestow.

Eugene W. Hilgard.

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