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California University



RECENT INFORMATION  
RESPECTING  
AGRICULTURAL EDUCATION  
ELSEWHERE.

In order to ascertain the experience of other institutions whose aims are kindred to those of the University of California, voluminous collections have been made of their reports and catalogues, and many letters have been interchanged with the most enlightened leaders of education in this country. Attention is particularly called to the experience of Cornell University, the University and Agricultural College of Michigan, the Illinois Industrial University, the Universities of Wisconsin, Minnesota, and Iowa, and the Iowa Agricultural College; as well as to the experience of the older States, the Amherst Agricultural College, the Rensselaer Polytechnic School, the Massachusetts Institute of Technology, the Stevens Institute at Hoboken, the Bussey Institution of Harvard College, and the Sheffield Scientific School of Yale College.

Some interesting utterances on the subject of modern agricultural education are contained in the following extracts from printed or manuscript papers in the possession of the Regents.

These extracts are not compiled for the purpose of exhibiting the full activity of these institutions, but in order to show that some of the difficulties which are experienced in California are encountered elsewhere, and also to show that some of the best institutions in the country are declaring that Agriculture is to be advanced by careful investigations, and that the scope of the National Colleges must be liberal and comprehensive—not narrowed and partial.

San Francisco 1875

FROM PROFESSOR E. C. BESSEY, OF THE IOWA AGRICULTURAL COLLEGE, JANUARY 17TH, 1874.

You refer to a problem which is somewhat difficult to solve ; *i. e.*, What is the proper work to be done on an experimental farm and garden? As you say, you cannot expect to compete with the shrewd and successful people about you, already engaged in farming and market gardening. It is difficult to determine, in an experimental garden, for example, how far it is profitable to illustrate the commoner operations in gardening by their actual performance. We hardly know yet when to begin or end our work, for there has been comparatively little done in systematizing either horticulture or agriculture.

The fact of an experimental station being connected with an institution of learning, adds somewhat to the complications of the case ; for many things must be done in such case which otherwise would be unnecessary : and yet, from an experience of eight years as student and teacher, I am inclined to believe that the greatest good can be done by making the Arboriculture, the Botanical and Experimental Gardens, rather adjuncts to the natural sciences, than the reverse. That is, I am pretty well assured that it will result in greater good, if the natural and physical sciences are made the centers, so to speak, from which to pass outward to the so-called *practical* sciences. I should teach Horticulture very largely as Economic Botany, treating it from the standpoint of the latter science ; thus leaving most of that which relates to the details of planting, caring, and gathering of crops, to be learned by the student elsewhere. The market gardens to be found about any of our larger cities, and the many well-conducted farms to be found in any county, will afford facilities for learning much more easily all that pertains to the minutiae of either, than any model garden or farm it is now possible to establish.

It is not altogether unlikely that, in the School of Agriculture of the future, the student will be taught the natural and physical sciences, and then be given a year or two in which to thoroughly acquaint himself with the details, on some well-conducted farm. Perhaps, in such case, the degree of Bachelor of Science may be

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conferred upon the student at the end of his College course, (of not less than four years) and another indicating proficiency in Agriculture, upon completing his apprenticeship. Probably you catch my idea. I am led to think that we must move in this direction, if we wish our industrial schools to do the greatest good. I am quite sure that, with the present limited amount of money at our command, it is useless to expect to turn out from our industrial colleges and universities, finished farmers, gardeners, or mechanics. We can do this much, however — we can give our students a good foundation of pure science, upon which to rear a superstructure of applied science.

PROFESSOR AGASSIZ ON THE VALUE OF RECENT RESEARCHES IN  
VEGETABLE LIFE, MADE IN THE AGRICULTURAL COLLEGE  
OF MASSACHUSETTS, AT AMHERST.

At the close of President Clark's remarks on the "Circulation of Sap in Plants," before the Board of Agriculture, at Fitchburg, Dec. 2d, 1873, Prof. Agassiz volunteered the following telling compliment to the College. He said: "May I request you to grant me half a moment, before you call upon the gentleman who is to speak next? I need not praise what has been said by President Clark, for the man that can make such investigations, and report them in such a manner, has the reward of his works in himself, and no eulogy from others can add to his gratification. But I would not allow this opportunity to pass, without saying a word with reference to the College. From this time forward, this institution has its place among the scientific institutions, if it had not before; for only those institutions have a place in the scientific world which do something, and this is something extraordinary. It is a revelation to physiologists. Let me say to those who have not thought that the Agricultural College was doing anything worthy of its expense, that the production of this one paper has amply paid every dollar which the State has bestowed upon the institution."

THE VIEWS OF PRESIDENT WHITE, OF CORNELL UNIVERSITY,  
JANUARY, 1874.

President Andrew D. White, of Cornell University; in an address delivered at Albany, January 21, 1874, before the N. Y.

State Agricultural Society, has referred to the misapprehensions of some who disparage the Agricultural Colleges of the country. One objector, he says, was especially hilarious over the small number of graduates from our Agricultural Colleges.

“ Let us look at this. The number is at present very small, but I presume that no thoughtful man expected that at so early a period after their establishment the number would be very large ; nor, indeed, do I expect that for some years the number will greatly increase. In a new country like ours, those professions which present the most brilliant returns, will be sought for first. Hence we find that when a farmer decides to educate his son, it is not generally with the idea of making him a farmer. \* \* \* \* \*

But while I allow freely that this is the case now, I can state quite as confidently that this condition of things cannot continue for many years. There are those now living among us who will stand among a hundred millions of citizens within the boundaries of our Republic. When that day comes—nay, long before—this present condition of things must change. The present system of routine cultivation—this present system of “ skinning ” lands and then running away to soils more fruitful, in the intention of robbing, and then running away from them in turn—cannot last. Men must get a subsistence on less and less land ; and they can only get it by bringing to bear upon it better and better cultivation. \* \* \* \* \*

But grant that the number of students devoted to agriculture is small : it is not these alone whose education tells upon agriculture. Even a partial course in it has great value. It was the remark of a very distinguished statesman of this Commonwealth—one who occupied this desk as Speaker, yonder chamber as Governor, and who received the suffrages of many of his countrymen for the highest office in their gift—that the main thing in agricultural education is to do something to make agricultural pursuits attractive.

But suppose that no young men came forward to take agricultural studies, the new education would still tell powerfully on agriculture. Think you, we can send out year after year—as we did, last year—a hundred graduates from all our various departments, whose powers of observation have been trained, and whose real knowledge of subjects bearing on agriculture has been extended by

close study in Botany, Animal Physiology, Geology and Chemistry, without its telling ultimately on the progress of agriculture?

But suppose that not one student was even thus educated: I maintain that the State and Nation would receive more than the equivalent of its endowment.

Look at a few figures. The last census gives certain agricultural statistics, whose magnitude is almost oppressive. The value of farm productions in the United States, in the year 1870, was considerably over two thousand millions of dollars.

The value of farm productions in the State of New York, the same year, was over two hundred and fifty millions of dollars.

Does not common sense teach us that we can well afford to make a little outlay to promote any sciences which may help such a vast interest? If, in the course of years, in all these laboratories and experiments, some one useful idea shall be struck out, it would pay our endowments a thousand fold.

Says Emerson: "The true poet is an inspired prophet." Did you ever think what an inspiration lies in the poet's declaration that "the greatest benefactor of mankind is he who makes two blades of grass grow where one grew before?" If not, look at the census returns showing the enormous value of the hay crop of these Northern States.

Knowledge of nature, coming by research and observation in the laboratory and the field—these are to give us finally our "two blades of grass," and multitudes of other benefactions to our race, not less precious.

The Sheffield Scientific School, at Yale College, has not a single student in agriculture; but Professors Brewer and Johnson, by their experiments on fertilizers and kindred subjects, have returned the value of their endowment to the nation a hundred fold already.

Take another item. The dairy products of New York, in 1870, were over one hundred million pounds of butter, and over twenty million pounds of cheese. Now, there has been quietly at work in our laboratory of Agricultural Chemistry, at Cornell University, a young professor, Mr. George C. Caldwell. He has made little noise in the world, but has worked quietly on upon the chemistry of the dairy. Said Mr. L. B. Arnold, an authority you all recognize: "Professor Caldwell's researches on the chemistry of the



dairy are worth more to the State than your whole endowment. He has taught us to do such things in dairy matters, and to increase dairy products, as we never dreamed of doing." And to this, substantially, Mr. Arnold has lately sworn before the Commission of Investigation.

Take a few figures more from the same census. In 1870, the market-garden and orchard products of the State of New York amounted in value to close upon twelve millions of dollars.

Can any one, then, gainsay the wisdom of our employing, as we do, a young naturalist of genius to devote his whole time to investigation, and to giving lectures based upon these researches?

Take still other figures. The same census shows the value of farm implements in the State of New York to be over forty-five millions of dollars. In view of this, we have investigations and lectures upon mechanics related to agriculture, and have obtained models and implements at home and abroad, to illustrate this subject. Is not the mere pittance this requires, well laid out?

Take another branch of the subject. We have been fitting up an establishment for experiments in the best rotation of crops, and in the feeding of cattle. A careful resident Professor has been called to carry on these, and I trust that Mr. E. W. Stewart may be called to superintend them.

Some time since, in view of this matter, I visited certain cattle-feeding establishments with a gentleman whose sound sense on such matters you all recognize, Hon. George Geddes. Said he: "This experiment fairly tried will be worth to the State of New York more than your whole endowment; no matter which way it turns out; no matter whether 'soiling' is found profitable or unprofitable; to try this matter fully and fairly and scientifically, will be worth more than your endowment."

PROFESSOR S. W. JOHNSON, AUTHOR OF "HOW CROPS FEED," ON  
THE BUSSEY INSTITUTE, IN MASSACHUSETTS.

[*Results of Glass-House Research.*]

Dr. Storer's laborious study of the plant-feeding capacity of these materials, while sufficiently interesting in itself, doubtless involved other collateral questions. One important object but hinted



at in the report, we conceive to have been, acquiring for himself and assistants a mastery of *all the minute details of glass-house culture, as applied to investigating the conditions of plant growth.* The grand results of this mode of research, as recently developed by French and German scientists, have so transformed vegetable physiology within the last twenty-five years, that we here record our thanks to the Bussey Institution for the promise which we see, in these toilsome experiments, of new scientific harvests from a prolific field as yet almost uncultivated on this side of the Atlantic.

The small number of students in attendance is regarded, in some quarters, as evidence that the Bussey Institution is not a success. There are various reasons why it probably may not, for years to come, be successful as a school, judged by the length of the roll-call merely. It cannot, however, fail to exert a widely-useful educational influence on public sentiment, if its Faculty simply labor to demonstrate how potent a lever the method of scientific investigation is for the elevation of agriculture. So soon as science can find among our agriculturists a constituency which is equal to the intellectual appreciation in detail of her spirit and her method, so soon we shall have good agricultural schools, amply supported and frequented.

May we not hope for the speedy coming of a time, when the results of the scientific study of the soil-depths and the plant-depths shall excite the popular interest as it is now stirred by the revelations that now reach us from the star-depths? Chemistry is to these mysteries, that invite all our studies of the summer days, as astronomy has been to the arcana which most keenly challenge our inquiry in the winter nights.—*New York Tribune*, January, 1874.

PROFESSOR ATHERTON, LATE OF THE ILLINOIS INDUSTRIAL UNIVERSITY, AND NOW OF THE RODGERS SCIENTIFIC SCHOOL, ON AGRICULTURAL EDUCATION.

Professor Atherton, commenting on a journal which had spoken of "Agricultural Colleges" as failures, meaning by "agricultural colleges" those which received, like the University of California, the National Grant of 1862, speaks as follows:

The assertion just mentioned is both fallacious and absurdly inaccurate. It is fallacious, because the institutions were never

designed by Congress to be "agricultural" merely. \* \* \*

This language certainly does not contemplate the teaching of "agriculture" alone, but of all the natural sciences which underlie its laws and processes; all the mathematical and physical sciences which are the basis of the mechanic arts, and whatever else is adapted to promote "the liberal and practical education of the industrial classes," not even excluding classical studies. It is, in short, the statement of a comprehensive scheme for promoting the higher education of the people—a thing which the Government has been doing ever since it first had public lands to dispose of. The institutions thus founded have come to be generally spoken of as "agricultural colleges" simply for want of a more convenient designation, and probably, also, because "agriculture" happens to be the first important word in that part of the law just quoted. In case, however, of a large majority of the institutions, "agriculture" or "agricultural" forms only a part of the legal name; and in case of two, neither word appears. It may be freely admitted, therefore, that the number of students of "agriculture" is small, without for a moment implying that the agricultural colleges, so-called and mis-called, have few students. Indeed, it is strictly within the truth to say that the fact of there not being one student of "agriculture" among the whole number of institutions would not necessarily have the slightest bearing upon the question whether they are fulfilling the end for which they were established. The sole question is: Are the institutions established by the Act of 1862 doing the work prescribed for them by that act? There is ample proof that they are; and it is the weakest kind of fallacy to apply an incorrect name to them, and then declare them a failure if they do not meet with the requirements of that name. If the law of 1862, instead of using the word "College," had simply said that the fund thereby appropriated should be for the support in each State of one "Scientific School," or one "School of Science where the leading object should be," etc., precisely what is now stated in the clauses above quoted, the institutions would without doubt have come to be called "Scientific Schools," or, perhaps, "National Schools of Science," or some similar name. Quite certainly they would not have been called "Agricultural Colleges," and that would have precluded a vast amount of honest misconcep-

tion respecting them, and would have rendered impossible some conspicuous attempts to befog the public mind.

#### NOTE ON PROFESSOR ATHERTON'S PAPER.

The name "Agricultural," when applied to the College established by the National grant and the State donations added thereto, is by itself misleading. As is abundantly shown by Professor Atherton, while agriculture was first named, mechanical and other scientific instruction was to be coupled with instruction in agriculture. The title "Agricultural Colleges" expresses but a part, however important a part, of the original object of the National Grant. The name "National Colleges," has been suggested as a much more comprehensive and accurate title; and this is the designation employed by the Hon. Mr. Morrill, (author of the bill making the original grant) in his speech on the latest phase of the question.

Whatever name be thought best, the full scope of these institutions should always be born, in mind.

Advantage has been taken of the restricted title "Agricultural," by those who are unfriendly to the modern scientific methods. These national schools of science are held up to reproach, because they have so few distinctively agricultural students. It is a false reproach. The whole number of students in all the scientific courses, which are so closely affiliated, is to be taken into the account. With these, the National Schools, fostered by the so-called "Agricultural Grant," everywhere make an excellent showing. None of them could make a good showing, if it were put on the narrow footing of a strictly agricultural curriculum.

#### ON AGRICULTURAL EXPERIMENT STATIONS.

[BY PROFESSOR S. W. JOHNSON OF THE SHEFFIELD SCIENTIFIC SCHOOL.]

Professor Johnson, when called upon to inform the committee as to the matter in hand, said that the same sort of investigation which has been of such assistance in all other branches of human industry, must be of service when applied to agriculture. The farmers in Leipsic, Germany, long ago, found out that many ques-

ions arose in individual experience in farming, that could not be harmonized and fairly understood without the help of scientific experts. So they learned shortly to establish chemists' laboratories, with means for testing and answering the various queries that arise in a studious farmer's mind in his usual avocations; questions of feeding cattle, manuring land, and of the qualities and constituents of farm produce. There are now some seventy such stations established in the German States. The stations have been at work industriously, disseminating the results of their experiments through the press. Their publications have become voluminous and valuable, producing a new literature for the farmer, so important in the eyes of the most intelligent European farmers as to have produced a revolution in practical agriculture. In the matter of feeding cattle especially, much benefit has been derived from exact knowledge of the nutritive qualities of fodder. The ability to make more profitable combinations of the food of animals, so as to prevent waste, has alone, in the opinion of the average German farmers, repaid by many times all the expenses of these stations. These farmers have also learned to feed their crops, finding their account in doing this accurately according to the peculiar needs of each. They would no more throw down food to their plants thoughtlessly by the ton, than before their animals. These stations are not forced upon the people by the government, but grow out of organized private enterprises with government help, and are largely supported by farmers themselves. The secret of their growth, thrift, and usefulness in Europe, lies in the fact that farmers have called for them.

It is found by German professors that, in making experiments upon soils and plants, not a great deal of land is needed. A box or barrel of soil—protected by glass, if necessary—can be much more conveniently forced to yield its secrets, at the first trial, than when exposed broadcast upon a farm. If we wish, for instance, to know what changes take place in putrescent stable manure, these can be determined for general application better without the use of a farm; a load or two of manure is sufficient. Field experiments will prove very expensive, and at the end the results must be of a sort that would vary by a change of location. The weather plays the mischief sometimes with experiments out of doors. The prin-

principles sought for are more readily and certainly grasped by trials in a small way, where the conditions are under control.—*Hartford Courant*, Jan. 15th, 1874.

FROM "AGRICULTURAL SCHOOLS IN EUROPE," IN A REPORT OF  
THE SECRETARY OF MASS. BOARD OF AGRICULTURE.

## I.

"It would be unfair to assert that the advocates of University teaching, in Germany, undervalue practice. Their position is that the union of the highest education in the sciences and the practice is incompatible at the same time and at the same school, and they advise the pupil to begin at the fountain head, and become well grounded in the scientific principles, and then to go on a farm under a competent, practical man, and learn the details of farm management. \* \* \* Liebig has taken the ground very strenuously in favor of a connection with the universities, and a great majority of the agriculturists adopt that view; or take a middle ground, that the location should be in the immediate vicinity of some established university, partly as a means of bringing the students under university laws, and partly to give the professors a higher position in the estimation of their pupils, and to avail themselves of the advantages of the collections, libraries, etc., which a university can offer, as well as the talent of university professors."

## II.

"Nor do I think that any impartial observer can fail to see that, had the Agricultural College of Cirencester been connected with one of the universities, Cambridge or Oxford, it would be more likely to accomplish the ends which it now proposes to itself, would possess greater vitality, and receive a far more liberal patronage from the class of people it now aims to educate, than it does, or is likely to, in any time to come. It would have been able to secure and retain the highest scientific talents; while the farm which is now used simply as a model for illustration, on which the students do not work, would have been equally valuable and important on the downs of Oxfordshire, or on the fens of Cambridge."

## III.

“In Germany, where the experience has been longer than in any other part of Europe, the question of connecting agricultural institutes with others, or of having isolated and independent establishments, has long been agitated, and is now more warmly discussed than ever before; one party—and it is possibly by far the larger—taking the ground for, and the other against, such union; each governed, in a measure, no doubt, by personal experience in the one or the other system.

So far as I was able to inform myself, the ground taken by the advocates of a union with the universities is, that it is better for a young man, setting out to procure a liberal education in agriculture, to lay the foundation in a thorough knowledge of general principles embodied in the wide range of sciences which bear more or less upon agriculture, and then to devote himself to the application of those principles by practical labor on a suitable farm or farms for one or more years, or till he becomes efficient in the manipulations.

This course will be seen, on reflection, to be closely analogous to our present most approved modes of acquiring a thorough knowledge of law, medicine, and divinity.”

THE “AGRICULTURAL COLLEGE IN PENNSYLVANIA” ABANDONS THE NAME, FOR THAT OF THE PENNSYLVANIA STATE COLLEGE.

PENNSYLVANIA STATE COLLEGE.—Upon application by the trustees of the Agricultural College of Pennsylvania, the court of Centre County has changed the name of that institution to the one given above. The change was desired, because the old name misled many persons as to the character of the college, and failed to express the breadth of purpose contemplated by the law of Congress under which it received its endowment. The law distinctly stated that the institutions organized under it, “shall have as their leading object, 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.”

From this it will be seen that no strictly agricultural college could do the work required. The effort of the authorities of the State College to give instructions in the various branches required by Congress, was denounced by many persons as a departure from the purpose of the institution as indicated by its name ; and the fact that some of its graduates engaged in other pursuits than agriculture was proclaimed as proof of failure or fraud on the part of the Faculty. In many instances, students were prevented from entering, under the impression that the college was designed for only those who intended to be farmers. — *Courant*, Feb. 14th, 1874.

#### EXPERIENCE OF THE SHEFFIELD SCIENTIFIC SCHOOL.

The reproach has sometimes been brought against this institution, which received the Congressional Grant of 1862, that it was not training agriculturists. Twice, at least, the investigations made by the Professor of Agriculture in the Chemical Laboratory, revealed the fraudulent character of certain popular fertilizers sold to the farmers of the State, and thus saved the State hundreds of thousands of dollars.—far more than the institution received from the National Grant.

In that same institution, two books have been prepared, by original scientific work, which are now the manuals of instruction in this and other countries. The value of such research is seen by the following statement :

The success of the two books on agricultural chemistry, “How Crops Grow,” and “How Crops Feed,” by Prof. Samuel W. Johnson, of the Sheffield Scientific School of Yale College, is somewhat remarkable, if we may judge from the favor which they have met with from scientific men. The first of these two works is now extant in three different languages—English, German, and Russian ; and the second in two—English and German. “How Crops Grow” appeared in 1868, from the well known agricultural publishing house of Orange Judd & Co., and has had a steady if not extensive sale. The companion volume, “How Crops Feed,” appeared in 1870. The first volume, “How Crops Grow,” was reprinted in England in 1869, by Macmillan & Co., from advance sheets, under the joint editorship of Prof. A. H. Church, professor of Chemistry in the Royal Agricultural College at Cirencester,



and Prof. W. T. Thistleton Dyer, professor of Natural History in the same institution. In 1871, this same book appeared in German, having been translated at Baron Justus Liebig's request, by his son, Herman, the present Baron von Liebig. The companion volume, "How Crops Feed," appeared under the same auspices the following year. And finally, during the past year, a Russian edition of "How Crops Grow" has appeared in St. Petersburg. This edition comes out under the following title: "The Life of Agricultural Plants. Hand-book for Agricultural Schools and for Self Instruction. By Samuel W. Johnson, Professor of Agriculture and Agricultural Chemistry at Yale College, in New Haven. Translated from the German by N. K. Dimasheff, St. Petersburg: 1871." This volume is numbered Tome I, so that it is presumed to be the intention of the translator to bring out the companion volume.



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