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HERALD BULLETIN

No. 1.

CRITICISMS

ON THE

Agricultural College

AT

BERKELEY.

BY

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Los Angeles, Cal.

PREFACE.

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The agricultural editor of *The Herald*, in the discharge of duty, after consulting with competent and judicious advisers, felt called upon to complain of the methods of the Agricultural college and its director. We presented the case fairly and the advocates of the college had the full benefits of our columns.

Several considerations now lead us through this Bulletin to ask for a further and larger hearing of what has been said—substantially on both sides of the question:

First—No notice was taken at the college of our strictures, although a letter was sent to the president of the university calling his attention to them. This Bulletin will, we trust, enable the public to decide whether our charges were too trifling to merit notice or were too well grounded to be rebutted.

Second—We gave Prof. A. J. Cook of Claremont, who volunteered as champion of the college and its director, an opportunity to answer our averments, or on his honor to pass on their truth or falsity. His virtual retirement from the case leads us to appeal to the public to decide whether the college is doing the work for which it was created and is sustained at an annual cost of \$40,000. Prof. Cook had it in his power to stop all criticism by simply showing the falsity of our averments.

Indeed, it was Prof. Cook who first told the writer of the absurd statement concerning the woolly aphid contained in Prof. Hilgard's last report.

Third—The character of the defense of the college appearing in the *Berkeleyan* and elsewhere has made it our duty to present in this form what we have written, that it may be decided whether personal considerations or great interests, vital to the tillers of the state, are at issue.

Almost any one of the indictments contained in the following pages should be enough to retire Prof. Hilgard. His mission, since his advent in the state about twenty years ago, has been a conspicuous failure. He has had charge of the agricultural college for more than twenty years, and during that time he has not graduated one and one-half students per annum. Indeed, Prof. Hilgard held before the farmers' institute, held in August and September last, "There is very little use for agricultural

experts in this country, as the soil is fresh and requires but little art in cultivation," so narrow is his view of the situation.

We have looked in vain for graduates of Prof. Hilgard in our wineries, in our sugar factories, in our great meat packing houses, in our canneries and fruit-preserving establishments, in our fertilizer manufactories, and among our horticultural commissioners. If one or two, by chance, may appear in some of these concerns, their records have been so inconspicuous that they are like the needle in the haystack—hard to find.

We have looked in vain for a single crop that Prof. Hilgard has shown the ranchers how to improve, either in quantity or quality, although we have found many who have asked his advice, some of whom say that they have received no benefit from following it, and others that they were positively damaged by following it.

Prof. Hilgard has done positively nothing of any benefit in showing the ranchers how the waste products of the ranch could be utilized and turned into by-products.

Prof. Hilgard's entomological department is a disgrace alike to himself, the university and the state. His last report states that there is no male to the black scale, for instance. When it comes to making a simple statement of facts, Prof. Hilgard seems to be incapable of so doing, which is the first requisite of a man making any claims to be scientific. For example, in the July (1895) number of the *California Cultivator*, he said: "All my recommendations so made (meaning on soil analysis) have been followed by culture tests, but usually on a larger scale than Dr. Woodbridge's, but the results have not been paraded in the papers." In August, 1895, the writer called on the professor to state whereabouts these tests had been made, but the professor failed to answer. We know that he had not carried on any such tests on the Chapman ranch, on the Crank ranch, on the Brigdon ranch and on many other ranches where he had given advice.

There are many other like cases within the following pages, which show Prof. Hilgard to be utterly devoid of the first requisite of a man of science. He should be retired in the interests of the ranchers, the students and the honor of the state.

REPORT OF AGRICULTURAL EXPERIMENT STATIONS.

We are in receipt of the Report of Work of the Agricultural Experiment Stations of the University of California for the years 1894-95. The report claims to embrace the work of the station laboratory only up to July, 1895, and the culture reports of the several sub-stations up to the close of the season of '95, whatever that may mean. The report is very voluminous, containing nearly 500 pages. And while there are some pages of value in it there are many matters in it that are treated in the most superficial and unscientific manner, and altogether unworthy to emanate from so high a source as the University of California.

To illustrate, the report says: "The confusion of nomenclature which we found existing at Santa Monica, when the station was transferred to us, is being gradually rectified, especially as regards the eucalyptus, by comparison with standard collections, but takes time and the service of experts. In this and all other work the limited financial resources interpose serious obstacles, which have sometimes been taken advantage of for unjust criticism." Excuses, with some people are like motions to adjourn—always in order. The Forestry Station at Santa Monica has been under the charge of the director more than twenty-four months. How many months does he want and how much money does he require to correctly spell the names on the signs and to rightly place them on proper eucalyptus trees at the Santa Monica station?

OUR AGRICULTURAL COLLEGE.

If there ever was any doubt about the inability and incompetency of Prof. E. W. Hilgard to occupy the high position of director of our agricultural experiment station and chief officer of our agricultural college, the professor himself has furnished the proof, in the production of his voluminous report just published, entitled, "Report of the Work of the Agricultural Experiment Station for 1894-95."

In the first place, there is little or nothing new in the work; scarcely anything that is not more than one year old, and that has not been published previously.

He says in his introduction or letter of transmittal, that the college has been attended by the usual number of students, but he fails to state that the usual number graduated annually is less than one and one-half students, and that he has been in charge of the college some twenty years and that he has made his course of instruction so unpopular and so un instructive that our youth, in this greatest of all agricultural states, are not attracted to him, his methods of thoughts or his college. There is the

usual complaint about lack of funds, but little is said about the \$40,000 per annum that it costs to graduate less than one and one-half students.

Here is a list of the professors, instructors and officers that it takes to graduate them, together with their salaries:

Prof. Hilgard	\$ 4,000
Associate Prof. Wickson	2,400
Associate Prof. Loughridge	2,000
Associate Prof. Woodworth	1,800
Instructor Jaffa	1,750
Instructor Colby	1,500
Assistant Hayne	1,500
Inspector of Stations Shinn	1,800
Gardener Kellner	900
Foreman Tyson	900
Foreman Hansen	900
Foreman Forrer	900
Foreman Mills	900
Foreman Strachan	600
Foreman Borland	720
Clerk Stubenrach	720
Cellarman Bioletti	1,000

Total

\$24,250

The number of men employed by the department are seventeen.

The expenses for salaries are.....\$24,289.80

Other expenses

16,050.10

Total expense of agr. departm't., \$40,339.90

The professor makes a very favorable showing in the raising of some four acres of beets, which were sold to the Chino Valley Beet Sugar company for \$185.26 net, which seems to be the only profitable crop that was raised on the thirty acres of land at the station near Pomona. But there is not one word said as to how to grow beets, nor has he made any attempt to show the farmers at Chino and Anaheim, who are raising some 9000 acres of that valuable crop, how they can raise heavier tonnage or better beets, i. e., beets with a larger percentage of sugar, or beets with a greater "purity."

When the foreman of one of the stations was asked a few days ago if he knew of a single crop that Prof. Hilgard had shown the ranchers how to grow with a greater yield or a better quality, he was as mum as an oyster.

When Prof. Hilgard was asked at the last farmers' institute held at Riverside "How can we grow sweeter oranges with thinner skins" his learning and acumen enabled him to say to the audience, "Don't ask conundrums."

When it comes to a matter of fertilizers, the professor is as weak as he is confusing, and a perusal of that part of the report will leave the mind of the seeker after information in a perfect muddle. There are but ten fertilizers reported upon, but there is no indication as to where they can be duplicated.

We quote one report: "Bird guano, from George Frost, Riverside. A preliminary examination shows this to be of good, perhaps high, quality, containing an abundance of easily soluble phosphoric acid, and considerable ammonia."

This preliminary report is about as valuable as would be a report on a sample of water, to which the professor would reply, "Yes, sir; the sample of water is wet, and I think if it were applied to a redhot coal it would cool it."

While treating of this part of the report it might be of interest to many to know that there are people in the state who have followed Prof. Hilgard's advice, given on an analysis of their soils, that say that the plant food they applied did them no good; there are others who say that by following his advice they ruined their crops.

When it comes to that part of the report which treats of entomology, it is so weak, inconsistent and useless that, as citizens of California, we drop our heads in very shame.

Reference is made to but two samples of it here:

CORN WORM.

"The Sacramento Packing and Drying company writes, under date of January 12, 1894: 'The sugar corn consumed in this state is brought out from the east, to a large extent, while, if it were not for this pest, corn-packing would be quite successful and extensive within our borders. We are assured by people having experience that it is well nigh impossible to get sugar corn not having a worm in the ear.' This is the same condition of affairs that is found in the southern states, where the insect is more commonly known as the boll worm, on account of its attack on the bolls of cotton. In the northern states the worm also exists, but the shorter season prevents the many broods that are found in the south; the corn also matures faster, so that the worm never becomes as abundant nor injurious. It may be that in California the corn, for packing purposes, will have to be grown mostly in the foothill regions, where the climate corresponds with that of the northern states. For market garden purposes the solution is growing of the most rapidly developing dwarf varieties.

"It may be that dusting the field with Paris green repeatedly, just before and at about the time the silk appears (which corresponds with the period of the entrance of the worm), may produce results. We have suggested the experiment to a number of correspondents, but have not heard of the results obtained."

Here is a question of a practical nature put some two and one-half years ago. A suggestion of a possible remedy is given, but no account of its having been tried. If the professors of our agricultural college understood their duties and were capable men, they would have tried the suggested remedy and reported on its efficiency. That is what they are there for, that is what they are paid for.

On page 258 we find the following paragraph. The scale referred to is the black scale (lecanium):

"This leads us to a consideration of the history of the scale when left to itself. Each well-developed insect lays a large number of eggs. It has been estimated that as high as a thousand are sometimes laid. Let us suppose, however, that five hundred are produced. As there are no males, each one of these that comes to maturity lays five hundred more. It will be evident at once that this rate of increase cannot go on long."

We call attention to the statement that there are no males to the black scale.

'Tis twenty years that Rip Van Winkle slept; 'tis about twenty years since our agricultural college was born. It seems to have dropped to sleep at its birth and to have remained in that soporific condition ever since. The state board of horticulture published in its annual report of 1893 an account of the finding and a description of the male, which we reproduce. The description was reproduced in the California Cultivator, October, 1894; by United States department of agriculture and in many publications. Except upon the Rip Van Winkle theory how can we account for our state entomologist's ignorance?

That something is wrong with our agricultural college is very generally admitted. What is the wrong and at whose door shall it be laid?

It has had and spent large sums of money. Its management has had full sway, unhampered and untrammelled. It has had the most magnificent stretch of country, with varying climates, and the richest soils and the greatest varieties of products of the soil to work upon. Its subject matter to work upon has been ideal—perfect. And yet with this vast amount of money and the crying need for trained agriculturists, the college has failed to produce them; as it has failed to show the farmer how to grow larger and better crops. The whole trouble lies in the personnel of our director and many of his incompetent assistants.

A SPECIMEN IN ENTOMOLOGY.

From the latest report of the Agricultural Experiment Station: The woolly aphid is a much more difficult insect to eradicate than those living above ground, but it is a much easier insect to control than such as the phylloxera. The treatment above ground is the same as for other aphids. Those on the roots are beyond the reach of any practical remedy, but fortunately they do but little injury. The danger from this insect lies almost wholly in their attack upon the crown of the root. At this point the irritation by the insect causes the tree to attempt to put out suckers. These, generally, are not

able to develop into a normal sucker, but remain as knots on the tree. The continuation of this process finally produces a very large knot of abnormal tissue around the base of the tree. As long as this tissue remains alive there is no danger to the tree, but it generally dies, and then may be the avenue for the drying up of the trunk, and causing the death of the tree. The most serious complication is the rotting of this tissue and the admission of toadstool fungi, which will ultimately result in the death of the tree.

The remedy is simple, and consists in defending this part of the tree by wood ashes or other substances distasteful to the aphids. Page 248.

We analyze the above account, and place its contradictions in the deadly parallel column:

"Those on the roots reach beyond the reach of any practical remedy, but fortunately they do but little injury."

The remedy is simple and consists of defending this part of the tree with wood ashes or other substances distasteful to the aphids.

As long as this tissue remains alive there is no danger to the tree, but it generally dies, and may then be the avenue for the drying up of the trunk and causing the death of the tree.

When this learned professor says: "The danger from this insect lies almost wholly in their attacks upon the crowns of the roots," he shows as much ignorance as he did when he said there were no males to the lecaniums, or black scale, for where the woolly aphids works at all it works on all the fibrous roots.

And yet Prof. Hilgard, in his letter of transmittal has this to say of this "professional entomologist:"

"Professor Woodworth, in addition to lecture and laboratory work with three classes, has steadily carried on experimental work on the grounds, and is constantly in receipt of specimens of insects, diseased plants, insecticides, etc., which, together with an extensive correspondence on the same and cognate subjects, occupies his time very fully. His contributions to the present report, and that of one of his students, Miss Tyrrell, illustrate fairly the kind and method of work pursued by him. He has also made several professional and other excursions to the southern and other parts of the state, for the purpose of ascertaining by personal study the actual and probable success of several of the imported scale-destroyers, whose practical value is still in doubt."

Last week we suggested that these gentry had merely been to sleep; but it would only be a fair conclusion to draw that they had just returned from a call on the \$1000 cellar man and special student before attempting to pen such matter.

It will be a great relief to thousands of orchardists to learn at last from the report of the work of the agricultural experiment stations of the University of California that the black scale is of little or no detriment to their orchards. To be sure the learned professor says: "It is conceded by all that the insect does an immense amount of injury." But then his reasoning upon "the economics of the scale" is such clear logic and shows conclusively that the damage may be very easily overcome. He has sifted these injuries into three classes:

"First—That occasioned by withdrawal of sap from the plant.

"Second—The injured tissue resulting from the punctures of the insect.

"Third—The excretions of the insect with the accompanying injury to the foliage and fruit by the accumulation of dust and the fungi.

"(1.) The loss of sap involves the loss to the plant of a certain amount of food-material and of water. The seriousness of the loss depends upon the number of scale insects and the condition of the plant. The exact amount of sap extracted cannot be estimated with any degree of exactness, but must be many times the weight of the insects. The weight of the insects is not as much as one might imagine; they may amount, on an orange tree, to the weight of an orange, or possibly two or three, if a large tree and badly infested. The loss of water is probably more than that evaporated from that amount of fruit, and the loss of food-material also larger; but taking the amount at double, the loss from this source might be equaled by removing, say half a dozen oranges early in the season."

It requires an immense amount of genius to think a thunk like the above, and it is surprising that some one has not years ago discovered that the injury done to an orange tree by the black scale could be overcome by the picking of half a dozen green oranges. Now that the idea has been struck upon by this Moses of the entomological world it is to be hoped that no orange rancher whose orchard is infested will be so thoughtless or economical as to neglect this simple duty "of removing his half dozen oranges early in the season."

"(3.) The excretions of the insect consists of a copious watery material which on drying becomes slightly sticky and probably contains a very small amount of sugar. It holds the dust firmly and seems to be a very suitable media for the development of fungi, especially the species known as the "black smut" fungus. The secretion sometimes gums up some of the breathing pores, but this can hardly be counted an injury as the leaf has a superabundance of these pores, and chiefly situated on the under side of the leaf where they are safe from this contingency. The dust and fungi pro-

duce injury in two ways: By covering a leaf and forming a screen through which the action of the sun on the chlorophyl of the leaf in elaborating food is diminished; and second, by disfiguring the fruit, making a washing necessary and entailing an expense and decrease in market value. These injuries are of a most serious nature, and the latter, in the case of citrus fruits, is often far in excess of the amount that a gas treatment (the most expensive method) would cost. In most situations the dust is a very inconspicuous element of the smut, and in such cases the application of a fungicide might be the cheapest and most satisfactory treatment. A thorough washing spray of water repeated often enough would keep a tree clean no matter how badly infested."

So it appears that the third injury named by our state entomologist is "of a most serious nature" if left to itself, but is really very easily overcome by the "application of a fungicide." It is a pity that the professor should have brushed over this matter of fungicides, as he has done, with a simple stroke of a pen, because it might be of practical knowledge to the rancher to know the name of a fungicide and the method of applying it. There is a large list of fungicides. We would suggest, not to cumber the situation, but three, batanaphthol, oxynaphthoic acid and the simple oil of cloves. Any one of these fungicides might be applied by an automatic machine, attached to each scale, that would spray once in twenty-four hours the "sopious watery material" exuded from the scale. These machines undoubtedly could be made very cheaply in Japan, where labor is cheap. These machines could be removed at the end of the season and stored for future use.

The most practical suggestion in this marvelous report is that "a thorough washing spray of water repeated often enough would keep a tree clean, no matter how badly infested." It is a pity that our "professional entomologist" does not state how often it would be necessary to apply the spray of water, for it is such a simple method. In those districts where the water is not under pressure but delivered in open ditches, all that would be necessary to put this practical method in use would be the erection of a tank about 100 feet high in order to get the necessary pressure for spraying; a pumping apparatus to put the water in the tank and the piping of the orchard with wrought iron pipe, a number of faucets and a few hundred feet of hose. One of the great advantages of this method would be the employment of numberless boys to hold the nozzles and squirt water on the trees. Such an outfit on a ten-acre ranch should not cost to exceed \$250 per acre.

"The second class of injury by the black scale, viz., that caused by the

puncture * * * where the insect inserts its beak." We'll we won't say much about this, but any American who has not ingenuity enough to fill up the holes made by so insignificant a little creature as the black scale, does not deserve to be a rancher in California, but should devote his attention to pedagogics, electricity or one of the learned professions.

The conclusion of this portion of the report is as follows: "It can thus be seen that each kind of injury from the attack of black scale can be reduced to practically nothing by the use of methods which are not calculated to destroy the insect."

In other words, the injury done by these supposed pests can all be surmounted without any injury to the tree or its fruit except the loss of half a dozen oranges, and by the humane methods suggested these innocent little lecaniums can be permitted to live out their natural lives without the cruel and inhuman treatment which many of the ranchers have been in the habit of giving.

PREPOSTEROUS PRETENSIONS EXPOSED.

The worthlessness of Prof. E. W. Hilgard's pretensions, that he could tell what plant foods were necessary from an analysis of the soil, are shown up very clearly as the light of history is cast upon his record.

In January, 1892, the professor, in answering an article that had appeared in the public press on Soil Analysis Not An Indicator of the Plant Food Required, in which article the writer had set forth that the only way to ascertain the required plant foods was by actual field tests, propounded these questions:

"When soil analysis has determined that potash exists abundantly and even in the soluble form, not only in the irrigation waters, but also in the soils of the valley of South California, will Dr. Woodbridge still think it necessary to try potash fertilizer there? When the same process shows the extreme scarcity of humus in these same (mesa) soils, being a mere fraction of what is always found in productive soils elsewhere, will he doubt that the supply of nitrogen will be the first thing needful when crops fall short? If so, let him inquire among those to whom I have recommended Chile saltpeter on the ground of this analytical indication, and ask what has been the result in the thrift of their citrus trees. When analysis shows the same soil to contain an abundance of lime, would Dr. Woodbridge still put his client to the trouble and expense of trying the liming process?"

Again, in a lecture published as bulletin No. 61 by the state board of horticulture, 1892, page 11, Prof. Hilgard said: "I have already told you that by far the majority of California soils is rich in lime, so as to render liming, so much

practiced in the east, an unprofitable operation here. That knowledge was obtained by analyzing the soils of the state. Well, the same series of analyses has shown that what is true of lime is nearly as true of potash—not quite so much, for while in the case of lime the proportion between eastern and California is one to over ten, in the case of potash it is about as one to four in favor of our soils. You see that to invest heavily in potash fertilizers, as you are frequently advised to do, is likely to be in very many cases a useless expenditure.” * * *

“But these same orange soils of ours are not very rich in phosphoric acid and nitrogen; therefore I would advise growers to spend their valuable cash for these only, and not for “complete fertilizers.”

With more than four and one-half years' experience since the professor attempted to squelch our efforts to get at the actual needs of the crops by putting the question to the soil and getting the answer in the crop through test plots, we have had these same soils to deal with that Professor Hilgard was referring to, and have found that where potash was so abundant that the soil contained over one per cent, or about 100,000 pounds of potash per acre for only two feet in depth, an amount that would last the average orange crop 2000 years, that the application of 150 pounds of potash salts per acre per annum is indispensable.

The professor himself in his last report gives an account of samples that “were grown by D. L. Wilbur of the West Riverside Land company, Riverside county, and are fair averages of the fruit from many five-year-old trees, and were not fancy selections; the aim being to have them of the same size and grown under similar conditions. The soil is a fair average of that within the Gage canal lands, which, according to analysis, contain .87 per cent of potash and .17 of phosphoric acid. To test the effect of potash fertilizers, samples were taken from trees that had had no application of the potash, and, on the other hand, from trees that a year previous had been fertilized with one pound of muriate of potash per tree. Both lots had an application of nitrates and phosphates. The trees of both lots are of good color and rank in growth, and no difference is notable between those fertilized and those non-fertilized. The oranges of the unfertilized trees were more elongated in shape than the others; the latter being, on the whole, well rounded, or more perfect in shape, and rather deeper in color tint. The skin and “rag” were about the same for both lots, and rather thick and heavy, but easily separated from the flesh. The flesh was tender and juicy. The naval portions of many of the oranges of the unfertilized trees extends and spreads into the flesh, while that of

the fertilized is confined to the end of the fruit.

“A glance at the results of analysis shows that, while the oranges of the two lots were practically the same in weight, those not treated with potash have a thicker rind and a larger average of juice, and those treated with potash have a large amount of pulp.

“The ash of the oranges was nearly the same in both lots, but in that of the potash lot the percentage of potash is a little higher than in the other. of phosphoric acid there is 5 per cent more in the no-potash lot.

“In the juice the potash seems to have had a slight effect in increasing the sweetness, as there is 1.3 per cent more in total sugar than in the other. The cane sugar was increased but .56 per cent. Had sulphate of potash been used instead of the muriate, the effect might have been greater. The citric acid was not influenced.”

On page 176 a table is published, which is made the basis of the above comment, wherein two test plots are referred to. No. 1 was fertilized with nitrogen and phosphoric acid, and No. 2 was fertilized with nitrogen, phosphoric acid and potash.

Extract from table—No. 1, fertilized with nitrogen and phosphoric acid—Solid contents by spindle, 12.40 per cent; total sugars, 11.56 per cent. No. 2, fertilized with nitrogen, phosphoric acid and potash—Solid contents by spindles, 13.70 per cent; total sugars, 12.51 per cent. Difference in solid contents by spindles, 1.30 per cent; in total sugars, .95 per cent.

So slipshod and careless is Prof. Hilgard that he has confounded the solid contents of juice with the total sugar contents of it, and has referred three times in the short paragraph to plot No. 1 as an unfertilized plot, and has stated that plot No. 2—the nitrogen, potash and phosphoric acid plot—contained 1.30 per cent more sugar, when, in fact, and reality it only contained .95 per cent more. He failed to state that this was an increase of sugar of over 8 per cent. It is but fair to state that this plot was tried contrary to the advice given by Prof. Hilgard, for in the Riverside Press of August 1, 1893, he said: “By all means, let some Riversider try the use of potash salts to settle his doubts in the premises; but let him try it Simon pure, and not mixed with phosphates and nitrates in a complete fertilizer, or else his test will amount to nothing.”

We think this test has amounted to something, for, as he states, the naval portion of many of the oranges of the unfertilized (?) trees extends and spreads into the flesh, while that of the fertilized is confined to the end of the fruit. And those not treated with potash have a thicker rind. And he further shows that those fertilized with the complete fertilizer contained more than 8 per cent of sugar. It was the opinion of Prof. Wickson, who has had large expe-

rience in such matters, that the oranges from plot No. 2 contained 25 per cent more points in favor of flavor than the oranges from plot No. 1.

A test plot was put out by the writer on the Richards ranch, at North Pomona, in January, 1893, and the fertilizers were renewed in the spring of 1894. On the 22d of April, 1895, oranges were taken from each plot. The samples, duly numbered, were taken to the packing house and the superintendent instructed to pack one-half of them from each plot in separate boxes and to send one box to Prof. Hilgard and the other to Messrs. Wade & Wade of Los Angeles, who, with the writer, made the analysis.

The oranges on the manured plot were inferior, the surface being sunken away and soft in many places as though in these spots the rind was more cured than in the balance, and the fruit was soft and somewhat puffy.

Plot 2—the nitrogen plot—contained more puffy oranges than any other plot.

Plots 8—the phosphoric acid and potash plot—and 9—the nitrogen, phosphoric acid and potash plot—were far ahead, in general appearance, of any oranges from other plots, and plot 9—the complete fertilizer—was of a much deeper color. The leaves on plot 9, also, showed a much deeper and healthier color.

To comment fully on the above tabulated results would require too much space. We will, therefore, call attention to but three points:

First, the percentage of sugar was raised in plot 9—the nitrogen, phosphoric and potash plot—by comparison with plot 1—where no fertilizer was applied—37.6 per cent. The rind was reduced 22.5 per cent, i. e.: the same amount of oranges that would produce 100 pounds sugar from plot 1 would produce 137.5 pounds from plot 9; the same amount of oranges that would produce 100 pounds of peel from plot 1 would produce only 77.5 pounds from plot 9, and the general appearance to the eye was by all odds the best.

Commenting on another systematic plot set of samples, the professor has this to say on page 173: "Muriate of potash does seem to corroborate the experience at Riverside that the potash tends to increase the sugar contents more than barnyard manure."

In addition to the facts above stated it is pertinent to the subject matter to state that many of our best, largest and most successful growers are using in addition to nitrates and phosphates potash salts and are perfectly satisfied with the results.

It will thus be seen, from the facts and figures above given founded upon actual practice in the field, how far from the truth Prof. Hilgard has been in trying to establish from an a priori line of reasoning the reputation for himself that he could tell from an analysis of

the soil whether potash was needed or no. When it comes to the matter of nitrogen the professor has placed himself in a more absurd position than in the case of potash, for he had advised the use of "nitrogen on account of the extreme scarcity of humus in our soils;" but after some twenty years of experience, he reported at the last farmers' institute, held at Monrovia, that the humus, although deficient here, "has many times more nitrogen than the humus found in the soils elsewhere." And thus he has to admit that "when the crops begin to fall short nitrogen is not the first thing needful." If the professor had followed in the wake of the great army of agricultural chemists the world over and systematically established a series of test plots he would have discovered, or at least the results of the crops would have shown, his error in a year or two. To illustrate the error of the professor's way we will give but a single example. He analyzed, some four or five years ago, the soil of the Crank and Brigdon ranches at or near Laramida Park, and upon his analysis advised that nitrogen was all that was needed. His advice was followed, and nitrate of soda was used, with no good results; the following year he advised the use of phosphates, and they were used with no good results; the owners then gave up "scientific advice" as worthless and have since been using "complete fertilizers" in the shape of stable manures with fair results.

In regard to the liming process, the professor told the people at the farmers' institute above referred to that they did not need it in the San Gabriel valley, as analysis of their soils showed that they contained an abundance. The fact is that the progressive people of that locality use large quantities of it with most beneficial effects. We could give names and places, but we expect to take up this liming matter more fully at a later date.

In order to show how utterly worthless are Prof. Hilgard's pretensions that he "can advise people as to the needs of their crops from an analysis of their soils," we produce a copy of a letter sent recently from his pen. Mr. Hall had written inquiring as to the proper method of irrigation, and asking what fertilizers should be applied to his twelve or fourteen-year-old apricot trees:

UNIVERSITY OF CALIFORNIA, College of Agriculture, Agricultural Experiment Station, E. W. Hilgard, Director, Berkeley, Cal., August 6, 1896. (Dictated.)

A. W. Hall, East Highland, Cal.: Dear Sir—In reply to yours of July 26th, I would say that I am afraid that you have not planted on your land the right kind of trees in such shallow soil. Peaches or almonds would have been much better adapted for the conditions, and I hardly know what advice to give you in regard to fertilization, as I do not think

City creek alluvium needs it yet. Your trees, I think, are in the same predicament as they are elsewhere when located on hardpan; they thrive finely as long as their roots were satisfied with three feet of soil, but when they grew so large that the roots had to reach out for more depth and moisture, they got 'stone instead of bread.'

I would replace the dead trees with peaches or almonds if the locality is suited to the latter, and on the remainder try abundance of stable manure and irrigation—frequent rather than abundant at any one time. Try to maintain the apricot trees in good heart. I am not sure that this will be successful, but it may be. Your case falls within the purview of the article in our last report (page 114) on Naturally Faulty Land and Their Correction. Very truly yours,
E. W. HILGARD.

Could anything illustrate more clearly the worthlessness of the professor's pretensions, his incompetency and inability than this letter?

His thirty-five years' experience in analyzing virgin soils makes him say "in regard to fertilization I do not think that City creek alluvium needs it yet." Yet the professor in the next paragraph says "try abundance of stable manure" * * * "but I am not sure that this will be successful."

It will thus be seen that from advising the use of nitrogen, the professor changed to nitrates and phosphates, and at present is advising nitrates, phosphates and potash, but still he is not sure that this combination will be successful. It is small wonder that Prof. Hilgard tries to belittle a system of practical field tests, when they expose the worthlessness of his preposterous pretensions that he can from his laboratory in Berkeley advise people from analysis of their soils what kind of plant foods they need.

MR. HAYNE'S INCOMPETENCE.

We are indebted to the California Fruit Grower for the following report of the grape growers' meeting at San Jose:

"A considerable number of persons interested in viticulture in this county assembled on Saturday to listen to the address by Mr. A. P. Hayne, instructor in viticulture at the University of California, on the best mode of combating the ravages of the phylloxera lately discovered in so many of the vineyards west of this city. Mr. Hayne laid before the meeting a table, printed in large characters, showing how long a vineyard must be kept submerged by water to drown out the insects; the period varying, according to the permeability of the soil, from fifty-five to 105 consecutive days. The water, too, must be at least three feet deep all over the surface of the vineyard to do the required good. The necessary daily supply to compensate for loss by seepage and evaporation

was also given with great accuracy. As the vineyards represented are on the foothills from 150 to 700 feet above water level this mode of ejecting an unwelcome guest did not appear to the audience very promising.

"Mr. Hayne then spoke of gas lime as an antidote or remedy, but before going far with this branch of the subject he inquired whether lime was used in the purification of gas in San Jose. A person in the audience responded in a somewhat sepulchral voice, 'No gas lime in San Jose,' which ended that chapter.

"The speaker's next method was to fight the pest with bisulphide of carbon, and this was the method he recommended. The mode of application was to introduce the liquid bisulphide into the soil a foot or two below the surface by means of an injector, which he described, where it would vaporize, and its fumes, spreading outward and downward, would kill the roots of the vines and many of the infesting insects, after which the infested places could be planted with resistant stocks already rooted and grafted, or with rooted resistant cuttings for future grafting. He here paid his respects to Prof. Husmann, who, as he said, lately in the Rural Press advocated letting the vines die a natural death, and then replanting the whole vineyard at once, so as to have a uniform growth. This policy the lecturer ridiculed as extravagant and wasteful, though if any one present felt that he could afford to wait till his whole vineyard was destroyed and then replant it all at once, there was no objection to his trying the experiment. He thought himself the preferable way was to treat the infested parts with carbon bisulphide, and after this had done its work by killing the vines and numerous insects, to dig up and burn the dead vines. To dig them up before killing them would probably bring living insects to the surface and scatter them over the neighboring soil. To an inquiry as to the quantity of bisulphide necessary for the treatment proposed, he replied that eight ounces per square yard would, he thought, be sufficient. Some one then demanded the number of square yards in an acre, and it was presently pointed out that the treatment proposed would call for 2420 pounds of bisulphide per acre, which, at 8 cents per pound, would cost \$193 per acre for materials, independent of the expense of application. Here the discussion among the audience became so animated that the lecture was for some time interrupted, until the chairman called to order and requested the gentlemen present to withhold comment until they had first exhausted all the information the lecturer could furnish, after which they could discuss the questions of economy among themselves while their visitors returned home on the train.

"Order having been secured, the lec-

turer proceeded to discuss resistant stocks and replanting. He presented a long list of vines with a statement of their relative powers of resistance to phylloxera adjusted to a scale of 20 as a maximum. This, he said, was compiled from the experience of France, Italy, Germany, etc. Of the riparia which had been most largely propagated for resistants, he stated there were 150 varieties, some of which were better, some worse and many worthless; but to an inquiry for the names of the really resistant varieties of the riparia he regretted that the boy who had packed his illustrations for the lecture had left that list out and put in these lists of vines of inferior resistance. Without his list he could not give the names, but he agreed to furnish them for publication to the secretary. As to grafting and replanting after the stocks had been selected, he advocated rooting the cuttings in the nursery, and at the end of the first or second year taking them up, grafting them on the bench, and returning them to the nursery rows for another year before planting out. He preferred this method, using stocks about the size of his little finger, rather than field grafting, where much time was lost in moving from one stock to another. This opinion elicited dissent from practical men present, and more discussion arose, after which Mr. Hayne retired from the platform and was succeeded by Mr. Woodworth, who lectured on the phylloxera from an entomological point of view."

That this address of Mr. Hayne clearly proves his incompetence and his inability to advise practical men, we think there is no question. His lack of practical information is painful. For instance, he says that the submersion for phylloxera must be carried for 55 to 105 consecutive days. Valery Mayet, an acknowledged authority, places it at 25 to 40 days.

Mr. Hayne says that the water must be at least three feet deep all over the vineyard. Mr. Mayet places it at about twenty-five centimeters or one-fourth of a meter, or about ten inches.

Finally, after discovering that submersion is generally impracticable in the Santa Clara valley vineyards, the vines being located on hillsides, Mr. Hayne proposed the extinction treatment. That is to say, he recommended that all the vines in an infested spot be killed by bisulphide of carbon at a cost of \$193 per acre, before they were rooted up and new vines planted.

Could anything be more absurd? How many vineyardists are there in the state whose vines are attacked by phylloxera who can afford to spend the modest sum of \$193 per acre for destroying vines before replanting with resistant vines? The fantastic idioy of this proposition is beyond the power of language to express.

Now, what about this extinction treatment so warmly recommended by Mr. Hayne? It has been thoroughly tested in Switzerland and, while it retards the spread of the pest, it does not entirely check it. It has been tried in Algeria with similar results. It is good in a way, but it isn't worth the expenditure of any such sum as \$193 per acre.

Mr. Hayne is a comparative stranger to the vineyards of this state. He obtained his first view of them, to any extent, as the guest of the state viticultural commissioners, who sent him with Mr. Gos when that gentleman went through the state. Of practical experience in viticulture, he has, so far as we have been able to determine, none whatever.

We think that the vineyardists would do well to discard his theoretical advice and reconstitute their vineyards under the advice of men like Dresel, Bundschu, Crabb, Wheeler, De Turk, Wetmore, Doyle, West and others who have been handling the phylloxera problem for many years in a practical manner.—Pacific Wine and Spirit Review.

OUR PROFESSIONAL ENTYMOLOGIST AND WASPS.

"The common yellow jacket, usually called the wasp, is often very destructive to pears and especially to apricots. Mr. J. W. Aytoun of Santa Cruz (September 19, 1891) reports the wasps as completely destroying the fruit of an acre raspberry patch. 'When the fruit begins to ripen it is attacked. These pests are exceptionally bad this season and never caused trouble in this manner before.'

"This insect passes the winter singly, hiding in any convenient place. In the spring an old gopher hole or something of the kind is selected and a nest constructed by paper manufactured by the insect. Soon a considerable colony is developed, all the children of the one insect founding the colony. The food for the young is chiefly other insects, which are destroyed in great numbers. The full grown wasp has a fondness for fruit, however, so that while the insect is otherwise useful, it must be destroyed when abundant. The only practical method is the search for and destruction of the nests. The best way to exterminate a nest is to visit it late at night and pour into the opening a quarter tumbler of carbon bisulphite; a little dirt might be thrown over the hole to confine the fumes. If the nest be examined the next morning all the insects will be found to be dead."

(Extract from the report of work of the agricultural experiment stations of the University of California, published in June, 1896.) It is to be hoped that Mr. Aytoun was a young man and possessed of considerable patience when he wrote in 1891 to our "professional entymologist" in regard to yellow jackets. If

he chanced to be an old man at that time the information contained in the answer to his letter will probably be useful to his heirs. Undoubtedly the remedy suggested for these pests is sure death; but will our "professional entomologist" tell us how in thunder to find those nests late at night, or to find them at all to the extent of extermination of their kind.

It is safe to assume that where wasps exist in sufficient numbers to destroy a crop of raspberries, that there would be at least one to every square foot, or 43,560 per acre, and as they live singly what lots of fun and employment Mr. Aytoun will have in hunting them at night!

As a practical suggestion for the extermination of yellow jackets the above advice is only equaled by the old receipt for catching birds by putting salt on their tails.

FARMERS' INSTITUTES.

The feature of the past two weeks in agricultural and horticultural circles has been the holding of Farmers' institutes in San Diego and Orange counties and at Pomona, San Gabriel and Santa Monica. The institutes under the management of Prof. A. J. Cook of Pomona college have become a power for good in Southern California. These meetings have been well attended. Pleasant and profitable discussions on live topics have taken place from day to day. We publish some of the papers below:

Prof. E. W. Hilgard, director of the agricultural experiment stations and professor of agriculture, was in attendance this week and had a full opportunity to show himself at just exactly his full worth, and he embraced the opportunity. He said among other things that much more interest was felt in these meetings in Southern California than in those held in the northern part of the state, but was at a loss to know why. Well, we can tell the professor why. These institutes have become regular intellectual feasts in this southern country. It is because we have at the head of them a real, live, able bodied brained Cook.

Perhaps the most interesting feature of these institutes is the question box, wherein any one can put a question, to be answered by such persons as the president may call upon for that purpose.

Some of the questions put gave Prof. Hilgard a chance to show his practical knowledge. Here is one of the questions, together with the learned professor's answer, taken down in shorthand:

Question—"Are variegated orange leaves a sign of disease? If so, what is the remedy?"

Answer—Prof. Hilgard: "It is due to a variety of causes and indicates a great weakness in vegetation. Variations has been due to want of sufficient mois-

ture, at other times to wet feet. It not only affects the oranges, but other fruits, apricots, for example. In hard pan the roots of the orange trees are certain to get into water, and then they will show the yellow leaf. Anything that produces weakness will produce disease."

In the professor's wonderful effort to produce this last sage sentence he forgot to give the remedy asked for, but a little thing like the "gist of an argument" seldom seems to strike the professor's mind as of any importance. He had given causes, which were both "wet and dry, and weakness" if not strength—why take up the time of an audience with a little matter like a remedy?

The professor was down for a paper on The Work of the College. He read, or rather spoke, this paper in a tenor voice with a slight foreign accent. In Pomona he alluded to the adverse criticism upon him and his college as "absurd." He gave as a reason why there were so few students in his college that "there is very little use for agricultural experts in this country, as the soil is fresh and requires but little art in cultivation." At San Gabriel he said that "preposterous statements, or rather misstatements found ready credence," referring to the criticisms on himself and his college. He further said that "it had been grossly misstated that only one or two students enjoy the benefits of instruction at the college." He went on to say that about 100 students had been enrolled in the classes of the agricultural professors and instructors. If this is so, he did not tell us how many of the students from the academic, scientific and classical sections are sent over to the agricultural department to receive their regular instruction in botany, etc. These statements may be truths, but if the professor refers to the criticisms that have appeared in The Herald he is the one who is "grossly misstating," what has been said, as by reference to The Herald can be seen. If The Herald has made any misstatements it will gladly correct them, if Prof. Hilgard will point them out. The last register of the university shows that in the four classes there are nine regular students in the agricultural college, four specials and two limited, one of the latter being the thousand dollar cellar man. The professor claimed, as does his last report (see pages 72 and 437), that he had made some "important experiments" in beet growing at the Chino station, and that he had shown the world that beets of the very highest grade could be grown on alkali soils. Nothing could be more absurd and conceited than these empty claims.

The facts in the case are as follows: Prof. Hilgard had advised several years ago that beets could not be grown in these soils. Mr. Gird, notwithstanding this advice, planted and grew them successfully in 1891, and every year since, on these alkali soils. "When the grasses failed in the spring of 1894" beets were

planted at the Chino station, and in 1895 another crop of four acres was planted. It is claimed in the report that this was done "on a purely experimental basis," but wherein the experiment consisted does not appear, except that "successive plantings" were made. Inquiry shows that in these alleged experiments no attempts were made to determine if either the tonnage, the quantity of the sugar or the quality of the juice could be improved or the season of harvesting the crop at either end could be prolonged by the use of the fertilizing elements singly, doubly or all three of them together, or by different methods of irrigation or cultivation. Mr. Shinn wrote the report, and it is very evident that both he and Prof. Hilgard are either trying to fool the public, or that they are both densely ignorant of what an agricultural experiment is. The fact is that after Mr. Gird has raised beets for three years on land adjoining or adjacent to the experiment station, that then Prof. Hilgard followed in Mr. Gird's wake and planted beets, just as several hundred farmers had done and are doing—nothing more, nothing less. Prof. Hilgard is as much off of an even keel in this matter of claiming a "beet experiment" at Chino as he is when he asserts (page 72) "that 15 per cent of sugar is the standard per cent required," or that he raised beets "of the very highest grades on alkali ground."

Prof. Hilgard said "fertilizer experimentation is a thing to be made after a soil has become exhausted. We cannot make them at our stations on virgin soils."

We have not the space to show all the errors that Prof. Hilgard has made during his present visit to Southern California, but reproduce a conversation had on Tuesday with Mr. Hache, superintendent for the Chino Valley Beet Sugar company, in charge of the 9000 acres of beets grown at Chino and Anaheim, in order to show some of the professor's errors:

Question—What is the standard percentage of sugar required in beets delivered at Chino?

Answer—Twelve per cent.

Prof. Hilgard has sent out word the world over that 15 per cent is required. See his last report, page 72.

Question—When did you first plant beets on alkali land?

Answer—In 1891.

Question—Have you ever grown any beets near the experiment station?

Answer—Yes, sir. In 1891 and subsequently we grew beets successfully very near there on the same kind of soil.

Question—Here is a map (showing map from report, page 78) of the ten acres belonging to the experiment station, divided into 169 equal shares. The soil of sixty-five of these plots have been analyzed, as you see. Are these analyses of any practical value in raising beets?

Answer—No, sir.

Question—Do you consider that any experiment has been tried at the experiment station near you?

Answer—I have never seen the result of any.

Question—Has the agricultural experiment station or college been of any service to you in the matter of showing you how to grow beets of a larger tonnage or better quality?

Answer—No, sir.

Question—Do you consider that they have carried on any experimental work in regard to beets at the station?

Answer—No, sir.

Question—Do you think that something can be done to raise the quantity and quality of beets by "test plots?"

Answer—Certainly.

Question—Are you doing anything in the way of experimental work? If so, what?

Answer—We have out a number of test plots.

Question—Do you believe that "test plots" are the proper method of showing what fertilizers are necessary to be used?

Answer—It is the only way.

TO EXCUSE IS TO ACCUSE.

The following letter was received by the agricultural editor:

Editor Herald: I have noticed and read with exceeding regret the several articles in the agricultural department of your paper reflecting upon the work and management of the agricultural department of our state university. Pardon me if I say that in my opinion such articles are very harmful, although they may be and often are written with the very best of intention.

I believe that every true citizen of California is proud of our university and takes great satisfaction in the thought that we, as a state, though so small, have two large universities, which rightly receive the respect of the cultured people of the world. As the universities cannot exist without increasing the respect for education all over the state, they are directly of advantage to every citizen of our commonwealth. Every school and college is also helped by the success of our universities. If there is anything in our state that gives promise of a brighter and better future, I believe it is the fact that our two universities of the north are crowded with students. When Stanford university started, the University of California made a grand stride forward. When the two universities of the north are successful, every educational institution of our state will feel the impulse and receive added life. I believe that our state university is doing more for the reputation and real advancement of our people than any other one thing in the state.

It is a sad fact that even yet there are among us many people who sneer at

higher education and are only too ready to grasp at anything that shall hinder its progress or stay the work of our higher educational institutions. Thus, I believe, that any word of criticism upon any department of the university tends to injure the institution, and this is to be deprecated by all true lovers of learning.

If this be true, I can but believe that, granting there was foundation for all the harsh words regarding the agricultural department, it would still be a mistake to send forth such articles in the public press. I have no doubt that the regents of the state university are fully alive to its interests and greatly desire to do everything that will further them. They are right at the seat of action, and certainly are better prepared to judge of the work of each department than can any one be who is so far removed as we are in Southern California. Would it not be much wiser to send criticisms to them rather than to publish them in the press, and thus send them broadcast in the state, to prejudice the minds of those who are already opposed to higher education? This would be a far more effective method, and without any evil results.

But to the especial subject of criticism: I have known Dr. E. W. Hilgard, as a scientist and educator, for more than twenty years. I have often had occasion to study closely his work, and believe that it stands among the best done in our country. I believe him to be one of the most careful and painstaking of our scientists, and he has certainly been untiring as an investigator in the realm of science. I also know that very few of the scientists of our country have a better or better-earned reputation as a scientific investigator than he has. Indeed, his reputation reaches beyond our shores, and there is not a country in Europe where his work is not known and favorably received. Again, I myself have been in just such a position for twenty-seven years as that occupied by Dr. Hilgard, and I know, as few can, the burden that is upon him. As the work of a teacher, he must keep abreast of the times and do hard, honest work for his pupils. I believe that Dr. Hilgard does not slight his work in the least. He is also at the head of the experiment station, and this brings a burden of responsibility that no one can appreciate until he has carried it. Frequently a single investigation goes through weeks and requires immense labor. To my positive knowledge, Dr. Hilgard has carried on and is carrying on just such lines of investigation. The burden and responsibility of such work is often well-nigh overpowering. I wish that we might all appreciate, that we might all say helpful rather than hindering words to one who has the burden to carry. Again, the correspondence that one has to carry on in such a position is enormous. Each letter demands an answer, and oft-

times the work required to give a suitable answer is heavy indeed. It is not surprising that with all these rounds of duties resting upon him, Dr. Hilgard should have given offense, and he would be far more than human if he has never made mistakes. I have been with Dr. Hilgard in attending the farmers' institutes for many days together, and I have rarely met a scientist who is more ready to disclaim perfection than he. In the past few weeks I have met and talked with a large number of our people regarding Dr. Hilgard's work, and, with hardly an exception, every one with whom I have spoken has referred in highest terms to Dr. Hilgard's researches and the valuable aid he has given to our state.

I believe that the regents of the University of California are keen in their scrutiny of the work of all the departments of the university. By their recent action regarding farmers' institutes they show that they are very desirous to make the work of the agricultural department in the fullest degree valuable to the farmers. That they will watch carefully our interests in this department and make any needed changes as soon as the merits of the case warrant I have not a doubt. Shall we not, then, better serve the grand cause of education and better minister to the interests of the state if we send any criticism that may seem called for directly to the regents of the university, and receive from them, as I am sure we always will, explanations, probably satisfactory ones, rather than to harshly criticize the university, especially as we may ourselves be mistaken? Yours truly,

A. J. COOK.

September 8, 1896.

REPLY.

Although the above letter in no way attempts to answer the specific criticisms on Profs. Hilgard and Woodworth that have appeared in *The Herald*, it is no doubt a commendable impulse that has actuated Prof. Cook to fly to the rescue of his friend; but in doing so we think Prof. Cook rather oversteps the mark in throwing out the hint that *The Herald* is antagonistic to the state university. Nothing could be farther from our purpose. On the contrary, our criticisms have only been with the view of pointing out lamentable failures in the work of one department of the institution, that it might be made all that Prof. Cook would desire it to be, both in the cause of higher education and also in the practical fruits of such education.

The head of one of the departments of the university, *The Herald* deems an incompetent official, and its criticisms against him have been substantiated by the facts. Prof. Hilgard has built up his reputation upon ex-parte statements, which do not bear the light of investigation. For example, he has told the public, and he teaches his students, that he

could "from an analysis of the virgin soil, tell what plant foods were necessary to be applied." This statement, like many others coming from him, as director of the California Agricultural college, was accepted as true, and the world accepted it as truth, but investigation, by putting the question to the soil and getting the answer in the crops, shows that Prof. Hilgard was in error in a matter of vital importance to the agricultural interests of our entire state.

The object of The Herald in exposing an incompetent and high-priced official is merely that a proper, competent and scientific official may preside at the head of our agricultural college, to the end that the university may have its full scope of usefulness and be a help to the struggling ranchers, an honor to the state and a blessing to our people.

The Herald has had every confidence in the ability and integrity of Prof. A. J. Cook of Pomona college and it would like to make him judge of its criticisms and leave it to him to pass upon the truth or falsity of the charges against Prof. Hilgard, provided that Prof. Cook will admit that a scientific man would be willing to accept the facts, test them fairly, and then be able and willing to state them in a case as they exist, or, in other words, a scientific man must always tell the truth.

The Herald would respectfully remind Prof. Cook that it is not the province of the modern newspaper to cover up the incompetency and shortcomings of high public officials by suppressing their records or in glossing them over with a thin coat of veneer, nor is it in accordance with the genius of our institutions that we should reverence and excuse a high public official simply because he occupies a high office, but we should reverence, respect and honor a high public official in proportion as he brings honor upon his office.

No greater danger threatens the body politic today and the demoralization of our youth than the tendency to a low standard in those who are high in position and attempts to overlook the shortcomings and incompetency of those who are feeding at the public crib and have the spending of the public funds.

SOME SCIENTIFIC FARMINGS OF PROF. HILGARD.

When Prof. Hilgard was at the last Farmers' institute he said that he was especially sent down here and charged by the regents of the university to ask what the ranchers of this section of the state most needed in the way of help from the university.

We have been telling Prof. Hilgard for the last five years that what the ranchers needed more than anything else was to know how to raise fruit of a better quality or greater quantity or both than they are now doing.

We have also told him how this could

be done and have actually demonstrated how it had been done. At first Prof. Hilgard said we could not do it in the way we pointed out, and after we had actually demonstrated that it could be done he belittled not only our efforts, but the system by which we arrived at conclusions. See his last report, page 173.

Mr. Shinn said in his address at the Farmers' institute that there are over 30,000,000 growing fruit trees in California. Prof. Hilgard has said plainly that test plots were not adapted to California, because it would take too long by that method to get at results.

At the last Farmers' institute he said "we cannot carry on fertilizer experimentation at the stations on virgin soils," but he gave himself "dead away" when he said a few minutes later, "fertilizer experimentation is a matter to be carried on by private enterprise and farmers' clubs," although in his last report he claims that the method is complex and intricate, and should be carried on by experts. He has, also, said that it takes too long to get conclusions by this method. Well, it is about five years since we pointed out to the learned professor the method, and three or four since we put it into practical use. During all that time Prof. Hilgard, sticking to his soil analysis theory, has not shown how he has improved the quality or quantity of a single crop, so far as we have been able to learn, although he does show the results of some of the work of the writer in his last report, which shows how a crop was improved, and then goes on to belittle the method by which the crop was improved.

As to the impracticability of Prof. Hilgard's method of analyzing the soil to determine what plant foods are necessary, we have only to look at his report, pages 69-91, showing the amount of work that was done on the 10 acres at Chino. There are 260 determinations made from this 10-acre plot, and a conservative estimate would be that it would take a chemist at least twenty days to make them. Assuming for the minute that these analyses are of some practical value (but they are not), it would take a chemist two days to analyze the soil from an acre, or to determine by analyses the 300,000 acres of trees already set out in California, it would take 600,000 days' work, or it would take 2000 chemists at work 300 days in the year in order to analyze the soils of the orchards already put out, to say nothing about the other crops in the state; or it would take for these analyses the modest sum of \$3,600,000, and according to Prof. Hilgard's report, it would be necessary to do this work every year, because he shows conclusively that no two samples of the soil analyzed alike on his 10-acre plot, and he says in effect that not even duplicates from these plots would be alike in seasons of different amounts of precipitation of rain.

Here is practical farming with a vengeance.

We show below by conversations with ranchers in the neighborhood of the experimental station of what practical value this immense amount of work on the 10-acre plot at Chino has been to them.

There is one conclusion in regard to this immense amount of work on this 10-acre tract that Prof. Hilgard has not drawn, and that is the only conclusion that can be drawn from this work, that each particular spot where a beet seed would be planted would have to be analyzed in order to know what plant foods could be properly applied, for no two spots have analyzed alike. This being so, and there being over 40,000 beets per acre, and 9000 acres of them, it would require 360,000,000 analyses to be made at Chino and Anaheim; or, allowing thirteen determinations for a chemist per day, it would be equivalent to 27,692,460 days' work, or it would take 92,303 chemists per year to make these determinations; or, at the rate the chemist is paid at Berkeley, it would cost on the 9000 acres of beet lands for chemists alone, to say nothing of chemicals and chemical apparatus, the modest sum of \$166,154,400; it would take a row of desks, end for end, allowing a desk of ten feet in length to each chemist, 170 miles long. To say nothing of the immense armies of people it would take to keep track of the spots where the samples were taken from and the beet seeds were to be dropped, and the application of the different fertilizers to each particular spot. And this is called scientific farming!

At the rate Prof. Hilgard has been graduating students at his agricultural college, it would only take 60,000 years to graduate the requisite number of chemists to do this work, provided none died during the period. And yet Prof. Hilgard said in his address at Pomona: "There is very little use for agricultural experts in this country, as the soil is fresh and requires but little art in cultivation."

It is little wonder that Prof. Hilgard, if he has been in the sublime contemplation of spending the vast sum of money above named and organizing the vast army of chemists, should have told the people of Riverside, when they asked him how they could grow their oranges sweeter and with thinner rinds: "Don't ask conundrums;" or when the people at Pomona asked him what was the cause of variegated leaves on the orange, and, if it was a disease, what was the remedy, that he should have gone off into a guessing dissertation on the causes and have neglected to give the remedy; or that he had not had time to read Miss Tyrrell's thesis in his report, so that he might have learned that there was a male black scale and informed his assistant, Prof. Woodworth, of that fact. Miss Tyrrell had evidently had time to read

the report of the state board of horticulture, where she undoubtedly learned the fact.

INTERVIEWS.

Among others, Mr. Richard Gird was seen and interviewed regarding the claim of Prof. Hilgard that he had made "important experiments" in beets at the station at Chino.

Question—The Herald used your name, Mr. Gird, without your permission in its issue of the 15th instant, as you were absent in San Francisco. Have you any comment on the article? (Here the article was read to Mr. Gird.)

Answer—The Herald has correctly stated the facts, except it might have said that Prof. Hilgard was down here in person and went over the fields and said that we could not raise beets on them, and when I gave the station that 10 acres, I tried to get Prof. Hilgard to experiment with beets on it, which he refused to do until farmers on every side of the station plot were growing beets successfully.

Question—Are the analyses of the soils made from the sixty-five plots on the station land of any use to you or the beet growers?

Answer—Not a bit.

Mr. Gird's secretary stepped forward and handed out a bulletin from the Kentucky station, saying that he received bulletins from the stations of all the states, and that most of them were reports of how crops had been bettered, and asked how it was that he never received a bulletin from our college showing such results. A little blush of shame came over The Herald man as he had to admit that our scientists (?) were not onto their jobs.

Mr. G. L. Pierce was interviewed.

Question—How long have you been growing beets?

Answer—Four years.

Question—Has the agricultural college or the experiment station been of any service to you?

Answer—No. They can't give any information.

Mr. C. A. Moore was interviewed.

I represent The Herald, Mr. Moore.

Question (by Mr. Moore)—Do you want me to subscribe for The Herald?

Answer—If you don't read The Herald you are the first person that I have met today who has owned up to that fact. If you don't subscribe for The Herald and want to become rich and wise, you had better do so. No, Mr. Moore, I am not here to get subscribers, but to find out if the agricultural college and experiment station have been of any benefit to you, and if so to record these facts.

Question—Has it been, and if so, what?

Answer—No, it has not been. On the contrary, I raise beets down there by the station and have beaten them every year.

Mr. E. R. Robinson was next interviewed.

Question—Has our agricultural college or the experiment station been of any use to you as a beet raiser, in showing you how to grow beets of a larger tonnage or greater sugar content, or of a greater purity of juice?

Answer—The station has not done me any good.

Question—Have you ever talked with any one connected with the station on the subject?

Answer—I have. They have been down here to get "pointers" from me as to how to grow beets.

Mr. George Moore was interviewed.

Question—Has the agricultural college or experiment station been of any use to you in showing you how to grow better beets or larger quantities per acre?

Answer—No, sir.

Question—What good does the agricultural college or experiment station do you?

Answer—Don't do a particle of good. They are all theory.

Some thirty other beet growers were interviewed in *The Herald's* attempt to find and record some good words in favor of our agricultural college or experiment station, but all to no use. Each grower had the same tale to tell as the ones above quoted.

TOO MUCH LEARNING HAS MADE HIM MAD.

A colored individual, befor' de war, was presented with a baby by his wife. The next day he said to his massa: "Frances dun give me a baby yesterday; you can't guess what it is?" "It's a boy," was the reply. "No; guess agin." "It's a girl," was the reply. "Oh, some one dun tole you," said the negro.

Prof. E. W. Hilgard is in just the same position. He dun guessed in 1893 and previously that nitrogen was the "first thing needful when crops began to fall short." When the answer came back from the trees and the deluded ranchers, "No," he dun guessed again that phosphoric acid was the first thing needful. See his last report, page 133, where he says: "The 'presence' of phosphoric acid in greater or less amounts depends entirely upon the kind of rocks from which the soil is derived. It happens that in California most of the rocks—and therefore the soils derived from them—are poor in phosphates, contrary to what happens in Eastern Washington and Montana. Hence, phosphates are among the first ingredients to become deficient in California soils, as has been amply proved by actual experience of farmers, in whose hands superphosphates and phosphatic guanos have become the favorite fertilizers from the first."

Here is an assertion in regard to phosphates, and just such a one as he had

made for years in regard to nitrates, and this assertion, like the former, is not substantiated by one particle of evidence. The public would like to know who the farmers are, where the reside, what kind of crops were grown, how much the quality and quantity were improved by comparison where no fertilizers were applied, and where the other fertilizing elements were applied, and for how many years these tests were carried on?

Prof. Hilgard spends in his department over \$40,000 per annum of the public funds, and the public is entitled to know the facts he claims to have collected, and who have bettered their crops, to what extent they have been bettered, and how they were bettered. The public has been fooled long enough by Prof. Hilgard's "glittering generalities." It wants the facts.

On page 132 the following appears:

"General conclusions—Some of the general conclusions thus gained may be thus formulated:

1. Apart from the regions of abundant rainfall in the higher Sierra foothills and in Northern California, and a few local exceptions, all the soils of the state contain as much lime as is useful in soils.

2. The same is almost as generally true as regards potash; the amounts present are, in the great majority of cases, so far in excess of the average found in the soils of Europe and the east that the experience of those countries cannot serve as a guide in considering the requirements of our soils. Throughout the valley lands proper of the great valley, as well as in that of Southern California and in the valleys of the coast ranges as far north as Mendocino, the soil-water carries such large amounts of potash salts (in the lakali lands often as much as 1000 pounds per acre) that to add more in fertilization would be sheer folly. While in the uplands adjacent the drainage toward the valley prevents such accumulation; the fact that such drainage water carries the same salts is easily verified, and is apparent from examination of the stream waters as well. It is, therefore, reasonable to conclude that in the great majority of California soils, potash will be the last one of the three ingredients usually supplied in fertilizers that need be purchased by the farmer."

Here are some more glittering generalities, unsupported by one particle of evidence. But if the reader will turn to pages 172 and 176 of the professor's now famous report, he will see that his "theorizing" is completely upset by the actual field test there reported, which shows that potash did improve the crops on soils already loaded with it, according to his chemical analysis.

The field tests there reported were put out against and contrary to the advice of Prof. Hilgard.

After asserting that phosphoric acid is the "first thing needful," the learned professor goes on to say: "Some highly important researches, somewhat surprising, but most conclusive in their results, have within the last three years been made in Germany. It has been established beyond question that the favorable effects of even the most finely ground bonemeal, as heretofore observed, are almost wholly due to the animal matter or nitrogen contained in bones, and that its use to supply known deficiencies of phosphoric acid is wholly unprofitable and unwarranted by the returns considered as interest on the investment.

"Bonemeal of various grades of fineness, raw or steamed, has heretofore been sold at prices based upon the commercial valuation of both nitrogen and phosphoric acid, with only a slight reduction upon the full value of soluble or fully available phosphoric acid as supplied in superphosphates. It now seems that a farmer cannot afford to pay for anything more than the nitrogen value of bonemeal, say about \$12 per ton, instead of \$28 or \$30, which has hitherto been the current price. Under such a reduction, the manufacturer cannot afford to make bonemeal at all, and thus it becomes necessary, from both points of view, that bonemeal should, prior to sale as a fertilizer, be first converted into the fully available form by treatment with enough sulphuric acid to form not necessarily superphosphates, as ordinarily understood, but that intermediate compound which requires only about half as much acid and yet, according to the same investigators, possesses the full value of soluble phosphoric acid. While this will increase somewhat the cost to both the manufacturer and the consumer, it is evidently the only reasonable way in which this valuable by-product can be made fully available for agricultural use."

Could idiotic asininity go further? After asserting that phosphoric acid was the first thing needful, to say that a grower cannot afford to pay for the phosphates in bone—the very substance he does need, but that he can afford to pay for the nitrogen, an element which he does not need at first.

In regard to the form of phosphoric acid, the learned professor is as far off as he was when he said that beets could not be raised on alkali lands at Chino.

We would respectfully refer him to the latest Massachusetts bulletin on the value of phosphates in bonemeal, or if he will come down to Southern California we will show him where phosphates from bonemeal and superphosphates have been used side by side and see if he can tell which is which.

The fact is, that phosphates for quick growing crops, that is, crops that mature in from three to six months, should be fed on superphosphates or bone made

into floats, at a cost of from eight to eight and a half cents per pound for phosphoric acid; whereas crops that are growing every day in the year, like citrus fruits, do exactly as well on a medium bonemeal at a cost of five to five and one-half cents per pound for the phosphoric acid. These are facts that Prof. Hilgard should have discovered for the people, instead of having the people teach him. Is Prof. Hilgard paid for learning or teaching?

The report goes on to say:

"In conclusion, I cannot but reiterate my recommendation to farmers to adapt their mode and methods of fertilization to the special requirements of their crops and lands by the use of the separate ingredients of commercial fertilizers, rather than by the purchase of ready-made mixtures indiscriminately recommended by manufacturers. To do so will involve the use of brain work in the study of the principles of fertilization, but is certain to result in a material saving of outlay for the purchase of unnecessary ingredients; even more than Europe or in the east, where the lands have been subjected to all-around depletion by centuries of culture. In our fresh, or relatively fresh, lands a surplus of one or more ingredients over those existing in the smallest amount, may almost always be expected; and to increase the surplus by further addition of the same ingredients is sheer waste. Sound economy requires that only what is needful should be used; but those in doubt, and having a surplus of this world's good, and an indisposition to use their brains, may, of course, continue in the beaten track."

Here is a gratuitous insinuation against both the manufacturers of fertilizers and the successful ranchers; that the manufacturer is trying to sell the rancher something that he does not need, and that the rancher is a fool with his money soon parted. If Prof. Hilgard had one particle of common sense, he would know that the interests of the manufacturer of fertilizer and the rancher cannot be segregated, but are identical, and that upon the success of the rancher depends the success of the fertilizer manufacturer.

If Prof. Hilgard would pay some little attention to what is going on at home, insist that the fertilizer manufacturers or dealers deliver the quality of goods that they pretend to deliver, or, in other words, come down to a practical basis, have a law passed regulating the manufacture and sale of fertilizers, show people how they can grow better crops, how to keep down scale and other pests, stop sending around a press fixer to bolster up his tottering and worthless record, instead of wasting his time over the soils of Montana, Washington, the east, Germany and the Hawaiian islands, etc., we might get some results that might help the struggling ranchers of our state.

THE STATUS OF SOIL ANALYSIS

By M. L. Wade, B. E.

Having taken a great interest in what has been written in The Herald on the subject of agriculture, and especially soil analysis, I willingly comply with The Herald's request to write an article on the above-mentioned subject.

It is not my intention to contend that an application of nitrogen will make the skin of an orange or lemon puffy, or that phosphoric acid will give out under the continuous exhaustion of any one crop before nitrogen; neither do I contend that irrigation waters will or will not, when laden with soluble potash, furnish all of that ingredient necessary for a growing crop.

While all of this discussion has been going on as to whether a soil analysis will furnish all necessary data to guide the agriculturist in the proper application of fertilizers to the soil, the idea was suggested that it would be well to investigate the present status of soil analysis, and to see even if we were, with the correct results before us, enabled thereby to give a correct diagnosis of the condition of the soil and to make a proper application of the remedy decided necessary; whether the accuracy in the analytical operations in the laboratory were developed sufficiently to guarantee reasonably reliable results and in the space of time that would make it worth while to put the soil to that sort of a test.

While I have for a number of years made a study of this special subject, as far as pertains to the laboratory work, in the analysis of soils, and after a thorough investigation of all important authorities on the subject, I am compelled to say that there is really no standard method of analysis that will meet the requirements of accuracy, dispatch and economy.

In this brief article it would be impossible to cite all of the authorities, so I will bring forward the leading ones of this country, whose statements will not be doubted by any one. I refer to the works of the Association of Official Agricultural Chemists and to the latest work of Prof. H. W. Wiley of the agricultural department at Washington, D. C.

The first investigation of the association were commenced within the past very few years. This association began by first investigating all the different methods of soil analysis, with a view of selecting the most reliable, in order to carry on a scientific investigation and at the same time improve the methods of procedure.

The report of the association in Bulletin 31 of the United States department of agriculture, 1891, shows that its time was consumed in fixing the size of the hole in the sieve to be used in soil analysis. This was the beginning of the

practical investigations. This report is about as important as the size of the hole in the sieve recommended, which is the one-sixth hundredth and twenty-fifth part of a square inch.

In the report for 1892, Bulletin 35, the reporter says in regard to the method adopted by the association, since so few of the members had reported on the samples sent out the previous year, that he "felt, therefore, some hesitancy in recommending changes on adopted methods, even when the necessity of such changes was convincing to his own mind."

Here are a few of the results of the most important determinations, page 95:

	Potash	Phosphoric acid	Nitrogen	Soda
Peter (Kentucky)...	1.10	.14	.057	.23
De Roode (W. Va.)...	1.10	..	.056	.23
Tilson (Texas).....	.81	.2922
Adrianan (Texas)....	.88	.34	1.35
Collingwood (A.T.)..	1.19	.2135

A study of this table shows that the different chemists varied in their analysis of potash 47 per cent, in phosphoric acid 392 per cent, and in soda there is a difference of 513 per cent. Only two determinations of nitrogen were made, and the results were very close.

On the same page, in another set of analyses by the same chemists, there is a difference of over 100 per cent in nitrogen, soda and sulphuric acid.

In bulletin No. 38, United States department of agriculture, Prof. Hilgard says: "In taking soil specimens for examination, the following directions should be carefully observed, always bearing in mind that the analysis of a soil is a long and tedious operation which cannot be indefinitely repeated."

In bulletin No. 43, United States department of agriculture, pages 33 to 41, there are numerous tables showing comparative results of analyses of the same sample of soils by different methods. The difference in per cent of average from the highest or lowest in one of the tables, and it is only a sample of them all, is as follows: Insoluble matter, 3.1 per cent; potash, 98 per cent; phosphoric acid, 59 per cent; nitrogen, 10 per cent.

I might continue all night giving such discrepancies, but deem it advisable to leave it to the reader to pursue the investigation for himself, so will conclude by quoting the comments of the official reporter and other members of the association on the methods used. In speaking of the methods for determining mois-

ture, page 42, the report says: "The Hilgard method of drying in a tube at 200 degrees C. was the worst of all. The method for carbon and silica was not found satisfactory. Dr. de Roode does not like the Goss method for phosphoric acid in soils, and thinks small quantities of phosphoric acid are not completely precipitated." * * * "In the Hilgard method for phosphoric acid it was impossible to dissolve the ignited soil by two days' digestion in nitric acid." * * * "This accounts for the low results reported."

On page 45 the report says: "The results of the soil analyses show wide and discouraging differences between the findings of different chemists. The only determinations in which a fair agreement has been obtained are those of the total insoluble matter, the ammonia precipitate and the nitrogen." * * * These discrepancies occur even in those determinations in which a good concordance was naturally to be expected.

"An inspection of the table of averages will show that the range of variation, while much too great in both methods, is distinctly greater in the Hilgard than in the provisional method, notwithstanding the fact that we are considering more reports by the latter method than by the former. Lack of familiarity with the Hilgard method can hardly be the cause of this, as some of the largest variations are found in the reports of those who should be most familiar with the method."

On page 50 the report says: "The very startling variations and the amounts of phosphoric acid reported by different chemists are in the nature of a surprise. It is hardly to be supposed that they are due to differences in the digestion, as it is to be supposed that the soil solutions obtained by different observers were fairly uniform in their content of phosphoric acid; the discrepancies must be due to defects in the method of determination." * * * Attention is here called to the urgent need of working out methods for determining the availability of plant food in the soil.

"The methods for what may be called the total resources of a soil need perfecting, but we need, also, methods by which results corresponding to the known results of field experiments may be obtained." * * *

"It is very evident to all who have done work in soil analysis that our present methods, and especially the older ones, consume entirely too much time for practical purposes, and unless they can be very materially shortened, soil analysis must remain of minor importance."

It was my intention to quote many other such statements from the agricultural reports, but the limited time and space at my disposal hurry me on to Prof. Wiley's comments on the same

subject. He says, on page 65 of his Principles and Practice of Agricultural Analysis: "The physical and chemical analyses of soils are long and tedious processes, and are entirely too costly to be applied to samples which represent nothing but themselves."

Here is evidence sufficient to convince any candid mind that soil analysis is still in the first stages of development, and lacks all the qualifications necessary to make it a reliable criterion in determining the proper treatment to get the best results from any crop. The pioneers in this work are yet groping in the dark, and I have not been informed from the report of the association for 1895 that the dawn is approaching.

SOME MISTAKES OF PROF. HILGARD.

At the Riverside Farmers' institute Prof. Hilgard made a grave mistake for a scientific man, when he represented from the analysis of the oranges there displayed that No. 1 was grown upon land with no fertilizer, and No. 2 grown with potash, when, in fact, No. 1 sample was grown with nitrates and phosphates and No. 2 sample was grown with nitrates, phosphates and potash.

He also made a mistake when he wrote his letter of April 25, 1895, to Mr. Palmer, in which he said: "Three days ago there was delivered at my house, with the inscription 'House' on the outside, a box of oranges," etc. These oranges were not shipped from Pomona until the afternoon of the 22d, consequently could not have left Los Angeles until the 8 p. m. train, and could not have arrived at Berkeley until the 24th. When Prof. Hilgard undertook to criticise the analysis of a similar box of oranges by saying that the total sugars more than equaled the total solids in the juice, he made a great mistake, forming an opinion before he had all his facts.

By a parity of reasoning, it is only reasonable to suppose that he got the second lot of oranges mixed, as he shows that wherever fertilizers were applied positive damage was done to the fruit by such application. If his house servant had gotten the first samples "inexplicably mixed up," might not he, under the showing by his analysis, his office clerk or laboratory cat have gotten the second lot mixed?

Certainly, no one who has given the matter of feeding crops any attention would believe for one moment that complete fertilizers, in reasonable quantities, could possibly damage the orange. When Prof. Hilgard thinks he is entitled to an opinion independently of all other agricultural chemists in the world in regard to the matter of finding out the needs of a crop, and when his opinions are not backed up by field experiments or any other scientific tests, or, if they are, he neglects or refuses to print his results and give them to the public, is

it not reasonable to think that he is mistaken in this?

Bulletin No. 36 of the Oregon station, published April, 1895, has this to say: "In the first place, let it be remembered that the value of a mere chemical analysis of a soil is at most doubtful. An analysis of a soil reveals what and how much of a given ingredient is present in the soil, but it does not show how much of the plant food is available. There is, however, more or less value attached to so-called virgin soils, and an accumulated number of analyses of this class of soils gives very valuable data upon which to base a judgment of probable success or failure."

"In all cases chemical analysis should be followed by careful field tests, and in this way any one may become familiar with the individual needs of his soil."

The professor always puts a great deal of stress upon the fact that he is the only and original investigator of virgin and arid soils, with thirty-five years' experience. The explanation of this solitary and unique position of our director is that he is probably the only man who would desire to waste the public funds and his own time in such almost worthless pursuit.

PROF. HILGARD AS DR. JEKYLL AND MR. HYDE.

Prof. Hilgard has told the people of California again and again that he could advise them as to the needs of their crops in the matter of fertilization from an analysis of their soils. A special sponsor of Prof. Hilgard from Berkeley, Mr. Victor H. Henderson, in a letter to the Times of last Sunday, has, in praising up the college of agriculture and defending Prof. Hilgard, this to say: "Any farmer who finds that his crops will not grow well and wants to know what the soils needs to make it fertile, can send samples of it to the University of California, agricultural department. It will be analyzed, and he will be told just what to do to correct the deficiencies in its chemical composition."

We find an advertisement in one of our country exchanges of a late student of Prof. Hilgard, recently from Berkeley, which reads: "If you are in doubt as to what kind of fertilizers to use, or how much to apply, it will pay you to have your soil analyzed."

Prof. Hilgard said before the last farmers' institute: "We cannot carry on culture experimentation at the stations on virgin soils." These stations are, however, several years old.

Thus doth Prof. Hilgard preach and teach at home before audiences not posted on these matters and upon whom he wishes to make the impression that he is the great, "first and only investigator of virgin and arid soils."

But how he changes his character when he goes abroad and talks to an au-

dience capable of weighing what he says.

At the meeting of the American Association of Agricultural Colleges and Experiment Stations, held at Denver, August, 1895, in summing up his paper on Late Progress in Soil Examination, he said:

"I think, therefore, that I am justified in indulging the hope that we are on the trail of a method for the definite ascertainment of the condition of a soil as to available (non-nitric) nitrogen, which, with the method of Dyer for the corresponding determinations with respect to potash and phosphoric acid, when all are perfected, would effectually solve the problem of the manure requirements of cultivated soils that has so long resisted the efforts of chemists. * * * In all cases the pot or field test will have the last word."

These expressions are hidden away amid 500 pages of his last voluminous verbiage pile.

Could a man wade deeper in the field of doubt? "I think, therefore, I am justified in indulging in the hope that we are on the trail * * * of a method which when all are perfected," etc. Why, a man could not get to heaven by the broad gate of the Salvation army who had not more "faith" than Prof. Hilgard expressed when he produced the above paragraph.

By the way, what is Prof. Hilgard's definition of a virgin soil?

Generally virginity is supposed to have ceased before the subject becomes prolific, but Prof. E. W. Hilgard seems to consider a soil "virgin" until such time as it has ceased to be prolific.

A MALICIOUS ATTACK.

The State Agricultural Department is Scored.

The people who see and appreciate the work of the University of California agricultural department is doing were surprised and disgusted by a half-column editorial which appeared last Sunday in The Los Angeles Herald. The article in question accused the staff of the agricultural department of being inefficient and petty politicians, and characterized the agricultural college as a waste of the hard earned-money of the taxpayers of California.

An explanation of the attack is simple. A Los Angeles man named Woodbridge, the inventor of a fertilizer, asked Prof. Hilgard for a recommendation of his invention. Prof. Hilgard examined the fertilizer and refused to recommend it. Ever since Mr. Woodbridge has lost no opportunity to injure the agricultural department. One Abbot Kinney, another Los Angeles man, was formerly a state forestry commissioner. When the commission was abolished, because of its inefficiency and corruptness, its duties

were given to the University of California agricultural department. This aroused Mr. Kinney's wrath. He is part owner of The Herald, and he and Woodbridge have inspired this policy of attacking the U. C. agricultural department on every possible opportunity.

Such attacks merely disgust those people who really know something about the institution, but it is calculated to harm the university's interests by leading people who have not come in contact with its work to form false impressions. It is unfortunate that personal spite should go to such extremes.—Berkeleyan.

The answers of the people who are trying to discredit the charges of incompetency against Prof. Hilgard and the inefficiency of his agricultural college are of two kinds. First, laudation of the professor and the college, and, second, abuse of those who are engaged in showing up the comparative worthlessness of the professor and his college. Prof. Hilgard has many times tried to make it a personal fight, but the editor of The Herald does not intend to be caught in any such battle, however much Hilgard may desire it. Our criticisms have been entirely upon the incompetency of the director of our agricultural college and some members of his staff.

The above article is published for the purpose of showing the second kind of "defense" Prof. Hilgard is setting up, either directly or indirectly.

The "explanation" is pure fabrication, and the writer of this article is "the man named Woodbridge," and he makes this statement because the above fabrication must have come either directly from the editor of the Berkeleyan or Prof. Hilgard, for who could know that Woodbridge had ever asked Prof. Hilgard for a recommendation for a fertilizer but Prof. Hilgard himself? This "man Woodbridge" denies that he ever invented a fertilizer or that he ever asked Prof. Hilgard to recommend his (Woodbridge's) alleged invention or any other fertilizer of which he is the manufacturer, and calls upon the editor of the Berkeleyan to retract the charge or produce the proof of his assertion.

Indeed, there was no reason why the "man Woodbridge" should have asked Prof. Hilgard to recommend his brand of fertilizer, for the professor had been doing it unsolicited, as the following letter will show. The letter has been in our possession since the time Messrs. Collins Bros. received it:

UNIVERSITY OF CALIFORNIA,
COLLEGE OF AGRICULTURE,
BERKELEY, Jan. 8, 1895.—Messrs. Collins Bros., San Dimas, Cal.—Dear Sirs: The samples of soil accompanying yours of December 27th have been received and examined, so far as can be done at short notice; a full examination would take

more time than you would wish to wait. The examination reveals no prominent deficiency in your No. 1, of which No. 2 is evidently only a modification. Yet there seems to be a deficiency in vegetable mold, notwithstanding the color of the soil is rather dark. It is a pity that stable or sheep corral manure is not available to you, as I think that would be the best thing for so sandy a soil.

It may be that a more complete examination of the soil, which we will make hereafter, will give a more decided indication; for the present, I think you had best use a "complete" fertilizer, like "Woodbridge's No. 2" orange fertilizer, together with some gypsum, which will help the land every way. Plowing in a green crop, say of crimson or burr clover, would be the next best thing, but should have been started before this time in your climate. Better look out for that another year.

The samples sent are not large enough for a full examination; a quart is as little as we ought to have. Your No. 1 only will need to be examined; take that to the depth of twelve inches, and tell me about the depth of the soil and subsoil to gravel or hardpan, or whatever lies underneath. Yours very truly,

E. W. HILGARD.

Many, no doubt, who read this letter and have followed out our criticisms will think that "the man Woodbridge" is a fool to criticize Prof. Hilgard when he was recommending his (Woodbridge's) fertilizer; but between the making the little money that we might have made by keeping in with Prof. Hilgard on one side, and exposing the utter incompetency of the management of our agricultural college, there is but one path to follow, and that is the path of duty—to fight the wrong as we see it.

HOW WORK GOES AT "COW COLLEGE"

A Stimulus Toward Good Sense in Agriculture—How People Ask Questions.
Wine-making—Olive Culture.

BERKELEY, Oct. 15.—(Special correspondence of the Times.)—To understand the work that is going on here, one has to remember that the University of California is a real university; that is, a number of individual colleges, all intimately bound together and under the same general direction, but each with its own faculty and its own particular aims.

One of the very oldest of all the departments is the college of agriculture, and its work, quietly and unostentatiously accomplished, is scarcely appreciated, so little is it known by most people.

"Cow college," as the students irreverently call it, has for the center of its activities a wooden building near the

southern edge of the university grounds, on the banks of Strawberry creek. Here are the offices of the director and the various professors, the reading room, the class rooms, etc.

But this wooden building is only a part of the equipment of the agricultural department. Its work is carried on from one end of the state to the other by means of the experiment stations, outposts, where investigations are carried on as to problems of soil, fertilizers, plant life, olive culture, forestry, wine-making, etc.

People often think of the agricultural department as being an outgrowth of the other side of the university—the culture colleges. But it is just the other way around. The first state institution was a college of agriculture and mechanics, and the other departments budded out from that. This California agricultural college was the first one in the United States, and it stands today at the head of all others in America.

Now, I want to tell you something about Prof. E. W. Hilgard, the man who has made the agricultural department, and is its life and soul. He is small, slight and wiry. His hair is gray, and his keen eyes look at one through spectacles. He is a German by birth, and though most of his life has been passed in America, he still talks with a German accent. In his own line, agricultural chemistry, he has no superior. Once every ten years a gold medal, commemorative of Liebig, the great German chemist, is awarded to the man held to be the greatest chemist living, the man who is doing the most valuable scientific work in that line. Prof. Hilgard is the possessor of one of these medals.

Some of his most famous work has been in the line of soil analysis, the study of the reclamation of alkali lands in especial. Not long ago a man came all the way from Hamburg, Germany, to study the question of alkali lands under Prof. Hilgard's direction. Any farmer who finds that his crops will not grow well and wants to know what the soil needs to make it fertile, can send samples of it to the University of California agricultural department. It will be analyzed and he will be told just what to do to correct deficiencies in its chemical composition.

One fruit raiser, whose ranch is in Central California, wrote to Prof. Hilgard that his trees all seemed to be stunted and wretched. Prof. Hilgard happened to know that section of the country thoroughly. He wrote back to dig down six feet and see what he could find. The farmer dug down two feet and struck rock. The man from whom he had bought the place had blasted out holes in which to plant his trees. That was a case where advice as to fertilizers couldn't save the trees. Some farmers are absurdly unreasonable. They will

write for information as to what kind of fertilizer to use, sending no samples of soil and no description thereof, and then grow angry and call the agricultural scientists ninnyes because they can't tell offhand, like a medium.

The number of regularly enrolled students in "Cow college" is not large. But there are a great many people taking particular lines of work there, men who enroll in the colleges of chemistry, or of natural sciences, but spend most of their time in agricultural studies. There are courses in agricultural chemistry, in sugar beets and sugar manufacture, in viticulture, in wine-making, in economic entomology and other allied topics, and anybody who wants some special line of work will be gladly advised and helped.

But, after all, the sole object is not to instruct students. Perhaps the most important phase of the work is the original investigation that goes on.

In all the other departments of the university the professors have summer vacations. In the agricultural college they never have more than two weeks, and this year they have had no vacation whatever, but worked right straight along all summer.

Their object is to furnish information on every topic any farmer wants to be advised about. If the subject is obscure and the questions have never been solved, they go ahead and work them out. Bulletins are printed from time to time on the work accomplished, and these are sent to whoever wishes them.

During the last year Prof. Hilgard has answered some 1200 letters of inquiry. These letters were not answered by printed matter, but by individual, specially written replies. The agricultural department, as a whole, wrote between 5000 and 6000 of these letters of information.

The farmers send for all sorts of information. They ask how to pickle olives, how to destroy army worms, how to dry figs, how to reclaim, alkali lands, how to grow oranges on cactus plants, and a thousand different things. Every question is answered as fully and as promptly as possible. Besides these letters, a great deal of printed matter is being constantly sent out.

Berkeley is the only place in the United States where there are facilities for studying wine-making scientifically. When the old viticultural commission was abolished, the valuable library and apparatus it had accumulated were turned over to the University of California, and its duties added to the work already carried on by the department. A great deal of very valuable work has been done since. Mr. Hayne of the department has recently devised a wine-cooling apparatus for use during fermentation, which, it is believed, will save tens of thousands of dollars to the farmers of California every year by

lessening the chances of wine spoiling in the making. At present the viticultural staff is experimenting on the use of yeasts in wine-making, another thing which promises to be of great importance to wine-makers.

Down in the western part of the university grounds is an interesting institution, the first experiment station founded in the United States. When Prof. Hilgard came to California twenty years ago, he induced the regents of the university to start an experiment station on the German plan. It was a valuable idea, and Senator Hatch was so impressed with the practical results that he introduced the bill which provided for the establishment of stations in other parts of the country, the well-known Hatch act. Since then other stations have been founded elsewhere in California, at Paso Robles, at Tulare, near Chico, etc., all directed by Prof. Hilgard, and all used as places for carrying on the work of the department. Here new varieties of fruits, vegetables and economic plants are domesticated, experiments in pruning, fertilizing, irrigation, etc., carried on, determinations made of the kinds of crops suited for particular soils, etc. The aim is not to raise anything in quantity, but merely enough for experimental purposes. The results of these investigations form part of the agricultural bulletins.

There are also two forestry stations, one at Chico and one at Santa Monica. They are the only ones in the United States.

An interesting part of the work of the college of agriculture is the farmers' institute movement. The farmers of a section of country meet together and listen to addresses on agricultural topics by professors sent from Berkeley, and then discuss their own experiences and observations. A great deal of useful knowledge is thus disseminated. The farmers' institutes have sometimes resulted in the formation of permanent farmers' clubs.

It seems to me this is a good opportunity to correct a widespread misapprehension. Some of those people who are opposed to the University of California agricultural department, from various motives, generally of personal enmity, talk about the impropriety and folly of the taxpayers of California supporting the expensive and useless agricultural college. The truth is that only about one-tenth of the revenues of the agricultural department comes from the state treasury. All the rest of the expenses are borne by the national government. Such an institution is necessarily costly, but from the knowledge it spreads, from the stimulus it is to intelligence in farming, its value is incalculable.—Victor H. Henderson in the Times.

We wish to give the advocates of the agricultural college the full benefit of all they can allege in its behalf, and therefore we print in full the letter of Mr. Henderson. The cause of dissatisfaction with the work of the college as they have been presented in *The Herald* are not even touched upon by Prof. Hilgard, and in his attempted vindication before the farmers' institutes or in the rehash of the same served up in the above letter. The practical question is what has the college done with its large resources to help the agricultural interests of Southern California? We have given replies from numerous ranchmen and we prove superfluously that no help has been given and none can be given to our crops along the lines followed at the college. The claim of Mr. Henderson that because nine-tenths of the money spent at the college comes from the United States, and therefore ought not to be taken in account in estimating the benefit which the state receives, is too absurd to need answer. Indeed, this whole epistle, viewed as an answer to our strictures, only reminds us of the old saying, as we try to review its statements of the case, that it is very hard to kick at nothing.

Will Mr. Henderson point out wherein the college has accomplished anything to rid our orchards of our infernal insect pests? Will he point out a single crop which Prof. Hilgard can show that he has improved in quality or quantity, were and how and to what extent this has been accomplished?

If Mr. Henderson would, instead of taking his inspiration from the men at Berkeley, get out among the ranchers and make some inquiries, he might learn the true state of affairs.

If he had been present on Wednesday at a controversy held with Mr. E. C. Bichowsky of San Gabriel, Mr. Henderson would have learned something.

Question: What good has the agricultural college been to you as a wine maker?

Answer: If you will ask me what damage it has done I can readily answer you.

Question: What damage has it done?

Answer: Prof. Hilgard was the direct cause of the spread of phylloxera by planting, for experimental purposes, infected vines.

Mr. Bichowsky is the manager of the great winery and property known as "Sunny Slope." He was, also, president of the viticultural commission.

Mr. Winston of San Gabriel was seen and interviewed.

Question: How long have you been in the orange business?

Answer: Twenty-seven years.

Question: Has the agricultural college ever been of any benefit in showing you how to grow oranges or improving the quality or quantity of them?

Answer: No, sir.

But why pursue the matter further? It is very evident that Mr. Henderson is not a rancher and entirely misunderstands the exceptions that are taken to the management and methods of the agricultural college.

THE BERKELEYAN'S ATTACK.

Such untruthful, cowardly statements as appear in the clipping from the Berkeleyan, published below, in answer to the charges of incompetency that have appeared in The Herald against Prof. Hilgard and some members of his staff are characteristic of the man, but wholly unworthy to emanate from a university that should be a teacher of morals as well as of science, but the agricultural department seems to be woefully deficient in both:

"An explanation of the attack is simple. A Los Angeles man named Woodbridge, the inventor of a fertilizer, asked Prof. Hilgard for a recommendation of his invention. Prof. Hilgard examined the fertilizer and refused to recommend it. Ever since Mr. Woodbridge has lost no opportunity to injure the agricultural department. One Abbot Kinney, another Los Angeles man, was formerly a state forestry commissioner. When the commission was abolished because of its inefficiency and corruptness, its duties were given to the University of California agricultural department. This aroused Mr. Kinney's wrath. He is part owner of The Herald, and he and Woodbridge have inspired this policy of attacking the University of California agricultural department on every possible occasion."—Berkeleyan.

It will be observed that "Prof. Hilgard examined the fertilizer and refused to recommend it." Having previously denied in toto "the explanation," we call attention to the cowardly way in which the matter is put. The writer of the article did not dare to say that the fertilizer was "found wanting," and that therefore Hilgard refused to recommend it, but leaves the reader "to infer" that such was the case.

Likewise in regard to the statement as to forestry, the article leads people "to infer" that Mr. Kinney was a member of the forestry commission when it was abolished.

The facts in the case are as follows:

Mr. Kinney was a member of the forestry commission until 1888, when his term expired. During his three years' connection with the commission he established five stations and two others promised, among them the Santa Monica station, on which he planted the interesting trees that are now sought to be studied there. When Mr. Kinney retired from the commission he turned over to his successors over \$100,000 worth of property. The commission then went into the hands of politicians and little was done in the interest of forestry.

This political commission was not abolished until 1893, when its property, including the five forestry stations, was turned over to Hilgard as head of the agricultural department. There seem to be only two stations left. What has Hilgard done with the other three stations?

If these facts were not known to the editors of the Berkeleyan, they certainly were to Prof. Hilgard or his press fixer, who furnished the statements to the editors of the Berkeleyan.

We understand that the Berkeleyan is published and edited by the students of the University of California. If such is the case, the regents ought to take this matter up and investigate it, and discharge from their employment the person or persons who have been giving these young editors their first lesson (we hope it is the first) in misrepresentation.

PROF. HILGARD BEHIND THE AGE

Some time ago we gave an account of the experiment station at Southern Pines, North Carolina, which is probably one of the largest experimental stations, if not the largest station, in the United States. The grounds of this station cover some thousands of acres, and are under the management of the state board of horticulture, the state agricultural experiment station and the German kali works.

In a little work published by the latter concern called Principles of Profitable Farming, some account of the station is given, a part of which we reproduce and place in the deadly parallel column with what Prof. E. W. Hilgard said before the last farmers' institutes held in Southern California.

"The soil when the experimental farm on fertilizer experimentation at the station in a virgin condition, on virgin soils." This was one great advantage, for the effect of fertilizers to be used in the experiments will not be influenced by the growth of previous crops or by elements of plant food supplied by previous manuring." —E. W. Hilgard's lecture before Farmers' Institutes, September, 1896.

If Prof. Hilgard had been doing the kind of experimental work that is being done at other agricultural experiment stations, instead of fooling away his own time and wasting the public funds in worthless soil analyses, no two of which agree, he might have shown the people of the state how to grow crops of larger quantities and better quality. And when he was asked how to grow sweeter oranges with thinner skins, he could have given some definite information instead of saying, "Don't ask conundrums." Prof. Hilgard has lost his opportunity and he should be retired.

THE HERALD AND THE AGRICULTURAL COLLEGE

The strictures which The Herald has felt called upon to make upon the methods and plans of the college are specific and radical. At the risk of "iteration," which Shakespeare qualifies so violently, we wish to present once more our contention in the simplest form. Such a statement will, we think, make clear that the issue is in no sense personal, but has to do with the vast interests of Southern California as a fruit and grain growing region. If the failure of the college to aid our ranchmen calls for a change in the administration of the college, The Herald is responsible only for its premises and not for the conclusion which those premises demand. Gold medals from beyond the sea may adorn the wise men at Berkeley, but our farmers need practical help in their crops and in the war they have to wage with the enemies that infest their fields and orchards, and such needed help has not come from director or assistants. Thousands upon thousands of dollars have been annually given to the college without any practical benefit. The Ontario Observer has hit the nail squarely on the head when it says:

"The Herald's criticisms have been entirely upon the incompetency of the

director of the agricultural college and some members of his staff. A perusal of the evidence collected by The Herald regarding the small benefit derived by the farmers of the state from the theoretical researches of the college staff leads one to suppose that a much better use might be made of the funds appropriated for agricultural college work if The Herald's suggestion of the establishment of numerous inexpensive experiment stations could be carried out. As already suggested in the Observer, plots of ground in the vicinity of such schools as Chaffey might be worked under the direction of teachers competent to investigate under the direction of a practical state superintendent questions vital to the interests of the farmers and fruit growers of the vicinity of each experimental plot."

We are receiving like testimony from various quarters, and we deem it a duty we owe the public to call upon those who control the appointment of the officials of the college to put practical men on duty. An agricultural college is a sham unless it sends forth irrigating streams of useful knowledge to enrich the state through its manifold harvests. The Herald proposes to continue to advocate practice vs. theory. The question hinges just at this point.

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ERRATA.

This Bulletin was printed in the absence of the editor and the reader is requested to correct any typographical errors.

Entymologist should read entomologist.

Page 17, last line of first column, should read "as" instead of "on."

Page 23, 2nd column, 4th paragraph, for "controversy" read "conversation."

