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New York Sugar Market, Dec. 1—Centrifugals 4.38. Granulated 5.34. Stock in first hands 57,850 tons against 204,242 same date last year.

Refined is in fair demand, notwithstanding that the beet sugar factories in several states are in full operation, and turning out excellent granulated sugar more largely than in any previous season, all of which finds ready buyers at local points and decreases the demand for eastern refined at those points. The Louisiana crop is also in full operation and supplying a certain amount of direct consumption. All these domestic sugar producers are having a very satisfactory season thus far as regards output and prices, and factories are likely to multiply faster in the future as the value of the enterprise becomes better understood.

In some localities the increase in the crops is not fully realized. The Government Cuba Crop report states that the crop is in a very satisfactory condition, that the cool weather was exceptionally opportune for the mature cane and that the concensus of opinion is that the grinding will produce a good yield. The outturn has been estimated as high as 600,000 tons, which is quite doubtful.

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The following items from one day's report of Wall street, New York, transactions are a few of the signboards of prosperity and of the estimate the investing public place on well conducted industrial organizations. Last sale of Chemical National Bank stocks was at $4,000 per share. Standard Oil stock has been selling at $700 per share and higher. The last sale of the common stock of the Royal Baking Powder Company was at $119. A seat in the New York Stock Exchange was sold for $47,500. For the common stock of the Proctor & Gamble Company $490.

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Colorado is growing beets of high sugar content. Eighteen samples from one section averaged 19.02 per cent sugar con-

tent, with 86.2 per cent purity. Another section returned from twenty-three samples 18.59 per cent, with 85.26 per cent purity. One analysis went as high as 21.82 per cent sugar and 88.5 per cent purity.

The latest estimate (November 15) of the sugar crops of the world for 1900-01 make the grand total 9,166,000 tons—the largest ever known. The beet sugar production is placed at 5,886,000 tons, of which 86,000 tons are credited to the United States; cane sugar production, 3,280,000. The total estimated increase over 1890-1900 is 831,697 tons.

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In 1876 only 5,513 tons of American-killed meat arrived at the Central Markets, London, and it was not until 1881 that a small consignment of 565 tons arrived from Australia. In 1898 American-killed meat to the extent of 75,890 tons was delivered, while 83,831 tons came from Australia and New Zealand. Last year 93,378 tons came from America, and 81,258 tons from Australia and New Zealand.

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It is a remarkable fact that this year Australia has entered the market as a large buyer of Javas, which reduces the available quantity of Java sugars for other centres of consumption. If the fall demand for early Java sugars extends also to later, say August-September deliveries, it is to be expected that also in this campaign after December only a small quantity of Java sugars will be available for export. Up to a small quantity the whole of the sugars from the coming (1900) crop has been sold by planters at prices equalling say 10s. 6d., or a shade less, f. o. b.

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## *INTENSIVE CULTIVATION.*

In most progressive countries, more attention is being paid to improved methods of cultivation, by greater care in the preparation of the soil, selection of the choicest seed, and more intelligent care of the growing plants. The history of the sugar beet perhaps affords the best illustration of this. But it pervades every branch of agriculture, including fruits, flowers, etc.—in all which new and unlooked-for developments are every year recorded, increasing the value of such products, whether for food or in the arts and sciences. In no other branch of agricultural industry has there been greater progress than in the culture of beets and the manufacture of sugar from them. The result is that every year shows gain,

the latest being seen in the reports of the French exposition on beet culture and manufacture. But while these evidences are more conspicuous on account of the magnitude of the beet sugar industry, yet the remark applies equally to cane, and almost every branch of agricultural industry. The man who is most successful is he who supplies the necessary food and stimulants demanded by each product, and by returning to the soil what each plant has absorbed from it.

In remarks made at one of the planters' gatherings in Louisiana, Prof. Stubbs expressed surprise that Hawaiian planters did not cultivate pea vines and other plants for soil manuring. Had he visited Hawaii he would have seen lupins growing and used successfully for this purpose, which has been done for several years, and with as good results as in other countries. The practice is extending each year to all the islands. Prepared manures made expressly to suit the needs of each estate have generally been preferred on account of the good results attending their use. The needs of the soil of different localities here are so varied, that it is only by actual test that the best can be determined. In Louisiana the soil of large sections may be of one class—alluvial perhaps, while here the soil of no two islands, or even districts, is the same. The chemist is employed on each plantation, and his investigation generally determines what manures are best adapted to it. The result is that each estate which is so equipped and conducted secures large returns in its annual crops.

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THE FLORIDA ORANGE.—A piece of news in a small way that will be deeply appreciated is the announcement that Florida will have an orange crop of 1,000,000 boxes this year, the largest yield since the great freeze. One million boxes is not much in comparison with the 1894 crop of 5,000,000, the last big yield, but it is about four times as large as the production of 1899. The 1901 yield, it is estimated, will reach 1,500,000 boxes. From this it may be seen that the Florida groves are being rapidly restored. In a few years the output will be larger than it ever was before, and the delicious fruit will once more abound in the markets. The Florida orange is the queen of fruits. All the grapes and figs and dewberries that were ever grown are not equal to one perfect orange with its golden rind packed full of the sweetness and exquisite flavor of the tropics. What makes the orange so welcome is that it comes to the North in the holiday season, reaching here about

Thanksgiving Day and being most perfect just at Christmas time. The oranges of California, though very good, are inferior to the Florida product.—*Louisville Journal.*

Prof. Stubbs, since his return to Louisiana, has given a number of statements and interviews, regarding cane culture and sugar manufacture in Hawaii, all tending to show that the planters of Hawaii stand in the front rank of cane sugar planters in any part of the world. He gave the details obtained regarding one of the most successful plantations. The principal items, per acre, were: rent, $54.00; commercial fertilizers, $41.13; watering, $37.18; pumping, $35.62; stripping of cane, $15.25; plowing, $14.50; cost of manufacture, $27.15; and other smaller items that brought the sum total to $292.74 as the average cost to put on the market sugar from each acre of cane. They manufactured from their lands an average of ten tons of sugar per acre, each ton costing $28.59, and selling for $84.50. These figures and calculations were made before the annexation of Hawaii to the United States, since which date the cost of labor has greatly increased and hence an addition of 25 per cent to above expenses would about put expenses as they now stand. Feeling that a change of seed would perhaps be beneficial to them, some of the ordinary striped variety of cane grown here was sent to them and it has done splendidly, in fact it looks as though it is destined to be used there entirely. The Professor's impression is that the Louisiana planters should imitate to some extent the best practices in Hawaii, and he believes that by proper cultivation of soil the yield per acre would be increased. This can be done by getting land in first class tilth, breaking, preparing it, and then maintaining its improved condition.

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## *SLINGS FOR HANDLING CANE.*

Referring to a new device for loading cane onto cars or carts, the Louisiana Planter says: "The enormous quantity of cane now handled in slings, and in car loads weighing from two to three tons, has led to the display of a large amount of inventive faculty in making slings that should thoroughly encompass such large bodies of cane and hold them in position so that they could be lifted from carts into boats and there retain their shape by the thoroughness of the grip of the sling, and be elevated out of the boats at the factory and landed on cars ready for the factory use, or, as was done so largely by

the Poydras Planting Company, the last season, where the canes were loaded into the cars by field derricks and then at the factory were again taken out of the cars by an American Hoist cane carrier derrick, and thus the handling of the cane made extremely easy and reduced to a minimum of expense. There has been considerable difficulty in the past in securing a sling that would grip the cane and maintain this grip through all the various handlings through which the load may pass. To meet this want the American Hoist and Derrick Company at once set about devising a proper gripping device, which at the same time could readily be tripped at any point needed. We learn from planters who have used their device that it has been quite a success. The Poydras Planting Company had 700 of them last year and have now ordered 200 more. Mr. Thomas Foret, of Bayou Lafourche, used 320 and has ordered 300 more this year. Messrs. Nicholls and Henderson tried 70 last year and ordered 70 more this year.

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## *CHEMICAL CONTROL.*

In a letter to the November meeting of the Hawaiian Planters' Association, published in the November number of the Planters' Monthly, Mr. Lowrie voices the opinion that it is very desirable that a common basis of chemical control be adopted throughout the mills of Hawaii. This must meet with the approval of all who are interested in scientific sugar manufacture; as with the variety of systems of control now in use it is often very misleading to compare the figures of one mill with another. For instance, a total loss of one mill may not include the loss of sugar in bagasse, that of another may not include the waste molasses, and still another may be estimated on the weight of raw sugar, instead of on the sucrose contained in the sugar.

Fortunately it is not in the methods of analysis that these differences occur, but in the statement of results. Analytical figures, where obtained with due precaution and with proper understanding of the chemical methods, are perfectly reliable and comparable. But in comparing such figures, and especially when they are obtained by different methods anyone not a chemist will almost surely fall into error. The purity of a final molasses may be given in one case as 40% Clerget, in another as 30% apparent, in another as 32% real, and in still another as 33% by dilution. These purities may all have been

made on the same molasses; the figures are comparable only when it is understood just what the methods are by which they are obtained, and this only a chemist can understand.

There is needed for general comparative purposes a simple system of stating the results of analyses, in which the quantities given will be computed in the same manner in all the mills, and will refer always to the same definite things. The figures given should be those which have a distinct and important bearing on the work of the house and plantation for which they are given, and they should be so named and explained that there can be little possibility of their being misunderstood or misapplied. The per cent of dilution of mill juice, for instance, should be figured on a common basis; as it is now, dilution may be given in per cent, either of the weight of cane, or of the theoretical normal juice extracted, or of the entire diluted juice. The data on extraction should state plainly the amount of fibre in the cane and the per cent of sucrose extracted, for one without the other is misleading.

The adoption of these and similar suggestions would entail no interference with the analytic methods of the chemists of the various mills. In his own work each chemist must necessarily choose his methods with reference to the conditions confronting him. But the use of a simple, uniform method of making general mill reports throughout the islands would render more available the results of chemical control,—a desideratum which none can more heartily wish for than the sugar chemists of Hawaii.

GEO. H. BALDWIN,
Chemist Haiku Sugar Co.

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## *BARBADOES.*

A correspondent of the Queensland Sugar Journal gives the following graphic picture of the British Island of Barbadoes, which is devoted almost exclusively to the production of cane sugar: "In Barbadoes there is a population of 180,000, consisting of planters, laborers, and officials. Let us take the laborers first. They are for the most part of negro or mixed blood. They are very hard working. Watch men in the streets moving casks of sugar; watch them working in the fields under the tropical sun; and you will say that there are none you have ever seen who do such a good day's work, and have the power and the will to do it, except the English navy.

They are temperate; you never see a drunken man. They are frugal, peaceful, quiet, and patient. There is really no fault to be found with the laboring population. What of their employers? Every square inch of the soil is utilized for the cane; farms are models of what they ought to be, and the planters' residences neither slovenly nor ostentatious. Art and science are not neglected in the production of the staple commodity of the island. Yet, in spite of all the pains they take in the cultivation of the land, planters are being ruined. Where they made £100 a few years ago, they make £10 now, and it is well if the balance is not on the wrong side. Here is an industrious population ready and anxious to work for small wages, capital freely and judiciously employed on excellent soil, and yet employers and employed are being ruined together."

Has this condition of the sugar cane industry in Barbadoes been brought about by systematic starvation of the cane lands during a long series of years, by failure to return to the soil what has been taken from it? Has any thorough investigation been made by competent persons to ascertain what elements of the soil are lacking to secure the heavy yields of former years; and, if so, have these elements been returned in the amounts required? A change of seed may not be what is called for, but a change of food. Herein probably lies the secret of cane in Barbadoes refusing to yield the sugar that it formerly did.—Editor P. M.

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## *PROF. STUBBS' DESCRIPTION OF CANE PLANTING IN HAWAII.*

Since the Professor's return to Louisiana he has been called on frequently to give his views of the manner in which cane cultivation is carried on in Hawaii, and he possesses the rare faculty of expressing them so clearly and generally so correctly, accompanied with suggestions which a person occupying his position would naturally be apt to state, that his remarks will be read with as much interest here as there. The following statement was made at the November meeting of the Louisiana Sugar Planters' Association:

The Chairman:—Prof. Stubbs, will you give us some idea of how they prepare lands out in the Hawaiian Islands; for I know you have had occasion to notice some of the methods of preparing land there.

Prof. Stubbs: I am afraid you will draw my thunder, which

I have promised for our January meeting, when the stereopticon views would be given to confirm thoroughly what I am going to say. Now, with respect to the depth at which they plow—when you are discussing Hawaii and the planting of sugar in those islands, you have to take into consideration that there are two distinct classes of planters on the islands; one class on the windward side, where there is an abundance of rain (sometimes too much); the other on the leeward side of the island, where they have no rain and consequently irrigate. The two customs of planting, preparation of soil, etc., are therefore entirely different. On the windward side they plant similar to us in Louisiana; they prepare the lands with plows and they have rows uniformly five feet wide all over the island. I found the rows nowhere wider than this. It seems by universal consent they have come to this width. On the leeward side of the island I had the good fortune to see them plow. They break the land with steam plows—five gang plows. The one I saw was running three feet deep—a tremendous depth. They were plowing and breaking the soil, pulverizing it very finely. I will have to say, however, in order that you may appreciate this fact, that their lands are volcanic, and do not possess that plasticity that ours do. In other words, you can get a very good idea of their soils if you will take our ordinary brick-bats and pulverize them. It is well known that when you take pulverized bricks and analyze them, they have lost their plastic properties; they never run together. Therefore, their soils being volcanic, emitted in the melted condition, disintegrate either naturally, through the ordinary methods of watering or through some agent which I need not stop to explain here, which is emitted along with the rock. These soils disintegrate and form a powder very similar to pulverized brick-bats, and therefore do not run together at all—don't break up into lumps, but pulverize prettily. Having plowed in this way, they lay the rows off along the line of levels. Contrary to public opinion here, or away from the island, the sugar lands in Hawaii are by no means level. They roll very rapidly from the sea coast upward. Now, they lay off rows five feet apart and use a double decked mold board plow, this high to the beam (indicating) drawn by eight mules. They lay the rows off five feet apart, and they go thirty to thirty-two inches deep—they plant cane this depth, using the tops of the cane, which is planted in one continuous row of tops. As soon as they are planted, a little stream of water is

turned on the cane, and right behind come Chinese with hoes who draw a little dirt about two or three inches over the cane, and in six days the cane came up making a good stand. I saw that accomplished while I was there. That is the method of preparing the land. Irrigation is continued, and after each irrigation the hoe follows and draws a little dirt over the cane. Water is one of the great troubles they have over there; hence they have to be very economical in its use. They irrigate with a stream of water, at each irrigation, which you would laugh at here. It is a little trickling stream—a small rivulet trickling down the centre of the rows. The Chinese come immediately behind it and draw the dirt over it in order to conserve the moisture.

Chair: Is that water turned on as soon as the cane is laid?

Prof. Stubbs: As fast as one row is laid, the water runs immediately after it. That is the method of preparation for planting on the leeward side. On the windward side, they do as we do. They put the cane in slight ridges. I may also remark just here that that soil is perfectly porous and that the rains falling upon it from the mountain side penetrate it immediately—it goes right down. You see scarcely any running streams on the island; and a fact which will astonish many of you is that they have a large number of cattle on the tops and slopes of the mountains which have never drank a drop of water in their lives—no water; but they are taught to *eat* water. Because of the heavy rain fall they go immediately after and eat grass with the water on it. I have a letter which I shall publish in my report which I am making to the Department of Agriculture (which will be an elaborate one I expect) from Gov. Dole, in which he states this fact clearly. I am glad he substantiates this as it will carry with it emphasis. Now, on the windward side of the island, rain falls heavily, but it does not act like ours. It penetrates as fast as it falls and goes right into the artesian basin. They have a good many wells underneath the island in what is called the "Artesian Reservoir," from which the planters on the leeward side draw their water supply; hence these planters are interested in the rainfall on the mountain, although they do not directly get the benefit of it. They are now fighting very strenuously to have an expert forester sent out to that country so as to see if the diminution of the forests in the mountains is not causing a diminished rain fall, and, consequently, injuring the sugar industry of the island as well as ordinary life in cities

and towns. They look to this supply of water entirely for their irrigation water; but the planters on the windward side get their water directly from the clouds in the form of rain. They slightly ridge there, but nothing like the ridge we have here—it is a mere ridge hardly more than two, three or four inches high. They cultivate with cultivators after the order perhaps of the most advanced planters of this state. The yields on the rainy side are very small compared with those on the leeward side—a clear demonstration to me when I was there that irrigation with proper soils and plenty of fertilizers in a tropical climate constitute perhaps conditions under which cane can be grown more largely, and bountifully, and cheaply than in any other place in the world.

Now that you have called on me, Mr. President, I don't suppose it will be out of order to read before this association a letter that I received yesterday reciting the expenses of one of the large plantations on the island, and which they promised me when I was over there. I received it yesterday. This will give you an idea of their expenses. This is from the celebrated Ewa plantation, on the Island of Oahu. The "Clearings," which I will have to explain, is the trash from the growth of last year's cane laid on the earth—laid between the rows of cane, where it is allowed to remain until the cane is harvested. As soon as the cane is harvested they send men through the field, who take this trash, pull it out and burn it like we do here. Clearing $5.51 per acre; steam plow and mule plowing $14.50 per acre; for ditching for irrigation, $2.05; for cutting and hauling seed (they plant only tops) $8.22; preparing and planting $9.04; for fertilizers, $41.13 per acre. That is commercial fertilizer. There are three or four large factories in Honolulu that supply the islands, the stock in which is, perhaps, owned by many planters of the island, or, I should more properly say, among all the owners of the stock of the plantations; because I wont say there are any planters on the island in the sense in which we use the term. The stock of all plantations is listed in the Honolulu stock exchange; and there you will find the quotations of all the different stocks and anybody can buy them; they are managed just as stock companies are managed here; the stockholders have their meetings and they appoint agents, who are usually commission merchants in Honolulu, and who attend to the plantations during the year. They employ managers, over-

seers, sugar makers; they buy all the supplies and material needed, and sell all the sugar manufactured.

Dr. Maxwell, who used to be with me, was formerly the director of the Station (Mr. Blouin left here a couple of weeks ago to take his place) was in charge of what is called the sugar experiment station over there. One of his duties was to visit each plantation several times during the year, examine the soils and give his directions and advice; hence Dr. Maxwell has the fertilizer prepared to suit the soil of the different plantations. On the windward side we need a very different fertilizer than on the leeward side. The windward side has been washed continually by heavy rainfall and is therefore comparatively poor. On the leeward side there is less rainfall. There are different fertilizers, therefore, which are prescribed for the different plantations on the island. In this instance the cost was $41 per acre. For watering $37.13. For pumping $35.62, or say a total of $63 for irrigating an acre. I will have to make another explanation here. They contract with a head Chinaman to irrigate one hundred acres of land from the time of planting until harvest, at so much per ton for the cane made thereon. That is what is charged as "watering." Then the plantation runs eight large pumping plants—a picture of one of which I will show you when I use the stereopticon views, which cost $1,750,000, of enormous pumping capacity; and they are run all the time. The cost of running is $35 per acre. The cost of Chinese labor, $37.13—making a total of $63.00 per acre for irrigation. The stripping of cane, $15.25. The place is rented on a lease from a Scotchman named Campbell, and for which they paid $54.63 per acre. I will have to explain that a little; he gets such a per cent of the sugar made; and, as you will see, the percentage of sugar was enormous, and therefore his rent was large. For manufacturing per acre $27.15. For bags, $9.77; or a total of $292.74 expense per acre. Now that sounds large; but you will find in a very short while from the yield that the cost is comparatively small and the profits large. "We planted," he says, "from August 10 to November 27 in 1897. We harvested that crop from February 1 to August 25, 1899." He could not give me the figures this year because they are still grinding.

The yield was 117,835 tons of cane; per acre, it was 79 tons. The purity of juice was 87 per cent. It took 7 71-100 tons of cane to make a ton of sugar. They made 15,289½ tons of sugar; or an average of 10¼ tons per acre of sugar. They sold

the sugar at $84.50 per ton in Honolulu, which it cost them $28 to make—$28.59, it is figured here per ton of sugar, and they sold it for $84.50. These figures will be a little instructive to the planters here. I want to say further that the owners, or rather the general agents, told me that when they began planting ten or fifteen years ago, that the yield was one to two tons to the acre; when they plowed 12 to 15 inches, they gradually got down deeper until they went three feet, expended $40 per acre for fertilizers, and then the plantation paid. Now, Mr. Renton in writing me on October 8th, sending me the figures I have just given, concludes his letter by saying that wages have materially increased on the islands, and that by reason of this increase he believes it would be safe to add 25 per cent to the figures in estimating on cost of taking off present crop.

The two great questions in the Hawaiian Islands are water and labor. They are constantly apprehensive that the water supply will give out. Four large plantations have gone out of existence during this past year on account of the water supply being too salty to irrigate with. Remember that all the plantations are near the ocean; the rims of the islands only are under cultivation; and therefore when the fresh water gives out it is very apt to be followed by a stream of underground water from the ocean; the result is the abandonment of the cane as soon as it does. That is the reason they are extremely anxious to keep up the rainfall in the mountains, which they feel is occasioned almost entirely by the heavy growth of timber on the top of the mountains; hence they are anxious to maintain that, while the cattle growers and the timber men are exceedingly anxious to clear it; hence there is a warfare going on between these different interests, and the United States government has been appealed to to decide this question. I presented the question to President McKinley and Secretary Wilson; and I understand that it has been decided to have Mr. Pinchot go over there to decide that important question for them.—Louisiana Planters' Journal.

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We have been requested to call attention to the advertisement in this issue of the Monthly regarding an infringement of the Mallon-Bodley cane feeder, in which it is stated that cane feeders of that pattern are being used here, the parties using them being liable to damages. See advertisement.

There are two sugar refineries in Japan, one at Osaka, the Japan Sugar Refining Company, with a capital of 1,500,000 yen, and one at Tokio, with a capital of 2,000,000 yen. This latter company, the Nippon Sei Sei To Company, is intending to erect a second refinery at Yokohama. The consumption of sugar in Japan last year was about 290,000 tons, the home production being only about 20,000 tons. According to a consular report, no immediate extension of sugar refining is to be expected in Japan, owing to the scarcity of capital in the country. However, the British Trade Journal of recent date states that a leading Japanese banker and merchant is visiting Europe, partly with the idea of purchasing sugar refining machinery, and it appears to be a good opening for the extension of sugar refining in Japan.

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The report which comes from the Paris Exposition refers to only those Hawaiian sugar plantations known as the Spreckels plantations and the Ewa, and very brief reports are given to each. The French colony of Mauritius sent some very fine sugars, said to be the best received. Regarding the latter, the correspondent of "Sugar Beet" says: "The Island of Mauritius sent the finest sugars in the Exhibition, and they were the admiration of all who claimed any knowledge of the subject. Unfortunately, however, we had not up to the time of this writing, any details relating to the manufacturing methods. We were requested to examine some magnificent sugar canes, which arrived too late for the jury inspection, but are of special interest. The canes were grown from cuttings of varieties known as Big White and Black Tanna, from the Benares plantation, and the other samples were from seed. These canes reach a yield of 40 tons to the arpent and were brought to Mauritius in 1894; it has an average diameter of 45 m.m., and reaches a height of 2 m. 75. Its growth is very luxuriant, having large green leaves and very plentiful roots, which give it a satisfactory hold on the surface of the ground. Canes from seed apparently have a considerable future, and when reaching the perfection looked for, will completely change all existing modes of cane cultivation."

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## *AN AGRICULTURAL UNIVERSITY WANTED.*

A writer in one of our exchanges advocates the establishment of an institution for a post-graduate course for students who have graduated from agricultural colleges—a sort of

agricultural West Point institution, where they can practice what they have learned in theory. He says: "The Department of Agriculture has, beyond all question, the finest staff of specialists in the world. Let these gentlemen prepare a post-graduate course, open to a number of students from the agricultural colleges throughout the country. A few lectures by each specialist would not make serious inroads upon their time, but, in the aggregate, would constitute the finest post-graduate instruction in the world. At the same time the students should be taken on as helpers, and they would emerge thoroughly fitted for practical usefulness. I would have each man devote one year to general work, something that should broaden him out, and then let him select his specialty and put in, say, two years at that. There should be no charge of any kind for tuition.

"The department fully recognizes the value of such special training, and to that end the secretary is now trying the experiment of offering scholarships which permit those graduates who secure them to enter the different bureaus as assistants under the experts in charge. About forty scholarships have been given out, and the scheme is working admirably, although it has not the elements of usefulness that a regularly organized post-graduate Government academy would possess. When the scholarship idea was first suggested, some time ago, it met with considerable opposition from the scientists in the service. They argued that they might be undermined in their positions by the very men they had instructed; but since then it has been so clearly demonstrated that politics has nothing whatever to do with the personnel of the Department of Agriculture that the objection has ceased to be urged. The experiment is, for a number of reasons, very interesting and important. It has fully demonstrated, among other things, that the training received at even the best of our agricultural colleges does not fit a graduate for immediate work in the field. There is a continuous demand for competent instructors on the part of the agricultural colleges, and, if we had a great Government University such as is described, it would furnish a magnificent body of men from which to draw."

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Bananas and Figs.—Attention has been called to the drying of tropical fruits, including those named above. Both the cooking and eating varieties of bananas grow readily here,

and could be made a profitable business for export, by drying them as is done in other countries. No healthier fruits can be found than the two mentioned, nor any better adapted for exportation, as both, when properly cured and packed, will keep in good condition for one or two years. Some forty or more years ago there was a family living in Kona, Hawaii, which dried bananas in the sun and packed them for export or local consumption. The fruit there put up was much relished, and found ready sale in Honolulu. Owing to the duty then imposed on dried fruits in the U. S., the business was finally given up. The Smyrna fig ought to be cultivated here now, as it can be had from California, where it grows and bears as well as it does in Smyrna, where it originated. A very interesting article on the introduction of this variety into California will be found in this issue of the Planter, and we advise all who are interested in fig culture to read it, and learn the peculiarities of this—the finest kind of fig grown. Mr. Koebele brought from California specimens of the fruit now grown there. Nature, in this instance, provides in a most wonderful and intricate method for the perpetuation of the choicest fruit of this description known. Prof. Koebele was wise in not importing woodpecker birds, which Dame Rumor stated he intended doing, but of which he had no thought, as he knew them too well. They are handsome birds, and like most others of their kind, live on insects, some of which they dig out from under the bark of trees—hence their name. In this connection it may be asked, what has become of the mynah birds, which formerly were so numerous here? Can it be true that the rats and mongooses attack them while asleep on the trees, where they are accustomed to roost? The mynahs are harmless, living mostly on ground worms and other insects which infest flower bushes and vegetation. Birds have their uses, but throughout the islands they are becoming more and more rare, excepting doves and pigeons and migratory birds, which seem to hold their own.

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The laboratory of the Sugar Planters' Association has been removed from the Robinson block to the premises of the Experiment Station on Makiki street, near Wilder avenue. Mr. Blouin, successor to Dr. Maxwell, will have an office for the present over the store of F. A. Schaefer & Co. on Merchant street, where he can be found between the hours of 10 and 12 o'clock. It would seem wise to have this arrangement

made permanent, or perhaps for three specified days in each week, for the convenience of planters and others seeking advice pertaining to his line of work.

No housekeeper who opens this number of the Planter should lay it down without reading the article headed "Low Cost Delicacies and Food Specialties." It is not an advertisement, but it will prove an eye-opener to everyone, and show what changes a few years have made in providing food for the millions, and the economy gained by the use of canned meats and fruits, which are now so abundant. As a rule, they are as healthy as any fresh meats and vegetables, when put up by well known establishments.

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## *LOUISIANA SUGAR LANDS.*

There is no better field for immigration than the great state of Louisiana with her splendid transportation facilities. Our alluvial lands are of marvelous fertility—the far-famed valley of the Nile is not more fertile. In the southern half of Louisiana these lands are mainly devoted to the cultivation of sugar cane, and its manufacture into sugar and molasses is the chief agricultural industry. Half a million people are engaged in the production. Nearly a half million acres of land are devoted to such cultivation, producing some 3,000 pounds of sugar and ninety gallons of molasses per acre. Five hundred sugar houses convert it into merchantable products, yielding annually some 316,188 long tons of sugar and 29,335,114 gallons of molasses, valued at something more than $26,000,000. This country imports about 83 per cent. of the sugar it consumes, yet no less an authority than Prof. W. C. Stubbs, director of the Experimental Station at New Orleans and elsewhere, claims that Louisiana has sufficient land suitable to produce all the sugar consumed in the United States.—Roseland Herald.

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Michigan granulated beet sugar is being sold as far east as New York, at a lower figure, freight paid, than is the regular refined. In Michigan, Minnesota and Wisconsin the refiners are compelled to cut prices so as to compete with the sugar product of the former State.

## *AUSTRIA AT THE PARIS EXHIBITION OF 1900.*

The Sugar Beet, Phila.

Our editor was invited to visit a beet sugar factory near Paris in company with several Austrian and Hungarian sugar manufacturers, but was unable to accept. We take pleasure in giving some facts herewith relating to the Austrian exhibits. We have already had occasion to call attention to some important Austrian statistics. Upon general principles it must not be overlooked that beet cultivation plays a very important role in the prosperity of the rural population of the Empire. Many changes have taken place during the past ten years. In 1889 the Austria-Hungarian raw sugar production was about 739,000 tons, while at present it is over 1,000,000 tons, representing 20 per cent. of the world's beet sugar production. Ten years ago there were 214 factories consuming the beets from an area of 683,000 acres under cultivation in these special roots, the average sugar extracted per factory was about 3,500 tons of sugar per campaign. The number of factories last year was the same as in 1889, but there were 770,000 acres devoted to sugar beet cultivation, from the resulting roots were extracted over 1,000,000 tons raw sugar. The average working capacity of the factories has consequently increased 40 per cent. The sugar industry is well looked after by the government, and considerable encouragement is given to increase the exportation, with excellent results. The Central Society of the sugar industry of the Austro-Hungarian monarchy exhibits tables showing their organization. They have several branches, such as the Industrial Sugar Club of Prague and Brun, etc. Each of these branches is in active communication with one another, the principal headquarters being in Vienna. There are several associations also in Bohemia, Moravia, etc.

It is too frequently overlooked that the sugar industry of Austro-Hungary is kept under control of what is known as Cartel, or a simple agreement by which the price on the market is regulated. There appears to be a most friendly understanding between all the sugar manufacturers, which is certainly to their credit and makes outside competition most difficult. Would it were that the same conditions existed in the United States.

The Austrian sugar exhibit surrounds an artistic allegorical group representing the farmer and manufacturer. The tiller

is symbolized by a man holding a basket of beets, while the factory is represented by a mechanic with one hand on a sugar loaf and the other on a machine.

The cases hold sugars, masse cuite and residuums of beet sugar manufacture obtained by different processes, elution, lead, etc. A collection of insect enemies of the beet is very unique and is the most complete found at the exhibition. These insects, as far as we were able to determine, were the same as those sent to the Buda Pest exhibition and previously described in these pages. One case which attracted our attention, but which is unfortunately very poorly shown owing to the electric light not working, represents the beet from its wild to cultivated stage—when it was started the root proper was not larger than one's little finger and ended by becoming after several years' cultivation a root having all the external characteristics of a superior sugar beet. In the Canary Islands there is a wild beet that was also taken as a starting point for the investigations. Beets attacked by various diseases were shown in jars; also on plates, preparations of cultures of micro organisms attacking beets.

The various machines used in the Vienna sugar laboratory attracted our attention, the apparatus for the successive analysis of sugar solutions was new to us. It consists of a series of tubes arranged on supports held by circular disks. The sixteen tubes filled with sugar solutions can successfully be brought into position so as to be examined by the chemist without any change being needed for the eye piece.

All the best known sugars and their derivatives were shown. The names of these are as follows: Formose (obtained by the condensation of formic aldehyde; it melts at 144° C. and decomposes at a temperature of 90° to 110° C.); Arabinose (obtained by synthesis, melts at 160° C.); Acrose (entirely a new preparation; it is said to be a derivative of phenol); Raffinose (found in beet molasses and sometimes in cane molasses; Levulose (another name for fruit sugar); Levulic Acid Maltose (obtained from starch by the action of malt diastase; it loses its water at 100° to 105° C. in vacuo; at 100° to 110° C. in the air without change of color); Galatose (obtained synthetically, melts at 140° to 142° C. when acids act on lactose or with sugar there is found galatose); Saccharose (found in juices of plants such as sugar cane, beet sugar, etc.): Dextrose (is found in many kinds of fruits, is also obtained by boiling starch or dextrin with dilute acids): Lactose (found

only in milk); Invert Sugar (obtained by mixing glucose and fructose); Aldehyde Glycolic and Aldehyde Glyceric: Arabic and Formic Acids, etc. Our readers all know that when sugar is submitted to the action of heat beyond a certain temperature it changes its aspect and condition. Just what the influence is was shown in small jars. At 100° C. the sugar was a fine white color; at 130° C. it becomes a dark yellow; then with an increased temperature the color changes from yellow to brown, and when submitted to a heat of 210° C. it is simply a black carbon or coke.

The collection of models from the special Prague sugar museums is certainly unique in the world. We noticed the Curin Barasmoscope, used for properly working a vacuum pan and previously described in these pages. The Netopil apparatus for estimating the carbonic acid gas in the gases from lime kilns has been in use since 1885, and still holds its own for this special purpose. Apparatus for the verification of polariscope tubes of Wiler was introduced in 1873, but other methods have taken its place. The Poupe sugar extractor for laboratory purposes does not offer any special advantage over other modes. Besides samples of sugar of various qualities and the products obtained during the various stages of manufacture by Sebor, etc., process, we noticed in this Austrian exhibit the wastes of sugar manufacture by various methods, when working with stronthia for the extraction of sugar from molasses. There remains very white scums, carbonate of stronthia, several salts and a final incandescent mass. On the other hand, by the Steffen mode there is a final residuum, a saccharate of lime before and after working. The Sixta and Hubec process for the ultilization of ammoniacal waters gives certain products that have very characteristic colors. As dried cossettes for cattle feeding have become very much in vogue of late years, the dried product obtained by the Buttner-Neyer, Petry-Hecking, Klepzig, and Mackensen methods offered very different characteristic appearances. The combination of the waste cossettes from diffusion with blood, palm oil, molasses and coco, corn sprouts and peat, gives products said to have considerable nutritive value, but not very attractive in appearance. We hope upon some other occasion to give certain details respecting the exhibit of the Prague Museum. At present, however, in a general way we mention the Weisner beet washer, the Robert beet slicer and diffusor. The Turinsky calorizator. A model of Erey-Jelinek apparatus for defecation,

the first wooden filter press of Danek. Milk of lime mixing apparatus, the Hubner centrifugal for the manufacture of sugar in lumps, the Herold-Lexa horizontal vacuum pan, the Karlik-Ehrmann vacuum pan with movable heating surface.

A complete collection of slicing knives used in Austria since Roberts' first invention is within itself unique and most valuable from a historical standpoint. They impress one upon examination with one very important fact, which is the efforts of the Austrian manufacturers to settle this very important question of beet slicing under most desirable circumstances, so as to obtain slices that will give up the greatest amount of sugar when worked in battery. Has this question been solved? We noticed that several beet seed specialists of Bohemia exhibited their seed. Upon a future occasion we hope to discuss their products and methods.

The collective exhibits of the Hungarian Sugar Manufacturers' Syndicate is most important, as each factory is of considerable size. In 1889-90 there were only 13 factories, and they sliced 612,000 tons of beets. Nine years later there were 21 factories slicing beets from 182,500 acres, or 1,460,000 tons of beets, or a yield of only 8 tons to the acre. In a previous writing it was explained why the Hungarian sugar beet yield is so small. The total sugar extraction two years ago was 201,332 tons of sugar, corresponding to about 13 lbs. sugar per 100 lbs. of beets worked. During 1898-99 the average factory handled about 76,000 tons of beets during the campaign.

In the German section some interesting examples are given of the methods of beet selection with the view to seed production. Dieckmann, of Heimburg, near Hartz (province of Saxony), exhibited models and plans showing the chema of their method, which they declare is based upon the true method, depending upon the real hereditary principles rather than upon the conventional form of the root, its weight, its sugar percentage and the external appearance of the leaves. It is maintained that these elements of appreciation are misleading, for they may have been due to special circumstances, and one cannot assert that they will be transmitted during generations to come. Beets after examination and analysis that are shown to be superior for the purpose in view are replanted for seed and the resulting seeds are intended for a subsequent selection. The seed from each of these beets is separately harvested and separately planted in special patches, with the idea of ascertaining whether their descendants give the same special

characteristic qualities as did the mothers from which they were obtained. If such prove not to be the case they are thrown out, not only that special beet, but all the series to which it belongs. The plan upon general principles is for the first year selection for mothers; second year, replanting the beets and harvesting the seed; third year, resowing of the seed in special patches; fourth year, replanting the beets from the same original mother. If all the series prove up to the standard the seeds are harvested, keeping each descendant entirely separate. Fifth year, again sowing the seed to make sure that the hereditary principles of the seed are of the fourth year. The remaining seed are sown in clusters and undergo a system of replanting from which is obtained the seed sold to the trade. One of the diagrams showed the beets growing in the field the third year. The seeds to be tested are sown in rows, and include only those seeds obtained from one original beet. Alongside of each of these rows is another row of a commercial seed, which is intended as a standard of comparison; this will be the same for all the alternate rows.

When harvesting period arrives, to prevent confusion all the beets, the outcome of same mother, are placed in one pile, and the roots from the standard seed are kept separate. Under these circumstances it is possible to compare the beets of each row, their weight, their shape, their sugar percentage. The Dippe brothers exhibit also attracted our attention. This establishment has been cultivating beet seed since 1860. In 1872 they adopted the specific weight method of selection. In 1878 the polariscope was introduced into their laboratory; 1883 the Scheibler system of extraction was adopted, and in 1889 the cold water method was standard, the details of which have been frequently described in these pages. The beets in 1879 tested from 6 to 12 per cent. sugar. This percentage has constantly increased from that day to this, and it is claimed that the average test during 1899 varied from 17.5 to 20.5. In the collective German exhibit under consideration mention should be made of a new beet sampler working under special conditions. It is the invention of Wahrendorf. It offers several special characteristics. The beet is held in position between two claws or semi-circular rings upon a moving platform. The arrangement is such as to present the beet at a constant angle of 45°. The moving carriage advances automatically by a well arranged gearing in an endless screw, turning the same time as the perforating sampler, but at a very

much reduced speed. By pressing a special lever the motion is given, the resulting pulp is very regular and falls into a special receptacle.

The Russian sugar industry at the Exhibition was represented by several exhibitors, who had taken great pains to present their products under the most favorable conditions regardless of cost—the Russian sugar differing very much in aspect to sugar from other countries, owing to its characteristic blue appearance. The demand of the country appears to call for this, so we willingly accept the tastes of environment. In Russia there are 250 sugar factories, of which 18 are refineries. These have worked 5,476,800 tons of beets, yielding 728,910 tons of refined sugar. The sugar industry gives employment to 89,180 persons. * * *

There is made in some of the factories a special sugar from molasses that the Russian population are allowed to use during Lent as a substitute for refined sugar. The main essential of a Russian sugar is its hardness, hence the difficulty of comparing it with products of other countries where the local demands are entirely different. As a member of the International Jury, exceptional advantages were offered for the study of the sugar question at the exhibition. During the past few years great changes have occurred in the entire sugar question, the machinery has undergone many improvements and the main issue at stake continues to be to produce a product as white as possible. While the syndicate of French sugar manufacturers did not exhibit, the several exhibitors and refiners showed that their sugars had but few if any rivals in the world. The tendency at present is to produce first grade white sugar in the factory proper and to do away with the refinery operations entirely. While this point has not been reached, the high grade white sugars now made in the factories give the refiners, with their enormous capital invested, much to think about as far as their future is concerned. Some of these refiners are owners of beet sugar factories and find themselves under special favorable conditions. We remember some fifteen years since that there existed in Europe a craze for the manufacture of raw sugar with its repulsive odor, then a reaction to eliminate the still adhering molasses, which was followed by the production of white crystallized sugar, which during the past four years has been constantly gaining ground. It must be said, however, that the main progress has been due to the working up of the after products of sugar

manufacture and their return to either the carbonatation tanks or the vacuum pan with the view of obtaining only one grade of sugar. Even these methods during the past few years have undergone many changes, and the true solution of the problem has not yet been reached.

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## *THE COLONIAL SUGAR REFINING COMPANY OF NEW SOUTH WALES.*

The Colonial Sugar Refining Company, which is now the largest industrial organization in the Australian colonies, is the outcome of a small company formed to carry on sugar refining at Canterbury, a suburb of Sydney, and which in 1842 came under the control of Mr. Edward Knox, the present chairman of the company. The business was then an extremely small one, and in 1854, when it was found necessary to transfer it to a more convenient site, the present company was formed. For a few years the operations proved very profitable, but the crisis in 1857 caused large losses to the company, and some years elapsed before it could recover its position. At the end of the sixties the board decided to assist the movement that had then been started to produce sugar from cane grown in New South Wales, and in 1870 three mills were erected and started—two on the Clarence, and one on the Macleay river; the latter, however, had soon to be removed, on account of the Macleay district being too far south for the profitable cultivation of sugar cane, and the plant was re-erected on the Clarence, other mills being a few years later placed on the Richmond and Tweed rivers.

The production of sugar was at that time a paying trade, as the price realized was about double to triple that now ruling, and the company was induced to extend its operations to Fiji, and afterwards to Queensland, in conjunction with the Victoria Sugar Company of Melbourne, and to a second district in Fiji with the New Zealand Sugar Company, of Auckland, both these companies being in a measure offshoots of the C. S. R. Company. The crisis of 1884, however, showed the necessity for amalgamating the three businesses in order to reduce the expenses and prevent any clashing of interests, and in the year 1887 this was brought about, the name of the present company being retained and its liability limited. The paid-up capital at the time was £650,000, but the proprietors, thinking it desirable that the business should be carried on as far as possible

with shareholders' capital rather than with borrowed money, have since increased this paid-up capital to £1,786,880. The business then comprised refineries in Sydney, Melbourne, and Auckland, two mills in Fiji, three in Queensland, and three in New South Wales; but refineries in Adelaide and Brisbane, three more mills in Queensland, and a third one in Fiji have since been added, the capacity of the refineries being now equal to a melting of 3,500 tons of sugar per week when occasion requires, while the mills are equal to the production of from 100,000 to 110,000 tons of refining sugar during the season. Except in Fiji, where the company cultivates large areas of cane on its own plantations, the mills are supplied by the purchase of crops from farmers in the neighborhood, and the sugars needed for the refineries, in addition to those produced at the company's mills, are chiefly obtained from planters in Queensland and Fiji, who think it to their interests to make gray refining sugars instead of whites or yellows to be sold in the open market.

As giving some idea of the extensive character of the business done by the company, it may be mentioned that the transportation plant includes about 150 miles of permanent railway line, about 100 miles of portable tramway, twenty-seven locomotives, and 5,000 cane-trucks; while in addition there are some 250 cane punts and lighters, and thirty-five tugs and launches. Altogether considerably over two and a half millions of money have been invested in the company's fixed assets. It is worthy of note that the two societies formed amongst the company's employees for the purpose of providing mutual assistance in cases of sickness, life insurance, and pensions to men incapacitated for work are subsidised by the company to the extent of about £5,000 a year. The assets of the Provident Fund amount to over £75,000, half of which is invested in the company's shares, and the yearly income of this fund in the shape of members' subscriptions, subsidy by the company, and interest and dividends on its investments amounts to between £11,000 and £12,000. The sugar refined yearly in the five refineries amounts to about two-thirds of the entire quantity of sugar consumed in the Australasian colonies.

The Colonial Sugar Company's branch refinery at New Farm is one of the leading industrial features of Brisbane, and situated as it is on the bank of the Brisbane river, the building, with its imposing smoke stack, cannot fail to catch the eye of visitors as they approach the city from the seaboard. The

head office of the company is situated in Sydney, with branch offices in Melbourne, Adelaide, Auckland, Brisbane and Fremantle, and agencies in London, Hobart and Launceston. The directors are Sir Edward Knox (chairman), and Messrs. F. C. Griffiths, W. C. Watt, H. E. Kater, M. L. C., and Dr. H. N. MacLennan, M. L. C. Mr. E. W. Knox is general manager of all the company's business. Before concluding, it may be mentioned that in the report and balance-sheet before us at the time of writing and for the half-year ending March 31st, 1900, the net profits are given at £89,408 6s 11d, to which sum has been added the balance at profit and loss account on September 30th, 1899, of £91,442 15s 7d, leaving available the total sum of £180,851 2s 6d. From this amount the board declared a dividend at the rate of 10 per cent per annum, which absorbed the sum of £89,254 14s 3d, leaving a balance of £91,596 8s 3d to be carried forward.—Queenslander.

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NEW YORK "SUN."—And what is this Bay State blather about the ideals of a century and sordid commercialism? Why has the Nation expanded for nearly a hundred years? Has it not been that there might be room enough for its future growth, land for its farmers, unimpeded rivers and harbors for its trade, better means of livelihood for all, opportunity and space for coming generations? The hunters and the trappers and the pioneers, the eldest-born children of expansion, the men whose bones are the milestones on the Sacred Way of American progress, were the original American sordid commercialists.

HON. ELLIS H. ROBERTS, UNITED STATES TREASURER.—In spite of the vast outflows, the gross gold in the Treasury is the largest it ever held—$437,221,191—and it is growing. Except the abnormal hoard of $450,000,000 of the Bank of France, likely to be soon reduced, there is nowhere else in the world so much of the yellow metal under single control. If this flow of gold shall satisfy the appeal for more money, how healthy our currency will be! The wealth of our people by the new census will not fall below $90,000,000,000, and their annual net production is at least $2,250,000,000. This wealth and this growth are beyond parallel in human annals. They explain why the world comes to us to borrow. But those who borrow from us must pay with interest. It is just as healthy for us to export gold as it is to export coal or iron or cotton or grain or pork or beef, except as more labor enters into those articles.

## *OLAA SUGAR PLANTATION.*

About one year's work on Olaa Plantation has worked a vast transformation on the big estate near Hilo, where one of the largest sugar plantations ever known is being cleared and planted. Already 4,000 acres are planted for the first crop, which will be the largest first crop on record in the island. There are about 21,000 acres in all, of which about 3,000 acres in addition to the 4,000 are cleared and ready for the second crop, which will also be 4,000 acres.

Manager McStocker has built a fine residence on the plantation, at the lower end. It is surrounded by the 4,000 acres of cane which has grown very rapidly and promises to be a splendid product.

Olaa now has a saw mill with which the cutting of lumber is being done, and such an abundant supply of water that there will be a lot to sell to others who may need it. The saw mill is a long way mauka. It is making railroad ties for the extension of the Hilo Railway Company's tracks and will be used to cut lumber for buildings on the plantation. There is a great quantity of lumber at the mauka end of the plantation.

Olaa's waterheads have a flow of 24,000,000 gallons an hour. Their discovery was an interesting exploration of the geological formation of the land above Hilo. It was only after a long and difficult search among the dense forests that the source of some small springs was found. Then by digging through the soil and lava Mr. McStocker arrived at the underground stream beneath. At three different places streams were found, about 20 miles from Hilo. Flumes are to be built to carry the water makai. As little or no irrigation is needed at Olaa, at least half of the supply can be sold.

The Hilo railway has begun work upon an extension of its line from Olaa station, nine miles from Hilo, through the plantation several miles mauka. The railway camp has been started, and McStocker's saw mill in the mountains is making ties.

Another great improvement that is now well under way at Olaa is the building of the mill, the foundation for which is now complete, near the railway station. The mill will have a capacity of 1200 tons of cane a day, or 150 to 175 tons of sugar every 24 hours. A large part of the machinery is now on the ground and all the rest is en route.

Olaa plantation is one of the biggest enterprises of the kind ever set on foot in the islands, and in the rapidity of going ahead and amount of work done the first year of its existence

as a plantation it is said to have no equal. First class roads have been constructed all over, in addition to the clearing of 7,000 acres, 4,000 of which have been planted, the erection of buildings and construction of the mill foundation and development of waterheads. In the end Olaa will be turning out 10,000 acre crops. It is on the stage road between Hilo and the Volcano, and attracts the attention of all tourists who visit the Volcano.—Cor. Star.

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## *A BARBADIAN PLANTER'S VIEWS ON DR. MAXWELL'S WORK IN HAWAII.*

DEAR MR. EDITOR:—When one reads of the hearty welcome accorded to Dr. Maxwell on his recent appointment as Director of the Experimental Stations of Queensland, and of the hopes entertained of the benefits to accrue to the sugar industry there from his appointment, the thought arises how much need there is here for some such awakening influence to give an impetus and act as a new directing force to the out-of-date and stationary methods of our agriculture and manufacture. Such an energizing force can proceed only from one who is an expert and an enthusiast in his work. Any one who has read the several annual reports by Dr. Maxwell from the Experiment Station in Hawaii cannot fail to be struck with the earnestness as well as the knowledge displayed by him in the execution of his work. His supervision extended over several Islands of various soils, as well as climatic and other peculiarities, yet the work done at the Station, the conclusions arrived at, and the advice given in the reports were applicable, more or less, to each and all of the Islands. In fact the reports are to a great extent applicable to all sugar cane agriculture. The various reports on soils, cultivation, fertilization, manufacture and kindred subjects drawn up by him for 1895 contain much valuable information, the evident result of careful and capable research, of great practical value to all agriculturists. In reviewing these, the Hawaiian Planters' Journal for November, 1896, in its editorial, remarks: "The establishment of a first class Laboratory and Experiment Station under the direction of Dr. Maxwell, aided by an efficient staff of assistants, has been an important factor in developing the sugar interests of Hawaii, which will no doubt increase with each succeeding year, as the requirements of the soil are more accurately ascertained, and the faithful co-operation of planters is secured in adopting the new methods and the instruction given to them.

The extraordinary increase in the sugar output of Hawaii for 1896 affords an object lesson illustrating the value of intelligent scientific supervision in every stage of the work, from the turning up and preparation of the soil to the marketing of the golden product, that should convince every one who may have doubts on this subject." In the report for 1896 of the Hawaiian Sugar Planters Association occurs the following: "Since our last session much good and valuable work has been done by what I may style the scientific department of our association, and many planters are indebted for a measure of their present success to the careful and painstaking advice which they have received from this department. Such prejudice as many have at any time existed against scientific methods has happily almost disappeared from among us, and there are but few now whose belief in scientific agriculture and manufacture is not as great as should be expected at this advanced era; and even this small minority will doubtless soon arrive at a full recognition of the assured fact that only with the assistance of science can the cultivation of canes and the manufacture of sugar progress as it should, if we are to keep pace with the rest of the sugar producing world and occupy a position abreast of the times." There is thus evidently good reason to accrue from having Dr. Maxwell as their agricultural director and adviser.

From these reflections one is led to consider what is being done in this respect in Barbadoes. I think I am correct in saying that Dodds Experiment Station was the first such station started in the British Empire. Barbadians have cause to be very grateful to Professor Harrison and Mr. Bovell for the work begun and carried on there in relation to sugar cane. Their work has been highly appreciated and commended by those in charge of similar stations elsewhere.

The Legislature of Barbadoes has for eight years annually voted between £1,500 and £1,600 under the head of "Chemistry and Agricultural Science." Of this amount £200 was devoted to salaries at Dodds, and the balance was spent by the Education Board, about £900 being paid in salaries. For this expenditure we have little or nothing to show beyond a well equipped laboratory and the experimental work carried on at Dodds, which I am sorry to say, seems, for various reasons, to have fallen considerably into disrepute. Much might be said on the possibilities which lay in the judicious expenditure of such an annual grant under capable and appropriate direc-

tion. It does seem strange that, after the experimental work at Dodds had proved so useful and justified its continuance, no new department was created to expend the greater part of this annual grant, which under such new direction might have been increased with advantage to the Colony. Agriculturists in Barbadoes have benefitted more by the work done at Stations in Java, Hawaii, Louisiana, than through the annual expenditure of our money for the last few years by the Education Board.

For the last 2 years the Imperial Department of Agriculture for the West Indies has been at work under the able guidance of Dr. Morris. One feels very diffident in appearing to criticise the methods and plans adopted by such an authority as Dr. Morris, but the history of the work done in one of the Hawaiian Islands proves that, it has been possible at a central station to work out experiments and elucidate and demonstrate facts which have been of interest and value for all the surrounding Islands of the group. Similarly, at a central station in Barbadoes under a capable and progressive director, the experimental work carried on would be applicable, with slight variations, to all the Islands of the Windward and Leeward groups. At such a station, with an efficient staff of assistants, research, investigation and experiment are concentrated and controlled by one directing mind, and the results are necessarily more accurate and reliable than in the case of 10 or 12 small district stations from each of which facts must be collected for comparison, though it might often happen that the conditions and surrounding influences interfere with the uniformity of method and environment absolutely necessary in experimental work. District stations, as control plots, to verify and explain the work done at the larger stations are extremely useful. A central station affords the opportunity of trying various agricultural implements and methods of tillage. Dr. Stubbs writing on experimental work in this respect concludes his remarks thus: "I further believe that if every planter should adopt this method of cultivation, to be used after a thorough preparation of his soil, that the yield of cane in the state would be increased from 5 to 10 tons per acre." A central station furnishes the authority, both scientific and practical, to be consulted by agriculturists, and also acts as an impetus to progress and development.

To furnish and equip an experimental station would require a somewhat larger expenditure of money. The Imperial De-

partment is generously spending money on agriculture in the West Indies from the Imperial grant. Might it not be possible for the Barbadoes Government to approach Dr. Morris and offer to furnish a substantial sum of money to be spent in addition to the funds from the Imperial Grant for the purpose of establishing here a central experimental station for the West Indies? The other Islands might be asked to contribute an annual sum—say £200 or £300 each—for which some special privilege should be granted such as the permission to send one or more students to work at the station. These would return, and influence for good the practice of agriculture in their respective islands. I would suggest that a tax of 10 cents or 15 cents per ton of sugar might be levied for this specific purpose. In Hawaii the planters assessed themselves at 15 cents per ton to provide the funds necessary for the annual expenditure, and they are satisfied with the result.

I believe that this matter requires only careful consideration on the part of agriculturists and legislators for the ways and means to be easily devised to provide, at a reasonable cost, a central experimental station for the West Indies at Barbadoes. The money now spent from the Imperial funds would be concentrated, and thus probably more economically expended; while the effect produced would be more permanent and beneficial. At the end of ten years, when the Imperial Department has perhaps withdrawn its valuable assistance, the West Indies would have their experimental station which should be doing a work and exerting an influence similar to that attributed by the Hawaiian Planters' Association, as above quoted, to the able work done in Hawaii by Dr. Maxwell.

Would it not be well for the Agricultural Society to ask the Government to try to carry out such a scheme? The Agricultural Society of Jamaica has lately approached its Government with a similar request.

I am Sir, yours truly,

A BARBADIAN PLANTER.

—Corr. Planters' Journal.

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## *LOW-COST DELICACIES AND FOOD SPECIALTIES.*

Every year the factory plays a more important part in the evolution of the food supply. The old-time prejudice against food prepared outside the home is a matter of past history; while today the people are urgent in their demand for prepared

foods, put up in convenient small packages, to be sold at low cost.

The growth in the demand for foods that can be sold at retail for 10 cents is phenomenal. That seems to be the popular price, and, therefore, any meritorious article of food sold at that price finds a quick market.

The introduction of the half-pound tins of salmon; the tins of concentrated soup in more than twenty varieties; condensed pie timber in small packages; potted and deviled meats; sliced bacon in tin cans and glass jars, and a wonderful variety of table specialties have been hailed with delight at home and abroad.

All of these preparations are comparatively new, and many of recent introduction, while new ones are coming on the market every week. One great firm in Chicago now puts up seventy-three specialties, and is adding one new one to their list every week. Among these we find stewed kidneys, Irish stew, beef and vegetables, beefsteak and onions, turkey and tongues, cottage head cheese, jellied hocks, sauerkraut and sausage, Hamburger steak with onions, chopped dried beef, luncheon loaf, veal loaf, ham loaf, cottage loaf, Vienna sausage, frankfurters, pigs' feet, and many other delicacies and popular home-made dishes.

Many of these articles are made from formulas that have been in use for over a century, and which have been the pride of the far-famed housekeepers of early Colonial days, while others are in use by matrons of this and many foreign lands.

The reason for the popularity of these preparations is due to superiority and low cost, for the factory has demonstrated that it can and does produce better prepared foods than can be made in the average private kitchen—and for the simple reason that its operations are scientifically conducted; its materials not only of the best, but handled and manipulated by skilful operators of large experience, whereby uniform results and perfect foods are secured. The application of steam and machinery secures cleanliness about the factory, and in the handling of raw material. For instance, cold polished steel knives, revolving in a metal bowl at tremendous speed, by steam or electric power, is immeasurably preferable to an untidy servant mincing meat in a bowl with a chopping-knife.

Every manufacturer also knows that the reputation and permanency of brands depends upon the reliability, uniformity, and high quality of his products. To deviate from a high

standard invites loss of trade, and hence self-interest compels the maker of food specialties to use extra care in the conduct of his establishment.

We confess to surprise at the superior quality of many of the 10-cent specialties. Take, for instance, the popular cottage loaf; in the preparation of which selected meats are used in connection with the finest Elgin creamery butter; the freshest of eggs and finest of spices. So careful are the makers that they insist on every egg being broken separately, in order to guard against the slightest chance of using an imperfect article.

Besides high quality of the products, every attention is given to style as it relates to the package. The shape of the tin and the character of the label are carefully considered, so that the various articles are available for shelf or window display, besides being so attractive to the consumer as to awaken desire for possession. Some manufacturers go so far in this direction as to put up tins of meat delicacies in handsome paper cartons. Almost everybody is familiar with certain food labels, as for instance, "Star" salmon; the showy cardinal, white and gold, and blue white labels that make well-known brands of soups a marked feature in the stock of purveyors, and which fact demonstrates that the people are quick to learn to identify products by the label or package. Manufacturers appreciating this, take the greatest pains to win popular admiration for their products, on account of fine appearance of the package. And lastly and most important is the cost—so low that it seems impossible that so much food, and of such superior quality, should be sold at retail at 10 cents, thus placing within reach of the poorest of wage-earners delicacies that 200 years ago were found only on the tables of royalty, and within thirty years were only within reach of people of large incomes. These goods are manufactured and sold to the jobbers in many instances as low as 80 to 90 cents per dozen; to the retailer at $1.00, and to the consumer at 10 cents per tin, thus affording the jobbers a profit of from 11 to 25 cents, and the retailer 20 per cent. As these goods are quick sellers and articles in daily use, they are far better money-makers than articles less freely used and which afford a much larger profit. It is an illustration over again of the nimble sixpence of quick sales, beating the record of the profit-making tortoise of slow sellers.

The foregoing facts form a very small chapter in the evolu-

tion of the food supply, yet, nevertheless, one pregnant of suggestions as to the future. They certify to the skill, pertinacity, ingenuity, and progressiveness of the American packer, who has made a market for his food product all over the globe. The empty tin that covered Hamburger steak and onions or Irish stew is more likely to be found in the jungles of Africa or the plains of the West than on the farms of America; while no small part of the rubbish gathered in the more densely populated districts of every large city is discarded food packages.

American packers are true missionaries, engaged in carrying to the labor of all the earth the most nutritive of food products at a cost far less than is possible of attainment when similar articles are prepared at home. And every jobber and retailer helping in their distribution is a co-worker with the manufacturer for the benefit of the race, and thus fulfilling his mission without self-condemnation.—Am. Grocer.

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## *SUGAR PLANTING IN QUEENSLAND.*

[The following letter is copied from the Demerara Argosy, and it gives so minute a description of the way that plantation work is carried on in Queensland, that every reader of the Planters' Monthly will be interested and amused with the primative methods on which it is there conducted. Dr. Maxwell has evidently no easy task before him. Editor P. M.]

We are indebted to a correspondent, formerly engaged in planting in this colony, for the following notes on sugar production in Queensland, where he now resides. Our correspondent confirms the views expressed by Dr. Maxwell that the Queensland methods of cultivation are very far behind, and that it is necessary for large improvements to be effected if the sugar industry there is to be maintained. Demerara men who go to Queensland generally do well, and they will no doubt do better now that an effort is being made to introduce improvements, whereas formerly all attempts at departure from the inefficient methods of cultivation were persistently discouraged.—Editor Dem. Argosy.

The cultivation, if it can be called such by any courtesy whatever, is entirely different to any sugar country I have seen. Plowing, harrowing, scarifying, a very little weeding by hoes, and less trashing, are about all that is done here. The

planters say leaving the trash on helps as a protection against frost. Of drains inside canefields, as understood in Demerara, there are none, and really none are needed. The lands in the district where I am residing are quite flat. The soil is loose and porous compared with that of British Guiana, and it is therefore much easier worked. The land being deficient in the qualities of stiff soils, manure should be applied early, but the reverse is the case, manure being used infrequently, and then applied broad-cast instead of to the cane stools.

Seven years ago, when acre after acre was being put under cane cultivation, a yield of 100 tons of cane per acre was the talk; now 20 to 30 tons are considered good. The Col. S. R. Company, Ltd., is the only company where really scientific methods are the rule; really valuable information, generally tabulated, is made available by them to the general sugar community, and instead of being execrated as a giant monopoly, the company should be regarded as real benefactors to the country. There is much need for a departure from the present system of cultivation.

On the other hand, you in Demerara have no buildings or machinery to surpass those here. The most up-to-date machinery is to be found in most of the "mills," as they are called; but in no instance is the waste worked up into rum at the mills. The distilleries are separate concerns and buy the molasses from the estates.

The laborers employed on the estates are South Sea Islanders, who are engaged for three years with return passages at the end of the time. Their salaries are £6, £8 and £10 for the three years. As contract laborers, they are paid half-yearly and for whole time, whether sick or not, whether fair or wet weather, but they are not required to work in rainy weather. After the expiration of their contract, the laborers may remain as overtime boys at advanced wages, but their pay is stopped each day they are sick or idle, exclusive of wet days. Both contract and time-expired boys get food and medical attendance free. The Labor Party are dead against the introduction of these Polynesian laborers, because the white are prejudiced thereby. The Party claim that the white man should do all the work at whatever price the white man chooses and when he chooses. Sad to say, nine out of every ten of the walk-about white men are inferior in industry to the South Sea boys, for if they were paid as the boys are paid, not a day in the three years but they would be sick or idle in

some way. These white men greatly resemble the blacks in your country; if they think they have you in a corner, they at once demand more money. The South Sea or Kanaka laborers are generally reliable and industrious men. If the Labor Party were to succeed in prohibiting the introduction of the Polynesians, the sugar industry here would be ruined. The Labor Party howl that the Kanaka is cheap and dirty, but that is not true to any extent. If Kanaka labor is abolished, no sugar estate can exist, unless coolies, Japanese, or some other kindred kinds are brought in, for history repeats itself. After the blacks were freed with you, they would not work except at five shillings a day; so would the whites do here, resulting in the collapse and ruin of many, while none would be benefited.

"Over-time boys" often get fifteen shillings a week lately, but the general run of wages is ten and twelve shillings. The "boys" know their value now, and a tried and seasoned "boy" is valuable to any owner. The "boys" are under what here are called overseers, but up North "ganger" is the name, and the proper one too, for the so-called managers are only overseers as we understand the name, although their dignity would be much hurt if so called. The "ganger" has 30 to 40 "boys," and goes out with them walking every morning at half-past six, gets breakfast and dinner sent to the fields, if he is a married man having his own cottage; if not, he has to get his breakfast before going to "make line," as the inspection of "boys" before work is called. The "boys" also have their breakfast before going out or carry it in their hands. Dinner has to go to the field to all, except the work is near at home, and it is eaten anywhere at the work. "Knock-off" time is to be at the mill, where houses mostly are, when the bell rings at 6 p. m. All day the "ganger" goes about among the "boys," or stands where he can see some occasionally. The "boys" are simply driven to do as much as can be got out of them in these hours, as there are no tasks, and nigger-driver" is an apter term here than it ever was with us in the old days.

The "managers," or overseers, as with you, are the only persons who ride, and one or two of these do all the overlooking, and to a great extent a lot of manual work, such as getting plow ready for fields, shoving trucks, clearing drains, etc., all of which would be far better done by the men paid for such work, as the "amateurs" only keep work back and necessarily make it more expensive.

All men, black and white, are "rationed," that is everyone

gets, beef, bread, etc., and cooks are supplied by estates for everyone, except married men who have houses. They get their supplies from butcher, baker and stores to do with what they like; and, of course, can eat at any time suitable out of working hours. The single laborers get breakfast at half-past 6 a. m., dinner at 12 noon, and supper at 6 to half-past 6 p. m., and they can supplement their meals with anything they choose to buy and can get cooked. Beef is at every meal in one way or other. Very few estates provide jam, vinegar, etc., and none but one or two do more than the bare bread, meat and tea with pepper and salt. Vegetables are unknown on some estates; potatoes given on none, except at a few upper messes. On some estates the castes are as many as among Brahmins, and you have no idea how many poor relations and would-be aristocrats are working for their few pounds on some properties, each one superior to the other in some small way. You will find cheek by jowl in office, mill and field, men who are divided when meal time comes, and some who are doing quite equal work with others, are not good enough to have even tea with the elite. The jealousy this causes sometimes cannot be believed, and one used to your plantations finds it hard to believe in such treatment, especially when work should be the only guidance to fair treatment in messes.

The house accommodation is in every respect very inferior, except for the heads of a few places. Cottages costing about £80 are considered good enough for mill overseers and those in office. The latter work in buildings much superior to those they have to live, eat and sleep in. The cottages are simply weather board buildings of pine or hardwood, of 3 or 4 rooms, unlined for the promotion of health, so that the rains of all seasons, and the bitter winds of winter, can get freely into even the bedroom. Ceilings are put in a few, under galvanized roof, but in very few. The barracks for the men are in some places simply abominations.

Perhaps to enter into the ways of so-called cultivation here, a little more may not be tedious to your readers. Instead of, as with you, one laborer to every one and a half or two acres, one boy is supposed to be enough for ten acres, with the help of an occasional plowman; and cutting firewood is supposed to be included in that. Thus for two or three months every year large gangs of laborers will be doing nothing but cutting firewood for furnaces for crop. The work done on cane fields by boys is very small, and if your estates and those in the West India Islands could do as little, and get as much from lands,

there never would have been any cry against bounties, nor any estates abandoned. The planting is all done with solid cane, as much of the tops as can be left on are sent to mill for crushing, and the sugar boilers bless that way, you may be sure. Dr. Maxwell condemns any but the tops, as with you, as unfit for planting; but here they have got into such a wholesale way of doing things I fear his words will have little or no effect. The only labor done properly is the steam plowing, and that seems to be very costly; for one month's work the engines require three months for repair or lying idle. The principle of work here—the men in charge too often being totally inexperienced men—is "do little, expect much." The land is plowed and harrowed; then the "boys" are put on with hoes; cane holes are dug for the plants, which are simply pieces of hard canes laid in bottom of holes flat along and then covered up. The trash is always burnt off after each crop is cut—for fear of insects. The young cane then grows, and in many instances goes on growing without any weeding or moulding or cleaning for months. A little scarifying may be done here and there, but often plows are put on, and a furrow made between cane rows and all grass covered up towards and on cane stools. The weeding when done is all laid along cane stools, and this is called "mulching." No clean banks or trash banks as with you. All is a muddle to look at; here grass round cane roots; there great hollows in middle of banks; and too often a hollow ridge in cane rows made by the plow throwing dirt from the openings, and that is left, when beautiful work could be done by the "boys" being sent to break down plowed land and clean cane roots, moulding cane stools nicely. As to trashing, I wrote and explained before. One "Damager" thought he knew all it, and did it on one field, and did it so improperly that only a few leaves were left on top of the canes, six months old canes they were, I should think, and he "bled" them as if they were to be cut in two weeks, and when the field, as a matter of course, turned out bad, he said "Trashing was nonsense." As I told every one, trashing to be done well in Queensland must only be done to clean young canes, taking off only bottom trash and cleaning cane roots. Twice will do here, against the eight or nine times with you, until the cane matures and is near cutting, then once, making thrice in all. The frost here requires the cane covered, but the young cane must start clean or else it will not do well. A few are starting to put manure by hand and machine to the rows of cane, and then covering up, but

to put to each stool as is done with you is too costly for them; and too much labor for their wholesale minds. I would not give much for nine-tenths of Queensland sugar estates twenty years hence if they do not mend their methods.

I will close my remarks by a few words on the climate, etc. Our summer is your winter, and December is generally hot with thunder storms. In June and July we have sometimes two or three nights frost, say 3 to 8 degress on grass, never more since I have been here, and after one of these touches the cane fields look burnt up, every leaf perfectly brown. Some planters say they like a sharp touch of frost as it stops the growth and allows the cane to mature in full saccharinity. Others want none of it, but at any rate, as Dr. Maxwell says, no one should ever plant cane out of the tropics, where no frost comes, and so say I. It nips the young canes right off, but they seem to recover very soon, and go on again all right; still it seriously handicaps old and young canes, and a frostless winter is the best. The climate is said to have changed much in the last twenty years, as many years ago frost was unknown. Droughts and floods you have read of as being permanent institutions with us, and need not be entered on here.

The whole success of Queensland now lies in irrigation and proper cultivation. What will be done regarding the needful work remains to be seen.

J. M.

17th April, 1900.

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## *KNOWLEDGE OF FERTILIZERS AND MANURES.*

The following article, taken from the 1899 Year Book of the Department of Agriculture, relative to the early knowledge and use of artificial fertilizers will be interesting reading. It shows that even in the early days it was necessary to apply artificial fertilizers:

The chemical knowledge of the composition and functions of fertilizers at the beginning of the nineteenth century was extremely nebulous. Experience of a wholly empirical nature had shown from the earliest history of agriculture the value of certain refuse products of the stable and the barn-yard in increasing the yield of crops; but the component parts of these materials and the manner in which they acted were entirely unknown. It was the custom in many of the older countries for the farmers to increase the litter of the farmyard by gather-

ing leaves and twigs, which were used in bedding the animals. As, for instance, it is said of Kliyogg: "He is attentive also to gather all the dried leaves, moss, and rushes from his ground that can serve for litter. * * A compost dunghill appears to him an object of so great importance to the improvement of land that of all branches of labor he regrets the want of assistance in this the most. * * In prosecution of this design, in autumn during the moon's increase, Kliyogg goes into his wood with a hedge bill to prune the supernumerary branches of the fir and pine trees. * * These he binds into fagots and carries home. * * At leisure hours, and especially in long winter evenings, he prepares these faggots for the purposes intended. * * By this method he amasses many proper materials for good manure."

Kliyogg was also careful to preserve the liquid manures which exuded from his stables and for this purpose he constructed trenches in his cow houses. It is interesting to know that, unwittingly, he had discovered the true function of much of this material, which he regarded as a ferment. The record says: "Thus placed, it receives the urine and dung of his cattle, and being always kept half full of water; it forms a thick mixture and serves as a ferment, with which a very great quantity of water may in a very short time be converted into liquid manure. One portion of this ferment being mixed with seven portions of the freshest spring water soon makes the whole become corrupt, especially if the reservoir in which the mixture is made is of wood and placed in a warm situation, or if an artificial heat is substituted in case a natural heat is wanting. By means of this fermentation an excellent manure is produced, which proves the best assistant which can be given to such meadow and arable lands as are naturally dry."

The earlier accounts of scientific agriculture at the beginning of the century recognized the great value of gypsum as a fertilizing material. All writers refer favorably to its use. The use of gypsum as a fertilizer is said to have been the discovery of Rev. Mr. Meyer, pastor of Kupferzell, Germany. Mr. Meyer published a detailed account of the manner of using gypsum. According to the method described by him, gypsum should be spread in its natural state after being reduced to powder, and is useful upon meadows containing both the common and cultivated grasses. Mr. Meyer also found gypsum valuable for peas, vetches, lentiles, oats, rye and tobacco. Its most surprising effect, however, was upon clover, and this in

soils the most dry and arid. On marshy ground it was found to produce no good effect. It is urged that gypsum should be spread upon the grass or grain before it begins to shoot. Upon meadows, the best time for spreading is stated to be at the melting of the snow, and upon fields of grain, as soon as they are sown. Benjamin Vaughn, the translator of "The Rural Socrates," says that at the end of the last century and at the beginning of the present gypsum was used largely in the United States, and he refers to the writings of Judge Peters, Robert Morris, Dr. Mitchill, Mr. Bordley, and others on the subject.

The use of marl was also fully understood at the beginning of the century. Since the time of the Roman conquest, and probably before, the marl beds of northern France and southern Belgium have been constantly exploited. Great hollows are found in many of the fields of northern France made by the excavation of marl many centuries ago. Kliyogg calls the marl bed "that mine of farming gold," and says: "I owe to this marl not only abundant harvests, but the character of my children. It is true that they murmured against me at first for employing them in hard labor, even during the winter. * * But at length the rich harvests with which Providence blessed us forced them to confess that I had said nothing which was not both true and useful."

The true function of marl, however, was but little understood, and even its chemical composition was practically unknown by those using it.

In the article on husbandry, in "The Spectacle Nature," the Prior, in conversation with the Chevalier, says in regard to manure: "This manure, which completes what the dews of heaven had begun, is the most contemptible substance upon the face of the earth and is chiefly composed of the litter taken from stables and sheepfolds; dove houses, hencoops and the dwellings of all domesticated animals furnish manures that differ in their degrees of heat, and which being blended together, as well as quenched and corrected by each other, replenish the land with all the fertility it had lost." Among other substances which the Prior mentioned as being used for manures, are straw, stubble, shells of pulse, useless leaves, refuse of garden herbage, rotten wood, chimney and oven soot, rags, hair of animals, cuttings of leather, skins of beasts, bark of trees, lees of wine, sediments of oil, malt dust, tanners' bark, dyers' lees, soapsuds, of which last it is said, "which are com-

monly thrown out of the laundry as useless, though soap is impregnated with oils and salts, which are the principal elements of plants."

The Prior also says: "No kind of manure has more prolific qualities than the soil which is swept from populous cities, and especially those where a great number of kitchens and dyers of wool are continually discharging into the streets a fat and oily sediment, which is very beneficial to corn."

The value of ashes is fully recognized, in the essay of husbandry, by the Prior, who says that they can supply the place of all the rest if a sufficient quantity can be obtained. The ashes of wood are preferred to those of any other substance. He advises the burning of turf for the purpose of securing ashes. The methods of forming composts with ashes are fully described.

The prevailing idea at that time that oil is one of the most valuable of manures is developed in his description, it being stated that "oil and salts constitute the chief merit of manure."

The fact that the principal value of ashes is due to the potash phosphoric acid which they contain was not even suspected by the earlier scientific agriculturists. The early agriculturists in our country were imbued with the customs of their European homes in regard to the use and value of manure, although upon the virgin lands there seemed to be little necessity for the application of fertilizing substances. The necessity of fertilizers, however, soon became evident, especially on lands planted continuously to cereals and to tobacco. When the first abundant crops, due to the virgin fertility of the soil, began to diminish, the colonists received a valuable lesson in the use of artificial fertilizers from Squanto, one of the leading Indians of the New England coast. In Governor Bradford's "History of Plimouth Plantation" is given an account of the early agricultural experiences of the Plymouth colonists. In April, 1621, at the close of the first long dreary winter, "they (as many as were able) began to plant their corne, in which service Squanto, (an Indian), stood them in great stead, showing them both ye manner how to set it, and after how to dress and tend it. Also he tould them, arcepte they got fish and set with it (in these old grounds), it would come to nothing; and he showed them yt in ye middle of Aprill, they should have store enough come up ye brooke by which they begane to build and taught them how to take it."

In George Mourt's "Relation; or, Journal of the beginning and proceedings of the English Plantation settled at Plimouth, in New England, by certain English adventurers, both merchants and others," London, 1622, it is said:

"We set the last spring some twenty acres of Indian corn, and sowed some six acres of barley and pease, and according to the manner of Indians, we manured our ground with herrings, or rather shads, which we have in great abundance and take with great ease at our doors. Our corn did prove well, and, God be praised, we had a good increase of Indian corn, and our barley indifferent good."

Thomas Morton, in his "New England Canaan," London, 1632, wrote of Virginia:

"There is a fish (by some called shadds, by some allizers) that at the spring of the yeare passe up the rivers to spawn in the pond, and are taken in such multitudes in every river that hath a pond at the end that the inhabitants doung their ground with them. You may see in one township a hundred acres together set with these fish, every acre taking 1,000 of them, and an acre thus dressed will produce and yield so much corn as three acres without fish; and least any Virginea man would infere hereupon that the ground of New England was barren, because they use more fish in setting their corne, I desire them to be remembered, the cause is plaine in Virginea, they have it not to sett. But this practice is only for the indian maize (which must be set by hands), not for English grain; and this is there fore a commodity there."

The following amusing quotation is from the records of the town of Ipswich, Mass., May 11, 1644:

"It is ordered that all the doggs for the space of three weeks from the publishing hereof shall have one legg tyed up, and if such a dogg shall break loose and be found doing harm the owner of the dogg shall pay damage. If a man refuse to tye up his dogg's leg, and hee bee found scraping up fish in a corn field, the owner therof shall pay twelve pence damage, beside whatever damage the dogg doth. But if any fish their house lotts and receive damage by doggs, the owners of these house lotts shall bear the damage themselves."

It is thus seen that even on the old ground cultivated by the Indian before the advent of the colonists it was not possible to raise good crops except by the artificial manuring which has been described above.—Florida Cultivator.

## *CULTURE OF THE SMYRNA FIG IN CALIFORNIA.*

The year 1900 will be remarkable in the history of fig culture in California, as it will record the production for the first time, not only in this state, but in all America, of a crop of Smyrna figs fertilized by the process of caprification.

From time immemorial the operation, which consists in transferring the insect known to science as the blastophaga from the wild, or Capri, fig to the trees which produce the figs of commerce, has been practiced in Asia Minor, whence large quantities are imported under the name of Smyrna figs.

In describing the process, now known to be indispensable to the production of the choicest figs, it should be primarily understood that the blossom of the fig tree is contained inside of the fig, and that, therefore, the true fruit of the fig tree is the seed found in the fig: that the fig itself is what botanists call a receptacle—viz., a stem or support—of the flower and fruit; and also that there are two kinds of flowers—the staminate, or male, and the pistillate, or female, flowers. It should also be known that there are two races of figs—those like the varieties in common cultivation in this state, such as the Mission, or Black California, the Brown Turkey, the White Adriatic and others containing both male and female flowers which fertilize themselves and produce a crop without external aid, and the Smyrna, which is deficient in the male flowers, but contains an abundance of the pistillate, or female, flowers, and which must be fertilized with the pollen of some other variety of fig to insure a crop. There is, moreover, a so-called wild fig, known in Asia Minor as the Capri fig (hence the word caprification), which is supplied with both pistillate and staminate flowers.

The blastophaga is a minute wasp, not over one-eighth of an inch in length, and it propagates abundantly in the Capri fig, its natural home. The insect lays its eggs in a flower, which, as the minute grub develops, forms a gall that protects and furnishes food for the little larva until it emerges, a perfect insect. It is a curious provision of nature that only the female wasp is provided with wings, which are necessary to enable it to sally forth in order to propagate the species by laying her eggs in other figs; while the male, having performed his function, dies in the fig in which he was born.

Insects play an important part in the fertilization of flowers, a notable instance being the pollination of the flowers of the red clover by the humble bees. Some years ago it was found

necessary to introduce that insect into Australia, in order that red clover seed might be raised in that island. The blastophaga is as necessary to the Smyrna fig as the humble bee is to the red clover. * * *

EFFORTS TO INTRODUCE THE BLASTOPHAGA.—Dr. Gustaf Eisen, of the California Academy of Sciences, made a careful study of the fig question and was probably the first person in this state to insist that Smyrna figs could not be grown until the insect was obtained. As a striking evidence in support of his view it may be mentioned that one day Dr. Eisen and E. W. Maslin, while making investigations in the Shinn nursery at Niles, found among the dried Capri figs from a tree of The Bulletin importation, some that contained an abundance of pollen which could be shaken out into the hand. By means of toothpicks, they forced some of the pollen dust into the eyes of a number of Smyrna figs and marked every fig so treated by tying a tape to the stem. It was found afterwards that every one of these figs came to perfection, and that they were the only ones on all the many trees that reached maturity.

Efforts were at once made to import the insect. Under instructions from the late James Shinn, a missionary of his acquaintance in the Aldin district sent figs containing the blastophaga by mail, and in some instances live insects arrived, but the Capri figs were either too old or too young to sustain them.

Ever since last March Professor Schwarz, the government entomologist, who was sent out from Washington to superintend the interesting experiment, has been watching the successive generations of blastophagas develop and transmit themselves through the recurring crops of Capri figs. Only a few hundred of the surviving figs of the winter crop were found to be populated with the wasps, but these supplied many more of the next crop, and of the critical June crop there are now fully twelve thousand figs, each containing upwards of three hundred insects, so that there is now available a flock of around four million of these useful domestic animals —quite enough to employ them on a commercial scale.

Wonderful as this novel use of an insect smaller than a gnat to do man's work appears, there is really nothing unique about it except the necessity of human aid. Most insects, like most bacteria, are useful, and most flowers are fertilized by insects, very many of them by only one species of insect. A

crop of clover seed is no more possible without humble bees than a crop of Smyrna figs without blastophagas. The difference is that the bumble bees take care of themselves and look out for their own work, while the blastophaga requires human care and aid.

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## *PREVENTING BUSH-FIRES.*

The commission appointed in Victoria to consider the best measures to adopt to prevent the recurrence of the disastrous bush-fires that have, during the past few years, wrought such havoc in some of the best agricultural districts of the Colony, have concluded their labors. In the report submitted, the Commission draw attention to the necessity for more stringent legislation, such as exists in the other Colonies, against the careless use of fire in grassed and timbered country, and make the following recommendations:

That the police and all forest officers and Crown land bailiffs be appointed fire wardens. Where there are no such offices suitable persons be selected for the work. That it be the duty of the fire wardens to prevent as far as possible the commission of offences against the law, and to take prompt steps for the extinction of all forest or grass fires. During the months of November, December, January, February, and March the following precautions shall be taken:

FIRE-BREAKS.—The making and maintaining of effective fire-breaks not less than half a chain in width—(a) by all owners or occupiers of grass land within and along the boundary fences of such land in their respective holdings, except owners or occupiers of such land situated in forest scrub districts. This provision to apply to all grass land having an area of 50 acres and upwards, and also to grass land having a less area than 50 acres when, in the opinion of the local fire warden, the making of such breaks is necessary for the protection of adjacent land from danger of fire.

CAMP FIRES.—The selection by the local fire wardens on the principal public roads or water reserves of the Colony of suitable camping places for travellers. The spot for lighting fires at such camping places to be, where practicable, in the dry bed or channel of some creek, or on the edge of some running stream, lake, lagoon, dam, or other body of water, and no fire to be kindled thereat at any standing tree, stump, fallen trunk of a tree, limb, or large log, but to be kindled and fed with small wood only, and to be completely quenched or ex-

tinguished by such travellers before leaving such camping places. Where no such camping place is set aside and indicated by public notice posted in the immediate neighborhood thereof, every traveller in choosing a place to camp to select a clear space, having a radius of at least 10 feet, or to make a clear space having such radius, to kindle and feed a fire thereon, when such is required by him, with small wood only, and before leaving such camping place to completely quench or extinguish the fire thereon.

Shooting and Smoking.—That the following acts be forbidden during the months of November, December, January, February, and March:—The use of any ignitable or combustile wads or wadding in any gun, rifle, pistol, or other firearm; the blasting of trees, wood, or timber with any explosives, unless at least two persons are present to prevent the spread of any fire arising therefrom; the burning of trees, live or dead timber, scrub, or undergrowth, for the purpose of clearing land, except in such districts as may be proclaimed by the Governor in Council as forest scrub districts; the burning of stubble, dry grass, or other herbage, except for the sole purpose of making such fire-breaks as are provided for by law; the lighting or smoking of any pipe, cigar, or cigarette in the open air within 20 yards of any standing crop or field of hay, corn, straw, stubble, or other inflammable vegetable production; the throwing down or dropping of any lighted or unlighted match, or lighted tobacco-pipe ashes, cigar, cigarette, or other burning substance, unless the fire of such be at once extinguished on the spot. That the following acts be forbidden: The lighting or smoking of any pipe, cigar, or cigarette in or within 20 yards of any stable, or within the same distance of any rick or stack of hay, corn, straw, or other inflammable vegetable material; the placing, throwing, or dropping of any inflammable, combustible, explosive, lighted, or burning matter or substance, for the purpose of causing a fire with intent to damage person or property; the burning of grass, stubble, herbage, timber, or scrub on a Sunday for the purpose of clearing the same.

Burning Off.—That the Governor in Council have power to proclaim certain districts as forest scrub districts, and to repeal, alter, or amend such proclamation when, owing to the clear and open character of the land in any such district, or any portion thereof, it ceases to be properly classed as such. That no district be proclaimed a forest scrub district unless—

(1) The land, occupied therein by settlers, is covered or partly covered with live or dead timber and thick scrub or forest undergrowth; and (2) unless, owing to the lateness of the rainy season or general humidity of the climate in such district, the grass and other herbage is green and succulent during the months of November, December, January, February, and March, and the timber, scrub, or undergrowth can be effectively burnt by settlers in the course of clearing their land only during such months. That no person shall during the months of November, December, January, February, and March set fire to any timber, scrub, or other inflammable matter on any private land or land held under license or lease from the Crown in a forest scrub district for the purpose of clearing the same: (a) While a hot northerly wind is blowing; (b) between the hours of 4 o'clock in the forenoon and 6 o'clock in the afternoon; (c) unless there shall have been cleared around the inside of the boundaries of such land of scrub, grass, or other inflammable herbage, a space not less than half a chain in width; (d) unless he shall have given to the local fire warden and also to the owners or occupiers of all lands adjacent to the land on which he intends to burn timber, scrub, or other inflammable matter, at least forty-eight hours' notice. Should the burning of such timber, scrub, or other inflammable matter be regarded by the local fire warden as dangerous, owing to its situation with respect to inflammable matter on adjacent public or private lands, or owing to the state of the weather, the warden to have power to order the postponement of such burning until such time as in his opinion it can be undertaken with safety. Should there be any tract of dry or inflammable grass or herbage within a forest scrub district, which, in the opinion of the local fire warden, is a source of danger to adjacent public or private lands, the warden to have power to call upon the owner or occupier thereof to make an effective fire-break around the boundaries of such tract in the same way as if it were outside the limits of a forest scrub district.

Municipal Liability.—That the cost of extinguishing fires, including the payment of any remuneration or allowance to such fire wardens as are not regularly employed in the service of the State, and also to such persons as are called upon by wardens to give aid in extinguishing fires, be borne in equal shares by the Treasurer of the Colony and the municipality in which any such fire warden resides and any such fires may occur.—N. S. Wales Ag. Gazette.

## *GERMAN SUGAR PROFITS.*

We shall shortly give some detailed statistics of the results of the operations of the German sugar factories during the past season. Meanwhile the following figures, just published, of the net profits of the "Zuckerfabrik Friedland in Meckl," during the working of 1889-1900 may serve as a useful object-lesson to those who are studying the question of the true economical position of the German, Austrian, French, and other exporting sugar industries. The factory in question has a capital of 500,000 marks (say £255,000), a working capacity of 700 tons of beets per diem, and the quantity worked up during the season may be taken as about 50,000 tons. The method is by saturation with a quintuple "effect." The net profits, after writing off 33,207 marks for depreciation and sinking fund, were 293,382 marks (say £14,650), equivalent to over 58½ per cent! The German sugar industry is usually described by the manufacturers and agriculturists in their not infrequent appeals to the government as "nothleidend," which is equivalent to "necessitous" or "hardly pressed."—Kuhlows.

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## *PARISIANS DELIGHTED.*

The Frenchmen of Paris were delighted with the California exhibit at the World's Fair. The fruit exhibit is a source of wonderment, but the Parisian is skeptical about its genuineness, says the Times. J. A. Filcher, in charge of the exhibit at the fair, writes to the Chamber of Commerce, describing his experiences, and stating some of the lessons to be learned from the big exposition. "California can advertise by means of samples better than in any other way," he says. "When we have convinced one Frenchman that the exhibit is genuine, he goes out and returns with a lot of his companions to verify the truth of his report." He asks why it is that wealthy people from all over the world and especially from America, go to Paris to spend their money. His conclusion is that it is not because of any natural advantage or on account of the scenery or climate, but because of what money and art has done for Paris in statuary, monuments and palaces, in well-paved and clean-kept boulevards, with wide sidewalks and borders of even shade trees. "It has paid Paris," he adds, "an inland city to beautify and make itself attractive."—Ex.