THE

PLANTERS' MONTHLY.

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OF THE HAWAIIAN ISLANDS.

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The latest quotation of sugar in New York, March 1st, was 5 $\frac{7}{16}$ for Cuban centrifugals, 96 degrees test, with a strong market, both in Europe and New York.

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Vigorous work is being carried on along the public roads in Hamakua and Hilo districts, under the new Road Boards, and there is the prospect, fast turning to realization, of good roads.

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By reference to the quotations taken from a voyage to these islands about the year 1800, it will be observed that the writer refers to sugar cane as one of the products grown by the natives.

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On page 137 will be found an article on the Pimento, which produces what is known in commerce as allspice. If any of our readers know of its growing on the islands, will he state where it is to be found.

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A subscriber calls our attention to the fact that correspondents when speaking of clarifiers do not always state the size referred to. As clarifiers vary much in size, it is well always to give the number of gallons contained in those to which reference is made, in any article alluding to them. Otherwise, no correct comparison of results can be had.

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The two articles on forest, gum and ornamental trees in India, the East and West Indies, taken from the Ceylon *Tropical Agriculturist*, will be found interesting. An error which occurs on page 134 should be corrected here. The manufacture of oil from the candle-nut, or *kukui* tree, is not now carried on here, and very little of it is used. As a substitute for linseed oil in mixing paints, it was, some twenty-five or thirty years ago, manufactured and used to some extent, but not of late years.

Ookala Plantation rests easy at nights for they have the weather by the horns. When it rains, they flume; when it is dry they cart, and the manager goes about with an air of independence and unconcern, which is charming to see.

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We have received, too late for extended notice, a prospectus of the "Hawaiian Coffee Plantation Company," to be located in the District of Kona, Hawaii. We trust that nothing will prevent this enterprise becoming an established fact. With green Kona coffee retailing at thirty cents a pound, and an unlimited demand for it abroad, our capitalists may safely assist in this worthy undertaking.

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Grafting grape vines has been successfully practised by Capt. Babcock, at his vineyard on the plain. He states that he had a number of vines which failed to produce fruit, though several years old. He cut them down to within a few feet of the ground, and grafted the stocks with fruit bearing vines. The result has been that these formerly barren vines are now loaded with very large bunches. This hint may be useful to others who have barren vines, and have been puzzled what to do with them.

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PROPOSED SUGAR PLANTATION.

On the lee side of the Island of Kauai, between the Waimea and Hanapepe rivers, lies the plain of Makaweli, some three or four miles in extent, composed of deep, rich volcanic soil, but so dry that grass and shrubs grow on the lower part only during the wet season. On either side flows a stream, pouring its waters into the sea. How to bring this water on to the plain has been a problem with many who have ridden over it. Surveys have been made in former years by Messrs. Houseman, Rowell and Wilcox, and the project decided to be feasible, but at an enormous outlay of capital, too large for any one person to undertake.

Recently, Mr. Wm. R. Watson, of the firm of Mirrlees, Watson & Co., of Glasgow, Scotland, visited the district, and after thoroughly investigating the location, with its abundant streams on each side of the plain, has decided to take hold of it, if, after a survey is made, the bringing of the streams on to the plain is found to be practicable and within the limits of estimated cost. With this in view, he has secured from Messrs. Gay and Robinson the option of leasing 5,000 acres more or less, of cane land at Makaweli, Kauai, for thirty-five years, and of taking water for irrigating and fluming purposes from the Koula (Hanapepe) and Makaweli streams, for the purpose of establishing an extensive sugar estate. The principal condition of the lease is the payment, as rent, of one-sixteenth of all

sugars made by the company (to be formed) save what may be grown on 600 acres of these lands on which the present proprietors, G. & R. reserve the option of planting and cutting up to 300 acres yearly, they getting nine-sixteenths, and the company seven-sixteenths of the sugars. The company to haul the G. & R. cane but to pay no sixteenth of sugars made from said cane.

This enterprise, if carried out will necessitate the expenditure of five hundred thousand dollars, in bringing the water on to the land, and for the erection of the mills and buildings to carry on the work. With an abundance of water for irrigation, there is probably no other spot on this group that can give the same promise of becoming a sure and permanent sugar producing enterprise. Lying on the lee side of the island, sheltered from the harsh trade winds, here is a tract of ten square miles of deep, virgin, volcanic soil, waiting only for the steam plow to break it up, with a gradual slope towards the smooth sea, where can be made excellent shipping piers—it certainly, has everything in its favor. The Kekaha plantation, a few miles distant, on the west side of the Waimea river, is noted for its extraordinary sugar yield—from five to seven tons of sugar to the acre. But the area of sugar land at Kekaha is limited to a narrow belt, while Makaweli offers from six to ten thousand acres, though at present it is not certain that more than five or six thousand acres can be irrigated.

This plantation will be carried on by a company to embrace local capitalists, as well as the firm named above. We trust it will meet with success.

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AN IMPORTANT WORK ON AGRICULTURE.

During the last few years of Hawaiian sugar culture a great deal of attention has very wisely been paid to improvements in machinery and methods of manufacture, and very important advances have been made. The same attention and improvement can scarcely be claimed for the agricultural portion of the sugar business. The natural fertility of the soil, together with the unexhausted condition of most of it, has rendered large crops the easy and certain result of simple and ordinary cultivation, and has obviated the necessity of any very general or energetic attempt to assist Nature by high farming. This condition of things however is changing, and we are being gradually forced into a more intelligent study of agricultural problems and improvements, as we have those of machinery and manufacture.

There are, we believe, comparatively few plantations in this country that have any considerable area of virgin soil remaining, while there are many which have considerable areas of old

and possibly exhausted soil. Every year must lessen the number of the former, and increase that of the latter; and every year must lend renewed interest and importance to the question that we already hear in some sections, "How can we bring our old lands up to their former condition?"

More or less empirically some of us are experimenting in fertilizers of various kinds, and feeling our way into some of the problems of agriculture that have engaged the minds of men for centuries. We have not done much thus far, but perhaps we have reached that stage in which we say we do not know. Perhaps we have arrived at some conception of the importance of the problem, and the necessity of undertaking its solution. We certainly must apply ourselves to the questions of agriculture as assiduously and as intelligently as we have to the problems of manufacture if we are to secure the profit from our improved methods and machinery.

In the light of this condition of things, the publication of Storer's "Agriculture in some of its Relations with Chemistry," is most timely. This work, in two volumes of about 500 pages each, is the outcome of many years lectures to students in The Bussey Agricultural Institution of Harvard University, and is we believe one of the most thorough, final and conclusive, as well as recent and readable books on the whole subject of agriculture. It is preeminently a work on agriculture, chemistry forming no considerable part of it. It is preeminently a book for the public, for the intelligent farmer, for any one interested in agriculture. Not alone for the scientist nor the specialist, but a book full of the most interesting and valuable world-wide experiments and conclusions therefrom; a book that the practical planter will read with the interest of a romance.

A large part of the work, in fact more than half of it is taken up in the examination and discussion of the various natural and artificial fertilizers in use; giving many careful experiments with them in various countries and under varying conditions, giving chemical composition and actual value based on such composition. These fertilizers are grouped and treated under such general headings as phosphate fertilizers, nitrates, ammonium compounds, etc.; treating under each head, almost everything that has proved to be of any value. A number of interesting and exhaustive chapters treat of farmyard manure, composts and compost making in a way that will awaken suggestions of value to the Hawaiian Planter, and probably lead him to discover that he has a great deal of very valuable fertilizer at his own door. Other chapters of perhaps less local interest treat of the rotation of crops, irrigation, sewerage, and of various special crops, such as are grown in temperate climates. It is a work well worth study.

In connection with this topic we quote the following paragraphs from the last "Bulletin of the Louisiana Sugar Experiment Station," on field experiments in sugar cane:

"In the last quarter of a century wonderful progress has been made in machinery for making sugar, so that the yield per ton of cane has been gradually increasing until to-day the startling announcement is made that by diffusion upon Magnolia Plantation 231 pounds of sugar per ton of cane has been obtained. Such progress in a few years is almost incredible. The open kettle has been supplanted by the vacuum strike pan; the centrifugal purges in a few moments and in a much more satisfactory manner, the masse cuite that once drained for weeks in the purging. The evaporation "in vacuo" by the simple, cheap and economical double, triple or quadruple effect, is as far superior to the open pans, as this is to the iron kettle. The three roller mill banished the two vertical rolls, to be in turn overshadowed by the five roller. Even these, with a shredder attachment, is now subordinated in its efficiency to the diffusion cells. a recognition of the superiority of chemical effect over mechanical power.

"Such has been the marvellous march of mechanical improvement in the manufacture of sugar. Has the agriculture of sugar kept pace with its mechanics? By no means! The reasons for this, numerous and incontrovertible, need not be given here. Suffice to say, that in the next quarter of the century a large portion of our time must be devoted to an education of the cane plant. It must be sent to school and be made to imbibe in large quantities those ingredients which shall cause its cells to distend with saccharine life. The action of manures, the functions of the soil, the differentiation of varieties, and the vicissitude of the seasons, must engage the intelligence of our planters. In the field and in the laboratory must be the work of those who wish to advance the science and art of successful sugar growing in the next generation. It is therefore with pardonable pride that this Station presents this Bulletin to the public, the record of the first systematic work in the agriculture of sugar cane done in Louisiana, and invites a careful perusal of its contents, and such an earnest moral and pecuniary support as to enable it to amplify its work and extend its investigations."

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ECONOMY VERSUS EXTRAVAGANCE.

It is a very nice thing to have a nice mill, one with all the latest improvements and thoroughly equipped in every respect; but we believe there is one thing nicer—that is *a mill out of debt*. We were on the point of going a step farther, and say-

ing that there was only one thing pleasanter than having $150,000 in a fine mill, and that is to have it in the bank; but in consideration of the present fair prices of sugar we had better wait. There is one thing, however, that we are reasonably sure of, and that is, that a good deal of money has been spent in machinery, that some owners now wish they had put in their pockets. If we can read the signs of the times at all correctly, the time has come to lay by something out of the sugar business, if we are ever going to do it. Doubtless this, and that, and the next improvement are very good things, possibly even as good as the inventor or maker claims; but if you have the choice between keeping your five or ten thousand dollars now, and getting it back sometime in the indefinite future, do not prudence and wisdom suggest keeping it now? "A bird in the hand is worth," we fancy rather more than "two in the bush," just now. If you have secured a satisfactory competence, and feel that you can spare money with which to experiment without being cramped or dependent on its return, it may be wise to spend it, and new machinery is a very effective way of doing so; but if you are struggling on with a heavy load of interest, in the hope of having something as a stay for your declining years, we would advise you to leave experiments alone, and devote yourself dilligently to the construction of a bank account, or something equivalent. Vacuum pans and maceration mills, will not prove much of a solace to a bankrupt old age, nor be very useful articles of furniture in a bare and lonely house. We know this line of advice will be condemned as antagonistic to the interests of trade, and perhaps of progress:—condemned as the policy of an old woman who keeps her money hid away in a stocking,—condemned as the policy of stagnation and niggardly shortsightedness. To which we can only reply: It is easier to keep money when we have it, than to get it again after it is spent, and that the making of money —not machinery is the ultimate aim of the sugar business.

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FOREIGN SUGAR MARKETS, ETC.

The following extracts relative to the market in the United States will interest our readers :

The New York *Commercial Bulletin* says, the present position of our local sugar market is a peculiar one. On one side stands the gigantic Trust, composed of an alliance of all the working refineries, supposed to represent a capital of $60,000,000 and operating under cover of the most rigidly preserved secrecy, except such methods as may have become public through attempts to control production, fix the plane of prices and dictate the demand for raw material, both as to the time of development and the quantity of stock to be handled. Against this

may be found about the usual number of importers now commencing to receive the new crop, yet all working independently and without concert of action in meeting the practically one buyer, to whom they must submit their cargoes or else seek custom of the three refineries in other cities that have thus far refused to cast their lot with the Trust. Without opportunity, therefore, to secure healthful competition, and groping in the dark as to the intents and purposes of the combination, holders and receivers of raw sugars are laboring under an illy-concealed feeling of apprehension regarding the ultimate result upon their business; and the market is reduced to a condition of uncertainty and almost complete stagnation, except such periods as the Trust may think it politic or necessary to enter as a buyer.

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THE AMERICAN SUGAR TRUST.

Much interest is felt by all engaged in the sugar industry, in the organization and developments of the American Sugar Trust of New York, which took place in October last, by a consolidation of the principal refineries in the United States under one management, for the express purpose of regulating the manufacture and sale of refined sugars in the United States. This combination has gradually increased till it now embraces all the large refineries, cxcept one in Philadelphia and one or two in San Francisco. The combined capital of this huge corporation is said to be fifty or sixty millions, and its object is to keep up the prices of refined sugar by closing some of the refineries and by preventing a larger importation of raw sugars than is required to meet the wants of trade. This course will enable the Trust to contract for raw supplies on its own terms and at very low prices, which of course, insures large profits to the corporation.

Trust men assert that there is nothing unlawful in their mode of doing business. The Standard Oil Trust has amassed immense wealth for its partners by crushing out or absorbing all rivals, and practically controlling the oil market. Every one connected with it has become wealthy, President Rockafeller being credited with a fortune of forty millions, acquired in twelve years. There are now about twenty trust companies in the United States, and their chief object is to control the trade in each branch of business, solely to enrich the members at the expense of consumers.

It now begins to look as though the Sugar Trust may ere long control the Hawaiian sugar industry, by absorbing one or both of the San Francisco refineries. Once in their power, the remitted sugar duties under the reciprocity treaty may be a prize too tempting to resist, which must be shared between the

Trust and the planters. It is even among the possibilities of the near future that it may own all of our plantations and run them under a single agency of their own, established in Honolulu. With a corporation of unlimited wealth, fully able to purchase in advance, the entire Cuban and Hawaiian sugar crops, or for that matter, the ownership of all their sugar estates, there can be no forecasting the changes of the next few months or years, in the way our sugars are disposed of. In this connection, the following paragraphs from an exchange, will be read with interest:

"The sugar problem grows more interesting every day. It is now quite clear that unless the New York Trust can in some way control production in Europe as well as here, its monopoly of the American market might any day be overthrown by a repeal of the sugar duty. Under the stimulus of bounties, the sugar production of Germany has reached phenomenal figures. It has doubled since 1880. In 1875 Germany exported, in round figures, 44,000,000 pounds of sugar, raw and refined; in 1885, the total exports of both kinds reached the enormous figure of 1,161,000,000 pounds. The increased production of sugar in Germany caused by the bounty system led to its adoption by France, Belgium, Austria, Russia, and other countries. In all the countries of Continental Europe in fact, sugar making has been so artificially stimulated that the amount of sugar grown in the world—exclusive of China and South America, from which there are no returns—in the year 1887 was about 6,000,000 tons, as against about 3,000,000 in 1877. Of course consumption has not kept pace with this unnatural development. The statisticians report that the consumption per capita has increased in this country from 36 pounds to 53 pounds; in England from 66 pounds to 74 pounds; in Germany from 12 pounds to 17 pounds; in France from 15 pounds to 24 pounds. But this increase, large as it seems, did not dispose of the surplus stock; and the consequence was that, until the Trust was formed, the course of prices was steadily downward. Now the Trust proposes to keep up the price of sugar by closing a given number of refineries; and this it does just at the moment when so level-headed a man as Claus Spreckels says that he can see his way to add a thousand million tons of sugar to the world's annual supply by developing the beet-sugar industry in California. Simultaneously representatives of the sugar interest on the continent of Europe are meeting in England to devise a scheme to abolish the bounty system altogether. It will be interesting to watch if the British Sugar Convention can devise a plan by which the sugar bounties can be abolished without involving the ruin of the refineries and beet plantations which were started on the strength of their adoption."

CORRESPONDENCE AND SELECTIONS.

THE CHEMISTRY OF PLANTS AND SOME OF ITS APPLICATIONS.

BY PROFESSOR VAN SLYKE, OF OAHU COLLEGE.

X.—THE CHEMISTRY OF SOILS, (CONTINUED.)

The *rock-derived* or *mineral* portion of the soil is with the addition of alumina, composed of the same substances as make up the ashes of burnt plants. The mineral soil constituents include, as the most important, the following substances: Silica ($Si\ O_2$); alumina (Al_2O_3); calcium (lime) carbonate ($Ca\ CO_3$); ferric oxide (Fe_2O_3); phosphoric acid (P_2O_5, phosphoric anhydride); potash (K_2O); soda (Na_2O); magnesia ($Mg\ O$); chlorine (Cl); sulphuric acid (SO_3, sulphuric anhydride).

These constituents are found existing in very different proportions in different soils. The first three, in the form of sand, clay, and lime, constitute over 90 per cent. of the substance of most soils; and as one or the other predominates, the soil is called sandy, clayey, or calcareous. The most valuable constituents of the soil, phosphoric acid and the two alkalies, potash and soda, occur in very small quantities, as also do the other and less valuable constituents, magnesia, chlorine, and sulphuric acid.

Silica is found in varying proportions in different soils, mainly in an insoluble condition, and to the greatest extent in the poorest sandy soils. The amount of soluble silica contained in fertile soils is very small. Sandy soils contain from 70 to 90 per cent. of silica, clay soils from 60 to 70 per cent., and calcareous soils and marls from 20 to 30 per cent.

In its insoluble condition it is like quartz sand, merely mechanical in its action, making the soil lighter for cultivation. Its value as a source of food for plants depends upon its being in the form of soluble silicates. Those soils which are derived from the rocks composed largely of feldspar contain silica in a soluble form, while those derived from quartzose rocks contain it in the insoluble form.

Alumina or *clay* is found in soils as a silicate of aluminum, and is derived from the disintegration of feldspathic rocks and other similar silicates. If it were absolutely pure, it would be of no use for plant food; however, it is seldom found pure, but con-

tains more or less potash, which, by decomposition, contributes to the food of plants. Clay also has the important property of absorbing and retaining phosphoric acid, ammonia, potash, lime and other substances necessary for plant food. In clay soils the alumina usually varies from 6 to ten per cent.; in sandy soils, from 1 to 4 per cent.; in marls, calcareous soils and vegetable molds, from 1 to 6 per cent.

The effect of the presence of alumina in the soil is purely mechanical, since it is never taken up at all by plants. The greater the proportion of alumina in a soil, the more difficult is the soil to cultivate, offering more or less resistance to the implements of tillage.

The *lime* or calcareous matter generally occurs in the form of carbonate, varying in quantity from about 90 per cent. or less in limestones and marls, to slight traces in some other soils. Clays and loams usually contain from 1 to 3 per cent. of calcium carbonate. Soils containing less than 1 per cent. may be regarded as being deficient in lime. Where a soil contains less lime than is needed for fertility, the little there is of it is mostly in combination with organic acids, and is more abundant on the surface than in the subsoil. One office of lime in the soil is to keep the particles of clay in separated coagulated condition, thus allowing the abundant powers of the clay full action. Another function is to promote the decomposition of vegetable matter and the generation of nitrates in the soil.

Most green crops are frequently subject to disease when grown on soils containing too little lime, even when they are manured. Up to a certain stage of growth, the cereal or other crops appear to thrive well, but later in the season they are checked in growth and yield a poor harvest; this is especially the case in poor sandy soils, and a liberal application of lime or marl, followed by barnyard manure or guano, has a most beneficial effect.

All analyses of Hawaiian soils give a very low percentage of lime, the amount being in almost every case one-half of one per cent. Therefore, as far as analyses have been made, Hawaiian soils would be pronounced deficient in lime.

Ferric (iron) *oxide* is found in all soils, causing the reddish color so common in many of them. From 1.5 to 4 per cent. of ferric oxide is usually found in soils but slightly tinted. Ordinary ferruginous loams vary from 3.5 to 7 per cent., highly colored "red lands" contain from 7 to 12 per cent., and occasionally 20 per cent. or more. Analyses of Hawaiian soils show ferric oxide in quantities varying from 20 per cent. to as high as 30 per cent.

One of the chief functions of ferric oxide is to combine with and retain phosphoric acid. Its efficiency depends upon its mechanical condition; in a state of fine division it is most useful,

but when encrusting grains of sand, or occurring as nodules, it exerts little or no influence upon the soil. In clay lands it tends to make tillage easier. Its color tends to the absorption of heat and oxygen.

Phosphoric acid is found in all good soils, but in very minute quantities as compared with other principal ingredients. It exists in combination with lime, iron and alumina, phosphate of lime being its most common form. In general, even in the most fertile soils, the phosphate of lime averages less than one-half per cent., though it may rise to 1 per cent.

The value of phosphoric acid in fertilizers depends on its state of combination, whether it is soluble and immediately available for plant food, as the super-phosphates, or slowly soluble, like ordinary lime phophates, forming a reserve store of food for the future. It is found in all soils which have been formed from such rocks as the granite, gneisses, limestones and dolomites; most volcanic soils possess it in abundance, while alluvial soils and lands that are subject to periodical floods contain less.

As a general rule, the soils that contain less than .05 per cent. of phosphoric acid will be sterile and unfertile unless accompanied by a large amount of lime. From analyses of Hawaiian soils thus far made, we find the amount of phosphoric acid varying from .056 per cent. to over .20 per cent., thus making a very good showing in this regard.

Potash. Soils suitable for cultivation contain potash in an available condition, coming from the decomposition of feldspathic and other rocks. In most cases the natural supply of the soil is sufficient to furnish to the plants the potash they need. A soil containing 0.125 per cent. should furnish potash enough for a hundred years for ordinary purposes of cultivation without it being necessary to add to the manures used on such soils any salts of potash. In addition to this avilable potash, the soil frequently contains considerable quantities not immediately available, but forming a reserve for the future supply of plants.

The amount of potash varies in different soils from the merest traces up to 1 and 2 per cent. Sandy and peaty soils and marls are usually deficient in potash. Its usual form, as it exists in the soil, is that of a silicate, which is somewhat soluble in water. Heavy clay soils and clayey loams vary in the contents of their potash from 0.3 per cent. to 0.5 per cent.; lighter loams from 0.45 to 0.30 per cent.; sandyloams below 0.3 per cent.; and sandy soils of great depth may contain less than 0.1 per cent. and still may be fertile, if associated with considerable amounts of lime and phosphoric acid. A high percentage of potash in soils seems capable of making up for a very low percentage of lime; and, conversely, a soil very rich in lime and phosphoric acid may be very fertile for most crops, even if there be but a small amount

of potash. The average annual consumption of potash for raising crops is 45 pounds per acre, or about 0.002 per cent. So far as Hawaiian soils have been examined, the amount of potash found varies from 0.049 per cent. to 0.606 per cent.

Soda is of less importance and value than potash as a constitent of the soil as a plant food; it is usually present in smaller quantities, except in soils near the sea coast. In the form of sodium chloride, or common salt, its presence is a cause of sterility when it exceeds 0.10 per cent in amount.

Magnesia is found in all fertile soils, varying from merest traces to 2 or 3 per cent., often exceeding in amount the lime.

Sulphuric acid or *chlorine* occur very sparingly in most soils.

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INCIDENTS IN THE HISTORY OF THE SANDWICH ISLANDS, A CENTURY AGO.

[While making the trip from Honolulu to Puget Sound, in the autumn of 1887, we found in the ship's library an old narration of voyages round the world, commencing in the year 1790, and continuing for some twenty-five or thirty years. It was entitled "In the Forecastle, or Twenty-five Years a Sailor," by Richard J. Cleveland, of Boston, Mass. On looking it over, we found it contained the author's record of two visits to this group, in the last century, and when very little was known of them. Before leaving the vessel, we copied some of the more interesting pages, which are inserted here, as they contain facts relating to the early history of Hawaii, which will be perused with interest. We give the original spelling of proper names as they appear in the book.—EDITOR PLANTERS' MONTHLY.]

"During our passage to the Sandwich Islands no incident occurred to vary the monotony of the voyage. We had none other than a fair wind; indeed the gales were so propitious that we had a sight of Owhyhee the 20th day after taking our departure from the coast of Mexico. At 3 P. M., of the 19th July, 1799, the snow-capped summit of that island was seen above the clouds, at a distance of at least twenty-five leagues, and bearing southwest by west. Standing in boldly for the shore all night, we were at dawn within about a mile of it, and saw some beautiful runs of water falling in cascades over perpendicular precipices into the sea. We perceived also a mustering among the natives to come off to us. The sea, however, was so rough that only two or three attempted it, and having bought of them a few melons and cabbages we proceeded to leeward, towards Toiyahyah Bay, in the hope of finding smoother water. This was discovered as soon as we doubled round Kohollo Point, when a multitude of canoes came off to us, bringing a good

supply of hogs, potatoes, taro, water and musk melons, sugar-cane, etc. We admitted a chief on board, who, while he kept the natives in order, and guarded us against having too many on board at a time, served us also as a broker, and very much facilitated our purchases. He remained on board all night, and was equally serviceable to us the next day, when by noon, having a sufficient supply of everything which the island afforded we dismissed our broker with satisfactory presents, and pursued our course to the westward.

"The very limited intercourse we had with the natives of this island was hardly sufficient to enable us to form a correct judgment of their general character. The contrast which their cleanliness forms with the filthy appearance of the natives of the northwest coast cannot fail to attract the attention of the most unobserving. Nor have they less advantage over the northwest natives in the size, shape and gracefulness of their persons, and in the open, laughing, generous and animated expression of their countenances. The characteristics of these islanders are activity, gayety, volubility and irritability; those of the northwest Indians heaviness, melancholy, austerity. They are perhaps, in each case, such as would naturally be inferred to be the effect of climate operating on the materials of rude and savage characters. The expertness of these islanders in the art of swimming has been remarked by the earliest navigators; and Meares mentions some divers, who in attempting to recover an anchor he had lost, remained under water during the space of five minutes. Whether there are any such at the present day is very doubtful, although it must be confessed I saw no evidence that would induce the belief of their talent being in any way diminished." Pp. 109, 110.

"Leaving the mission of San Joseph's on the 28th of May, 1803, we experienced moderating fine weather, fair winds and smooth sea on our passage to the Sandwich Islands, and on June 19, got sight of Owhyhee, its summit towering above the clouds. We passed Kohollo Point with a strong breeze; and presuming the King to be at Karakakoa Bay, we proceeded directly thither; and arriving on the 21st, in the morning, we lay by and fired a gun. Not a canoe, however, nor a person, was seen moving. The silence and inactivity which prevailed, formed a perfect contrast to all my former experience at these islands. At length, after lying by more than an hour, two persons were discovered swimming off to us. On arriving on board, one of them spoke sufficient English to make us understand, that there existed a Taboo; and moreover, that the King and principal men were at Mowee. They piloted us to the best anchorage, passing over the coral bank; and we anchored on a sandy bottom in sixteen fathoms.

"The next day, John Young, who had seen us pass his resi-

dence at Tooayah Bay, made us a visit, presuming we should anchor here. He told us that the Taboo was a periodical one. When he first became an inhabitant of the island it was of ten days duration; but of late years had been reduced, and was now limited to three. We intended to remain here no longer than was requisite to supply ourselves with a few refreshments, which Young undertook to procure for us. We improved the time though, by a ramble on shore. Among other places we visited that Morai, where in defiance of the prejudice of the natives, Capt. Cook caused his observatory to be erected; a desecration which was the origin of the quarrel that terminated his existence. There are yet standing near the Morai, several cocoanut trees, which are perforated with the balls fired from his cannon on that occasion.

"We left Karakakoa Bay on the 23d, and the next morning anchored in Tooayah Bay, for the purpose of landing the mare with foal for which Young was very urgent; professing to have a knowledge of the treatment of horses, and promised to take all possible care of the animal. In the expectation that the chance of their increase would be better secured by placing the horses in the care of different persons, we acceeded to his request and landed the mare in safety near his place. This was the *first horse that had ever trod the soil of Owhyhee*, and caused among the natives incessant exclamations of astonishment. Leaving this bay the same evening we steered for Mowee; off which island we lay becalmed a part of the next day. When the breeze sprung up, though at a long distance from the village of Lahina, we were boarded by Isaac Davis, the European who, with John Young, was captured many years since, in Capt. Metcalf's vessel. Soon after a double canoe was seen coming toward us, and on arrival alongside, a large, athletic man, nearly naked, jumped on board, who was introduced by Davis as Tamaahmaah, the great King.

"Desirous of conciliating the good opinion of a person whose power was so great, we omitted no attention which we supposed would be agreeable to him. But whether he had left some duty unperformed on shore, or whether he had met with something to disturb his serenity of mind I know not; certainly it was, he did not reciprocate our civilities. He appeared to be absent, and after walking around the deck of the vessel, and taking only a very careless look at the horses, he got into his canoe and went on shore. Davis remained on board all night to pilot us to the best anchorage, which we gained early the following morning, and soon after had our decks crowded to see the horses. The people showed none of that indifference on seeing them, which had been manifested by the King, and which I believe to have been affectation, but on the contrary, expressed such wonder and admiration as were very natural on

beholding for the first time, this noble animal. The horses were landed safely and in perfect health, the same day, and gave evidence by their gambolling of their satisfaction at being again on *terra firma.* They were then presented to the King, who was told that one also had been left on Owhyhee for him. He expressed his thanks, but did not seem to comprehend their value.

"While the crowd were apparently wondering what use they could be put to, a sailor from our ship jumped upon the back of one and galloped off amid the shouts of the natives, who with alacrity opened a way to let him pass. There existed strong apprehensions in the minds of all for the safety of the man; but when, by going back and forth, they perceived the docility of the animal, his subjection and his fleetness, they seemed to form some little conception of his utility. The King was among the number who witnessed the temerity of the sailor; but with all his sagacity, for which he has been justly praised, remarked that he could not perceive that the ability to transport a person from one place to another, in less time than he could run, would be adequate compensation for the food he would consume, and the care he would require. As a dray or a dragoon's horse, there was no prospect of his being wanted, and hence our present was not very highly appreciated. In this we were very much disappointed, but hoped, nevertheless, that the King would be influenced by our advice to have them well taken care of; that they would increase, and eventually that their value would be justly estimated.

[This part of the narrative is important, as it fixes the time of the first importation of horses into this group—about June 23, 1803, and the source whence they came from—the mission of San Borges, Mexico.—Ed.]

"Our supplies were received from the King; for all which we paid the full price, and though he offered us a small present as an offset for the horses, we declined its acceptance. Being apprehensive that our stock of bread would not last till we reached China, we hoped, as a substitute, to procure a good supply of yams; but in this expectation we were disappointed, as they were at this time unusually scarce, and therefore we determined to touch at the other islands for this purpose. Accordingly, on the 2d July, we left Mowee, and the next morning anchored in Whyteetee Bay, island of Woahoo. While the natives were engaged in collecting our supplies, I made a long excursion on shore, among the beautiful rural scenery in the neighborhood of the bay. In a retired spot, clothed with verdure and surrounded with cocoanut trees, my guide pointed to the grave of my old friend and former shipmate, Charles Derby, who died here last year on board a Boston ship which he commanded, from the northwest coast. Charles and I had sailed

many thousand leagues together, and being of the same age, the probability was as great when we parted, that he would visit my grave as I his.

[The grave referred to in the above paragraph is on the land of Kewalo, in this city, now occupied by the writer of these lines, and is marked by a marble tombstone on which is the following inscription: "In memory of Charles Derby, late commander of ship Caroline of Boston. Died Sept. 25, 1802, aged 32 years." Near this grave are also two others, the granite slab over one of which bears the name of Isaac Davis, who died here April 10, 1810. The stone that marked the other grave has been broken off near the ground and destroyed.—EDITOR.]

"Meeting with but partial success in procuring here a supply of yams, we left on the 5th, and passed the following day lying off and on near Atoui, the most western island of the group, with no better success; and then bore away and made all sail to the westward. Atoui, at this time, was independent of the government of King Tamaahmaah, from whom we were bearers of a message to the King, purporting that the ambassador which had been sent to him, together with one of equal rank, must be sent to Woahoo, within the space of one month, acknowledging him, Tamaahmaah, as his sovereign, on penalty of a visit with all his forces. As the King did not come on board, and we did not land, the message was given to one of the European residents, who promised to convey it, but said it would be disregarded by the King.

"The Sandwich Islands and their distinguished King have long been so familiar to the European and American reader, as to require little to be said about them. At the time of our acquaintance with Tamaahmaah, he was a perfect savage, but evidently destined by nature, both physically and mentally, to be a chief. His mind was of a superior cast; its dictates induced the politic measure of seizing and forcibly keeping Young and Davis, aware of the advantage that would result from it, and foreseeing that good usage and habit would reconcile them to their fate; which calculations the result proved to have been correct. As our intercourse with these islands increased, the danger of a temporary residence on shore ceased. Among others who at this early period took advantage of it, was a Mr. Howell, commonly called Padre Howell, who soon ingratiated himself into favor with the King, and being struck with his superiority of intellect, conceived that it would not be difficult to induce him to abandon his idolatrous worship and substitute one of rationality. Accordingly, he let no opportunity, after acquiring a sufficient knowledge of the language, to convince the Chief of the incapacity for good or evil of his gods, and of the power, wisdom and goodness of the Supreme Maker and Ruler of the Universe, whom he worshipped. The first, that

of the impotency of the idols, was without difficulty admitted; but the second, not being tangible, could not be comprehended. His mind, however, appeared to be dwelling on the subject, with increased attention, after each conversation. At length, one day, while walking together, the King unusually thoughtful, and Howell auguring favorably from it, the silence was broken by the King's observing, "You say your God is powerful, wise and good, and that he will shield from harm those who truly worship and adore him?" This being assented to, then said the King, "Give me proof, by going and throwing yourself from yonder precipice, and while falling call on your God to shield you. If you escape unharmed, then I will embrace the worship of your God." It may be unnecessary to say that Howell failed to give the desired test, and that the King remained unconverted.

"The practice of mutilation was prevalent on the decease of a person of consequence. At this time, every one was deficient in the two most prominent upper front teeth, which had been have failed in giving such evidence of loyalty, would have been knocked out, in conformity with the tyranny of custom; and to impolitic and unsafe. Gallantry is held in no less estimation have failed in giving such evidence of loyalty would have been than loyalty; and feats are related to have been performed to convince the adored object of devotedness and attachment, which will bear comparison with those of the renowned days of chivalry. An instance occurred a few days before our arrival, of a man swimming from the village of Lahina, in Mowee, to the island of Ranai, a distance of not less than ten miles, to convince the idolized damsel of the truth and extent of his passion. The effect was unknown at the period of our departure, but it may be presumed to have been irresistable." Pp. 207, 212. * * * * *

[During a later voyage (Capt. Cleveland's third or fourth) his vessel sprung aleak on the American coast and he brought her in this condition to these islands, with the hope of being able to repair her and continue his voyage. But he found here no facilities for repairing his brig, and at this stage the narrative goes on:]

"In this dilemma, it was decided, as a choice of difficulties, to barter with Tamaahmaah the brig Lelia Byrd, for a little vessel of thirty or forty tons, which had been built on the island. This was a negotiation of greater magnitude than the King had ever before participated in, the importance of which was sensibly felt by him. To place a cargo of such value, and composed of such a variety of articles, so tempting to the savage, in detail, and of such inestimable value, in the aggregate; in the power of this barbarian, relying entirely on his honor for its restoration, could be justified only by the pressing neces-

sity which existed. The confidence placed in this Chief, though reluctantly, was proved by the event to have been well merited. The cargo was received into his store, and when the schooner was ready, it was all faithfully and honorably delivered to the person appointed to receive it. To the schooner was given the name of the Queen, Tamana. * * The Lelia Byrd was repaired by the King, and made two or three voyages to China, with sandal-wood. At length, worn out, and after being used for a time as receiving ship for opium, she was broken up or sunk at Whampoa, near Canton." Pp. 220–1.

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HISTORY OF THE BEET INDUSTRY IN CALIFORNIA.

The idea of making sugar from beets, says the S. F. *Bulletin*, is not American. The industry has been carried on for many years in France, Germany, Belgium and other European countries. The Government bounty system prevalent in Germany and other foreign countries has resulted in a wonderful development of this industry. Of late years beet-sugar has formed one-half of the world's supply of sweets. The manufacture of the article has reached a magnitude that practically makes the price for cane-sugar. The beginning was crude and unsatisfactory, but under the inspiration of bounties, German farmers and fabricators have gone on from year to year selecting the best seed and soil, the most favorable and economical means of cultivation and transportation, as well as the most approved machinery and methods for extracting and refining the saccharine matter obtained, until now the industry ranks among the prominent enterprises of the world.

California was one of the first States in the American Union to inaugurate the beet-sugar industry. The matter was prominently discussed here upwards of twenty years ago. But the conditions were not then favorable for crystalizing the idea into an actual fact. The refining of cane-sugar had then been in progress here only a few years, and those at the head of these refineries did not take kindly to the innovation. The promoters were frowned upon at every turn. Capitalists refused to lend their aid. The popular theory seemed to be that the thing was impracticable at the time. If our recollection serves us, certain parties here were then as thoroughly opposed to the scheme as they are now in favor of it. There was an idea then prevalent that beet-root sugar must necessarily be inferior to cane-sugar, and consequently there was a widespread prejudice against the article before a pound had ever been made. This prejudice lost none of its force when the first samples came upon the market. The color of these was inferior,

and there was a decided beet flavor in the taste. The enemies of the industry did not fail to call attention to these defects in the pioneer attempts, and to parade them far and wide, and for all that they were worth.

If the faith of the parties who had engaged in the enterprise had not been well-founded, the manufacture of beet-sugar in California would have been abandoned after the first season. But the promoters thoroughly believed in beet-sugar; they also believed that California was adapted to the business; and that when the right seed and the right soil were brought together, the standard could be raised through skillful refining to the highest grades of cane-sugar. It was remembered that pioneer attempts in the same line in other parts of the world had not been attended with perfect results. They knew the business was no longer an experiment. It had been brought to a satisfactory stage elsewhere, and no American, and especially no California-American, will ever admit that he cannot do what any one else under the sun can do, and do it just a little better than the other fellow. So our pioneer beet-sugar makers kept at work from year to year, pefecting seed and soil, and the work of cultivation and refining, until they were finally able to put upon the market an article of beet-sugar that was beyond criticism in color, flavor and saccharine properties.

California has been making beet-sugar for seventeen years. During this interval 12,000,000 pounds have been produced—not a large quantity, but greater than the combined yield of all other sections. In fact, beet-root sugar has been peculiarly a California product. In a trade review of this port for 1869, we find the following language: "The product of sugar from beets is thus far experimental, and the future result perhaps quite doubtful. It is safe at least to state that there is no probability that any supplies from this source will be equal to our increased yearly requirements." It was in 1869 that General C. I. Hutchinson, of California, wrote to Bonesteel, Otto & Co., beet-sugar makers, of Fond du Lac, Mich., for information concerning this industry. The reply to this inquiry was dated November 22, 1869, and General Hutchinson immediately organized a company with a capital of $250,000 to engage in beet-sugar manufacture. Bonesteel and Otto came to California in the spring of 1870. The company purchased land from E. H. Dyer at Alvarado, and the erection of a factory was begun May 9, 1870. A crop of beets was put in, and the factory was started November 15, 1870. Four days later the first lot of beet-sugar was turned out.

The dimensions of this pioneer factory were 150x50 feet, and three stories high, including the tower; boiler-house 50x50, and bone-coal house 75x40. The capacity of the refinery at that time was fifty tons beets every twenty-four hours. So far as

possible all the work is done by machinery. The beets are first washed, then grated to a fine pulp, when the juice is extracted. This juice goes through several processes, until it reaches the evaporating pan, where it is boiled to a thick syrup, then filtered, and again boiled down to a solid substance. After crystalization, it is placed in the centrifugals and refined, coming out a pure white sugar. The above statement is condensed from an elaborate description of the Alvarado Factory in 1870, as published in the San Leandro *Gazette.* The same paper adds the following: "This is the largest beet-sugar factory in the United States, and is under the immediate control of A. D. Bonesteel, A. Otto and Ewald Klineau, and the two former have no superiors in the United States as manufacturers of beet-sugar. Otto was awarded a diploma and medal for exhibiting the best crystalized sugar at the Paris Exposition in 1867."

We have been thus particular in referring to this pioneer beet-sugar enterprise of this State, from the interest that is now being taken in a more general development of the industry. In a trade review for 1870, the first samples of beet-sugar placed on the San Francisco market are referred to as follows: "The beet-sugar produced in this State, which has been placed on the market in this city, is of about the same description as that which is known as refined granulated. It is somewhat problematical what will be the result, pecuniarily, of this new enterprise. If it cannot profitably compete with producers of cane-sugar in foreign countries, it will be a great disappointment to its sanguine projectors." Cane-sugar fell in the market in the early part of 1870, from 14c. to 12½c., on account of the rivalry between the local refiners. The average for crushed during the remainder of the year was 15c. per lb. Yet it seems there were grave doubts about beet-sugar being able to compete with such prices, and the same paper published an itemized statement on the estimated results of working 3,000 tons beets, yielding 12 per cent, on which the writer figured out a loss of $29,000, after allowing for the sale of 300,000 pounds of sugar at 12c. and 180,000 pounds at 6c. The circumstance is mentioned to show the prejudice against the industry at that time.

Despite the discouraging outlook in 1870, with crushed sugar selling at 15c., the beet-sugar industry has been maintained, though during the current year crushed sugar had been sold down as low as 6c. Referring to the campaign of the Alvarado Factory, which ended March 28, 1885, a contemporary says: "The beet-sugar industry has proved a great success in California. During a season of the lowest prices ever known, it has yielded a profit. There is a great field for it in the future." During that campaign the Alvarado Factory worked 16,354 tons beets, producing 2,167,283 pounds sugar. In the first four

months of the campaign the beets yielded 10 per cent saccharine matter, but owing to the warm weather during the winter months, the last part of the campaign showed only 7 per cent. By a new process, while the beets remain fresh, say 120 days, 10 per cent saccharine matter is obtained. This is a larger per cent than is obtained in any other part of the world. It enabled the Alvarado Factory that season to lay down in San Francisco, in barrels pure, dry granulated sugar at a cost of 5¼c. during that part of the campaign. That year $4.50 per ton was paid for beets, but contracts for 1886 were made at $4 per ton for a factory having a capacity of 80 tons daily. Enough beets could have been secured to run a 200-ton factory at the same rate. Best beet lands in this State yield from 3,000 to 6,000 pounds refined sugar per acre, which is greater than the average yield of cane-sugar.

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SILK RAISING.

While the belief that diversified industries are essential to the continual prosperity of all countries, it is the more important the smaller in territorial extent a nation may be. There are very few nations in the world that are so favorably situated in both climate and geographical position for supporting a multiplicity of industries as the Hawaiian Islands. Among agricultural products, that could be raised to more than supply our domestic consumption, aside from our most important productions, sugar, rice and bananas, could be enumerated. Pine-apples, oranges, limes, mangoes, alligator-pears and guavas. A few pines and pears have been exported, but in season they should be exported by the cargo, either fresh or canned here, instead of being sent off by the dozen boxes. Ramie, with a very little assistance, would become one of our leading articles of export, as would also coffee and tea. With comparatively a small expense by the Government, silk growing could become one of our leading industries, as with a central station for refrigerating the eggs, the silk-worms could be hatched and reared during the entire year, as the mulberry, by pruning or cutting back every month, will grow continually, furnishing fresh leaves all the year round, as food for the worms. As to the cause of failure in silk growing here, several years ago, I am told that the only trouble encountered was the enforcement of the very strict Sunday laws. As Christianity has made some remarkable advances within a few years, all over the world, we may hope that hungry silk-worms would now be allowed their food Sunday as well as other creatures. This difficulty being removed, there seems to be no trouble except the inauguration of the in-

dustry to make it a success. The Portuguese and Japanese are both people who, to a greater or less extent, are already familiar with the subject. But that silk growing here should have all of the advantages of the experience of growers in other countries, some one thoroughly conversant with all of the details of the business should be employed by the Government to instruct the people. I suggest that the Government nursery distribute the best varieties of mulberry trees, say 100 or 200, to each school-house in the country, and that our enlightened and energetic Superintendent of Schools give instructions to the different teachers about planting and caring for the trees, on the school grounds, or some suitable piece of land that would almost always be given for the purpose by owners near the school premises. In the United States teachers are compelled to attend a Normal or Teachers' Institute of one or two weeks every year. Let such be the case here, and at that time have everything in readiness for a practical demonstration of silk growing, and if one or two hours every day of the institute is devoted to this study the knowledge of silk growing on the most modern and improved plan would be very soon in the possession of every hamlet in the kingdom. The enlightened teacher would readily instruct his pupils in the scientific and practical details. I am a believer in practical education—an education that will fit a student for earning an honorable living by *producing something*. Several of our schools now *attempt* to teach some trade, but without much practical result. "A man who makes two blades of grass grow where only one grew before, is a benefactor to the human family," is a truth too little heeded by our teachers. If every child in the kingdom owned half a dozen mulberry trees and received instruction and encouragement in caring for them, in three or four years there would be an unlimited supply of silk-worm food in the country and by that time the school teachers could have been educated in rearing and caring for the worms, and be able to teach their pupils the same, when the benefits, not only to every inhabitant of the country, but the Government treasury would be benefitted by it.

I understand that the Government is at present investigating the feasibility of engaging in a number of Japanese families for the purpose of introducing silk culture, and for one I am in hopes that the arrangement will be consumated, and from this nucleus let the teachers of our schools receive their instruction and supplies, and then imparting the same information and distributing their stock to the children who are old enough and have the proper carefulness to take charge of a small number of trees, etc.

E. LYCAN.

Honolulu, March, 1888.

A QUEENSLAND SUGAR PLANTATION.

THE MACKAY SUGAR COMPANY.

[The following sketch of one of the leading Sugar Estates in Queensland is taken from an exchange, and will be of interest to our planters]:

"If the approach be made from the Nebo Road, where the clearing on the Savannah ridge is reached, a good view is obtained of the free extent of the splendid plantation of 2,000 acres. A broad expanse of green cane fields divided off into square blocks and traversed by miles of tramways, the dark lines of the banks or dykes showing out a distinct contrast, presenting somewhat the appearance of a huge chess board, while in the distance the blue rugged outline of the precipitous hills forms the background to as pretty a picture as one might wish to see. It is here also that the more practical observer gets his first impressions of the extraordinary facilities afforded by nature for irrigation. A gentle sloping plain with a fall of some three feet to the mile, a natural reservoir at the head for storing flood waters, a copious supply of fresh water lying within twelve feet of the surface, the cost of irrigating this large plain would be a trifle compared with the advantages gained, for it matters not what the crop may be, whether cane or corn, rice or fruit, the resources of this inexhaustible black soil when brought into contact with the fertilizing fluid, would be simply limitless. Riding over these level fields one finds even in the dry season the young cane springing vigorously from a soil reduced by judicious cultivation to the consistency of a fine garden mould, and lacking nothing save the life-giving element. This is as we find Savannah to-day. Let us, however, take a retrospective glance at this place and see it as it appeared before taken up by the Mackay Sugar Company, and note the process by which this wonderful transformation has taken place. Teamsters in the early days when the glories of the Peak Downs copperfields were in their zenith have pretty lively recollections of the boggy track by which they had to cross the great "Black Swamp." Little dreampt they then that a few short years would see that dismal wilderness transformed into a flourishing plantation of miles of green waving cane, and traversed from end to end by a railway.

"It was some time about the year 1880 when the sugar boom was at its height, that the Southern capitalist, attracted by the splendid prices then ruling, was seeking investment in the North where the rich virgin soil and the genial climate had proved capable of producing in limitless quantities a staple whose market was the world, that special attention was directed to the rich alluvial country stretching for miles along both sides of the Pioneer River. Indeed, land was taken up in

large tracts all along the coast, and a lavish government did much to feed a fever that bid fair to develop into reckless speculation. So keen was the competition at that time that nothing was thought a difficulty, no price considered to high to pay for sugar country or for the labor to develop it.

"Looking round to-day we see the result of an expenditure of many hundreds of thousands of pounds and what may be effected by the combination of labor and capital, brain, muscle and energy—but nowhere, perhaps, is this more strikingly illustrated than on the plantation under notice.

"A more forbidding field for operations could hardly be imagined than a huge boggy morass of ti tree swamps and devil-devil country, yet here it was that a Melbourne Company resolved to stake their capital and risk their reputation in the elucidation of one of the grandest problems of science, viz: so altering the conditions of nature as to turn the hitherto waste productiveness of a teeming soil into wealth for themselves and good for the nation.

"Mr. A. R. Mackenzie was the company's first manager, and with characteristic energy he took in hand the task of planning and superintending the erection of the factory and completing all other arrangements for at once crushing the cane which was already being grown by the local farmers. The company at first intended to work on the central mill system, but a short experience of the farmers in the locality forced them to the conclusion that they would soon have either to close their mill or grow their own cane. There were many difficulties in the way of adopting the latter alternative which entailed an enormous additional expenditure that at that early stage they were scarcely prepared to meet.

"Cane would not grow in a swamp, so the swamp had to be drained, a mile of road constructed, and bridges erected. To Mr. Alfred Smith the present manager, is due the credit of initiating and carrying out a thorough system of drainage as original in design as it was bold in conception. Bred and reared in the great fen country of Linconshire, this gentleman seemed specially adapted for this class of work, and besides he brought to his task all the experience of a trained agriculturist as practical as he is enthusiastic. The work of drainage was taken in hand at once, white labor was at this time expensive and almost unprocurable, black labor was tried but after a time had to be abandoned, being found expensive and unsuitable. The company has been singularly unfortunate all through with this class of labor, but it was not till every other means had been tried that Chinese had at length to be resorted to, and they were found to work much better if not cheaper than either of the former. Powerful steam plows were then set to work tearing up the devil-devil and turning up to the surface the rich

black soil to a depth of two feet, the heavy harrows followed, breaking down the lumpy surface. It was then left to the pulverizing process of the weather, which has a truly wonderful effect upon this soil, reducing it after a few months exposure, to the consistency of a fine garden mold. In the hands of experienced men this powerful machinery is very effective; without its aid this plantation could never have been declined, as no horse or bullock teams ever yoked would face that devil-devil country. Most of the clearing too, has been accomplished by the aid of the traction engines, and under their mighty influence large lumps of ti tree, and even forest timber disappeared as though by magic. Through the courtesy of the manager, the writer is able to give as the result of over five years operations some fifty miles of broad, deep drains, representing an outlay of a little over £1,500, and capable of carrying off and discharging any volume of water likely to come down upon the plains; 900 acres cleared and cultivated, of which 750 acres are now under cane. Some 9,000 tons of cane have already been taken off, one block alone of 40 acres yielding the good return of slightly over 1,000 tons. These figures are not discouraging, but though the mill, since it commenced, has turned out a trifle over 3,000 tons of sugar, it is admittedly a poor return for a gross total expenditure of some £57,000.

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WHEAT PRODUCTION IN INDIA AND THE UNITED STATES.

Within ten years the dimensions of the wheat crop in India have been a matter of interest to the people of the United States and of Great Britain, and have been made the subject of official inquiry and investigation in both countries. England was led to look to its Eastern empire for the chief supply of its wheat, and our farmers were made apprehensive lest the sceptre of wheat exportation should pass to Hindoo hands. The data relating to this subject are scattered through innumerable English and American journals, are embodied in reports of our Agricultural Commissioner and in similar documents from British sources, and these have been carefully examined in preparing the statistics and summing up the results that follow.

There are nearly 30,000,000 acres under wheat cultivation in India, and of these about two-thirds are in the British provinces of the Punjaub, the Northwest provinces, Oude, the Central provinces and Bombay. The remainder, of the acreage is mostly in native provinces. The region covered lies between fifteen and thirty-five degrees north. The country is watered by rivers and streams, and much of it is broken by hills and mountains or it is elevated table land. As a general rule the

use of agricultural implements, as understood in Europe and America, is impracticable, owing to the inbred prejudices and trditional customs of the natives. The most primitive methods of culture are followed. The Superintendent of Agriculture in Bombay introduced a threshing machine and contracted for its use on fifty acres of wheat. The landholder, when the machine began to work, fell upon his knees and begged that it be stopped. It broke the straw, contrary to Hindoo methods, the cattle would not eat the straw, and the machine was set aside. Rev. Mr. Hauser, twenty years ago, introduced a fanning mill, but it was condemned as an innovation. The cultivators are too poor to buy them, the larger landholders will not have them, and a few only are used in the great markets. The Hindoo farms are small—of five acres or more. Wages are from five to twelve cents a day. Coolies carry the grain on their backs to the local markets. Middlemen absorb much of the profit, unless prices are high. The rent and land tax, the latter from fifty cents to $1 an acre, are oppressive. The peasantry are steeped in debt from loans from village capitalists, to whom they often pay interest at the rate of seventy-five per cent per annum. It is estimated that fully ninety per cent of this class of the people are in this condition of servitude. No wonder, with the low wages, that life is in its least tolerable condition.

The cost of transportation is a severe tax upon the wheat trade. Every twenty miles of bullock carriage adds twenty-five cents to the cost of a quarter of grain, and the freight by railroad is more for 600 miles in India than for 1,000 in the United States. Sir E. Baring, in his financial report in 1883, stated that New York had an advantage of from twenty-one shillings to twenty-eight shillings per ton over Bombay and California respectively, or from eleven to fifteen cents a bushel. Ocean rates are liable to a reduction, while the inland charges are not likely to be changed for the better. Railway building is at present not in great favor in India, the average mileage of new tracks in the last ten years being less than 800 a year. The wheat region is from 300 to 900 miles from the seaboard. The cost of production is about fifty cents a bushel, the price sixty-three cents, the yield ten to twelve bushels on dry land and from seventeen to twenty-two on irrigated. The system of irrigation is extensive. In the Madras Presidency where some wheat is grown, there are 40,000 tanks or reservoirs, many of them from ten to twenty-five miles in circumference and ten to sixty feet deep. One reservoir contains 100,000,000 cubic yards of water. The rainfall in some parts of the country is from 400 to 600 inches a year; in others forty inches. The evaporation is rapid, and the quick flow from the water-sheds swells the streams and causes freshets.

It must be remembered that of the population of India, only

about five and a half millions live in towns of over 50,000 inhabitants, and that nine-tenths of the people live in villages and subsist almost altogether on the products of the soil. There is a great similitude in the villages, and the prejudices of caste keep alive hereditary distinctions, and fetter the people by traditional avocations. Only about fifteen per cent of the cultivated soil is irrigated. There are millions of wells whose presence is indicated by patches of green vegetation scattered over the arid plains, and which rise in attractive mounds, veritable oases in the summer deserts. Up and down the sides of these mounds a pair of patient bullocks, attended by an equally patient peasant, toil slowly at the task of drawing up buckets of water, which, as fast as they are delivered, are handed to a second peasant, who decants them into a small waterway, from which the water is diverted into other channels and so made to refresh the land. In the portions of the country where the subsoil does not hold water, or where the rainfall is slight, poverty and want are the chronic conditions of the people. The Hindoo, unlike the people of western nations, regards the export of food with disfavor as a method of depleting the means of subsistence and not as a source of wealth. Hence the slow growth of the export of the grain which is so laboriously produced.

The land is plowed twenty times in some regions and two or three in others. Eight times is about the average. The plows are merely sticks pointed or shod with iron, and are drawn by small and ill-fed bullocks. The plow simply tears up the surface, scratches, or "tickels" it. The plows cost about forty cents; the cattle from $5 to $20 a pair. About three-quarters of an acre can be plowed or passed over in a day. The harrowing or pulverizing is by a wooden log drawn over the ground. The harvesting is done by a sickle worth four cents. The operator rests on his heels, cuts a handful of straw, lays it down and waddles to the next handful. He harvests one-twelfth of an acre a day and is paid five cents and boards himself. The binder follows and does up the fallen grain into small sheaves. It is then shocked, and after a day or two, carted to the threshing floor, where it is threshed by the feet of cattle. The grain is winnowed by wind power, either the wind of nature or an artificial breeze, produced by a blanket waived by two men. The straw is fed to cattle. The grain is sent to market or buried in the ground to await ressurrection when prices advance. The seed is sown by hand, droped one-by-one or two-by-two, in the little furrows, or from the end of a bamboo tube, a sort of boy's "bean-shooter" put upon a peace basis. The fields of growing grain are often weeded, and the crop is irrigated three times—after germination, before blossoming, and in the ear. The sowing is in September or Octo-

ber, the harvest in March or April. A comparison of the value of Indian and American wheat in the English market shows that when "Calcutta wheat No. 1" was sold for $1.27 a bushel, American wheat brought $1.44. The comparative cost of wheat in the two countries in 1886 was as follows:

India.		*United States.*	
Value per quarter at Delhi	$4 85	Value at Chicago	$7 99
Freight to sea	1 55	Freight to sea	1 50
Ocean freight	1 60	Ocean freight	1 60
	$8 00		$10 00

The difference as laid down in England was twenty-five cts. a bushel in favor of India. The difference in quality was in favor of our wheat, which is cleaner and better.

The India wheat does not go to England alone. The course of exportation for several years is worth noting.

	To Un. King.	*Total export.*
1876-7	8,096,000	10,442,000
1877-8	10,698,000	11,835,000
1878-9	1,597,000	1.950,000
1879-80	3,037,000	4,098,000
1880-81	8,964,000	13,896,000
1881-82	17,508,000	37,078,000
1882-83	12,273,000	26,402,000

It will be seen that in the earlier years a very large share of the export went to the United Kingdom, and that the proportion has greatly declined in later years. At the same time the proportion taken by France, Holland and Belgium largely increased. Egypt also takes an immense quantity, and the export from India to Italy grows. In Italy the India wheat is used for paste preparations. The shipments to Egypt are mainly in transit. They are transferred thence to continental ports in Europe.

How rapidly the increase of grain culture and export in India is affected by the introduction of railroads has a remarkable illustration in the case of the town of Dongargaon on the plain of Chatisgarh. This place in 1857 was a pretty hamlet of twenty houses. In 1862 the grain trade began by the settlement there of a wheat buyer. In 1877 the houses numbered 2,000, and on the busy "bazaar" days the market attracts a crowd of 100,000 people. This marvellous change is the result of the building of a railroad. In India the teeming population awaits the railroad. In the United States the population accompany and follow the construction of the road.

The export of wheat from India began about twenty years ago. In 1868 the export was 559,000 bushels. The trade grew steadily for ten years, and in 1878 reached 11,896,000 bushels. Two bad years followed, aggregating about 6,000,000. For the last six years the returns are as follows:

	Bushels.		*Bushels.*
1882	37,148,153	1885	29,588,311
1883	26,495,024	1886	39,312,969
1884	39,202,636	1887	41,558,249

The detailed returns for the last two crop seasons ending March 31st, as by the memoranda of the statistician, Mr. E. H. Walker, are as follows:

Exports to	1886–87. *cwts.* 112 *lbs.*	1885–86. *cwts.* 112 *lbs.*
United Kingdom	9,667,619	12,071,218
Belgium	2,403,785	2,661,583
France	2,803,670	2,145,243
Holland	206,945	85,918
Italy	5,212,305	1,218,269
Egypt	1,317,654	2,296,153
Other countries	651,370	582,135
Total cwts	22,263,348	21,060,519
Equal in bushels	41,558,249	39,312,969

For the crop of 1885–86 the acreage was 27,405,772; yield 256,530,923 bushels. For 1886–87, acreage, 26,735,484; yield, 238,585,947 bushels.

The following table presents in a form convenient for comparison, some of the important contrasted features of this subject.

	India.	*U. States,*
Population	260,000,000	60,000,000
Area, square miles	1,383,000	3,000,000
Miles of railroad	13,250	138,000
Population to mile of railroad	20,000	435
Population engaged in agriculture	70,000,000	8,000,000
Number of farms	.....	5,000,000
Wheat, acreage	27,000,000	34,000,000
Wheat crop 1886, bushels	256,000,000	360,000,000
Export of wheat 1885–86, bushels	39,000,000	132,000,000
Average product per acre, bushels	10a17	11a12
Average value period of years, bushel	68c	85.5c
Exports 1881–6, bushels	175,000,000	800,000,000
Average crop 1880–6, bushels	.....	448,000,000

A moment's consideration of the foregoing table will exhibit to the reader the relative situation of India and the United States as wheat-producing and wheat-exporting countries. The English corn merchants make the most of the Indian product. A Mark Lane report in 1885 says the India wheat is steadily improving in quality, and that it affords "a larger margin of profit to millers and bakers than any other." Yet the wonder never ceases in English journals and periodicals, why, with all the repeated plowings in India, the lack of modern methods and the difficulties of distance and cost of transportation, the home farmer contends with the Hindoo at such great odds. Nor are these journals slow to predict that India must expel America from the English grain market.

This last conclusion is one in which "the wish is father to the thought." Our Consul-General at Calcutta, in his latest report, does indeed take the English view, basing it on the great cheapness of labor in India, and the low cost of the farmer's outfit in land and tools. To be sure, wheat-growing land and wheat-exportation have made great progress in India within the last few years, but the work of transportation, the expense

of irrigation, the lack of railroad facilities and the inferior quality of much of the grain are important factors in the problem. This inferior grain is mixed in England with better grain and thus a fair grade of flour and only "fair," is made. But the day when India wheat will take the place of that produced in America is yet remote. The specially prominent advantages of India are the peculiar productiveness of soil and climate, and the fact that food crops are produced throughout the year, so that the wheat crop is in some sense an "extra" and is not the only stay of the people for subsistence. This consideration is strongly urged by the advocates of India, yet the fact remains that out of 250,000,000 bushels produced, only one-sixth at the best has been exported, while of the 360,000,000 grown in the United States, one-half has been exported. The population of India, four times that of the United States, is thus shown to be a consumer of wheat. In the future, if they raise more they will eat more, and if their exports increase they must rise to very great proportions to equal or surpass those of the United States.—*N. Y. Mail.*

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THE MUD-PRESS.

EDITOR PLANTERS' MONTHLY:

Economy and thrift, among some of those engaged in the sugar industry, in the Hawaiian Islands, are to all appearance, plants of slow growth. Our luxuriant climate and rich soil, have not imperatively demanded of us that peerless economy and unremitting thrift, should be the alternative of utter failure in the sugar enterprises; and, as "necessity is the mother of invention," we consequently fall into line but slowly, in the above named direction, and almost always under protest. At the same time, even the most superficial observer cannot fail to see that steady progress is being made. Our European friends engaged in the production of sugar in their own country, have shown us that very small things are worth looking after. They not only arrange for taking the mud-cake from the juice, but they also arrange their presses to take the sweetness out of the cake.

Not many years ago, all our planters were in the habit of throwing all the skimmings away, except what portion of them the mules could use for food—not a very likely diet, even for a mule—but as the price of sugar declined, and labor advanced in price, it became apparent that we could not longer afford to take but one bite out of our biscuit, and throw the balance away. Sensible men soon began to see that the crescent thrown away, meant the difference between making money and eking out a miserable existence.

The introduction of the mud-press has been one of the most important steps taken in the line of economy; for by its use, we not only get all the juice away from the mud and other impurities, from which to make four per cent more sugar, but we get the mud-cake itself in great quantities, which, either alone or mixed with ashes from the boiler furnaces, has proved one of the best fertilizers yet tried on our cane fields; and no one who has not seen it, would credit what a pile is made from these presses, in taking off two or three thousand tons of sugar. This fertilizer is better kept under a roof, otherwise it will lose much of its strength.

Most people, when first using these presses, are disappointed with the results, partly because they do not get enough press capacity to do their work, and cannot allow time for the presses to form good hard cakes; and partly because they do not have the experience needed to enable them to guage the proper quantity of lime required to be added to the skimmings, to cause the free separation of the juice from the impurities, so that filtration through the cloths, may be the more rapid. Perhaps no boiling-house in the country has enough press capacity to do the work well: besides, what may be enough for one plantation may not be enough for another plantation, doing a similar amount of work. But speaking in a general way, three or four twenty-eight frame-presses, will do the work for eighteen to twenty tons of sugar per day. Where the dirt is sent to the fields, instead of to the refinery, four presses are better than three; and it is best to get the full capacity to begin with, and not try one, then another, and still another.

No boiling-house can afford to be without mud-presses, even if they get the cane delivered at the mill free of charge. But, as the cane usually costs nearly two-thirds the whole price of the sugar, such economy should be practiced in the boiling-house, as will prevent the throwing away of four per cent of all the cane ground. Some boiling-houses have of late, paid more attention to the cleaning of the juice than formerly; and as cleaner sugar means more mud, more presses, higher polarizations, more fertilizer, and greater economy, let every planter give his sugar-boiler tools to work with, on the score of economy alone: for according to the old adage, "willful waste brings woful want." On most plantations, the time required for press-cakes to form, if the thickness is, say one and three-eighths inches, is from two and one-half to three hours; and during the time of filling, they should be steamed out two or three times by the full boiler pressure. I know of only two reasons for not getting good hard cakes in the presses—one is the want of lime, and the other is the want of time. It is a mistake to strain all the fine trash out of the skimmings; the more of it that can be kept along with the slimy skimmings, the better they will work

in the presses. Care should be taken, however, that the small inlet passages do not get choked, or the breaking of a frame now and then, may be the result.

One of the important items of press work, is the washing of the cloths; they should be well washed, either in a dash-wheel, or tramped in warm water, so that the pores of the cloth may be thoroughly cleaned out every time the press is filled. The practice of scraping the mud from the cloths, and going on again for another charge, is followed by poor results. Changes of cloths should be ready before the presses are emptied, and then it takes but a short time to accomplish the change,

The settlings from the bottoms of all containers should, while sweet, be promptly put in along with the skimmings, and worked up quickly while hot. It is really better to throw away all the skimmings and settlings, than to allow them to stand over, waiting for the presses, until inversion has made such headway that the juice strained from them, when added to the other juice, would cause a loss rather than gain in sugar; and as our aim is to make sugar and not molasses, this is a point that should have the closest attention of the sugar-boiler. Cleanliness and despatch in sugar making are invaluable, and the reverse has cost many plantations a fortune.

ALEX. YOUNG.

DESIRABLE FOREST PRODUCTS.

We are not aware that the extraction of the black Burmese varnish has ever been fully described, and as some planters on the Nilgiris intend introducing the plant on their estates, and there is little doubt that in the near future it will be as largely cultivated as Cinchona, it is of the first importance that all practical details relating to the industry should be carefully studied in order to carry the enterprise to a successful issue. We likewise invite the attention of the planting community and Forest Department to equally valuable products which would undoubtedly thrive in Southern India, particularly in the Nilgiri District. The varnish tree, *Melanorrhœa usitata*, belongs to the order of *Anacardiaceæ*, which comprises the Mango, the Piar or Chirongi, (*Buchanania latifolia*) the Bhilawa (*Semecarpus Anacardiam*) and the varnish tree of Japan (*Rhusvernicifera*). It is found almost everywhere in the Eng Forest of Pegu and Tenasserim; and in the Tharawaddi district; it is particularly common in the lower part of the Eng belt, where the soil is said to be better than further east near the foot of the Gomah. The tree does not attain the same size as the Eng, Engyin or Theya, and at this time of the year (August) it may be known at once by its darker foliage. The leaves resemble those of the *Seme-*

carpus (*Chayben*), they are ovate-lanceolate, painted at both ends, and covered with soft short pubescence; they are narrowed into a short petiole, while the leaves of Eng (*Dipterocarpus tuberculatus*) are glabrous, much larger, and have a broad cordate base. Those of Engyin (*Pentacme Siamensis*) which have about the same size, and of Theya (*Storea obtusia*) are also glabrous, of an oblong shape with rounded ends. While these trees are in leaf it is easy to distinguish them. A large proportion of the Thitsee trees—from which varnish is likewise extracted—is generally found with the varnish tree in the Eng forest, and also a number of trees found in South India, though they are wanting in North and Central India.

Of cultivated trees, the Mango, Plaintain, Custard-Apple and Jack fruit are common. The trees which have been tapped are at once known by triangular scars about nine inches long and five inches broad, the apex pointing downwards. On some trees from forty to fifty of these scars may be counted, and many incisions are made at a height of thirty feet. To work the higher scars a most ingenious ladder is used, which is permanently attached to the tree. It consists of a long upright bamboo, with holes cut through at intervals of from two to three feet. Through each hole are passed two flat bamboo sticks, driven with their pointed ends into the bark. These form the spokes of the ladder and are about twelve inches long. The scars or notches to extract the varnish, are made with a peculiarly shaped chisel, about fifteen inches long; the handle is of iron, of one piece with the chisel and about nine inches long, the lower end thicker, hollow, and closed with a bamboo plung. The chisel is wedge shaped, about six inches long (the edge half an inch broad) and forms an obtuse angle with the handle. With this instrument, two slanting slits, meeting at an acute angle, are made upwards through the bark, and the triangular piece of bark between the two slits is thus slightly lifted up, but not removed. A short bamboo tube, about six inches long, with a slanting mouth and a sharpend edge, is then horizontally driven into the bark below the point where the two slits meet, and the black varnish, which exudes from the inner bark near its contact with the wood, runs down into the bamboo tube, which is emptied at the end of ten days, when it ceases to flow. A second cut is then made so as to shorten the triangular piece of bark which had been separated from the wood when the first cuts were made. A shorter triangular piece of bark remains, ending in an angle less acute than before, and the appearance of the scar is then as below. The bamboo tube,

which before was at *a*, is moved a little higher (to *b*) and the edges of the original cut (*c b* and *d b*) are cut afresh. The varnish then runs out for another ten days, after which the scar is abandoned. The trees vary in yield exceedingly. A crooked tree with very scanty foliage, which Mr. Douglas examined, was said to yield a good outturn, while some of the largest trees were said to yield very little. Mr. Douglas saw trees tapped which had a diameter of only nine inches. One man is employed to cut two hundred and look after one thousand two hundred scars per diem. Work is carried on only in those parts of the forest where the trees are fit to tap, are abundant, and stand close together. The tree yields nothing while it is leafless in the hot season, and the best season for working is from July to October. One man collects from forty to fifty viss (one hundred and forty-six to one hundred and eighty-two pounds) in one season, and the viss sells at Rangoon for one rupee. In the slack season these men are employed in making torches of the Eng tree woodoil, and we add particulars of the method pursued in the collection of this valuable article. Unlike the varnish, the woodoil exudes not from the bark, but from the outer layers of wood.

It will, however, be remembered, that among conifers, which all belong to one natural order, some, such as the Larch and Pinus Pinastur, exude resin from the wood, while others, like the Spruce, produce it in the bark. Deep, semicircular niches are cut into the wood: the first cut is from four to six inches deep, and from twelve to eighteen inches wide; the bottom of the niche being slightly hollowed out, to receive the oil. It oozes out and collects at the bottom of the niche about three days after the cut has been made. The surface is then charred with fire, after which the oil runs for three days; this process is repeated four times, and at the end of fifteen days, the surface of the niche is cut afresh, the old charred wood being cut away and the niche enlarged. After the oil has run for three days, the surface is again charred, and the original process repeated. The Eng tree yields oil throughout the year, and one tree often yields oil from several niches at the same time. Mr. Douglas saw a tree with six niches, two of which were yielding oil at the time. One man can make from two thousand to three thousand torches in a year, and one hundred torches require about ten viss (thirty-six pounds) of oil which is mixed with touchwood and neatly wapped up in the leaves of palms or of the Tsathoaben, a species of Pandanus, so as to form cylinders about twenty inches long and two inches in diameter. They are tied with thin strips of bamboo, generally of the Shizostachyum pergracile; leaves of the Licuala piltita are likewise used

for this purpose. A man can collect from seven hundred to one thousand pounds of woodoil in a year. The woodoil of the Kanyin tree is collected precisely in the same manner. One man can manage from thirty to forty oil-yielding Kanyin trees; he goes around with a number of hollow bamboos or other vessels, and one collection gives him from three to four viss. The torches sell at the rate of fifty per rupee and the Eng torches at rupees five per one hundred. The Eng and Kanyin trees so valuable for their woodoil; the Bambouay, (Careyea arborea) Thanat, (Cordir grandis) Mhayah, (also a species of Cordia) Maranta dichotoma, of which the beautiful soft Thinbu mats are made the cetechu and varnish trees, and several species of Sterculia for rope and an immense variety of other useful and necessary articles, would all thrive in the Nilgiri District and Wynaad, and would amply repay the planter for the cost and labor of cultivation. We commend these congenial branches of industry to planters who are seeking other investments for their capital than the played-out and overdone Coffee and Cinchona industries.—*Nilgiri, India, Express.*

(From *Jamaica Botanic Gardens Bulletin.*)

A very large number of seedling trees can be supplied from the Gardens at the nominal price of 1d. to 3d. each. Carriage is not undertaken by the Department, but can be arranged for at the rate of about two dozen plants for 3s.

The trees should not be planted closer together than twenty or thirty feet, according to the length of the branches. If it is found possible to plant them at regular intervals, it is preferable to have all the trees in one street of the same kind; if, on the other hand they stand at irregular intervals, it is better to have a variety.

In forming new streets, the rule to be adopted for the position of the trees on the road is that they should be four feet from the foot-path and clear of the water-table. They should never be planted on the foot-path where they would hinder foot-passengers, and raise the pathway by the growth of their roots.

In a road or street, the holes should be dug larger than in ordinary ground, about five feet wide at the top, and five feet deep. The earth taken out from holes in streets should be replaced with good soil well mixed with well rotted manure.

If an iron grating is placed on the surface round the stem, the soil remains soft, and allows water and air to penetrate to the roots. Probably the best plan in this climate would be to have a kind of gridiron arrangement with the bars attached by nuts, so that as the stem expands, the innermost bars could be removed. The grating should be at least three feet square.

It is also necessary to protect the young plants by means of

upright guards, which should be four or five feet high; and stakes are necessary until the plants are well established. Pruning is constantly necessary to keep the trees within bounds, and to give them a good shape. The trees, especially while young, require constant watering.

The following are a few of the trees suitable for planting.

The Eucalyptus or Gum trees are natives chiefly of Australia where they form forests, but they are also found in the Malay Archipelago. They are the largest trees in the world, some which were measured proved to be more than 400 feet high. The leaves hang vertically, thus giving a remarkable character to the scenery. Several species of Eucalyptus grow more quickly than any other tree; the timber is at first soft, and is easily felled, split and sawn, but when thoroughly dry it becomes as hard as oak.

Eucalyptus have acquired a reputation for planting in malarial swampy ground, and that for two reasons, first because they absorb an immense amount of moisture from the soil practically draining it, and secondly, because there is a large quantity of aromatic essential oil contained in their leaves, which becomes oxidized by the action of the air, and produces an active disinfectant—peroxide of hydrogen.

The "Red Gum Tree" (Eucalyptus rostrata) of Southern Australia thrives in wettish soil with a clayey subsoil, even when the water is slightly brackish. It is recommended as an antiseptic tree for cemeteries in tropical countries. It is of rapid growth, often attaining a height of sixty-five feet in six years, eventually reaching to a height of 200 feet. The timber is thought highly of, lasting well above or below ground, or in water. The government of Victoria, whenever practicable, use no other timber for bridges and railways; as railway sleepers it lasts twelve years.

The Yate Tree, (Eucalyptus cornuta) of Southwest Australia, is reported to have reached a height of eight or ten feet in the first year in plantations at Lucknow. It prefers a wettish soil. The wood is equal to the best ash.

The Iron-bark Tree (Eucalyptus Leucoxylon) supplies a valuable timber, worth 2s. 5d. a cubic foot in Melbourne. The wood bears twice the strain of American oak or ash. The tree grows to a height of 100 feet; it is generally found on slaty formations, but accommodates itself to any soil.

The Swamp Mahogany (Eucalyptus robusta) is said to thrive best in low, sour, swampy ground near the sea-coast. It grows 100 feet high with a grand mass of foliage, and resists cyclones better than most other Eucaluptus.

Other desirable Eucalyptus are the Manna Gum Tree (E. viminalis), the flooded Gum Tree (E. saligna), the Tallow Wood (E. microcorys), the Red Gum Tree (E. tereticornis), and the

Stringy Bark Tree (E. obliqua). A mass of information is contained in Baron von Mueller's Works.

The Tamarind (Tamarindus indicus) though of slow growth, is suitable for planting near houses, as it is large and ornamental, affording pleasant shade with handsome fragrant flowers. The fruit is useful, and the timber is beautifully grained and valuable for building.

Bauhima variegata, a native of India and China, is a beautiful shrubby-looking tree of twenty to thirty feet in height, suitable for open spaces. The flowers are handsome, of a rosy-white color. The dark wood is sometimes called ebony, but it is of little use. The astringent bark has been used as a tonic in medicine, and also for dyeing and tanning. Bauhinia megalandra, a native of some of the West India Islands, may also be planted in the same way.

Cassia siamea (also known as Cassia florida)* grows to a height of eighty feet at Castleton. It has large, showy, yellow, flowers. It is a native of India and Malaya. Cassia Fistula, the India laburnum, has flowers of the same kind, it is a middle sized, erect tree, reaching a height of forty to fifty feet. The pulp round the seeds is a mild laxative.

Lagerstroemia Flos-Reginæ (Queen's Flower) when in blossom, is one of the most showy trees of the Indian forests. A moist, damp climate is most suitable for its growth and for the full development of its rose-colored blossoms. It reaches a height of fifty to sixty feet. The timber is blood-red, and as it lasts well in water, it is used for boat-building. In Burmah it is employed more than any other timber except teak, for a variety of purposes, but it soon decays under ground. The astringent roots have been used as a remedy for thrush; the bark and leaves are purgative.

Spathodea campanulata grows to a height of eighty feet at Castleton. The branches do not spread, but the mass of rich orange-colored flowers gives it a most attractive appearance.

Caryocar nuciferum produces the Souari or Butter Nuts, the kernels of which have a pleasant nutty taste, and from which an oil may be extracted by pressure. The nuts have a very hard shell, and are enclosed, two, three or four together, in a fruit about the size of a child's head. The flowers are very large, and of a deep purplish brown color. The tree is a native of Guiana, where it often grows to a height of 100 feet. The timber is very durable, and is used for ship-building.

Sterculia carthaginensis, called "Chica" by the Brazillians and "Panama" by the inhabitants of the Isthmus, is a fine tree forty to fifty feet high. It has become naturalized in the West Indies, and does well in the plains. The flowers are yellow, spotted inside with purple. The seeds are about the size of

* The Wa of the Sinhalese, used largely as firewood on the railway.—Ed.

pigeon's eggs; they have an almond-like taste, and are sometimes eaten.

The Candlenut, sometimes called Walnut (Aleurites triloba) grows to a height of thirty to forty feet. The seeds yield oil, which is a good drying oil for paint. In the Sandwich Iles 10,000 gallons are annually produced and used there, as a mordant for their vegetable dyes. The cakes, left after the oil has been expressed, is used as food for cattle and also manure. It thrives along roads.

The Mountain Mahoe (Hibiscus elatus), a native of Jamaica and Cuba, reaches a height of fifty to sixty feet. The timber is valuable, especially to cabinet-makers; it has the appearance of dark-green variegated marble. The fibres of the bark make good ropes. The lacelike inner bark was at one time known as Cuba bark, from its being used as the material for tying round bundles of Havanah cigars.

Three species of Ficus are growing well in the Parade Garden: (1) Ficus indica is one of the Banyans, the roots which drop from its branches becoming new stems with spreading branches and fresh branch roots, so that of some of these trees, it is said, "at the age of 100 years, one individual tree will shade and occupy about one and-a-half acres, and rest on 150 stems or more, the main stems often a circumference of fifty feet the secondary stems with a diameter of several feet." (Mueller.) (2) Ficus lucida, another native of India, affords dense shade, (3) Ficus Benjamina, a natve of North Australia has handsome, drooping, willow-like branches. It forms part of the avenue at King's House. All these trees form very shady avenues.

The Ginep (Melicocca bijuga) is a native of Guiana and New Granada. It is a good shade tree, and there are very fine examples at King's House. The timber is hard and heavy, and the fruit has an agreeable flavor, but the stringy portion which is usually swallowed by children, is most injurious, and according to good medical authority has frequently caused death by coating the lining of the stomach.

The Flamboyante (Poinciana regia) is a native of Madagascar. It is a tree with very showy flowers, and is suitable for planting in open spaces, or in broad mixed avenues.

The Red Bead Tree (Adenanthera Favonina) is a native of the East Indies and China, growing up to an elevation of 4,000 feet in Sikkim, The common name is derived from the bead-like seeds, which are of a bright scarlet color, and of a uniform weight (4 grains) so that they are used by jewelers in the East as weights. By rubbing the wood against a wet stone, a red dye is obtained, which is made use of by Bramins for marking their foreheads after religious ceremonies of bathing. The tree affords hard, durable timber called "Coral Wood," or "Red Sandal Wood." There are trees in the Parade Garden and in Orange street. They are well suited for avenues.

The Kananga (Cananga odorata) of India is largely cultivated there for its ornamental appearance. It is soft-wooded, quick growing, ultimately reaching a height of 150 to 200 feet. The specimen at Castleton is at present about forty feet.

The Guango, or Rain Tree (Pithecolobium Saman) is a native of Brazil and Venzuela. It is fast-growing and ornamental, and very suitable for open spaces. It is so much desired in India that in 1880 the Jamaica Botanical Department sent 130 pounds weight of seed, Dr. King, the Government Botanist in Calcutta, says of it: "This wonderful tree grows faster than any hitherto introduced into Bengal, with the single exception of Casuarina. It gives a beautiful shade and yields a pod with a sweet pulp which is greedily eaten by cattle. For avenues, cantonments, squares. and situations where dense shade is wanted, no tree is more suitable than this."

The Casuranias are mainly Australian, but are also found in the East Indies and Polynesia. They grow quickly but are not good shade trees, for the leaves are represented by scales. The general appearance is something like the larch. The timber called "beefwood" in Australia, is hard; it makes excellent firewood, and as the ashes retain heat for a long time, it is much used for ovens and steam engines. Casuarina equisetifolia, the Swamp-Oak, is found in the East Indies and Polynesia. The hard wood is known as "Iron-wood;" it is durable under water, forms good posts, and bears a considerable strain. This is an excellent tree for planting in sandy districts along the sea-coast. Casuarina stricta, the Hurricane Tree, is found in the islands of the Pacific. At Castleton, it has grown to eighty feet. Casuarina muricata, from India, has a showy wood of great weight. Grown close, it forms pretty avenues in narrow roads.

The Betel-nut Palm (Areca Catechu) of tropical Asia is a very graceful palm of remarkably perpendicular growth, with a trunk seldom more than six or eight inches in diameter, it grows to a good height—at Castleton, it has reached sixty feet, The flowers are very fragrant. There is an immense trade in the nuts in the East, for the Malays and other natives use them for chewing, rolling a small piece up with some lime in leaves of the Betel Pepper.

The Talipot, or Umbrella Palm (Corypha umbraculifera), of India and Ceylon is a very fine Palm, sixty to seventy feet high, with fan-shaped leaves, twelve feet in diameter.

One of the Royal Palmettos (Sabal umbraculifera), a native Palm, is well worth planting.

The Oil Palm (Elaeis guineensis) has become quite naturalized, growing wild in some parts of Jamaica. The Cocoanut (Cocoa nucifera) is also suitable for planting.

DISEASE IN ORANGE TREES.

Last May the following prescription was given to be used for orange trees which had begun to die off. The bark was decaying at the collar, and from the original starting point the decay was spreading and in some cases had completely encircled the stem. The leaves had begun to turn yellow, and there is no doubt that the whole plantation was doomed, unless the remedy proved effectual:

Apply to the wounds in the bark a mixture composed as follows: 2 lbs. stiff clay, 2 lbs. flowers of sulphur, ¼ lb. soft soap, 1 tablespoonful kerosene oil, mix with water to consistency of paint and apply with a brush. The oil should be added last, and the mixture should be allowed to stand twelve hours before being used.

It is satisfactory to have received the following statement, dated 2d September:

"After having applied, on two different occasions—at an interval of ten days—the preparation you were good enough to prescribe for my orange trees—the disease—whether fungoid or animal which attacked them at the end of the stem just where it touches the earth—completely disappeared. The trees whose peel had been eaten away all round the stem have died, but wherever there remained a strip of peel to connect with the peel on the roots the tree has recovered, after lingering more or less according to the injury it had sustained prior to the application of your prescription.

"There is no appearance of the disease at present on any of the trees, and the peel newly formed is covering over that part of the stem which the disease had eaten away.

"It seems to be rather singular that all the trees of a plantation, numbering over 200 were attacked simultaneously by this disease, and that they were mostly young trees, though a few old trees in the immediate neighborhood suffered equally.

(Signed) OSCAR MARESCAUX."

CINCHONA.

Some Cinchona trees have lately been dying off. On investigation, it was found that the bark at the junction of stem and root had been injured, and that in consequence the mycelium of a fungus had penetrated between the bark and wood. The bark had become loosened on the roots and decayed away. It is probable that the injury was caused by the wind during the last hurricane. It would be difficult to detect such injury at first, but probably an early application of the remedy prescribed above for the orange trees would have saved the trees. Trees which are too far gone to save, should be taken up by the roots, and barked. The bark may be stored, after thorough

drying, for mildew does not affect the quantity or quality of the alkaloids, when once the bark is cured.

COFFEE CULTURE IN RIO JANEIRO.

Reporting on the general state of the province of Rio Janeiro, the British Consul thus speaks of the coffee:

"In the districts of Cantagallo, S. Fidelis, and other parts, for some years past, the coffee trees have been subject to a disease manifested firstly in the yellowness of the upper leaves, and afterwards in the shoot, the trees soon drying up. In this way about one-tenth part of the trees in the above-named districts have perished. This disease is supposed to be propagated by an insect which lives in and feeds on the roots. It deposits its eggs in the knots of the roots causing the fibres of the same to rot. On this the eggs are seen, having the shape of mushrooms. This generally takes place in the heaps of weeds or grass which rot at the foot of the trees, forming a fine soil for the new root fibres. As a remedy against this evil it is recommended by Dr. Glaziou that the weeds and grass should never be heaped up to rot near the roots, but should be left to be dried by the sun and afterwards brought together and burned. The orange trees are also subject to be attacked by the same plague. Dr. Glaziou is convinced if the rule be attended to that in two years' time the coffee estates will return to what they were formerly."—*Gardeners' Chronicle.*

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THE PIMENTO TREE.

It has recently been suggested that the pimento tree could be grown in Southern California and Florida, and that the production of its berries, generally known as allspice, would be profitable. There is little reason for believing that the tree would grow even in the most favored parts of the South, or that there would be profit in raising the berries if the tree would endure the climate. The pimento tree is a native of Central America and the West India Islands, and when they were discovered its fruit was for a time very popular, probably for the reason that it was new. Finer spices are used now than in the days of the conquest of America, and allspice appears to be the least used of all. In a recent number of the *St. James' Gazette* a correspondent has this to say about the pimento tree and its product:

"What is allspice? Most people would hazard the answer that it is a mixture of spices in which there are several ingredients. Cinnamon, nutmeg, cloves and cardamons are supposed to be mingled in it, the result being a flavoring mixture of special merit. It is true that allspice does combine a very agreeable variety of flavors; but it is a simple and not a compound product. We are indebted for it to the tropical islands of the

west; but practically all that comes into commerce is the growth of one island—Jamaica. Allspice is the name given to the powdered berries of what is known elsewhere as pimento, or Jamaica pepper. The plant yielding these berries is a near congener of the pomegranite and guava, and is known to botanists as *Pimenta vulgaris.* It is a handsome evergreen tree, something like arbutus in habit. The bright, glossy leaves have quite a spicy odor when bruised, and recall at once the allspice of commerce. The flowers grow in dense clusters, almost like hawthorn, but greenish in color. Following these we have small, green, aromatic berries the size of black pepper. If allowed to ripen they become pulpy and lose some of their pungency. For commercial purposes the berries are gathered when green, carefully dried in the sun on barbecues or platforms, and, when well cured, are packed in large bags holding 160 to 180 pounds, and shipped.

"Pimento trees are natives of many parts of tropical America, but nowhere are they so plentiful or thrive so well as in Jamaica. The properties devoted to the growth of pimento are called pimento "walks." Several hundreds of them are dotted over the limestone hills to the west of the island; but strange to say, the trees are never actually planted, nor do they receive any cultivation worthy of the name. The whole industry is one in which man does but little except reap the result. But in many years, owing to low prices, the results are not worth reaping. Hence the pimento grower has often to fall back on his cattle and horses, raised on the rich pasture beneath the spice trees. In spite of low prices, however, the pimento industry is, as a whole, of considerable value. In 1874, a bad year, the value was only £36,000; in 1880 it was £146,000. The grower seldom gets more than two pence per pound for it when cured. It is certainly more mild and innocent than most other spices, and it is largely used in various dishes, so that a better time may come for the grower.

"I mentioned just now that pimento trees are never planted by the husbandman. It is all the work of birds, who feed on the ripe pimento berries and scatter the seeds over the land. The seeds soon germinate, and the warm genial rains and tropical sun do the rest. What man does is to thin out the trees where they are too thick, clear off other trees that interfere with the pimento, and then a "walk" is established. The surplus plants, taken up with good roots, are shipped to make walking sticks and umbrella handles. The wood of the pimento tree is very close in texture, takes a good polish, and is of a fine rich color. A few "male" or barren trees are sometimes cut down, but otherwise pimento wood is too valuable to be used for commercial purposes.

"The pimento "picking" is a time of great excitement and

activity in a district. Troops of negroes, the women dressed in bright colors, collect together. The men break off the branches laden with green berries and pass them to the women, who, sitting in a circle and chatttering as only negro women can chatter, strip them by hand. The berries are carried to the "works" at night, piled in a heap, and left to undergo a certain amount of fermentation before being dried in the sun. When cured they are dull brown little balls, very light, fragrant, and possessing the well-known allspice flavor. The pimento industry has been in existence in Jamaica since 1771. Even so early as that period about three million pounds were exported. An excellent liquor, known as "pimento cordial" or "pimento dram," is made from the pimento berries; this is a specialty in Jamaica country-houses. Visiting a pimento property while "crop is on" one would fancy that the birds as well as the people had imbibed pimento dram. Flocks of parrots and parroquets shoot from tree to tree, screaming discordantly; but, as Gosse remarked, they are intelligent enough to be as quiet as mice directly they alight to feed on the pimento berries. They are then concealed by the greenness of their plumage. They deserve some share of the profits, for to them we owe the very existence of the pimento berries."

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VALUE OF SUGAR STATISTICS.

Our people generally do not properly appreciate the importance of compiling statistics to show the magnitude of our sugar industry, and its far-reaching dependencies and effects. We are led to this reflection by seeing that the Committee on Sugar Statistics, appointed by the Louisiana Sugar Planters' Association, have great difficulty in getting other planters to co-operate with them in this work.

The object of this compilation is to lay all the facts before Congress, who erroneously suppose that "only a handful of Louisiana sugar planters" are interested in sugar protection. It should be shown that notwithstanding the threat of putting sugar on the free list, which has for years been hanging over sugar planters' heads "like the sword of Damocles," yet the sugar product has been steadily increased until now it has reached a point to equal any existing two years before the war.

It should be made known that not over *one-tenth* of our territory, adapted to cane culture is now devoted to that crop, and that, under a proper system of protection, in a very few years the country adapted to tropical cane *alone* could supply the whole nation with its sweets. Then, when it is remembered that fully one-half of our country can profitably produce sugar from sorghum or beets, it would be a suicidal policy to put sugar

on our free list and deprive our own people of the hundred million of dollars annually spent for sugar.

But perhaps the most important data to be compiled is to show the very large number of people who are directly or indirectly dependent upon the Southern sugar industry. Instead of the thousand sugar planters being alone dependent, there are at least *fifty* thousand black field hands, about *two hundred* thousand women and children (their families); several thousand white mechanics; the *entire* population of all the sugar parishes, numbering several hundred thousand more; and besides this, the business of our great metropolis, New Orleans, is fully one-half dependent upon this same sugar industry. Just think of the vast army of overseers, sugar makers, engineers, coopers, blacksmiths, stablemen, etc., etc., who have to be employed to carry on the one thousand sugar plantations.

But, to convince most men, you must touch their *pocket.* Hence, the Western Congressmen must be shown that *their* constituents are vitally interested in protecting this important industry. The value of the annual supply of mules and horses, exclusively purchased from Tennessee and Kentucky, should be tabulated; the value of the implements, made almost exclusively in the North and West; the cash value of corn, meat, oats and even hay, purchased by our sugar planters from the Northern producer; the flour, meal, and a *thousand* items which need not be enumerated.

If the duty is taken off sugar, or even materially lowered, it will be "killing the goose that lays the golden egg," for all the people enumerated above, and we feel sure when all the *facts* are known we will be saved from that dire calamity.—*Sugar Bowl.*

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BLACK WALNUT TREES.

A correspondent asks for some information about black walnut, its time of growth, uses and how best to plant and cultivate it. There is no better tree to plant for future generations than the black walnut. It is of slow growth, but of great value when matured, and any young man now settling on his own farm who is shrewd enough to utilize its ravines and knolls, where he cannot conveniently raise grain, by planting them in walnut trees, may hope to live to see the time when he can sell the trees for a small fortune. The owner of a piece of rough land in one of the border States, finding it of little use for farming, planted thereon walnut trees, raising them from the seed mostly, but filling in the gaps where the young trees died with hardy sprouts from the forest. In time he had nearly twenty acres covered with a fine grove of thrifty young walnut trees. Once well started, they needed no fostering or

favor, but went on slowly through the passing years, putting on noble growth and stately proportions. They heard the roar of battle afar off, and many a band of gallant scouts dashed under their broad, spreading branches, but, fortunately, no whizzing cannon-balls wounded their lordly trunks or rent their thick foliage. And when the storm of war had passed, the man who had planted the forest came back to his own. Little had the battle tempest left him save this forest of stately trees. Thirty years from the day when he first plowed the hillside to plant the nuts thereon he sold his walnut grove for $20,000. Few farm investments could have been looked to for a return like this with so small an outlay of labor and capital.

On almost every farm in the older States there are broken portions, indifferently adapted for crops. These should be used for the growth of forest trees. On prarie farms, where the whole surface is arable land, trees should be planted for shelter belts on the north and west sides of the farm. The land for the raising of walnut trees should be plowed and harrowed. The nuts may be planted at once in the furrows, or they may be raised in a nursery and transplanted. Dropped nuts may be covered with the plow. If young trees are set out it will be necessary to open holes for them with the spade, and in planting them the earth should be packed very firmly about their roots. This planting should be done as early as possible in the spring, as soon as the soil is dry enough to work well. The best practice in tree planting is to set closely, about six feet apart or nearer, thinning the rows out after some years, when all have grown up tall and straight, if it is desired to allow part of the trees to become large, and to give room for the spreading of their branches. The young trees should be thoroughly cultivated for a few years. The first summer the two-horse cultivator may be used, after this the double-shovel is needed. In the fall after planting it may be well to bank them with a turning-plow as a protection against winter storms. The hoe is needed while the trees are small, but in later years the shade will keep down the weeds. If planted thickly there is little need of trimming the trees, as the side branches will wither and die off when the tops form a canopy. But if the trees have room to spread side branches will form, and these should be judiciously trimmed away. If a tree here or there appears stunted or injured by insects or any accident, cut it off at the ground in the winter, and it will be reproduced by a strong, healthy root.

The black walnut is a tree of many uses. Its nuts are always of marketable value, and when green are used for pickle and to make catsup, which a favorite ingredient in table sauces. Walnuts also yield an oil which is much used in painting, and is also liked by some persons as a salad oil. The

cake left after the oil is pressed out is used for feeding cattle and poultry. The wood of the walnut, however, constitutes its greatest value, being very extensively used in cabinet-making, and always in demand. The bark of the walnut tree and husks of the nut yield, by infusion, a valuable brown dye, which is used mainly for staining wood.—*Chicago Inter-Ocean.*

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MARRIAGE OF FLOWERS.

THE PROCESS DESCRIBED BY VENERABLE GARDNER JOHN THORPE.

The flowers that bloom in the fall are now to be found at the fall exhibition of the New York Horticultural Society. Three long tables were covered with cut chrysanthemums of rare and radiant design and color.

To appreciate properly the exhibition, however, the services of John Thorpe will be necessary.

John Thorpe is a somewhat tall and very valuable chrysanthemum whose trunk of brown diagonel, with a calyx of beard under his chin and a corolla of shrewd and rugged features, lights up with interest when he discusses his favorite pursuit. He is the Secretary of the Society and lives at New Rochelle. When John Thorpe sits down in the shadow of a date palm, with two chrysanthemums about to be married in his hands, he becomes singularly interesting. Of the two chrysanthemums the bride is arrayed in spotless white and the bridegroom in the brilliant vestment of red.

"The marriage of two flowers," says Mr. Thorpe, in a semi-poetic but entirely practical way, "is exactly like any other marriage. Most of the flowers on exhibition here are composite varieties, but in the simple varieties the male and female flowers are instantly distinguished by a practical eye. The development of the chrysanthemums is nothing more or less than the breeding of them and exactly like the breeding of fine varieties of stock. Five years ago we had nothing but simple flowers. Now you see the wonderful variety of shapes and sizes and colors which has resulted. This has come from hybridization and that is done in this way.

"Cutting off the long petals of one of the flowers, he showed at the base of each the pollen which had ripened and was ready to be scattered by the air in the shape of an impalpable powder. Cutting away the petals of the other, he brought to view a multitude of the stamens, slightly sticky. Whenever the pollen powder touches any of these sticky points, a floral union takes place, and the flower grown from the resultant seed partakes of the characteristics of the two which went to form it.

"In growing the flowers," Mr. Thorpe continued, "we take a

fine camel's hair brush, and with it transfer the pollen from one flower to another. This process, in nature, is fulfilled by the air, by insects, and in various ways. There are some flowers which are fertilized only at night by moths. There are others which are wedded only in the day by butterflies and humming-birds reading marriage service over the flowers in the garden. There is quite an opportunity for poetry in flower culture. The arrangement is sometimes very wonderful," he said, taking a quaint and grotesque orchid in greens and browns. "This flower is self-generating, and the fertilization is carried on by the ants. The ant can get into this flower only by going over the pollen cells, and the pollen clings to him. He can get out only by passing over those places which the pollen needs to touch, and for the new flowers the ant alone is to be thanked. The same way of developing flowers can be applied to any variety. You could breed roses, for instance. The value of the chrysanthemum, however, is that you get your new results in a year, where with roses equally satisfactory results would require five years."—*New York Churchman.*

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DAIRYING A PROGRESSIVE ART.

BY J. W. DARROW.

There is no branch of farming or stock keeping that is more progressive in its tendencies than dairying or butter-making. If great strides have been taken in the improvement of machinery for tilling the soil or harvesting the crops, so have they, also, in the means used for converting milk into the butter product. If the days of grass scythes and grain sickles have passed, so likewise have the days of the churn, the skimmer and the butter ladle. And if the mowers and reapers of to-day are crude and bungling as compared with what inventive genius may in the future produce, so may the implements and utensils of the dairy be susceptible of like improvement; hence we say that dairying is a progressive art.

We have not to span many years in memory, to recall the very different scenes of other days, when grandmother churned the cream in the old dash churn, and worked the life out of the butter with the wooden ladle. Then milk was always set in pans, because they knew no better way; but as compared with the deep setting of the present time, the only conclusion that can be drawn is, that much cream was lost, much less butter made than should have been. Then milk was skimmed with a perforated skimmer, after the milk had become so sour that a respectable pig would almost refuse it. But now they have an idea that the old process was wrong; that instead of removing

the cream from the milk we should remove the milk from the cream, as is the case now in all well-regulated, up-to-the-times dairies, and all this when the milk is yet quite sweet. Six or eight hours is long enough for milk, under proper conditions, to send up its cream; and where centrifugal separators are used in large creameries, it is not necessary to wait as long as that. A vast difference, is it not? between the old perforated skimmer and the separator.

In the matter of churns, like advance has been made. The old dash churn was enough to weary any one of butter-making (and parenthetically we may remak that some of the trouble about "boys leaving the farm" can be accredited to the old dash churn). Boys could churn before breakfast, you know, as well as not, or when the hired men were resting. The old churn has haunted many a boy in his dreams.

But now another principle has been utilized in breaking the milk, whereby not only greater ease is secured to the person, but more cream and butter result. There is a wide difference between the butter gathered in the dash churn and the globules that roll about in the swing churns of to-day.

The old ladle, too, has been superseded. Spat and rub, spat and rub, was the ladle method, and of course the butter was spoiled; the globules were broken and a pasty, sticky substance called butter was transferred to the tubs for shipment. But step into a well-regulated dairy now and see what are the butter-making utensils used. As unlike the ladle as can be imagined.

So, too, in the shipment of the product great improvement in putting up has been made. Then, great massive rolls were sent to the stores, and butter for city markets always went in tubs, and it was lucky if they were clean. Now, the highest priced product goes to market in Welsh pails, in little packages, in neat prints, and as a result it brings more money. Quality, neatness and attractiveness are three indispensibles in successful butter-making, and every year makes new methods whereby the most money can be made and the least labor incurred in dairying. And the end is not yet.—*N. Y. Independent.*

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The Louisiana *Sugar Bowl* says: "As the past has been a phenomenal sugar year, it is not just to the interest to estimate our ability, on that basis, to stand a reduction of the sugar duty. Such a season is met but once in the time of each generation. We hope our planters who have prospered will be prudent, and use their gains to prepare for the evil day that may yet come. The best appliances of every character should be erected. It will pay. Just see what Gov. Warmoth did, with his best equipped sugar house in the State—made 2,400,000 pounds refined sugar from 620 acres of cane."