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SUGAR.—New York Aug. 25.—This market continues firm, quiet for want of supplies and unchanged from last week, both for raw and refined. The demand for the latter is quiet. Meltings are about the same as last year at this time, but since January 1 lead last season by 24,000 tons. Centrifugals 96 test 4 15-16.

Willet & Gray's Statistical (August 23) says: "There has been no change in price or conditions during the week under review. Receipts of raw are unusually light and quite inadequate to the requirements for meltings, and stocks are further largely reduced to 88,633 tons, against 184,643 tons at same time last year. Very fortunately, under these conditions the demand for the refined product is light, otherwise there would naturally result a decided corner in the market during the next few weeks, while waiting for increased supplies, which can only come from new crop sugars, which are not available for several weeks yet. Most anything imaginable may happen in the interim with refiners stocks reduced to 88,633 tons, and a certainty of only small weekly receipts and virtually no available sugars for sale anywhere in the sugar world for prompt use. Meltings must be reduced somewhat or refineries closed before very long. Four weeks running at present rate with four weeks receipts at present rate, would exhaust every available pound of sugar in the country. Under these conditions raws cannot decline for thirty days at least, and if any sugars can be brought out anywhere they might, in extremity even, bring an advance. Refiners, however, are well up in deliveries of product contracted ahead, and if jobbers have still a fair supply of stock for next few weeks' requirements, the situation can be bridged over fairly well by a reduction in the meltings or closing of refineries temporarily. Refiners are now depending mainly on the arrivals of Java sugars. Three cargoes of Javas came in this week, and there are reported 145,000 tons further, which are on the way, but the receipts of which will be strung along over about six weeks."

RAWS.—New York, Aug. 30.—The receipts for the week were much more than expected and larger than the meltings, hence there is no reduction in stocks and 89,000 tons still remain for use during next six weeks, plus what may be received from week to week. Only one refinery, the McCahan, of Philadelphia, has thus far been obliged to close for lack of supplies. Others must follow if receipts do not keep up, but the A. S. R. Co., having the fullest supplies, reaps advantage from the closing of independents. Few Centrifugals and a few Muscovados could be bought this week. The raising of prices would make no difference as there are no sugars for sale, hence quotations remain nominally unchanged for Centrifugals as well as Muscovados, of which a few were bought at current quotations and a few more may come on the market soon, but only in dribbles for the next six weeks.—Willett & Gray, Aug. 30.

Advices from both India and Mauritius note a larger advance in the price of sugar than has been known for ten years past. These are both sugar markets in which material fluctuations in the price rarely take place, and indicate a scarcity of stocks for export. The output in India has been lessened by the famine, which has prevailed there for two years past.

LARGE JAVA CARGO LOST.—Cable advices today, Aug. 30, report the steamer "Indra," with 8,000 tons Java sugar on board, as ashore near Aden and likely to prove a total wreck. She was bound for the Delaware Breakwater and due to arrive September 23d. The cargo was owned by the American Sugar Refining Co., and this disaster reduces their next month's supply of raws 8,000 tons, which is important at this time of scarcity of raw sugars. If there are any further losses of cargoes on the way, or if steamers are delayed by breaks in machinery, etc., which frequently happens, it will be necessary to close some refineries and the grocers may thus be unable to secure their supplies of refined sugars in season for requirements.

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CONCERNING FRUITS AND VEGETABLES.

The orange crop of Florida, which has been rapidly increasing during the past few years, will this year tally nearly if not quite 750,000 boxes. The demand for this fruit is constantly increasing in the United States and also in Europe. We have not had an opportunity to sample the Florida orange, which is

said to be preferred in the eastern markets to that of California. The latter are not so large and sweet as formerly, which may be owing to less care taken in fertilizing, harvesting and packing the fruit than was formerly done. While the young trees may be well cared for, the older orchards are often left to take care of themselves. In Florida the greater part of the orchards are young and in their prime, which may account for the difference in the quality of the fruit. Orchards of any fruit need the same constant care in cultivation, trimming, fertilizing, etc., that annual crops, such as grains and vegetables require. In the long run, it pays a hundred fold in the quality and quantity of the fruit. There is no good reason why orange culture is neglected here in Hawaii, when our mountain slopes on each of the islands are so well adapted for them. We ought to export a hundred thousand boxes annually, ripening between January and March, just when they are most wanted abroad, instead of importing them from California, and many of them unfit to eat. A few years ago, in one of the ravines back of the village of Waialua, on this island, there was a grove of orange trees, planted by one of the mission families, where each year the trees were laden with the sweetest and most luscious fruit ever grown in any country. In later years these trees have disappeared owing to the advent of roving Asiatics, who too often destroy the old landmarks, and turn the Eden spots into a desert. There is no good reason why all the vallies along our mountain ranges should not be filled with orange, lemon, fig and other fruits which we now have to import or go without. Just now no fresh island fruits can be had in the market, except occasionally a pine, a measly melon, or a green tomato. This ought not to be the case in a land so admirably suited to the production of every variety of tropical fruits, that will grow without effort and yield most abundantly.

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UNITED STATES EXPERIMENT STATIONS.

The relations of the Department of Agriculture to the experiment stations of the several States becomes closer every year. An increased amount of assistance is given every year to the State experiment stations to enable them to carry out work of a national character. Cooperative work between the Department and the Stations is gradually increasing. The Department is consulted oftener regarding the organization and management of the stations, the choice of officers, the

lines of work to be undertaken, the execution of special work, plans for station buildings, materials and apparatus required for use in connection with the different kinds of agricultural investigations, etc.

The Department has been able to bring some influence to bear against the frequent change of station officials, which has been too common in certain States. At the same time no effort has been made to interfere with the independence of each as a State institution. The farmers of the States are appreciating the stations more and more, giving them attention, requiring better work, securing State funds, and interesting themselves in the management and supervision. This is having an excellent effect and resulting in better work for the communities in which they are located, all along the line.

NATIONAL AND STATE AID TO THE STATIONS.—The stations in all the States and Territories are visited regularly every year by officials of the Office of Experiment Stations, whose report is transmitted annually to Congress for the information of the national legislators. Where the experiment station is a part of the agricultural college of the State the connection has a beneficial influence on the course of instruction, as the work of the station in the interest of the locality has a tendency to better instruct the officers of the college engaged in teaching. There is much need that the endowment of the Federal Government should be supplemented by the State in nearly every case, and many of the States are appropriating money to enable the stations to extend their work. The erection of buildings for the colleges has often been done for the purpose of increasing the facilities for experiment station work.

The printing of station bulletins in a number of the States is regularly done at the public expense, while some of the stations are unable to publish the results of their experimental work for want of means for the purpose. Experimentation has been begun in Alaska with the aid of national funds. In each of the States of Alabama, Connecticut, New Jersey, and New York a separate station is maintained wholly or in part by State funds. The Louisiana experiment station, supported for a number of years by the sugar planters, is now under the management of the State. Every year the sum of \$720,000 is paid to the several stations by the National Government, while nearly \$500,000 is paid by the States, individuals, communities, and as fees for analyses of fertilizer, etc.

FUNDS OF THE STATIONS.—It has happened occasionally that boards of trustees have diverted experiment station funds to college purposes. The opinion of the Attorney-General of the United States has been had on this subject. According to this opinion, no portion of the funds appropriated by Congress in accordance with the terms of the act of March 2, 1887, can be used, either directly or indirectly, for paying the salaries or wages of professors, teachers, or other persons whose duties are confined to administration, teaching, or other work connected with the course of instruction given in the colleges with which stations are connected, or in any other educational institution, nor should any other expenses connected with the work or facilities for instruction in school or college courses be paid from said fund.

THE STATIONS CENTERS OF INFORMATION FOR LOCAL REQUIREMENTS.—In the development of methods of investigation and special apparatus the Department can now accomplish much more than any one of the stations. On the other hand, the stations are, to an increasing extent, becoming centers of information and authority on the lines of work in which they have been engaged with special reference to the local requirements of agriculture, and in some instances the stations, through the liberality of State governments or connection with strong colleges and universities, are in better position than the Department to carry on investigations requiring the knowledge and skill of experts or expensive forms of special apparatus.

By recognizing the authority of the stations in their several localities, securing the services of their expert officers, and the use of special facilities at their command, it is believed that the Department may oftentimes most economically expend the funds intrusted to it by Congress for special investigations, and can at the same time devote the energies of its officers more fully and effectively to the large enterprises for the promotion of the science and practice of agriculture.

NEED OF STATIONS IN THE NEW POSSESSIONS.—There is a pressing necessity for the establishment of experiment stations in Puerto Rico, Hawaii, and the Philippines. The newer and more intimate relations existing between these islands and the United States, the responsibility assumed by the United States regarding them, and the necessity for giving to the peoples of those islands information regarding their staple crops, their development, and the insect and bacteriological

pests to which they may be liable, suggest the necessity of scientific investigation of everything pertaining to production. These stations will be needed in our island possessions much more than they are needed in our States and Territories. Special investigations along these lines will not take the place of permanent experiment stations.

There is no method of informing the tiller of the soil so valuable to him as to have practical scientists studying the conditions of production in his neighborhood. There is thus provided not only an object lesson, but the foundation of a farm literature. A local station should be placed in each of the groups, on land belonging to the Government, with buildings and equipments for field and laboratory investigations, for careful surveying of the agricultural capabilities and requirements of the lands, cooperative experiments with interested farmers, the dissemination under frank of bulletins of original and compiled information, and the holding of farmers' meetings in different localities for the diffusion of practical information.

In general, there should be a systematic effort to disseminate useful information on agricultural subjects among the people and to gain new knowledge which may be utilized for the benefit of the agriculture of those regions. Educational influences of this nature established among the peoples of the islands will not be the least potent influences in elevating them to higher levels. Fifteen thousand dollars could be wisely appropriated for Hawaii, \$10,000 for the Philippines, and \$5,000 for Puerto Rico. These stations for the present should be under the direction of the Secretary of Agriculture until such time, as under the benign influence of the United States, the people in the islands are thoroughly prepared to take charge of institutions of this kind and manage them for themselves.

INFORMATION REGARDING WORK OF THE STATIONS.—A series of Farmers' Bulletins, based on the work of the experiment stations, for the purpose of disseminating throughout the country information regarding the work of the stations, and thus to acquaint farmers in a general way with the progress of agricultural investigation, on its practical side, has been printed by the Office of Experiment Stations. The demand for this class of Farmers' Bulletins is growing very rapidly. The aim is to provide our farmers with a popular record of the progress of agricultural research.—U. S. Dept. of Agriculture.

VISIT OF DR. STUBBS.

Dr. William C. Stubbs, who arrived here early in August, commissioned to examine and report on the agricultural conditions of this Territory, returned to Washington after a very brief sojourn, during which he obtained the information sought for by the head of the Agricultural Department. A visit to the other islands of the group would undoubtedly have supplied him with other valuable data, such as can only be had by personal inspection of an adept in cane culture and sugar manufacture, but other official engagements prevented his doing so, though he hoped in the near future to return and make a tour of the group. As the central government at Washington intends to include Hawaii, in its broad and liberal plan of assisting in the agricultural development of every section of its domain, it must know what is needed most, and how best to supply its aid. It is not merely the sugar interest, but other agricultural pursuits, that need assistance, and which will undoubtedly be provided for. We feel sure that the result of his visit will be to secure government aid in developing the agricultural resources of Hawaii, which calls for it as much as does any other section of the Union.

Dr. Stubbs' address, delivered on the eve of his departure, will be found in full in this issue. It is a very eloquent and instructive paper, and shows the interest that is taken by the general government in the prosperity of Hawaii. It should be read by everyone, whether engaged in agricultural pursuits or not.

WIRELESS TELEGRAPHY.

The tests made with the wireless or Marconi system in this group have not so far met with full success, although the promoters are confident that it will become successful after certain defects or obstacles have been overcome. This group was thought to afford exceptional advantages for operating this new system, and it may yet prove to be such. From all accounts it would appear that some occult obstruction intervenes to prevent its successful working—that the electric current or waves in the atmosphere are deflected or scattered so as to become inoperative. May not this be caused by land or even rocky islets intervening between the stations? For instance between Oahu and Lanai lies the west end of Molokai—

not perhaps strictly in a line, but near enough to deflect or disperse the waves passing over the route. If so, then some other routes should be selected for terminal stations, where no adverse influences can operate to disperse the waves. It has been suggested that perhaps the best place to be found is between Maui and Lanai, where there is no intervening land, but excellent elevated points near the sea. And, moreover, the distance is a short one. If a test made there proves perfect, it might settle the question at once—that some influence has served to disturb the wave currents that convey the sound. This mode of ascertaining the cause why the Marconi system has not been more successful here may not be wholly new, and may already have been tried. If not, it should be. The place here suggested differs from any other in the group in having good points to operate from, no rocks or islets to disturb operations, and the test can be made with comparatively small expense.

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THE BEET SUGAR INDUSTRY IN AMERICA.

The following from the Philadelphia Sugar Beet regarding the outcome of the industry in the United States shows that it is meeting with the same drawbacks that the cane industry has had to contend with:

“This is a bad year for sugar beets in California, and the outlook is not encouraging for the beet growers in many sections of the State. A dispatch from Stockton says: “Next week the work of harvesting sugar beets will be commenced in this county, but the yield will be very small, according to reports from sections where they were cultivated. What is known as beet blight has greatly affected the crop, and while it is impossible to tell how much the yield will be reduced till harvesting has commenced, several beet experts say that they do not anticipate over a half crop in the vicinity of Lodi and New Hope.” The Watsonville Register, referring to the Stockton report, says: “That is not the only locality to suffer from the disease, as the Salinas and King City districts are said to be badly affected, while all other beet growing sections throughout the State, with the exception of Watsonville and Castroville, are said to have more or less of the blight. Spraying is being practiced. The factories this season will not be able to run more than a third or a half of the usual time, as there are not sufficient beets to supply them.” The reports

from the Santa Maria and Guadalupe beet districts are of the same tenor. The crop will be light, and the factory will have a short campaign. The sugar company has been to considerable expense sinking wells for irrigating the beet fields in the vicinity of the factory. A portion of the crop will be saved, but the yield on the non-irrigated lands will be exceedingly light. * * * The labor problem in a beet sugar factory is a very vital one, requiring a great deal of attention and intelligent handling. Where men are employed for only a few months, it follows that the campaign must be opened each year with green hands, because there is no inducement to have experienced men from one season to another. It is often the case that a new man of good timbre is assigned to a station for which he is not suited."

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BAGASSE BURNERS.—In a paper read by Mr. Jas. Fisher before the Louisiana Sugar Planters' Association, he states his experience in burning bagasse as follows: "During my career of sugar planting I have worked four different kinds of patent burners, always believing the last would be the best, but I find, after fifteen years' experience, my first simple attempt to burn bagasse as fuel to be the best. I will describe it. In 1886 the sugar house on the place I managed consisted of a battery of open kettles with an open strike pan. All syrup made during the twenty-four hours was cooked into sugar in the day time, so that at night steam to grind cane only was required. The bagasse was then consumed in an open chimney, such as was so common in those days, simply to get rid of it. I had at the time an intelligent fireman (a German); he saw the great heat which the bagasse produced at times in this open chimney, so he suggested that if I would furnish him with a boy to keep his coal box supplied with bagasse, he would fire it during the night. I did so. The bars, which were set for coal 20 inches from the boilers, were not changed. He fired the bagasse by hand with a fork or shovel, the same as coal, being careful to keep the bars completely covered about 8 inches deep. The result was wonderful; it produced all the steam required to grind cane, which was 90 pounds, and from that day to the finish not a pound of coal or wood was used in the furnace when the pan was not working."

PORTO RICO'S SUGAR INDUSTRY.

Much has been said about Porto Rico as a sugar producing country and its possibilities under its present condition as a colony or integral part of the United States. The following statement, written by a special correspondent of the International Sugar Journal of Manchester, England, conveys probably a correct statement, though it may be ten years before that island reaches the output named of 434,000 tons.

"In the course of a tour which I have made in the island with the manager of one of the banks, we have made a calculation of the number of central factories which could be erected in those maritime plain districts alone which are provided with the means of communication either by water or by land. We find that no less than forty-six such factories, mostly producing about 10,000 tons of sugar, or on the whole an annual total of say 434,000 tons, could be set up, equipped with the latest improvements such as are found in some of the Egyptian factories, which, in the opinion of Mr. F. O. Matthiessen, of New York, are in the van of modern progress. Several fairly large usines are in course of erection or at work. One, which is being set up, will crush and work up 1,000 tons daily, but none of them are on the latest system like those of Egypt. Others are being projected, but the question of adopting the latest improvements will be quickly settled; it will be sufficient if one factory will set the example.

The above production of nearly 450,000 tons is calculated only for the low lands having already means of communication, but as soon as the island possesses practicable roads (there is only one, from San Juan to Ponce, which is still without bridges), the cane will be planted all over the coasts as is done at Gaudeloupe, Martinique, and Mauritius, and the island will produce more than a million tons, which will go to supply the United States market.

Porto Rico has a grand future with the market of the United States open to it, whether free or with 15 per cent. duty under the Dingley tariff, for the American Government will, sooner or later, have to admit all her products free. The 15 per cent. duty is unconstitutional, consequently its abolition is only a question of time.

It is useless to discuss or draw a comparison between the cane and beet sugar industries, the question has been long ago settled in favor of the former, and the failure, partial or other-

wise, of several beet sugar factories, indicates the difficulties with which the production of beet sugar has to contend in certain districts of the United States.

As compared with Louisiana, everything is to the advantage of the island, and for the following reasons:—

In Louisiana a field hand gets \$0.75 gold per day; the same laborer in Porto Rico gets \$0.36 per day. This is the wage in ordinary times, but at crop-time the American laborer gets \$1.00, while the Porto Rican gets only the 36 cents. The cultivation of cane in Louisiana is much more complicated than here, and there are frosts to be feared which here are unknown. The Louisiana cane is much poorer in sugar (by about 30 per cent.) while the production of cane here is 30 to 40 per cent. more to the acre than there. The Louisiana cane contains a large quantity of glucose, which is a serious hindrance to the crystallization of the sucrose and to the yield.

In Porto Rico the tops of the canes are utilized for planting, while in Louisiana they are obliged to use whole canes, and do not make use of the tops. The Porto Rico cane, once planted, gives several crops from the same stools, which is not the case in Louisiana. With us all the sugar is got by simply using the bagasse as the only fuel, while in Louisiana large quantities of coal are required, because of the low density of the juice. Finally, with rare exceptions we are sure of our crop here, while in Louisiana almost every year they have to allow for unseasonable weather.

Porto Rico, thanks to its situation and the market opened to it in the country to which it now belongs, in short, to all the advantages enumerated above, is destined to become one of the richest cane sugar producing countries in the whole world.

E. DELAFOND,

Porto Rico, June 4th, 1900.

Chemist and Engineer.

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In France, the recent tremendous rise in coal makes a difference in the cost prices of sugars of 6d. per cwt. to an average factory, and although, of course, the factories have already contracted for this season's supplies, the effect will be felt in the prices for the following campaign, or in the sowings, in case fabricants try to make the farmers bear the brunt of the increased cost of production, by bidding less for the roots.

LOUISIANA'S SUGAR ON TOP.—The New York Times says that on August 17, the list of awards to American exhibitors at the Paris exposition was made public. The United States secured in all 1,981 awards. Of these 220 were grand prizes, 486 gold medals, 583 silver medals, and 422 bronze medals, 270 honorable mentions and a long list of gold, silver or bronze medals for collaborators. The Times gives a total list of all of those who received the highest recognition in the shape of grand prizes or gold medals, and among them the Department of Agriculture, Food Products, Group 10, the name of the Louisiana Sugar Planters' Association. This is a handsome evidence of the appreciation of the exhibit forwarded by this organization for the great exposition. The Michigan Sugar Beet Association has also been similarly recognized.—Louisiana Planter.

An expert beet grower claims that deep plowing is the keynote to successful beet raising in any but the loosest soil, and better results follow it in all cases. Experiments seem to sustain his position. It costs a little more to plow deep, but the result of it is a better crop of everything grown upon the same land subsequently. He also suggests that farmers give this a trial for themselves. It will take but a few hours additional time to plow a few acres from 12 to 14 inches deep, and then note the result. Beets mature more rapidly in a light and not too strong soil in moist, heavy ground. The impression prevails that when the beet leaves begin to die the root has reached its full maturity, and that if allowed to remain in the ground it deteriorates. The superintendent claims that this is not necessarily the case. On the contrary, that except in very moist soil or under unfavorable climate conditions, there is an increase of tonnage, and that the sugar complement is maintained. The same remarks apply to cane planting and cultivation—the lands that are deepest and most thoroughly plowed give the best returns.

A Company, under the title of the British Sugar Co., Ltd., has been formed in Liverpool to acquire the estate of Santa Barbara, La Huaca, San Jacinto and Motocacha, in Peru, together with necessary buildings and quays at the ports of Cerro Azul, Montalvan, and Huacatama, and generally to carry on the business of sugar planters, manufacturers, refiners and merchants.

The Oxnard Courier says: "A sugar-beet blight has appeared on the Pacific Coast, which so far as can be ascertained has no parallel in Europe. The disease made such inroads in the crops about Salinas that a campaign last year was impossible. A conference of experts failed to hit upon a reason for, or treatment of, the disease. Mr. Claus Spreckles has left for Europe, and one of his objects will be to consult European sugar-beet authorities about this scourge which is such a puzzle here. The leaves of the affected beet curl upwards, and on the under side of the leaves along the veins an abnormal granulation appears. The roots show an unusual number of rootlets, and eventually the growth of the beet is stopped, after which the roots themselves start to decay. This is the only case known in which the leaves of a diseased beet curl upward, and the blight can be discovered from that peculiarity. A field can be in an apparently healthy condition, for the blight does not seem to affect the color of the leaves to any great extent, but a closer examination will show every few steps a plant with upturned leaves, with granulations on the veins, a sure sign that the beet below the surface will give no sugar to the grower."—Sugar Beet.

Only about 20 per cent of the sugar consumed in the United States is produced in the country. The consumption is increasing continually. It will be many years, therefore, even with thirty or forty million dollars a year invested in the sugar business, before the production will catch up with the consumption. We are a long ways from over-production. To show timid souls who may be afraid of overcrowding the country with sugar factories, or placing them too close together, how they do those things in Europe, it may be mentioned that in the province of Saxony, Prussia, there are 116 beet sugar factories. Saxony covers an area of 9,750 square miles, about one-sixth of the State of Iowa, which contains 55,046 square miles. Accordingly Iowa ought to be able to accommodate 696 beet sugar factories.

Bees, says The Planter (Calcutta), can learn to tell the time of day as well as a clock. A gentleman lately noticed that a large number of bees were frequenting the flowers on his lawn, and every day when he came home to lunch he put a piece of sugar on a brick in the garden for them. They soon learned the time when they might expect the sugar, and now when he goes out at noon, he finds about a hundred bees sitting around waiting for their lunch.

An exchange has the following: "Mr. F. H. Hayselden, the energetic manager of Maunalei plantation on Lanai, has successfully raised and is now marketing in Honolulu 'garden stuff' which offers a good reason to induce others to follow. Potatoes, white turnips, carrots, cauliflowers, peas, lima beans, okra, onions and summer squash are included in his first consignment, and the sale has netted a satisfactory return. Local fruit and vegetable dealers call for 'more.' That's the sort of farming that will help out Hawaii."

It has been demonstrated time and again that good vegetables, including almost the entire list grown on the mainland, can be raised here. But the trouble is in disposing of them when sent into town. To peddle them around the town is quite impossible when the labor and expense attending it is taken into account. The most likely way to succeed would be to have a central vegetable market, perhaps in the government market, at the foot of Alakea street, though it would be better if located on one of the central avenues—King, Fort or Nuuanu, where all consignments might be sent, and orders received by telephone delivered by carts. The business if well conducted with good vegetable supplies, would in time pay. Half the vegetables now peddled about town by Chinese are unfit for the table, because they are grown by people who do not know nor care whether the vegetables offered are ripe or green. It will take time and a good deal of patience to bring the undertaking to a paying, self-supporting basis. We know of no one better fitted to undertake establishing a good vegetable market here in Honolulu than Mr. Allen Herbert. His experience in this line would be very valuable, for from the day that he took charge of the Hawaiian hotel, he has been familiar with vegetable gardening, and knows better than most people what will grow here and how to make vegetables and fruits pay well.

LIMES AS A GERMICIDE.—It may not be generally known that fruit acids are germicidal, but the information is of special value to planters generally. The juice of lime and lemon is as deadly to cholera germs as corrosive sublimate, or sulphur fumes, or any other disinfectant. It is so powerful a germicide that if the juice of one lime or lemon be squeezed into a glass of water, that if then left standing ten or fifteen minutes, the water will be disinfected. It makes little difference where the water has been obtained, or whether it has been boiled or

filtered. This is a fact worth knowing, for anyone may at any time find himself under circumstances in which it is impossible to get either boiled or filtered water. In such a case the juice of a lime or lemon will purify the water perfectly.—*Indian Planters' Gazette.*

The U. S. Department of Agriculture has been experimenting to find the areas in the United States most suited to sugar beet culture, and has distributed beet seed to different localities, and the resulting beets are tested by the Division of Chemistry, or by the Experiment Stations of the states wherein the beets are planted, in order to find out their sucrose content. This work is still in hand, and in the course of time a very clear idea may be had as to which states are the best adapted to sugar beet culture and also what sections of those states are the most suitable.

The recent organization of another sugar refinery company in New York, with a capital stock of \$20,000,000, has created a stir in business and financial circles. The Havemeyer and the Arbuckle sugar companies are at daggers ends, and this new candidate coming into the field will make matters interesting. The public will be benefited by the competition of these giant concerns, provided of course that they do not pool their interests. Trusts never do good to the people, but in this connection and in the handling of this important produce they must derive the benefits of low prices.—*Sugar Planters' Journal.*

The total foreign commerce of the United States in the fiscal year ending June 30, 1900, amounted in value to \$2,244,193,543, of which \$1,394,479,214 represented exports and \$849,714,329 imports—records never equaled in the history of the country. In the preceding fiscal year the total foreign commerce amounted to \$1,924,171,791. Compared with five years ago, the increase in the country's trade with other nations amounts to \$704,685,413.

For the first time the United States report show a larger production than the British figures for the corresponding period. The significance of this fact cannot be over estimated. Coal is now more than ever "the material energy of a country, the universal aid, the factor in everything we do." The relative abundance or scarcity of coal, therefore, is the truest index of

a country's position among its industrial rivals. According to recent information, steamers have been chartered to carry coal from America to St. Petersburg and Stockholm, as well as to Italian, French, and German ports. While these exports may be due mainly to the present abnormal conditions of the British coal market, there is no doubt that in time this country will be called upon to supply an ever larger part of the coal needed by foreign industrial countries which, until recently, have been drawing upon the British output. This is the more probable since cost of production and prices of coal show a falling tendency for this country, whereas the opposite holds true of European coal-producing countries.

CO-EFFICIENT OF JUICE EXTRACTION.—A correspondent of the Sugar Cane thus explains it: To avoid misconception, let us state what is understood by yield and co-efficient. Take, for example a cane juice containing 16 per cent sugar with a loss in the bagasse of 1.42 per cent, then this 1.42 per cent equals 8.8 parts of juice. If we now suppose that the cane contains 12 per cent of cellulose then, of the 88 parts of juice, 8.8 are lost and therefore 79.2 are obtained by the factory. These 79.2 we call the yield obtained by crushing. If this is calculated in per cent on 100 parts of juice we obtain the juice extraction co-efficient of 90.

According to the contract entered into between the Crown Agents and Messrs. Elder, Dempster & Co., for the steamship service between Jamaica and the United Kingdom, the contractors agree to purchase, in Jamaica, at the current market rates of the day, not less than 20,000 bunches for each voyage and convey them to an English port, the price to be paid on delivery of the fruit to the contractors, who are also to ship at specified rates fruit and other cargo offered them. Messrs. Elder, Dempster & Co. contract to provide six skilled agents to improve fruit cultivation in Jamaica and to instruct growers how best to harvest and pack the fruit. They further undertake to pay one-fourth (not exceeding £10,000) of any improvements or additions which may be made by Colonial Government to their hotels in Jamaica. Jamaica ought to begin a new era of prosperity with this service.

The French Government has made overtures to the Governments of Germany and France, looking to an international regulation of sugar bounties.

ADDRESS OF DR. WM. C. STUBBS TO THE HAWAIIAN
SUGAR PLANTERS' ASSOCIATION, HONO-
LULU, AUGUST 13.

"Rosebank," the beautiful residence of Mr. and Mrs. F. A. Schaefer, Nuuanu avenue, (formerly the residence of Hon. R. C. Wylie, then Minister of Foreign Affairs of Hawaii,) was ablaze with lights on the above-named date, the occasion being a complimentary dinner in honor of Dr. William C. Stubbs, Special Agent of the United States Agricultural Department. The dinner was given by Mr. Schaefer on behalf of the Hawaiian Sugar Planters' Association.

The guests assembled at 7 o'clock. The dinner was an elaborate one. The table was decorated with cut flowers. The members of the Planters' Association and others interested in the agricultural development of the Islands predominated.

F. A. Schaefer, the host, after dinner, greeted Dr. Stubbs as follows:

"On behalf of the trustees of the Hawaiian Sugar Planters' Association, I beg to tender to our esteemed and distinguished guest, Dr. Stubbs, a hearty welcome in our midst. We deem it a great privilege to have the Doctor with us, as from personal intercourse we have learned to value his vast scientific experience and attainments not alone, but to esteem him as a man of high culture and excellent qualities.

"As trustees representing the sugar planters' interests of the Hawaiian Islands, we are indebted to Dr. Stubbs in the past and in the present for the kind interest he has shown, even at his own discomfort, when called upon to select a scientific and practical man for the responsible position of director of the Planters' Laboratory and Experiment Station. Thus we have to thank Dr. Stubbs, next to Dr. Maxwell himself, for the valuable services rendered to the sugar planters of these Islands by Dr. Maxwell, and again at the latter's resignation to fill a more responsible position in Queensland, for his consenting to part with his trusted right-hand man, Mr. Blouin, in order to secure the most reliable and capable man to fill the position left vacant by Dr. Maxwell's departure.

"I deem it a pleasant duty to speak of all this in due appreciation of Dr. Stubbs' characteristic self-sacrificing endeavors to further agricultural pursuits on scientific prin-

ciples and on broad lines, and also in appreciation of his devotion to the well-being of those working under him, as regards their advancement in life, if worthy of promotion.

"There are others who can, better than myself, by word of mouth do justice to Dr. Stubbs concerning his extensive knowledge of agriculture in all its branches and of the manifold industries depending thereon. But I may be permitted to say, speaking for myself, that I have been deeply impressed with Dr. Stubbs' vast extent of information, and those who have listened to him will no doubt fully endorse this personal sentiment.

"I take great pleasure in proposing the health of our esteemed guest, Dr. Stubbs, wishing him God-speed on land or sea and a long life of continued usefulness in the promotion of good to his fellow-man, and of health and happiness to himself wherever he may be."

Dr. Stubbs as the guest of honor read an address to the guests upon cane growing and experimental work. It was listened to with attention and is a valuable treatise upon the subject. The paper in full, reads as follows:

It affords me great pleasure to be with you this evening, and I sincerely thank you for this tangible evidence of your appreciation and esteem. My stay in your midst has been a continuous song of delight; indeed I have been the recipient of every courtesy that even most exalted worth could expect, or titled dignity desire. Superior even to the loveliness of your tropical verdure has been the generous hospitality of your noble people.

As a Louisianan, a dweller beside the waters of the Mexican Gulf, a representative of Southern cane planters, I come to you bearing the cordial greetings and generous sympathies of men engaged in a common industry, speaking a common language, awaiting a common destiny. For we, too, are engaged in cane culture, and while our soils are fertile, our labor rather abundant, our machinery on the whole excellent, our climate is only sub-tropical, and blizzards from the northwest force gulfward every winter our genial climate, chilling and withering our cane and forcing us to annual harvests. We therefore grow two crops to your one, but your one crop greatly exceeds in yield.

Twenty years ago the rapidly expanding beet sugar industry threatened the very extinction of the tropical sugar cane. Developed and sustained by the best scientific talent of Ger-

many and France, the beet sugar industry grew into enormous proportions and lowered the price of sugar to such a degree as to seriously paralyze and practically destroy many sugar cane plantations throughout the world. The latter industry was content with the primitive methods of cultivation and manufacture, relying solely upon tropical fertility to overcome human ignorance and careless work. But an awakening took place. It was decided that science, which had done so much for the beet industry, should also assist sugar cane. It was secured, and since that time no industry on earth has made such marvelous strides. In my own State this march of progress has been by "leaps and bounds," until today it can be said without arrogance, that Louisiana is perhaps leading the sugar cane world in its improved methods, if far behind you in your acre product.

You too have made wonderful progress. A report upon sugar made to the Royal Hawaiian Agricultural Society, in 1852, cites the product for the Islands, per acre, as one ton of sugar, made upon creaking wooden mills, propelled by water or horse-power and evaporated in kettles. The centrifugal was introduced a year or two later. Compare this with one of your up-to-date estates of today—growing 80 to 100 tons of cane per acre, crushing with nine ponderous rollers prefaced by an enormous cutter, clarifying with superheated steam, evaporating in quadruple effects, cooking to grain in 14 to 16-foot pans, and centrifugalling in a battery of ten or more Weston and Hepworths machines, yielding over ten tons of sugar per acre.

Truly these Hawaiian Islands have become the center of maximum production of sugar of the world, and several of your plantations stand as the keystone to this magnificent sugar arch which spans these Islands.

The sugar industry is supported by three principal scientific pillars—agriculture, mechanics and chemistry. The cane must first be sown ere it can be manufactured. The soil, water, fertilizers, sunshine and heat all combine to give canes large in tonnage and rich in saccharine matter. Three fundamental principles underlie all successful agriculture—first, a knowledge of the composition of the soil; second, the requirements of the plants which are cultivated, and third, the application of fertilizers in proper proportions and quantities to meet the needs of the latter when grown upon the former. Under the head of fertilizers must be included water, which,

especially for cane, is the "sine qua non" for large yields. It is most desirable that the cultivator should know the composition of his soils and the availability of the elements. This can only be determined by a trained expert agricultural chemist.

Just here permit me to speak of the inestimable benefits to the planters of these Islands, and the valuable contribution to the science of chemistry and geology of the very exhaustive report on "Lavas and Soils" recently issued by your able director. These investigations not only serve for all time to come, for your guidance in the treatment of your soils, but furnish to the chemist and geologist everywhere valuable information relative to the disintegration of basaltic lavas. Such a work is not only a valuable contribution to local agriculture and general science, but must stand forever as a monument to the genius, patience and intelligence of its distinguished author.

Having determined the character and composition of your soils, it is only necessary to know the requirements of the plant to be grown, to prescribe the fertilizer both in quality and quantity to be used. Just here comes in the valuable assistance which chemical science renders to agriculture. Formerly commercial fertilizers were prepared to suit all crops, and all soils, and were not esteemed valuable unless they constantly appealed to the nasal organs with repulsive odors. Gov. Toombs, in advocating the passage of a fertilizer law through the Legislature of Georgia, many years ago, said that he could drag a pole cat through a pile of sand and there was not a farmer in the State that could tell it from the best fertilizer on the market. Today the chemist, by passage through the beaker and crucible, can tell its constituents, and, knowing the wants of the plant and the deficiencies of the soil, can prescribe the kinds and proportions of the ingredients which must be used. So universal has become the confidence of the farmer and planter in chemical analysis, that States have established laws inspecting and controlling the sale of fertilizer. Advanced farmers of today rely entirely upon the advice of expert chemists as to the quality and quantity of the fertilizers they use, and scorn with righteous indignation the advice so freely proffered by manufacturers.

Just here I may remark the necessity of managers of plantations being guided by experts, since they are without tech-

nical training, and though possessed of high administrative and financial ability, they are entirely ignorant of the laws of nature which control plant growth.

As a result of the good work accomplished by procuring the proper fertilizers for different soils, after their chemical and physical properties were known, I may recall the comparative yields of your Islands—in '95, three tons per acre, and in '99, four and one-half tons per acre.

Irrigation has transformed your arid deserts into fertile fields, which yield you bounteous harvests. But excessive irrigation may be almost as destructive to plant growth as an absence of water. Pumping water from great depths with costly machinery, using high-priced coal, involves such a heavy expenditure of money as to require special study on the economy of its use. From Dr. Maxwell's experiments I find that 800 to 900 pounds of water to one pound of sugar grown is ample, yet many plantations use twice or three and even up to seven times this quantity. Known laws of physics, both in regard to the capacity of soils for water and evaporation, should guide us in the application of water. By so doing continuous nitrification will take place, and the plants supplied with abundant food, provided the proper fertilizers have been applied.

Of the mechanics of the sugar house I need scarcely speak at this time. Enterprising manufacturers have sent their wares all over the world, and money and skilled labor are only needed in any clime to secure and use the best up-to-date sugar machinery.

I believe your islands are equipped with the best machinery obtainable, and it is only necessary that this be worked intelligently and economically to secure the best results.

The chemist, a recent adjunct to every well-equipped sugar house, is the guiding genius of the factory. Sugar-making, when properly conducted, is a highly complicated, continuous chemical process, and the best chemical talent is required to direct all operations, so as absolutely to avoid loss. Extraction, clarification, evaporation and turbinage are all steps requiring his closest attention to insure the largest yield. Often have we witnessed heavy losses, in low extraction, in improper or imperfect clarification. Mechanical and chemical losses in evaporation and cooking, wastes in the centrifugal by excessive use of wash water, and finally (the heaviest loss perhaps of all) by sending to the market or throwing away

molasses, which by proper treatment would yield a profitable crop of crystals. This last loss is estimated by Dr. Maxwell, in your Islands, at a quarter of a million dollars annually.

In our State our best sugar houses are still losing at least five pounds of sugar to every ton of cane worked. We are now figuring to recover these theoretical losses. I am not acquainted with the chemical statistics of your sugar houses, but presume they are as large, if not larger. Assuming that they are equal, and that your annual harvest yields 2,000,000 tons of cane, this will net at least 10,000,000 pounds of sugar, which at present prices will represent nearly half a million of dollars of annual losses incurred in manufacture—a sum sufficient to support several chemists in every sugar house on the Islands. I really believe your losses are even greater than this estimate.

One can readily see the great value of scientific control in the sugar house, as well as in the field.

I might dilate upon the efficiency of the machinery used, especially here, where coal is so valuable, but my time will not permit.

I might also dwell upon your most serious problem—the labor question—but this would take me “far out to sea” with probably no compass or chart to guide me. One suggestion I cannot refrain from making. In our experience, labor is the largest single factor that enters into the cost of sugar production, and every effort should be made by every planter to reduce this item to the lowest possible quantity consistent with good results. Therefore, the economical handling of labor should be of paramount importance to every planter.

In conclusion, permit me to say that your planters are enjoying extraordinary facilities for the successful pursuit of your chosen industry. Nature has given you soils of wonderful fertility, a climate of tropical luxuriance, and without excessive heat, an abundant rainfall, furnishing water directly to plants, or storing it in underground reservoirs, from which, by large pumping plants, it is taken for use upon your formerly arid lands.

You have the advantage of cheap water transportation for your freights. Beginning your sugar industry on the last half of the present century, you had the experience and lessons of the sugar world for your guidance. Only labor and fertilizers were required to be imported. No wonder, then that you have

become the head center of the tropical sugar industry, the cynosure of the sugar world.

See to it that you execute faithfully the natural trust confided to your care, and meet the expectations of your admiring confreres.

Great trusts involve large responsibilities. Nowhere on earth is scientific control so imperatively demanded, for the permanent success of your industry, than here upon these Islands. Your large yields necessarily mean heavy drafts upon you soil—drafts which no soil, however fertile, can withstand indefinitely without assistance. With you this assistance must be of the best quality, and in quantity, "good measure," "heaped up," "well pressed down" and "running over."

Your water supply is of first importance and requires that you should look to the preservation of the present source of precipitation, and a more economical use of your present supply.

Don't forget in your mad ambition to declare the largest dividends, the old maxim, "Feed your lands and they will feed you."

Your environment, from a scientific standpoint, imperatively demands attention to the above, if you wish to avoid the calamities which long ago overtook the once prosperous biblical nations. Soil depletion has been the downfall of many a prosperous nation, and it is the part of wisdom to be guided by the teachings of history. See to it, that you lay the foundations of your present agriculture so broad and deep that each succeeding year will witness increased yields, and coming generations will learn from you an intelligent culture now not dreamed of by our most visionary scientists.

Invoke the spirit of science to wipe the sweat and dust from the brow of labor, and lead her into those fields of yours, where love is brooding and life is born, and show that she can work in perfect harmony with labor, in the largest production of stalk and leaf and sugar crystals. Then will your fondest anticipations be realized, and the prophetic finger of your Islands' proud history point to your work as the climax of their noble achievements.

The list of guests was as follows:

Dr. Stubbs, Dr. Maxwell, Prof. Alexander, Mr. Wray Taylor, Mr. O. T. Sewall, Mr. S. M. Damon, Mr. Swanzey, Mr. Clive Davies, Mr. Paul Isenberg, Sr., Mr. Suhr, Mr. P. C. Jones, Mr. G. M. Robertson, Mr. Tenney, Mr. J. A. Gilman, Mr. J. P.

Cooke, Mr. M. Louisson, Mr. Bolte, Mr. J. G. Spencer, Mr. Focke, Mr. Schaefer.—P. C. Advertiser.

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TROPICAL PRODUCTS.

A Demerara paper of recent date contains the following relative to cultivation of tropical products, as pertinent here in these islands as there.

Persons unacquainted with the past history of the colony are continually asking "Why don't you grow coffee?" or why not cultivate fifty other things? They hand you a long list, including cotton, cacao, rice, spices, and even ground-nuts, without thinking of the local conditions of the countries in which these articles are already grown, and of the possibility of overstocking the market. Calculations are often made showing that a certain product will pay at the present price, but no thought is given to the probable effect of increased production.

Sugar is a food, and as such its possibilities of consumption are greater than perhaps any other food products, except the different kinds of grain or corn. Rice may be put down as the best grain for this colony, but no one who has thought over the difficulty of turning a sugar estate into a rice plantation, and then of putting the product into competition with that from the East Indies, can come to any but an adverse conclusion. With other foods there will always be the possibility of over-production, and that very quickly. Indian corn and cassava can be grown here to advantage, but in the case of the first we should have to compete with the United States, and the second with Brazil. There is no probability of any very great increase in the consumption of cassava starch, farina or tapioca, and maize is so cheap that it is out of the question. Plantain flour might be useful, but unfortunately there is no market for it in quantity at present.

The story of sugar cultivation in the colony is an interesting one. It was commenced by the West India Company about two centuries ago in the neighborhood of Kyk-over-al, from where it gradually extended down the Essequibo and into the Demerara. But, although commenced in the upper districts, it was never anything of a success until the coast lands were taken up. The experience of the early settlers agreed with the late deductions of the government analyst, that the river banks beyond the alluvium were barren, and hardly

worth cultivating after two or three crops had been taken off. Only the high price of sugar once made it possible to carry on the cultivation by clearing new land as the old gave out. When it was discovered that on the lower banks and coasts this was unnecessary, the die was virtually cast which made British Guiana a sugar colony. Nevertheless the final decision was not come to all at once. Even then a sugar plantation required a large supply of labor, and many a poor man with but a few slaves found it suited his pocket to grow cotton and coffee, which then fetched what we should now consider magnificent prices.

Coffee was introduced into Essequibo in 1725, but at first it was a failure. The comparatively barren soil in the neighborhood of Kyk-over-al did not suit it, and then again the trouble of picking and preparing the berries was against it. So great was the failure that, although 24 bags were shipped in 1728, a few years after the Commandeur had to get a supply for his own table from Surinam or Berbice. In the last colony coffee cultivation was more successful. It was introduced from Surinam in 1720, and soon became of so much importance that Berbice coffee was well known in the markets of Europe down to the emancipation. After Demerara had become settled coffee came to the front and took its place beside sugar. In the year 1745, when the first land grants in the Demerara river were made, only one bag of coffee was shipped from Essequibo, but from that time the export increased until it reached in the early years of this century about ten million pounds annually from Demerara, besides nearly seven millions from Berbice. Java, in No. 1 Canal, seems to have been the principal coffee estate in Demerara, and Anna Clementia the most important in Berbice, the latter producing 530,525 pounds in 1811.

Besides the high prices of coffee and cotton, there were other factors which helped to prevent losses on their cultivation. Slave labor was reliable—there could be no strikes, nor was Saint Monday observed anywhere. Then again the estate owners worked together. "You scratch my back, and I'll scratch your back" was in effect their motto. One lent his gang for picking, and in return similar help was given when required. Coffee picking was no doubt tiresome, although by no means laborious, still it had to be done, and done at the right time. It is generally considered that coffee came to grief on account of the emancipation, but this was not altogether

the case. A time came when sugar and coffee were equal in price, or when the advantages of the former were so great that, with a small labor supply, it would be foolish to keep up a plantation of the lower priced product.

Although cotton was one of the articles brought from Guiana by the first traders, who bought it from the Indians, it was not cultivated to any extent until the middle of the last century. In 1762 the produce of Demerara and Essequibo amounted to only ten bales, and it was not until the surrender to Great Britain in 1796 that anything like a "boom" took place. Then the three rivers were really opened, free grants of land were made, with the result that the whole coast from the Essequibo to the Corentyne, and even across to Nickerine, was a succession of cotton fields. Virgin soil, impregnated with salt, produced good crops, which sold at what would now be considered fabulous prices. The exports soon reached to over seven million pounds, and there seemed to have been good prospects before the cotton planters. But very soon after the abolition of the slave trade, the Southern States increased their cultivation, and not being hampered by so many obstructions to their labor supply, the staple came down to a price which did not pay. Ruin was almost universal in Berbice, and Demerara was little better.

Only sugar was left when coffee and cotton fell; it was the survival of the fittest. Can we say today that there is the least chance of success with any other product? But, if there is hope, will it not be for a new body of men in new districts? Such being the indications, what a sad thing it would be for the colony if the coast plantations were ruined! When cotton fell, coffee and sugar were left. When coffee fell, sugar was left. If sugar falls, what then?

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A life insurance policy was made out by an insurance company of New York, lately, for \$250,000. It is what is known as a 5 per cent. gold bond policy, on the life of Charles T. Schoen, of Philadelphia, President of the Pressed Steel Car Company, who sailed for Europe recently. Mr. Schoen will pay an annual premium of \$18,270. On his death the company will issue to his beneficiary 250 bonds of \$1,000 each, bearing 5 per cent. interest, or \$12,500 a year, for twenty years, when the principal will be paid. If full settlement is desired at the time of his death, the company will pay \$304,250.

*SELECTIONS FROM THE U. S. CONSULAR REPORTS
FOR JULY.*

RIGHTS OF FOREIGNERS IN JAPAN.—A report in *Nachrichten für Handel und Industrie*, Berlin, April 10, 1900, is summarized as follows:

The latest Japanese treaty gives to foreigners the right to engage in trade or exercise their professions anywhere in Japan.

It was hoped that this concession would not only attract foreigners into the country, but that foreign capital would also be led to take an extensive share in Japanese enterprises. So far, this has happened in only one instance; an American tobacco trust has formed with a Japanese firm in Kyoto a joint-stock company for the purpose of importing American raw tobacco in greater quantities and manufacturing it. Other import firms do not appear to find it necessary to establish branch offices in the interior, nor to take advantage of their right to carry on business under their own names. In some places, where for special reasons such representation might be desirable, as in the coal ports of Moji, firms have continued to carry on business in the old way. Neither has the opening of twenty-two new ports to foreign commerce had any appreciable results.

One reason given for this state of things is that Japanese legislation does not give to foreigners the right to acquire real estate or mining property in Japan. The existing companies which have acquired a legal status by registering in the Japanese trade register are entitled to acquire real estate, whether their members are Japanese and foreigners or foreigners alone. Whether this will be of any great advantage appears doubtful. In case of dissolution of partnership, individual members can not hold real estate; thus the property must undergo forced sale, with loss to the company. Some time ago, the prevailing lack of capital aroused in Japanese circles a sentiment in favor of allowing foreigners to work the mines. There is now a current in favor of allowing them to hold real estate. Whether these concessions may be expected in the course of the next few years can not with safety be prophesied. The prevailing opinion that Japanese industries, in consequence of the cheaper conditions of life and labor, possess great advantages over European competition has lost

its authority of late years, since wages, as well as the price of the necessaries of life, have increased enormously.

Rice, which forms such an important article of food for the laboring people of Japan, has increased almost threefold in price in the last ten years. The dexterity and intelligence of the Japanese workman find universal recognition; but his capacity of production amounts at most to two-thirds of that of European workmen. Besides, he possesses peculiarities of character; it often happens that a large number of workmen leave work suddenly without warning, merely to gratify their desire for change. It is evident that the education of a skilled laboring class is rendered difficult by this, and that trade disturbances must follow.

THE SIBERIAN RAILWAY.—Mr. Khilkoff, Minister of Ways and Communications, had a special train sent to him on the Great Siberian Railroad some months ago. There were five coaches—one first-class, two second-class, one dining, and one baggage car. All the appointments were excellent. There were, besides the usual library, pianos, writing conveniences (found in American cars), a barber shop, a gymnasium, a good supply of ice, patent water boilers, dials which indicate the next station and the length of stop, double windows to protect from dust and the extreme Siberian cold; and an observation car at the rear. On this train were attendants speaking English, French and German. The cars are lighted throughout by electricity. There is no charge for the barber or for medical attendance. The bath costs 2 rubles (\$1). From St. Petersburg to Irkutsk the transit occupies about seven days; from Moscow, about six; and from Paris, not more than twenty-eight days.

The total length of the line to Vladivostock will be 4,714 miles. The cost will be \$400,000,000.

The section just completed as far as Stretinsk is important, because it marks the connection with Vladivostock; some 1,500 miles, and gives a continuous all-rail travel of over 5,000 miles from Moscow. As is well known, there will no longer be any necessity for skirting the Amur by railway, since the acquisition of transit rights in Manchuria gives an almost straight line from Stretinsk, via Tsitsikar, Harbin, Nikolsk, then south a three hours' ride to Vladivostock. The last rail on the Moscow-Stretinsk division was laid December 28, 1899.

Lake Baikal is as long as England, covers an area of 12,430 square miles, and is the formidable obstacle to be overcome. It is 1,561 feet above sea level, has a shore line of nearly 1,200 miles, a depth varying not less than 819 feet on an average, and a distinct ebb and flow. Four thousand five hundred feet have been sounded, and in one instance 4,900 feet is the record.

After crossing Lake Baikal—by rails over the ice in winter, by boat in summer—the road ascends the Yablonoi Mountains and attains its loftiest elevation, 3,412 feet above sea level. From this point it descends to the Amur.

As at present planned, there will be three branches, all via Harbin; to Nikolsk, via Vladivostock; to Peking, via Mukden and Niuchwang; and to a point not yet given out. The Nikolsk-Harbin branch is rapidly going forward from the Nikolsk terminus, and that to Mukden is now complete.

Two travelers, who have made the overland journey, arriving at Vladivostock within a week, were six weeks from Moscow, including a stop-over of nine days. About the food, there are varying reports. Some say even at remote stations the restaurants are excellent, with substantial dinners at 50 cents; others say the charges are extravagant. It depends much, I imagine, on the philosophy and patience of the traveler. My own experience on the Ussuri branch to Khabarofsk is good food, reasonable prices, and every attention. The entire road is divided into sections of two-thirds of a mile each. At each station is the cottage where the station master lives with his family and the guards. Between the Urals and Tomsk, there are said to be nearly 4,000 of these guards. When travelers speak in a critical manner of the number of "soldiers" found on the cars and along the road, it is to be remembered that it is the same as if our conductors, brakemen, and flag and switch men all wore the same uniform.

Word has just been received that the administration of the Central Siberian Railroad intends to do some good work in shaping up the line and increasing the speed according to plans fully matured. The cost of this work will be about 55,000,000 rubles (\$28,325,000), and the varied improvements will require seven years.

From Ob to Irkutsk, 1,754 versts (1,163 miles), the following programme will be carried out: (1) All the rails will be changed; (2) all wooden bridges will be replaced by iron ones; (3) stations and crossings will be widened; (4) several new crossings will be constructed; and (5) passenger accom-

modations will be provided, as well as houses for railroad employees, freight warehouses, provision stations for the army and also for immigrants.

PROTECTING SONG BIRDS IN SWITZERLAND.—Switzerland has not many feathered songsters; but those that do exist are carefully protected, not only by law, but by the fostering care of the people, particularly the German-speaking people of Switzerland. In 1875, a law was enacted prohibiting the trapping or killing of song birds, or the robbing or molesting of their nests in any part of the Alpine Republic. But in northern Italy, bird murder is epidemic, and this spirit has spread over the Swiss-Italian Canton of Tessin, where the willow wren, hedge sparrow, black cap, swallow, nightingale, and little singers of all kinds are victims of the trap, the net, and the gun.

As the seasons come and go, the Swiss birds make their pilgrimage south, and in going and returning across the land of northern Italy and the Swiss Canton of Tessin, they are mercilessly pursued by hunters of all ages and all classes. On Lake Maggiore it is estimated that at least 10,000 of the feathered songsters are trapped or killed every year, and in the region round about Bergamo, Verona, Chiavenna, and Brescia, many millions are indiscriminately slaughtered to satisfy the demand of the tables and of the millinery establishments of the world.

One of the schemes is to cover the limbs of trees, the rocks, and even the telegraph wires along the line of the bird migrations with a certain paste of such adhesive qualities that whenever the birds stop in their flight for rest or food, they are held helpless captives; hundreds are often captured in a very small space by this simple means.

During the past year, the border police of Tessin captured and destroyed 13,000 bird traps set to imprison these weary little flyers. Authorities are being urged to take the most rigorous measures to suppress the evil. The criminal courts are having many more bird-law-violation cases than formerly, and bird-catching-and-killing crimes which in former years were either overlooked or punished only slightly are now dealt with seriously. The excellent laws are being enforced, and the song birds of Switzerland may yet survive the attempt to exterminate them.

BRITISH VIEW OF THE UNITED STATES POLICY IN CHINA.—Consular Agent Harris sends from Eibenstock, March 30, 1900, extract from the London Daily Mail in regard to the policy of the United States in China, as follows:

It is of importance for China, but it is of infinitely greater moment as it concerns America. It is the chief of the many signs that the Government of the United States has fully aroused itself to the duties as well as the privileges of international politics. America has once and forever renounced the policy of the hermit. Nothing that it has hitherto done in international affairs can in the least compare with the result of its present action. By a brief period of correspondence and of representations, it has practically secured the permanent opening of China's trade to the whole world. Henceforth, it is to be a matter of fair competition and no favor in the struggle for trade in the great Empire of the East.

SPEED OF RAILWAY TRAINS IN EUROPE.—The following is taken from the Journal of German Engineers:

The speed of railway trains is in reality much less than in the popular belief. The reports which from time to time come from the United States would create the belief that a speed of more than 64 miles an hour is absolutely within reach. Recently, an American newspaper reported a trip on a line between Philadelphia and Atlantic City where a speed of even 107 miles per hour had been attained. Even if such reports are true, such forced time is in the nature of a doubtful experiment, and serves as an advertisement for the respective railroads.

If the schedule time of trains is taken into consideration, the French railroads come first, and not, as is usually believed, those of England. The fastest train in the world at present is one of the French Northern Railroad; it makes the distance of 82 miles between Paris and Amiens, without stop, in one hour and a quarter, equal to a speed of about 65 miles an hour. Another train of the same road between Amiens and Calais runs at a speed of 51 miles an hour; another between Paris and Arras and one between Paris and St. Quentin, at 55 miles an hour. The time made on the Orleans Railroad is also fast. Two trains between Orleans and St. Pierre make 51 miles and 57 miles per hour, respectively, and three other trains make more than 55 miles an hour. On the French Southern Railroad, there are not less than six trains with a speed of more than 56 miles an hour. They run between Bordeaux and An-

gouleme, Bordeaux and Dax, Angouleme and Poitiers, and Orleans and Tours.

The time schedule of French trains contains not less than ten trains which in distances of more than 62 miles make an average of more than 56 miles an hour.

Compared with this record, the English railroads are considerably behind. The best time of 60 miles per hour is made on only one train between Perth and Forfax, a distance of 33 miles. A train between Perth and Stirling makes about 57 miles an hour; one between Perth and Aberdeen, 56 miles an hour.

The German schedule does not give us occasion to boast of our speed. The German railroad management, by the regulations of 1897, permits as highest speed for passenger trains with air brakes, under specially favorable conditions, 56 miles (90 kilometers) per hour. This is the maximum speed permitted, but the average on even short runs is much less. The fastest trains run between Wittenberg and Hamburg, at a rate of 52 miles an hour; between Stendal and Hanover, 50 miles an hour; and between Berlin and Bitterfeld, 47 miles an hour.

LIQUID FUEL IN EUROPE.—The scarcity and high price of coal have given much impetus to the construction of apparatus for using liquid fuel, petroleum, benzine, and gasoline, and competent authorities are sanguine of success. The advantages of liquid fuel, when properly applied, are obvious. There is no smoke, no stoking, no ashes or cinders, no incomplete combustion; the fire can be started or shut off at a moment's notice; a more even temperature can be maintained than by the use of coal or wood; and the fire can be regulated by the mere turning of a single cock. There is no dust or dirt, no spacious coal sheds are required, and there is no danger of spontaneous combustion, as frequently happens with coal.

It is claimed that petroleum and its manufactures will soon to a great extent supercede the use of coal for manufacturing purpose, and therefore the supply of petroleum becomes of great importance. Statistics show that the United States and Russia are between them producing, in round numbers, 120,000,000 barrels per year, and that the production of outside countries has of late increased so much that they are able to contribute enough now to bring the world's aggregate annual production to about 150,000,000 barrels. It is well known that the production of Russia is much less now than it might be, owing to the lack of enterprise of the people and to inade-

quate transportation facilities, which cause the price to be higher even in Germany, adjoining Russia, than that of American petroleum, which has to travel thousands of miles.

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SUGAR CANE NOTES.

In an article in the Louisiana Planter, written by T. Mann Cage, are the following comments on sugar manufacture and cane culture:

"In juice extraction Dr. Maxwell advocates powerful pressure and light saturation in preference to excessive maceration, as the latter tends to add impurities to the juice, and augments the fuel bill. The relatively low per cent of fibre in the canes in Louisiana has heretofore necessitated the use of wood or coal or adjuncts to the bagasse. It is generally conceded that fuel stuffs with a high per cent of moisture should be consumed in furnaces when a light initial temperature can be maintained, say from 2,000 degrees to 2,200 degrees. For such that the water of the fuel will be dissociated, thereby adding to the intensity of the flame. With the prospective improvement in furnaces and the making of a higher quality of bagasse in the near future, as space at the sugar factory is no object as on shipboard, boilers could be set to secure a greater amount of heat than is utilized at the majority of factories. The boilers most in vogue at present are large in diameter, with thick shells. The heat passes under the boiler, where the absorption is seriously impeded by the thickness of the metal, and rapidly passes through the flues to the stack. With high furnace temperature a pyrometer at the base of the stack would register from 600 degrees to 1,000 degrees Far., due to the short absorbing surfaces, and the too rapid transit of the gases. Have the temperature reduced to 400 degrees, thence a loss of twenty per cent of the fuel is incurred.

To prolong the life of the boiler plant and economize fuel, water tube boilers could be placed next the furnace; then the tubular boiler (the flame passing around the entire shell, if desired, and through the flues) and then a upright boiler to each three or four water tube and other boilers at the base of the smoke stack of the nest or battery. With high furnace temperature and large heat absorbing surface, the bagasse could be made to do over sixty per cent of the work in the Louisiana sugar factories.

That portion of Dr. Maxwell's report which is of greatest interest to cane sugar producers here is that which relates to the crushing plants. In Queensland, with about 75 per cent saturation, the extraction was from 94 per cent to 97 per cent of the sugar in the cane. He states: "In certain examples known to the writer in other countries the extraction of the best mills ranges from 93 per cent to 95 per cent. The rollers of these mills move under a vast hydraulic pressure, the maceration, in average, does not exceed 10 per cent to 15 per cent, and the whole fuelling and evaporation are done by the bagasse, not a pound of wood or coal being used." Such excellent work is worthy of imitation on the part of mill owners, many of whom are anxious to learn how the canes are fed on to the carrier, and with what regularity. Whether the crushings are double or triple, with or without shredder or crusher, and how many tons of cane per foot of length of rolls are crushed per day of twenty-four hours, also the diameter of the shafts and shells.

Dr. Stubbs in Bulletin No. 59 treats of experiments made at Audubon Park during the past ten years. The results had from tile drainage were not very satisfactory, as the tiles became gradually filled with silt, consequently wide, deep, open ditches are recommended to rapidly free the fields of water after heavy precipitations, as without efficient drainage an approximation to maximum crops cannot be had in this flat country with such tenacious soils. The soils of the station were unusually rich in nitrogen when the experiments began, hence the results had from the application of nitrogenous manures have not been as marked as would have been the case had the tests been made on old exhausted cane lands, where the cultivation had been continuous for say fifty years. At the station the pea vine crop is ploughed under flush with the disc plough, and later on the land is ploughed in rows with the double plough. The method is an efficient one on a small scale, but on a plantation of from 700 to 1,000 acres the extra labor could not well be incurred in the fall with but limited time for ploughing and planting prior to the commencement of the campaign. The high ridge formed by the lister and the four mule plough is an admirable preparation.

That part of Bulletin No. 59 which will prove of special interest to the cane growers of the state is that which relates to the cultivation of the cane with the disc and Mallon middle cultivators. After the middles are ploughed out, then the

canes are cultivated with the disc machine, followed each time by the implement to cultivate the middles. The above method proved superior to any other, and resulted in a yield of 42.56 tons of cane per acre, with 12.89 sucrose and 96 glucose. How are such results explained? It is simply the reduction of clod formation the nearer to a minimum, thereby increasing the root ramification and the action of the micro-organisms. The future of the cane sugar industry here in Louisiana will largely depend on the successful production of a relatively heavy tonnage of cane, although the sucrose content may be slightly lowered.

During thirty-five years of observation the writer has always found the most thrifty canes during seasons of extreme dry or wet weather on new lands, or those manurially enriched; hence the conviction becomes stronger and stronger that recourse must be had to intensive culture, which means effectively drained and manurially enriched soils, kept in friable condition. Cutting canals in Louisiana with dredge boat or otherwise is still in its infancy, but from year to year such work is becoming more general. When the lands are well drained and kept well ridged, then they will be in a condition to produce a heavier tonnage of excellent canes when properly rotated, and judiciously fertilized. Where a good stand of cane is secured on a certain percentage of the acreage in the spring, there the promising fields can be fertilized to yield say 40 tons of cane per acre, and such fields to be ground late in the season.

The shovel plough is an admirable implement for both young cane and corn; but here it has one serious defect, which is to flatten the ridge. It can be remedied by having four narrow shovels (each $2\frac{1}{2}$ inches wide with sharp cutting points), two on each side, and beyond a disc attachment to return the mellow soil toward the crown of the ridge. When the crop has attained sufficient size, the small shovels can be replaced by discs.

Although many seem to appreciate the benefits of drainage, yet how few pay any attention to the retention of soil moisture during periods of drought. Some may erect irrigation plants in the near future, but the majority must rely on a pulverized soil near the young plants to supply moisture during dry weather.

To counteract natural drawbacks is to enhance the chances of success. Here the climate, not the kind of cane grown, is responsible for results had at factory. Dr. Maxwell in the

Planter of June 30, records some wonderful results with Louisiana cane in Honolulu. The striped cane when seventeen months old yielded 239,520 pounds of cane per acre, with 14.35 per cent sucrose, which gave 34,340 pounds of sugar per acre. The end of the communication is significant, viz.: "When cane sugar gets down to the scientific methods of beet sugar, the beets will be driven out of competition. Hence the future of the cane." Here every effort should be made to increase the tonnage yield without the excessive use of manure, and then rely on science to guide in maintaining a relatively high sucrose content, such that acreage yields will be increased.

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NEW DEFECATING PROCESS.

Patent 648,577, issued to Albert Verley, of Courbevoie, France, assignor to the Societe Anglo-Francaise des Parfums Perfectionnes, Limited, of London, England.

The invention relates to the application of ozone to the juice obtained from cane or beet in the manufacture of sugar, and has for its object to increase the yield of sugar, as well as to improve its color.

Many attempts have been made to use ozone for the purpose of bleaching the juice from which sugar is obtained. It is well known that ozone possesses the property of bleaching such juice, but all attempts to commercially use this principle have failed, because the juice in the subsequent processes regains its color and the bleaching is not permanent.

The inventor has discovered that the bleaching effect of the ozone may be rendered permanent by adding a suitable alkali (or alkaline earth) to the juice, so that it gives a slightly alkaline reaction before the ozone is applied to it, and by continuing the action of ozone until such alkaline reaction is almost or wholly removed. It is necessary to take great care that the action of ozone is not continued beyond the point of neutrality.

By way of example is described a practical application of the invention to the treatment of the juice in the manufacture of beet root sugar.

To the juice extracted by any usual or suitable method is added lime in the proportion of four parts, by weight; of lime to ninety-six parts, by weight, of the juice, and then treated with carbonic acid, so as to leave an alkalinity corresponding to about 1.5 grams of lime per liter. The juice is then passed

through a filter press in order to separate it from the carbonate of lime, and then is subjected to the action of a current of ozone or ozonized air, and by this the ammoniacal matters are oxidized, the albuminoids are precipitated, and the coloring matter destroyed. Afterward a current of sulphurous acid is passed through the mass to completely neutralize the alkali, and then the mass is filtered. The sulphurous acid acts in this case as a reducing agent on certain organic peroxides formed in the action of the ozone.

Other alkali or alkaline earth can be employed in place of lime and carbonic acid, or other acid may be used instead of sulphurous acid, but sulphurous acid is preferred, because it acts as a reducing agent and destroys certain organic peroxides which are sometimes formed by the action of the ozone or ozonized air, which would, if not so destroyed, interfere with the success of the process.

The juice is afterward treated by the usual or any suitable method, and the sugar is crystallized out very readily. The sugar crystals are obtained in larger quantities and the formation of molasses is greatly reduced, while the bleaching effect is permanent.

The process may be simplified, especially in the case of treating cane juices, by dispensing with the treatment with carbonic acid to form a carbonate, it being then sufficient to add to the juice a small quantity of alkaline earth, such as lime, baryta or strontia, treat with ozone or ozonized air, and afterward neutralize with sulphurous or any other acid.

The same process may be applied to the purification or discolorization of saccharine juices or syrups generally.

If desired, the action of the ozone may be prolonged, so as to entirely get rid of this alkalinity; but it is preferred to proceed as hereinbefore described.

Claims—1. The process for purifying saccharine juices or syrups, consisting in subjecting the same to carbonation, and then subjecting the completely carbonated juices while alkaline to the action of ozone.

2. The process of purifying saccharine juice or syrups, consisting in subjecting the same to carbonation, then subjecting the completely carbonated juices while alkaline to the action of ozone, and finally neutralizing the juices with an acid.

3. The process of purifying saccharine juices or syrups, consisting in subjecting the same to carbonation, then while

the juices show an alkaline reaction subjecting them to the action of ozone, and finally neutralizing with sulphurous acid.
—Beet Sugar Gazette.

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TECHNICAL EDUCATION IN SUGAR INDUSTRY.

Dear Sir:—At the present moment there is passing through educational circles in England a movement in favor of Technical Education with the object of the introduction of more complete technical control into those industries capable of benefit from applied science; in every manufacturing town technological institutions have been erected, designed to give a complete grounding in the principles underlying the industry of that town. In Germany, where the development of Technical Education has reached its highest standard, every industry is in the hands of trained experts, and in certain cases is State advised; for instance, in the dye industry, which has been captured from English control by the employment of technical skill, a Government laboratory has been founded solely to assist the manufacturers, any one of whom, finding some difficulty which his own expert staff are unable to solve, reports to the laboratory; analysis and investigations are made, generally satisfactory to the manufacturer.

In Java very similar private undertakings have resulted in that island reaching a remarkable pitch of excellence in the manufacture of sugar; three experimental stations were established—one is now abandoned; funds for their equipment and upkeep were found by the estates' proprietors and commercial houses; skilled chemists, bacteriologists and botanists were engaged; investigations on all points of the sugar industry were made and are still being carried on; the value of these stations and the excellence of the work produced may be estimated by anyone who cares to read Geerlig's articles on the causes of the formation of molasses (an ideal example of the value of the application of science to manufacture), or the works of Went, Wakker and Kruger on the fungus diseases of the sugar cane; or any other papers that have issued from the Java experimental stations. In addition, the introduction and establishment on a firm basis of two processes but little known in this Colony—the carbonatation and crystallization in movement schemes—are due to the investigations and energy of the Dutch Chemists in Java.

To a certain extent work on these lines has been done in this Colony by Harrison and Jenman, and it is not the writer's intention to belittle in any way the excellent results obtained by these investigators, but rather to point out that much more work could be done by an experimental station, the staff of which would be able to devote their whole time to the improvement of the sugar industry, and it is the establishment of such a station that the writer now proposes for the consideration of the planters and commercial houses of the Colony.

The work to be done by such an establishment would be on the following lines:—

1. The undertaking of experiments with the view of introduction of improved varieties of cane.
2. The examination of the diseases of the cane, their cause and cure.
3. Experiments on the manuring of the cane.
4. The examination of new processes and superintendence of their introduction if found suitable.
5. The examination of the processes at present used in the Colony.
6. Advice on the ordering of new machinery.
7. The analysis of soils, manures and sugar-house products.
8. Investigations of causes of indifferent working in particular factories.
9. Standardization of polariscopes and other instruments used in factory control.
10. Trials of boilers, evaporators and new machinery.
11. Lectures on the cultivation of the cane, on the theory and practice of sugar manufacture, and instruction in the analysis of sugar-house products.

But little explanation of the kind of work which would be done under the different headings is required, as those which are not self-explanatory are already familiar to planters; very few estates, however, employ a chemist, and the establishment of such a station as is indicated above would enable overseers and others engaged in the manufacture of sugar, to learn something of the theory and practice of the operations they control as well as of the laboratory work they have at present to undertake; such a course could not but be conducive to the interests of both employers and employed.

The question of ways and means has purposely been left untouched; in the event of any scheme similar to the skeleton outlined above ever being taken in hand there will be plenty of time to discuss the financial basis.—Cor. Demerara Argosy.

THE HOME OF THE SUGAR BEET.

Along the hill sides and along the plains in sunny Saxony and the moorlands of Prussia one can see seemingly endless rows of verdant green, like a miniature army in the regularity of its lines and the uniformity of color and array. And on every beet field there is a real army, squads of men, women and children who are industriously thinning out the ranks of this green array, the surgeons of the beet field, who sift the chaff, remove the weaker and protect the strong.

There are a few sections in the fatherland where the first seed has now been proven a complete failure, and no time is being lost to get another crop planted. The season is very propitious for more beet seed, and while this second crop is more than a month late, if the weather conditions hereafter are favorable, a good crop should result. But in far the most cases the seed has sprouted and the beet come up in better condition than before in many years, and the weather continues quite favorable.

Furloughs are being liberally issued by the government for the farmer boys who are serving in the army at present, and this help is mitigating the lack of sufficient field labor at present to some extent, though there is work for twice as many hands as can be secured in Prussia at this time.

Beet growers of the last quarter of a century report that the stand of beets this year is phenomenal, and the methods of cultivation much more regular and practical than ever before. They predict a bounteous harvest, and the manufacturers a good price, because of the very high sugar percentage in the beet, and the sugar dealers are encouraged by the steady and advancing prices of the refined article. So to say that Germany's beet sugar interests are very hopeful is putting it mild. Even the bourse has felt the pulse of the industry, and if their very liberal policy toward the beet interests is a fair criterion, the very highest hopes are abundantly justified.

As the time for the fiftieth anniversary draws near, the press in Germany are giving the industry a general and naturally very flattering review. They point with pride to the fact that in 1872 Germany exported only 14,720 tons of sugar from beets. In 1894 the government reports showed exports amounting to 473,000 tons, and in 1895 this had grown to over 1,000,000 tons, and the total production of the empire had increased to 1,850,000 tons per annum. They point with great satisfaction to these figures, which prove that more than one-half of Germany's beet sugar product is exported, and that Germany produces more sugar from beets than the entire world produced from sugar cane twenty-five years ago. This remarkable development of the beet sugar industry bears a close relation to the financial status of the country, for the empire has prospered even as this great industry has prospered during this last quarter of a century.

Another statistician has figures to show that German sugar can be sold in the United States at 5 cents per pound, while the Germans pay $6\frac{1}{2}$ cents for the same refined product, with Austrians paying $8\frac{1}{2}$ cents, and France pays 10 cents, all owing to the export bounties paid by these governments, while at the same time these governments collect an internal revenue tax of 2 cents per pound for the privilege of manufacturing beet sugar. At the same time these countries have practically prohibitory duties against imported sugar, thus protecting the beet growers and manufacturers. The agriculturists of Europe are all highly protected, and the fact is very prominently before the people at this time that these same agriculturists are a power in the land. Their well nigh perfect organization is in great part responsible for these laudable conditions. They have an enterprising lobby at the seat of government year in and year out, and have able representatives on the floor of the reichstag and landing, as well as the bourse. All these factors are particularly active at this time to show the very best possible results on the occasion of the coming half century celebration.—Sugar Beet.

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THE SUGAR INDUSTRY IN THE PARIS EXPOSITION.

Reported by Sigmund Stein, Technical Sugar Expert and Technical Adviser to Raw Sugar Factories and Refineries, Liverpool.

(International Sugar Journal.)

GERMANY.—The most striking and prominent object is the exhaustive tables and statistics of sugar for the last fifty years, also the total production of beet and cane sugar as well as the tables referring to beet cultivation and the quantity of beetroots worked in the individual factories. Tables relating to the consumption and price of sugar in Germany and the yield of sugar in the different countries of the world are also given.

There is a small laboratory with various apparatus for sugar analysis.

On the whole the German sugar industry is not so well represented as it should be, considering its extent and importance.

BELGIUM.—This country shows a few very fine and bright products; loaves, crystals, granulated, small and large cubes, pearl sugar, loaves of four kilos., three kilos., and two kilos., and packets of one kilo.

This very small exhibit deserves attention for the excellency of the products.

HOLLAND.—In this department should be specially noticed the machinery of Stock Brothers, Hengels, who show a nice vacuum pan and malaxeur.

The *Nederlandische Fabriek*, Amsterdam, has a vacuum with condenser and a Mirreles-Watson three-roller crusher.

RUSSIA.—The Russian sugar exhibit is not a collective one, but each firm shows on its own account. The sugar beets and beetroot slices are very interesting, also the last by-products. Several products are rather dark-colored, and would not do for the English market. There are a small vacuum pan and some other apparatus and machinery, mixers, air-pumps, etc., etc.

A large loaf of sugar, weighing about three hundredweight, is a very good specimen.

Worth mentioning are a vacuum pan, exhibited by a Warsaw engineering firm; also fine sugar slabs from the refinery of Charitonenko and Sons, well-preserved beets and beetroot slices, and raw juice; also refined liquor, a good sample of limestone, well-made masse cuite of a bright color, and nice large crystals.

In this group may be mentioned the exhibit of the Chocolate Works of Sion, Moscow.

FRANCE.—This exhibit is exceedingly interesting. The French sugar manufacturers have made a collective exhibition in one large department, as well as separate exhibits.

We find samples of sugar machinery and sugar beet seeds, which are all of a very noteworthy character.

Amongst the exhibits of sugar beets the best is that of Vil-morin.

The products shown are cubes, loaves, crystals, and granulated. Very noticeable are the different sizes of cubes and loaves, and the exhibition of the sugar school in Douai.

In this portion of the exhibition we find several sugar and engineering works exhibiting in different parts, a full description of which would take up too much room. I will not specialize the different machinery and apparatus, but must say that there is nothing new to the sugar engineer, although there may be some things of interest to the outsider. The machines are no better than German or Austrian machines, although I have seen some very practical ones.

A very fine exhibit is made by the Company of Fives-Lille, which consists of very many different kinds of machines for raw sugar works and refiners, including cane sugar manufacture.

A fine display is made by the engineering works of Cail. They show a fine large filter press with 46 chambers, a vacuum pump (system Weiss), a three roller cane crushing mill, a well-fitted quintuple effect, and a very practical diffuser of 50 hectoliter capacity.

Hignette exhibits his known centrifugal machine, which deserves special inspection.

The exhibit of the Chocolate works of Ménier is worth mention. It is one of the most interesting shows of confectionery in the exhibition, and indicates what can be done in the way of working models.

The exhibit of the big refinery of Say, which is one of the largest refineries in the world, must also be mentioned. This

refinery shows loaves and cubes, and cubes packed in nice boxes and slabs. The quality is unrivalled and cannot be surpassed, and is far superior to any other exhibit of the kind. The sugar is nice bright crystals.

Amongst the other French refineries that of the "Mediterranean refinery" and the refinery of St. Louis, in Marseilles, may also be mentioned. Both of these show loaves, cubes, and granulated.

Technologists will be much interested in the large glucose factory belonging to the factory in Briche, and of the glucose factory in Paris. There are several other glucose factories exhibiting a series of their output of very good quality. There are to be seen liquid glucose, solid glucose in a nice loaf, and caramels.

Amongst the chemical apparatus in the French department must be mentioned the apparatus of Pellet and of Sidersky, which are more or less known to sugar chemists.

AUSTRIA.—This exhibit is the most complete of all the different countries. It is in the Engineering Hall in the Palais de l'Agriculture du Champ de Mars (Groupe de l'Alimentation). Immediately on entering a monumental group is seen representing allegorically the sugar industry. The department of the Austrian sugar refineries is a well arranged one, in which are shown loaves in paper and without paper, cube and granulated sugar in nice vases, and also very nicely arranged cube sugar in boxes. The raw sugar works exhibit is most attractive and shows all the products of the entire manufacture, together with the whole of the processes in the different stages. In another part beetroot in its natural state is shown. We find here all the enemies of the sugar beet plant, and see roots which have been damaged by the insects and also by the nematodes, demonstrating the great injury they do the beet. There are several varieties of sugar beet and many different samples of seeds grown and selected in Austria.

The chemist will find a very fine assortment of different polariscopes, showing all the latest improvements, as well as flasks for polarizing and different apparatus for analysis.

The by-products of the sugar industry are also a very interesting exhibit.

There are samples of extraction of sugar from molasses, according to the osmosis process, the strontia, the elution, baryta, and lead processes, as well as an exhibit of the application of molasses in the manufacture of alcohol. Samples of molasses utilized as fodder, such as a mixture of molasses with cocoanut, blood, moss litter, bran, raw and refined potash, and other things are shown.

Among the apparatus and machinery we find many small models of a Wiesner's washing machine, cutting machines, lime slaking apparatus, saturators, vacuums, Czisek's filter press, with a very interesting collection of cutting knives, and a model of a centrifugal machine for making cubes.

A very remarkable collection is that of the different kinds of sugars and the principal derivatives of sugar which shows the transformations which take place at different temperatures from 100° to 200° C. The progress the Austrian sugar industry has made during the past fifty years, as well as the yield of sugar for the last ten years, the export to the different countries and the money value of same, were illustrated by a large number of tables and documents.

The exhibit of the Hungarian sugar factories is also very interesting. In large flasks and vases we find the various products of the Hungarian industry, and samples of raw sugar and molasses together with documents, tables, and statistics showing the immense strides the sugar industry has made in Hungary in the last two decades. The place allotted to the Hungarian sugar industry is well selected, and the specimens of the different products are of a very high quality.

GREAT BRITAIN.—Great Britain is represented by over 2,000 exhibitors and the space allotted to them is by far the largest as compared with any other country.

Group 4, which is toward the old machinery hall, containing the exhibit of engineering and transport appliances is very attractive.

The chemist will find a very interesting exhibition of chemical industries in group 14. About the sugar industry nothing special could be mentioned.

I find there is, on the whole, a want of uniform system, and it is impossible to form ideas and comparisons of the different industries as they are placed in different buildings and arranged differently by each country. It is regrettable to notice that the original project of having a working model of a sugar works has not been realized. It was a splendid idea and would have shown the outsider the whole process of manufacture of sugar in a nut-shell. Instead of this, we find isolated groups of apparatus appertaining to the sugar industry in different parts of the different departments of countries, and of products in a raw and refined state. In fact, comparing the sugar industry with others represented it is plain that it has not been a success owing to the whole process not being shown as in other industries. The student of technology can really see the whole process of working better by studying handbooks or other descriptions of the sugar industry.

As France is the home country, of course the French exhibit is nearly the largest as regards sugar.—Int. Sugar Journal.

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QUEENSLAND CONFERENCE OF PLANTERS.

An Agricultural and Pastoral Conference has lately been held at Warwick, at which, among other things, there were discussions on several of the questions relating to the sugar industry which are now attracting so much attention. As there were many points raised which are both instructive and

suggestive, we thought it advisable to put on record the summary below, for which we are indebted to the report in the *Queenslander*. The very varying opinions on the subject of colored labor are interesting, but we maintain the views already expressed by us, that sugar, without Kanaka or coolie labor, cannot be produced at a profit, and the great weight of opinion which finds utterance in the *Mackay Sugar Journal* is unmistakably in the same direction.

SUGAR-GROWING AND SOIL MOISTURE.—The first item was an interesting paper on the cultivation of sugar cane, by Mr. E. Denman (Mackay). Mr. Denman opened his paper by stating that he had been struck with the almost universal omission, from articles intended to either instruct or aid the cane-grower, of numerous small details which have a most important influence on the crop. Continuing, he pointed out that the chief object he had in view was to try and impress upon the minds of our cane-growers the value of soil moisture conservation. Perhaps they knew a good deal about irrigation, but he would dismiss that subject, as it was beyond both the means and expectations of most of the cane farmers. Whatever may be said of the value of nitrogen, phosphoric acid, potash, lime, stimulants, and fertilizers, they were all valueless if one element was lacking—namely, moisture, and it was in every farmer's power to conserve moisture in a remarkable degree at little cost, and with large profit to himself, and so reduce their crop variations from 40 to 60 to 10 to 15 degrees from normal. Dealing with soils, he said he knew of no sugar-growing country with such a wide variation. In almost all old cane-growing countries the soil was uniform, whereas in Queensland there were to be found half a dozen distinct soils under cane on the one estate. Many placed immense value upon soils of great depth, but he had had experience of many soils, and in several countries, and he preferred a gray soil, fairly retentive, not more than 18 in. deep, with a clay subsoil, and he was confident that with good and proper cultivation, such a soil would, especially with our erratic climatic conditions, give both the best and most regular return. Many farmers almost dreaded such a subsoil, saying it was too cold, etc., and would not let their ploughs touch it. It was, however, a storehouse upon which the farmer always could, and should, periodically draw, both by plough and leguminous plants. The first step towards moisture conservation commenced with tillage. As to how many ploughings land should receive, no rule could be laid down, but this much was universally admitted, that the cultivation must be thoroughly done, and all weeds thoroughly eradicated, before the land is planted. Trusting to get rid of weeds by after cultivation was a great mistake, was rarely successful, and always very expensive. Twelve inches was not sufficiently deep to cultivate land for a cane crop, and until he came to Queensland he never saw land cultivated less than from 21 in. to 24 in, for the plant

crop. He thought there was altogether too much talk about intensive cultivation (whatever that term meant) and too little attention given to rational cultivation and treatment of both soil and crop. Under the present system of cultivation, our soils had lost much of their natural porosity, as well as their retentive power. This state of affairs could only be remedied by subsoiling. He of course was presuming that draining was beyond the means of most. Continuing, Mr. Denman dealt with the plants themselves, stating that experience had taught him that in cane cultivation, the man who selected and cultivated his own plants was much more certain of getting a good sound suitable and reliable cane for his land than the one who pursued change and variety. The latter method, besides being very expensive, generally gave disappointing and not infrequently disastrous results. Referring to trashing, he contended that if done properly and at the proper time, the work benefited the cane farmer in many ways. Dealing with stimulants, Mr. Denman pointed out that the statement that sulphate of ammonia overcomes drought was a great fallacy, as drought overcame it; for without moisture it was useless, if not harmful. The value of sulphate of ammonia lay in its nitrogen. The chief drawback with the old sugar lands in Queensland, from which trash had been regularly burnt, was, however, not that they had been denuded of nitrogen, but of vegetable matter. The question of tariff was then dealt with at length, the matter being finally summed up as follows:

"A protective tariff, accompanied with the abolition of reliable labor, would greatly benefit about half a dozen of our wealthiest and best situated manufacturers, but it would absolutely ruin the rest, who had been equally enterprising, who were quite as deserving, but less fortunate—men who had expended immense sums of money, and devoted many years of their life to the business. It would, further, drive about 90 per cent of the cane farmers from their holdings."

Mr. Denman concluded his paper thus:—"That the sugar industry is slightly indisposed I must admit, but the very fact that it is even alive after the treatment it has received in the field and in the Legislative Assembly proves not only its vitality but also its suitability to our climate, and its importance to the colony. I do not think there is anything prophetic in what I have so far said, and least of all in what I am about to say in conclusion—namely, that should unwise counsels prevail, and the industry be killed, as it undoubtedly will be, all those who assist to bring this about may rest assured that the interests of the colony will demand its early resuscitation, even under conditions as regards labor that will be much more abhorrent to the sentiments of those who killed it, and much more inimical to the interests of those for whose supposed benefit it was killed than ever has been, or even can be, the case with reasonably-regulated Kanaka labor."

SUGARCANE VARIETIES.—A lengthy paper on improvements

in sugar cane varieties, by Mr. E. Grimley (Brisbane), was the next item on the programme, but as printed copies of the paper had been distributed to delegates the previous day, Mr. Grimley contented himself with touching on a few of the more important points dealt with in the paper.

Discussion then ensued on both papers.

Mr. W. Gibson (Bingera) advised cane growers to go in for experimental plots for the purpose of finding out the varieties most suited to their soil. As showing the necessity for these experiment plots, he pointed out that one variety, which was doing exceedingly well at Bingera, proved a total failure when planted on land some twenty miles distant.

Mr. G. Sanders (Stanwell Agricultural Society) stated that the sugar industry was exhausting the magnificent lands of Central and Northern Queensland, and contended that the Government should take steps to compel those growing sugar to return to the soil the valuable constituents which the cane crop uses up so freely.

Mr. W. Castles (Brisbane) rose to deny the statement that cane was very hard on the soil, giving it as his opinion that cane drew less nourishment out of the ground than any other crop he knew of.

Mr. W. Deacon (Central Downs Agricultural and Horticultural Association, Allora) referred briefly to the black labor question. There was a great deal of misapprehension and ignorance with reference to Kanaka labor, some considering it a species of slavery. Such was not the case, however, for on the whole the Kanakas were well paid and well treated. What they should fight against, however, was Japanese labor. When a Jap came to Queensland he brought his sisters and his aunts with him. This was a very undesirable state of affairs, for Queensland was wanted for the white man.

Mr. F. W. Peek (Logan) said that so far as the labor question was concerned his sympathies were with the planters. His visit to Mackay during the last conference had opened his eyes to the vast resources of the sugar industry, and in his opinion the planters should receive every assistance from the farmers of Southern Queensland.

Mr. C. P. Maw (Mackay) related how he had tried to grow sugar with white labor and had failed in the attempt. The experiment, he said, had convinced him that the sugar industry could not be carried on without the assistance of black labor.

Mr. Sumner (Zillmere) opposed black labor, and expressed his conviction that sugar could be grown with white labor just as well as it could be with Kanaka labor. He had had some experience on plantations, and considered the work of cutting the cane much more congenial than work in the mill.

Mr. L. G. Corrie (Queensland Acclimatisation Society) strongly advocated experiments for the purpose of finding out the varieties of cane best suited to local soil and climatic con-

ditions. So far as black labor was concerned, he felt confident that the planters could make out a good case. The matter, however, was going to be dealt with by Federated Australia, and in their own interests the planters should prepare their case and submit it to Australia.

Mr. T. De M. Murray-Prior spoke strongly in favor of something being done to prevent both over-cropping and over-stocking.

Several other delegates also addressed themselves to the subject, after which Mr. Denman and Mr. Grimley replied briefly to the criticisms passed on their respective papers. In the course of his remarks, Mr. Denman stated that to ask the sugar grower to carry on his business without the assistance of black labor, would be equivalent to asking a large farmer to do his harvesting without the help of a reaper and binder.

The Chairman (Hon. J. V. Chataway) then briefly summed up the discussion. Referring to the black labor question, he stated that he never employed black labor. That the work of growing sugar could be carried on by white men he was assured. The question as to whether white men would carry on the work, however, was one that had not yet been solved. Dealing with the question of overcropping, he pointed out that sugar growers were by no means the only class who were carrying on the practice, a practice which might almost be called a crime. Dealing generally with the question, Mr. Chataway pointed out that in impoverishing the soil a person was not robbing himself so much as the State and his children.

ENGAGEMENT OF DR. MAXWELL.—During the evening a deputation consisting of sixteen delegates interested in the sugar industry, waited upon Mr. Chataway with reference to the appointment of Dr. Maxwell, and handed in the following resolution, which had been passed by the Bundaberg Council of Agriculture:—"That the union approve of Dr. Maxwell's recommendations that experimental stations be established in various districts in Queensland for the purpose stated in his report; also, the appointment of a managing director possessed of the necessary qualifications, and who is not only a chemist, but a practical agriculturist. Also, that if the Government agree to the foregoing resolution, this association of growers agree to pay a sum not exceeding 1d. per ton of cane crushed, on condition that the millowners agree to do the same. The expense of the engagement of Dr. Maxwell is to be divided as follows:—Not less than 25 per cent by the Government, the balance to be equally divided between the millowners and growers."—*Int. Sugar Journal.*

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According to Licht's circular there will be an increase of beet acreage in Europe amounting to 3.6 per cent in Germany, 6.10 per cent in Austria, 10 per cent in France, Belgium and Holland, and 5 per cent in Russia.