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The price of sugar in New York has been quoted at $4\frac{1}{4}$ cents for the past month, and as the new beet crop, and the Cuban and Porto Rico crops may soon be available, it now looks as though the price will not advance, but may drop a little during the next month.

Vegetable marketing in Honolulu is very poorly conducted. Corn is planted with poor seed, grows two or three feet high, and then the ears are picked too young or too old. The same with melons and bananas. The Chinese have got into the way of cutting off banana bunches when green, as is required for shipment to California, and so all banana bunches must be gathered green, and they are kept in a back room for one, two or three weeks, when they become insipid and tasteless. A gentleman who has purchased about a dozen water melons this season, says that only two of them proved to be really fresh, savory and fit to eat. The others were green or over-ripe and tasteless. Yet several of them were "plugged" before purchase. There is room for much improvement in the line of supplying vegetables and fruits for local consumption.

The first regular steamship line between the United States and China and Japan from New York, will soon be inaugurat-

ed, with a force of seven ships, averaging from 3,150 tons to 6,057 tons. It will be known as the Japan Steamship Line, and the steamers will make regular monthly trips.

LOUISIANA CROP.—Ideal sugar cane weather has prevailed nearly the whole of June. Early in the month showers commenced to fall, and while many had no rain for two weeks thereafter, the bulk of our sugar planters had very helpful showers, not too much but just enough to permit of a proper cultivation and laying by of the cane crop. Other planters experienced too much rain which caused the weeds to grow rapidly and delayed the final cultivation. In a few other instances rain is still needed.—Sugar Planters' Journ. July 2.

Many glorious incidents in the Spanish-American war will be told to "generations yet unborn," but few, we take it, more inspiring than Capt. Phillip's command to his men—"Don't cheer, boys; they are dying." And then that sublime moment when the Captain of the Texas said: "Men, I believe in God, the Father Almighty; let every man bare his head for a moment of silent prayer because of our deliverance." Is it any wonder that our sailor boys win battles? What wouldn't they do for such a commander as that!

The importance of the citrus-fruit industry in Southern California may readily be seen from the fact that conservative estimates place the next season's crop of oranges at about 17,000 carloads. The raising of lemons is far behind orange-growing in importance, yet, during the past few years, the increased output of lemons has been very large, and many new lemon groves are now coming into bearing, so that there is likely to be still greater increase in the product of this fruit during the next few years.—Los Angeles (Cal.) Times.

Don't wait for a higher position or a larger salary. Enlarge the position you already occupy; put originality of method into it. Fill it as it never was filled before. Be more prompt, more energetic, more thorough, more polite than your predecessor or fellow workmen. Study your business, devise new

modes of operation, be able to give your employer points. The art lies not in giving satisfaction merely, not in simply filling your place, but in doing better than was expected—in surprising your employer; and the reward will be a better place and a larger salary.

A somewhat remarkable proposition—quite characteristic of the attitude of the French sugar manufacturers—has been made by the *Sucrerie Indigene* apropos of the prospective great increase in the beet sugar industry in America, to the effect that, considering that the seed of sugar beets must needs for some time be obtained from Europe, the Continental growers should decline to supply that seed, the idea being that the export of beet seed should be prohibited. The journal suggests that if the coming Conference cannot get all nations to agree on the sugar question (as is more than probable) it can at least come to an understanding on the matter of beet seed, “and let them be quick about it.”—*Dem. Chron.*

History does not record an act of finer heroism than that of Lieutenant Hobson and the crew of the collier *Merrimac*. I watched her as she made her way to the entrance of the harbor, and my heart sank as I saw the perfect hell of fire that fell upon those devoted men. I did not think it possible one of them could have gone through it alive. They went into the very jaws of death. It was *Balaklava* over again, without the means of defense the *Light Brigade* had. Hobson led a forlorn hope without the power to cut his way out. But fortune once more favored the brave, and I hope he will have the recognition and promotion he deserves. His name will live as long as the heroes of the world are remembered.—*Com. Schley.*

Agriculture is rapidly being changed from a drudgery to an art. No other avocation in life has advanced so rapidly the past few years as has the business of farming. The field for the exercise of the mind has enlarged quite as fast as that for the hand, and we have just fairly started along the road of scientific agriculture. The new farmer, with his improved machinery, will soon sweep the earth, and the old-timers will

just worry along and drop out of existence. They are no longer in the way of anyone, and it's no use for the busy, up-to-date farmer to try to get them out of the ruts, thus wasting valuable time and doing no good.—Lou. Planter.

The Sugar Cane estimates the consumption of sugar in Europe for the year ending May 31, 1898, compared with two previous years, as follows:

	Tons.
Great Britain	1,631,000
Germany	719,000
France	535,000
Austria	380,000
Holland, Belgium, etc.....	455,000
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Total, 1897-98	3,720,000
Total, 1896-97	3,392,000
Total, 1895-96	3,665,000

I consider the American Navy, ship for ship, gun for gun, and man for man, unequaled by any navy in the world to-day. The act of Lieutenant Hobson has few, if any, parallels in the history of the world. At Manila the act of Commodore Dewey was brave, but he entered a hostile harbor to give shot for shot, to beat down his assailants, to triumph by the force of his arms. Lieutenant Hobson and his heroic crew not only went with the Merrimac into the range of an awful fire, unable to reply, but with the interior of their vessel loaded with torpedoes for her destruction, at the proper time. They went in unable to fire one gun at the enemy, and prepared to destroy the very deck under their feet. We search the pages of history in vain to find some act of heroism for country and flag that approaches this.—Ex-President Harrison.

To quote Prof. Marcker's words: "One may twist and turn the matter as one will, whether used with cereals or crucifers, in sand, clay, or loams, rich or poor in phosphoric acid, in cold or hot years, whether in respect to its effects upon the first or upon succeeding crops, the result is always the same, namely,

the action of the phosphoric acid in bone-meal, whether raw or steamed, or glue-free, is invariably unsatisfactory, and the author comes to the conclusion that it is high time that raw, steamed and glue-free bone-dusts ceased to be regarded as phosphoric fertilizers; they require previous treatment just as the mineral phosphates do, in order to make effective fertilizers of them, and the author believes that the future of the bone-meal industry lies in the preparation of these products which experiments have shown to be effective."—Ex.

The capabilities of the Hawaiian Islands for tobacco-growing on a commercial scale will soon be put to the test. Carl Vogt's Sons, of 195 Pearl street, New York, have entered into communication with the Hawaiian Government on the subject. They have also made arrangements with W. W. Dimond, of King street, Honolulu, who will on their behalf supply tobacco seed of the best kinds free, with full directions for use, to all planters willing to make a fair trial of tobacco-growing. Messrs Vogt are also prepared to send over an expert in curing tobaccos as soon as occasion requires, so that this important part of the undertaking will be well taken care of. Agricultural Commissioner Marsden, of Honolulu, has already experimented with tobacco, and, we believe, much encouraged by results so far as he has gone.—Tobacco Leaf.

The machine politicians tell us, says a New York exchange, that parties are necessary for the conduct of the government, and that strict organization and rigorous discipline are necessary for the preservation of parties. But every day's experience shows us that the stricter the organization and the more rigorous the discipline in the machine sense becomes, the greater grows the number of citizens who throw off party allegiance and follow an independent course. There were 150,000 of them in our late municipal election, and there are, as estimated by competent authority, more than 200,000 citizens in this State who without regard to party, vote according to the dictates of their conscience, largely owing to their disgust of machine rule, which is thus in fact the disintegrating agency in party life.

THE AMERICAN BEET SUGAR OUTLOOK.—The management of the Chino sugar factory states that in all 55,000 tons of beets are expected to be sent to the factory, producing 8,500 tons of sugar, as against 85,000 tons of beets last year from which 12,720 tons of saccharine matter were extracted. The Chino factory will be kept running for three months. It is estimated that the establishment at Los Alametos will not have enough beets to keep it busy for more than three weeks. A two-thirds crop, or 35,000 tons of beets, is prognosticated for the Alvarado factory. The amount at Watsonville will be a little in excess of these latter figures. The factory at Crockett will give more attention to the refining of cane than to crushing of beets, the crop being less than half, while that at Salinas will be idle, and the Alamos factory is unfinished. The main sugar factory building at La Grande, Or., is about finished. The owners have sent to Lehi, Utah, for expert beet growers. In Nebraska the sugar beet prospects are good, and about 4,000 acres have been sown at Grand Island.

SEEDLING CANES.—The experiments which are being carried out by the Botanical Department and by a few planters of Trinidad, distinctly confirm the results which have been obtained by local experimentalists, Messrs. Jenman and Harrison, in the growth of seedling canes. The canes Nos. D. 61, D. 74, D. 78, D. 95 and D. 145, grown on Palmiste estate and examined by J. R. Holloman, Esq., of Pln. La Fortunee, confirm previous Demerara records.

Mr. Hart has had 126 seedlings examined, some of which have given splendid returns, notably those raised from seed taken from plants of the Demerara seedlings, Nos. D. 95 and D. 74; the latter cane giving the very high percentage of 21.3% Sucrose or 2.333 lbs. per gallon. Whether this cane will turn out a good cropper or not is the business of the scientists to prove, but the bare possibility of a field of cane yielding over 21½% Sucrose or Crystallizable sugar, is certainly to our mind quite sufficient to justify any expense connected with the proper working of these valuable experiments.—Dem. Argosy.

The commerce of the Philippines has been estimated by some authorities at \$50,000,000 a year, but it is probably much

greater; the chief exports being sugar, tobacco and hemp. Of Manila cigars, the yearly product is several hundred million, one factory alone employing 10,000 hands; and of Manila hemp the yearly product is probably 200,000 tons, eight-tenths of which is bought by the United States. One factory in Manila produces 40,000,000 cigarettes in a single year.

The imports are also of enormous value. The United States send the Philippines chiefly kerosene oil and flour, while England, Germany and France sell them print cloths, white drilling, hardware, canned goods, etc. There are other large towns in the island, but most of the imports are landed at Manila and are shipped to them by local steamers. One company alone has 27 steamers engaged in local and coastwise trade, their ships ranging in size from 500 to 8000 tons.—Scribner's Mag.

INSECT PEST ON THE SUGAR BEET.—In the gardens about Salinas, Cal., there has appeared this year an insect feeding upon the beets, which appears to be capable of doing considerable injury. It is a small maggot which burrows in between the membranes of the leaf, eating out all the green substance, and when full grown falls to the ground, producing an oval, brown pupa, in which is developed a fly of about the size and general appearance of the common house fly. This insect lays its egg upon the beet leaves, generally two by two, side by side in a place, and the young worms, when they hatch from these eggs, again enter the leaves and begin their work. The eggs are very conspicuous, slender white bodies, found both on the under and upper side of the leaf, and the shells remain attached to the leaf often long after the worms hatch from them and become adult and enter the ground. The insect appears to have two or three generations in a year, and seems to be capable of doing a great deal of injury, especially upon sugar beets, where the effect of the destruction of the green matter of the leaf would materially reduce the sugar contents of the beet.—Chino Companion.

The only really successful tea plantation now in the United States is located near Summerville, S. C., says La Fayette I. Parks in April Cosmopolitan. It is the property of

Dr. Charles U. Shepard, who has undertaken to prove that tea, one of the greatest staple articles used by Americans today, can be raised by our farmers profitably. This attempt to add to our now widely diversified list of industries a new one, Dr. Shepard made partly as an experiment and partly as a regular business enterprise. And it is very interesting to note that in a business way it has been quite successful. Last season Dr. Shepard sent to market upward of eleven hundred pounds of the finest tea obtainable. Thus far experience appears to justify the original hope of our ability to grow high-grade teas remuneratively. We have established at Pinehurst very fair tea gardens from choice imported Chinese and Japanese seed. From them we have produced both the green and black teas, of a quality which readily commands one dollar or more in the retail market. The gardens have few vacancies, and the plants have a luxuriant growth.—Ex.

CORA SUGAR HOUSE BURNT.—The sugar house on Cora plantation was destroyed by fire at 10 o'clock July 17. Smoke issued from the lower side of the tower on the pan floor, immediately above the hotroom. The fire made rapid headway and in two hours the sugar-house, containing 160 barrels of dry and about 300 cars of seconds, together with the blacksmith and machine shops near by, were entirely consumed. Mr. Elseman, the agent, couldn't say how the fire originated, as there was no fire about the house and no one slept in the building. His manager had been through the place at 8:30 a. m., and there was no sign of fire. He could not give the amount of insurance nor the names of the companies; that part of the business was left to Mr. V. Meyers. He only knew that it was insured in a number of companies. Neither could he estimate the loss, as it would have to be determined by experts. It was his opinion that the mill and bagasse burner had not been greatly damaged. It was a nine-roller mill, with triple effects and the latest improved machinery. The bagasse burner had just been completed and the sugar-house put in good shape for the coming season.—Sugar Planter Journal, July 23.

HAWAIIAN ANNEXATION.—The Bill of Annexation of the Hawaiian Islands to the United States finally passed the Senate July 6th, and was signed by the President on the 7th. After confirmatory action by the Hawaiian Government, the annexation will be complete and a Governor-General will be designated by the President. The effect upon the sugar trade will not be especially important. Raw sugars are now admitted free of duty into the United States, as they will continue to be. Sugar is not refined in the islands and is not likely to be, as everything required for the refining process would have to be carried from the United States.

The last crop of the islands was 225,000 tons. This may be increased somewhat, but the production of the islands is necessarily limited by several adverse conditions. Few of the sugar companies now operating in the islands appear to make a great success of it, even with the advantage of no duties to pay, and annexation will, in some respects, such as labor, tend to increase the cost of sugar production there. The domestic beet sugar industry, which is really the only industry adversely affected by annexation, will scarcely realize any change in conditions, at least for some time to come.—Willett & Gray's Cir.

Up she goes—Old Glory—where lightnings are sped;
She dazzles the nations with ripples of red;
And she'll wave for us living, or droop o'er us dead—
The flag of our country forever!

She's up there—Old Glory—how bright the stars stream
And the stripes like red signals of liberty gleam!
And we dare for her, living, or dream the last dream
'Neath the flag of our country forever!

She's up there—Old Glory—no tyrant-dealt scars
Nor blur on her brightness, no stain on her stars!
The brave blood of heroes hath crimsoned her bars,
She's the flag of our country forever!

"WESTWARD THE COURSE OF EMPIRE TAKES ITS WAY."—E PLURIBUS UNUM—ONE OF MANY.

On the twelfth of August, 1898, at the noon hour, in the presence of an immense concourse of people, the American ensign was raised on the government buildings in Honolulu, denoting the extension of American sovereignty over the entire Hawaiian group. From that time Hawaii became de facto American territory, and will henceforth be known as part of the great American Republic, in the same manner as Fiji or New Zealand is part of the British Empire, and Tahiti is part of the French Republic.

The ceremony attending the transfer was simple and unostentatious, as it should be. It consisted first in lowering the Hawaiian flag from the staff on the tower of the government building in Honolulu; and in its descent it received a national salute of twenty-one guns from ship and shore. It will still remain and be known as the local ensign of the territory of Hawaii. As soon as it was detached from its halyards, a beautiful large American flag was raised to the same staff, while a smaller flag—the same identical one that Commissioner Blount pulled down in 1893 from the Judiciary Building—was raised to and floated from the same staff on the latter building, from which the Hawaiian ensign had also been lowered. The American flag received the same national salute that had been accorded to that of Hawaii, and in addition, the cheers of the assembled multitudes that thronged the grounds, avenues and every available spot in the vicinity.

There never has been even a peaceful annexation of foreign territory of one country to another, where there was not some disagreement of opinion as to its propriety and justice, by the residents of both countries—some strongly favoring, while others as strongly opposed the transfer of sovereignty. It has been the same here, and this antagonism may continue during the lifetime of a few of those who have opposed it, residing in either country. While we honor and respect them for their patriotism, we believe they err, so far as the general good of the country is concerned. Some few of the older Maories of New Zealand still wail as bitterly over the forced loss of their native sovereignty as many of them did forty years ago, when it took place, though the majority cheerfully ac-

quiesce in the change, and are said to be better educated and more comfortably off now than they were then. The same remark applies to the Tahitians and the Fijians. Peace with personal and property security, and every opportunity to improve their condition will be guaranteed to Hawaiians by annexation, as it is elsewhere, and there can be no question that the native and foreign population of Hawaii will enjoy a more lasting and greater prosperity, under the aegis of America than it has ever had before.

Long live the American Republic and its Hawaiian territory.

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PLANTATION LABOR.

The annexation of Hawaii to the United States, which was finally accomplished on the twelfth day of August, will undoubtedly affect the price of labor as well as the mode of securing laborers for the sugar and coffee plantations, as well as other industries, but to what extent can as yet be only a matter of conjecture. The employment of laborers by contract will not be abolished, but what is termed the "penal clause," must be eliminated, being contrary to American laws, which are now the laws of Hawaii. But as contracts without the penal clause, are used in almost every branch of industry in the United States, they may be depended on here.

In conversation with Mr. John A. Scott, manager of the Hilo plantation, he expressed himself as quite confident that the labor question will adjust itself to the changed conditions brought about by the treaty, and that laborers will in future be obtained, as is now done in the United States, through the medium of labor companies, whose business it is to provide laborers in any branch of work, notably in the sugar beet farms of California. He thinks that the large number of laborers in the country now—of which there must be at least forty thousands, including Hawaiians, Portuguese, Japanese and Chinese—is amply sufficient for the demand, if they can be controlled. While there is nothing to prevent any planter having lawful contracts, yet it will be better to have the laborers provided for planters by companies who will be responsible for them, provided the terms are reasonable. There

are thousands of Chinamen here now who will work in gangs or companies, while they refuse to ship individually to planters direct. These companies become responsible for the service of their men.

Japanese also will serve under contractors or companies, who furnish their own funds, and find employment for their men. There must be some guarantee that they will not become charges on the government. This can be met by having the whole service placed in responsible hands. If this system can be carried out, it may work to the advantage of all parties. There is this difference in California and other States, that the work is only for a few months in one locality, when the gangs remove to another section and a different service.

However, the plan remains to be tried, and may work well. If so, it will be adopted. A great deal, however, will depend on the rate of wages given. More than one-half of the laborers employed on plantations now, are not under contract, and are reliable men. This number may be increased by judicious treatment, and making their surroundings more attractive.

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EXTRACT FROM S. F. BULLETIN.

The San Francisco Bulletin of August 2 has the following on the subject of labor in Hawaii, which voices the opinion of many thinking men in the United States; as well as in Hawaii:

"Mr. J. B. Atherton, a sugar planter in the Hawaiian Islands, strikes the keynote of the labor question in the remark that 'if we can get the family class of negroes, the class who bring their wives and children and pastors and churches with them, it would be well both for us and for them.' The family class of laborers from any nation do not disturb the condition of the native laborer. The foreign family man works under about the same conditions as home laborers, and is subject to the same responsibilities. It is the single-man laborer who makes pretty much all the trouble. The single man enters a field in which family men are laboring and cuts wages because he is exempt from the expenses that consume a large part of the family man's earnings. The family man naturally objects to this unequal competition. The contract laborer, from whatever country he may come, has only himself to look out for. He can take whatever wages are offered, his only care being to get the job. * * * *

“Mr. Atherton says that in his opinion the native Hawaiians will in no respect be worse off than under former conditions. The native laborer, will, in fact, be better off, for the reason that in a short time there will be no laboring class which can by their exemption from family responsibilities underbid him in the labor market. Wages will adjust themselves on the basis of the necessities of men who have families to provide for. This may cause some advance in wages, but the Hawaiian sugar planter will only be subjected to the conditions which prevail in competing countries. These may be said to be the normal conditions of a civilized country. Industries based upon rates of wages which only provide for the laborer are out of line with Christian civilization. The family home, the schoolhouse, the church, are essential features of modern civilization. They are features, however, which cost money. The law of all civilized countries requires a man to contribute to the support of wife and children. It requires him to send his children to school, and subjects him to penalties if he fails to comply with the law's provisions. Has not this family laborer a right to demand that the law which takes from him a part of his earnings shall see that laborers who have incurred none of his responsibilities shall not crowd him out of his place among workers? It is for the good of society that the wages of manual laborers shall be sufficient for the maintenance of the family relations, for the support of schools, churches and other agencies of civilization.

“Production is in excess of consumption, even with children and a large proportion of women unemployed. There is no reason, therefore, in the nature of things, why a system of labor should be tolerated which establishes rates of wages only sufficient to provide for the necessities of the single-man laborer. The coolie laborer working in the islands for 50 cents a day and finding his own board and clothes is a cheaper producer than can be found elsewhere in the United States. The Hawaiian planter should therefore accept cheerfully changes in the laws which will devolve upon him about the same labor cost in the production of sugar that sugar producers in other parts of the Union are compelled to incur.”

AN OBJECT LESSON FOR SMALL FARMERS.

On the island of Hawaii, the largest of this now American archipelago, and in its southernmost district of Kau, lies the village of Waiohinu, which, in the melodious vernacular, signifies the "sparkling water." The village stretches along the base of one of the volcanic tufa hills, which were thrown up in pre-historic times, and are now covered with thousands of acres of golden sugar canes, that furnish the rich dividends of the well-known Hutchinson Sugar Plantation, the shares of which figure so prominently in the daily reports of the San Francisco stock bonds. It is an ideal spot of tropical beauty, and in former times was the home of the warrior chieftains and kings who ruled that section of Hawaii. These hills and vallies were then noted as the favorite locality where the ancient Hawaiian Olympic games were held, where assembled thousands of the famous warriors and sports from every district of the group to contest for the wreaths of honor bestowed by the assembled chieftains, or perhaps for the hand of Kau's favorite belle.

It was not, however, to portray these ancient scenes that we took up our pen, but merely to draw attention to the opportunities that are now open to every land holder on either island of our group, however small the holdings may be.

Some fifteen years ago, while making a tour of inspection as postmaster-general of Hawaii (1883), we stopped at Waiohinu to investigate the working of the mail service in that remote corner of the then kingdom, which was not running as well as it should. Having finished this business, in company with the local postmaster, we took a stroll through the village. Waiohinu has a population of perhaps 800, with one principal street, a mile or more in length. Many of the villagers are permanently employed in the sugar mills and on the plantations of the district. It is an ideal spot, some 700 feet above the blue ocean which stretches off to the south, without an island between it and the equator, a thousand miles distant.

Nearby and back of his dwelling, the local postmaster pointed out a field extending up the steep hillside, containing perhaps an area of ten acres, which he had lately purchased for a pasture for his domestic animals. A fine stream gurgled

down from the mountain, showing that there was no lack of moisture, and that any trees would grow there, if only planted and cared for. We then suggested to our friend the post-master, that he plant fruit trees, which in time would become a source of profit. The idea did not strike our friend favorably, who thought nothing could possibly come from labor spent there. And what would you plant? he asked. Well, oranges, limes, lemons, pears, figs, or any fruit that will grow. Oh, but oranges and limes will take a lifetime to commence bearing fruit, he replied, and then, where is the market for them,—surely not here. No matter if the trees do take several years to mature and yield fruit, your children will reap the benefit, if you do not, was our reply. The trees will require no care, after being once planted, and your cattle and horses can do them no harm, as citrus trees protect themselves with their thorns. But argument did not seem to make much impression on our happy-go-easy German friend, and we left him, hoping the advice given might some day be followed, and if ever we visited Waiohinu again, we might find a grove of trees bearing abundant fruit in the pasture.

A few days reflection, however, convinced the village post-master that no harm could follow, if he planted a few orange and lime seeds. It would cost only a few hours labor, and might prove a good thing. Fifteen years seem a very long time as we look ahead, but when past, they are like a night's dream. A grove of citrus trees sprung up, and grew rapidly in the fertile, well watered soil, nursed by the warm showers and the rays of the hot sun, and now, having grown to be large trees, they are covered every month of the year with white flowers, green and ripe fruit, as thick and heavy as the limbs can bear; and as the months roll by, and the ripe fruit is gathered in a never-ending harvest, Charles Meinecke wonders that he should ever have hesitated in providing such a bountiful income as he now enjoys, obtained with so small an outlay and so large a profit.

This trifling incident will serve to show how easily an income may be provided by any man or woman, who owns a small tract of land—say, one, five or ten acres—by the outlay of a very little labor, and with no other expense than that of gathering and marketing the crops. Limes are preferred by

many to lemons for cool summer drinks, and are considered as perfectly harmless, and a healthful stimulant. As their use increases from year to year, so also the demand both for the domestic and foreign markets, and the cultivation of them is a safe and profitable minor industry. Owing to the extraordinary influx of soldiers the present season, the consumption has been much larger than usual, and limes have been worth almost their weight in silver. Often in former years, Honolulu has had to depend on Samoa and San Francisco for this fruit, which ought not to be. There will always be an increasing demand here for both limes and oranges, and it is a safe investment for any man or woman to engage in their cultivation, in any part of these islands.

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THE WAR JUSTIFIABLE.

One of the highest European authorities in international law, M. Alphonse Rivier, of the University of Brussels, now an arbitrator between England and Russia, in relation to Canadian sea fishery claims, in reply to the question whether the United States have the right, according to principles of international law taught everywhere in Europe, to interfere with Spanish sovereignty in Cuba, says:

“Should my neighbor’s house be in flames, and should this neighbor be unable or incapable of putting out the fire, I would certainly invade his premises. This is our principle of intervention, and it can be defined as follows: A state has the well-recognized right to intervene in virtue of its own right of self-preservation whenever its rights or its safety are effected, injured, or imperiled by the political or social condition of another State. This is a well-established principle of international law, which no European jurist in his senses can afford to deny. It has always been admitted. The destruction of American property in Cuba carried on for a number of years, the expense incurred by the United States to patrol their coasts or prevent filibustering expeditions from leaving their harbors, without speaking of the state of anarchy existing for some years in the island, were motives more than sufficient, from our legal European standpoint, to authorize the United States to invade that Spanish colony. And,

besides, can Europe afford to question this right when her own history is full of instances of armed intervention not always justified and nevertheless tolerated? It is a wonder to me that the United States, having the undoubted right to interfere, did not do so long ago."

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MANURING CROPS OR LAND.

Mr. EDITOR:—I enclose two short articles on Manuring and Nitrification, taken from the Southern Cultivator, which contain valuable information for cane planters, and which, if intelligently carried out, will result in an increase of the yield of sugar, even on land which may not have yielded good crops before:

"Farmers are partial to lasting manures, those which tell for several years after they are applied. This is the case with barnyard manure; and being a universal and original manure, it has been made the standard by which all other kinds are judged. On strictly business principles, however, it is not a good standard, if its lasting quality be the chief consideration. In all ventures the quicker the returns the greater the profit. The oftener a merchant can turn over his capital the greater his gains. So with the farmer. If he could recoup every particle of the manure applied to a crop in the crop itself, the greater his profits would be. For if he has to get it from several crops in place of one, there comes in the expense of the labor expended on these additional crops and the loss of interest on the investment during the additional years. If a farmer applies a lasting manure to a crop, he manures both land and crop. If he applies a very available quick-acting manure, *he manures his crop rather than his land.* It is true that in both, and all cases, land is more or less manured, for under no circumstances is all the manure applied to a crop appropriated by it; there is always a greater or less residuum left in the soil or lost by leaching or evaporation.

"Cottonseed and its meal furnish an example where the least residuum is left in the soil, the effects of these on a second year's crop being almost inappreciable. Though when the matter is tested by careful experiment, where actual

weights are compared, there is always an observable effect on the second crop. Coarsely ground bone produces more lasting effects than finely ground phosphate rock compared with that treated by acids. But not only the solubility and consequent availability of a manure affects its lasting quality or the reverse, but the mode of application modifies results.

(Sugar cane is planted here, in drills, and our plant has always been to fertilize in the furrow, after the cane is about two feet high. We never broadcast.—Corr.)

“When crops are grown in drills, manure applied in the drill is more completely appropriated than when applied broadcast. This is particularly true when moderate quantities of fertilizers are used. One explanation of this is that plants take up the larger portion of their food during the early stages of growth—that is to say, that portion of the rarer kinds of food, such as are usually supplied in fertilizers, to-wit, nitrogen, phosphoric acid and potash. Carbon and water, which furnish the materials of much the larger portion of a plant's weight, and of which there is no scarcity, are appropriated continuously through all stages of growth up to complete maturity.

“When fertilizers are put in drill the young plants whose roots have not yet reached full length can find it more readily in drill than if applied broadcast. It has been said that barn-yard manure, regarded simply as a lasting manure, is not an ideal standard, but aside and beyond its lasting qualities it has much to commend it and make it a popular favorite. In the first place it contains every kind of food any plant needs. In the next place, it supplies a good deal of humus and thereby improves the physical texture of the soil. Again, it inoculates the soil with microbes which favor nitrification and the development of tubercles on the roots of leguminous plants, and lastly helps to render soluble the insoluble and unavailable plant-food in the soil. It is a grand manure, but except on stock farms the supply is unfortunately too limited.”
—Southern Cultivator.

“NITRIFICATION.—Nitrogen is at the same time the most important element of plant-food and the most costly, and it

cannot be assimilated by the plant until it is converted into some nitrate, e. g., saltpetre. All organic matter contains some nitrogen; some kinds, as peavines, clover, etc., contain a much larger percentage of nitrogen than others. The nitrogen in the plant forms the basis of the albumens (like the white of eggs), protoids, etc. During the process of decay this nitrogen is changed by many kinds of micro-organisms into some form of ammonia. This process takes place readily, and under almost all conditions, in warm weather. Then another kind of micro-organism or bacteria lives in the soil and upon the ammonia and changes it into nitrous acid or into the salts of this acid. Then still another bacteria converts these nitrous salts (nitrites) into nitritas, the latter containing one more part of oxygen than the former. A Russian chemist and bacteriologist succeeded in finding and separating each of these kinds of bacteria, and by placing each in tubes they made one nitrites and then the other nitrites from ammonia.

“CONDITIONS FAVORABLE TO NITRIFICATION.—Since nitrogen is so essential to plant growth, forming the living, growing portion of all plants, and since only nitrates can be assimilated by plants, a knowledge of the conditions favorable to nitrification is very important.

“1. Warmth, about 90 to 95 degrees.

“2. Moisture, best not too much so as to fill up the pores in the soil.

“3. Looseness of soil, for the process is one of oxidation, and the oxygen or the air must be present in considerable quantities.

“4. The presence of a base, as lime, soda, potash, for the acid formed must combine with these bases and formed a salt (nitrate) with them. Sour land won't nitrify until a base, as lime, is added.

“5. Stirring. The bacteria cannot move from place to place among the soil grains and find the organic matter, so the soil must be stirred frequently in order that the bacteria will continually be finding new portions of organic matter. This last factor (except in the case of sour lands) is the only one which is under the control of the farmer, and the farmer does not realize the value of frequent stirring, rain or no rain. I am

aware that I am presenting a new doctrine to the farmer when I say the soil should be plowed even where there has been no rain since the last plowing, in order to promote nitrification. The director of the French Experiment Station, Dr. Diberaine, placed portions of the same soil in different vessels. One he stirred once a month, the next he stirred once in two weeks, the next once a week, and the last twice a week. After three months he analyzed each for nitrates, and found that about twenty times as much of the organic nitrogen had been changed into nitrates in case of the one which had been stirred twice a week as in the one stirred once a month.

"The writer tested for nitrates in many kinds of soil and found no nitrates in sour crawfish land and in meadow lands. Liming, draining (so as to let the air in the soil) and stirring would put these lands in a condition for good crops. He found less nitrates in a soil previously in sorghum than in the same soil previously in corn or cotton; why I can not say. But sorghum either makes very much heavier drafts on nitrogen in the soil than corn, etc., or leaves something in the soil which hinders nitrification. Rapid nitrification is essential to a good crop and is promoted by rapid stirring. If the stirring be very shallow it may be prolonged very late to an advantage.

A PLANTER."

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*EXTRACTS FROM AN ADDRESS READ BY MR. T. LOW,
PRESIDENT OF THE MOSSMAN SUGAR PLANTERS'
ASSOCIATION, QUEENSLAND, IN THE MACKAY
SUGAR JOURNAL.*

Gentlemen:—Having been asked to read a paper on sugar cane growing, acceding to such request gives me much pleasure, not, perhaps, that I can tell you anything you don't already know. Still it is well we should interchange ideas, as there is no doubt cane planters are far behind beet-root growers, if we compare the improvement made in the cane as a sugar producing plant with the rapid strides that have been made in improving the beet as a sugar producing root. * *

The soil most suited for cane growing, is one that will yield us the greatest amount of sugar per acre, not necessarily the greatest weight of cane. The greatest weight of cane per acre

is no doubt the desire of the farmer here in the meantime, but I hope the day is not far distant when we will be paid by the amount of sugar in the cane. Therefore the soil I would choose for successful cane growing is what might be termed a rich loam. The term loam is given to land composed of sand and clay, with a little lime. If there is much sand in its composition, it is called a sandy loam; if much clay, a clayey loam; and if much lime, a calcareous loam. In saying a rich loam, I mean one bordering on a calcareous loam with at least 5 per cent. of organic matter in its composition. The latter is required for the lime to act upon and make food for the cane roots. The above described soil is, in my opinion, the best for producing a good weight of cane and a juice rich in saccharine matter. No doubt you will get a heavier weight of cane for a soil very rich in organic matter, but the juice will fall far short in the yield of sugar, besides being far more difficult to manipulate. Heavy clays produce cane yielding a rich juice, but seldom a heavy crop. The rich juice may to a great extent be accounted for by the fact that the cane generally stands erect on such lands. * * *

To put our lands into proper order we must subsoil our land. This is best done by having a proper subsoil plow, but any plow will serve the purpose by removing the mould-board, and just follow the ordinary plow, breaking up the subsoil, but bringing none of it to the surface. By this and the drains it forms a naturally artificial substitute for a naturally porous subsoil, causing a free circulation of air through the soil, and the rainfall, by descending to the drains, washes out substances hurtful to the growth of plants, and in time fits the subsoil to be brought to the surface as plant food. The better our land is drained the better it is pulverized, and the finer the particles of earth the more it is rendered capable of absorbing and retaining moisture, and absorbing more of the gases from the air, and, as you might say, acts as a filter in catching the soluble manurial matter on its downward course by the rainfall. Lime, where required—and I think on analysis, the want will be universal in a greater or lesser degree—would assist draining and subsoiling much in bringing our land into a state more fitted for sugar cane culture, as lime,

combining with the acids, removes the sourness from the soil and generally disposes the vegetable matter in the soil to change into soluble food for the plants, and also acts upon the mineral properties of the soil so as to fit them for entering into the roots of growing plants. You can fairly well tell if there is sufficient lime in your soil for crop support by the following crude method:—Put a little soil in a glass, and pour upon it either vinegar or weak muriatic acid. If no effervescence, no lime; if much, plenty of lime.

In the Straits Settlements and British Guiana I have always seen the cane juice improved by deep drainage and liming. This seems to free it of much of the saline and albuminous matter (which juice from canes grown on rank and undrained land is always impregnated with) and consequently makes it easier to manipulate, besides giving a better yield.

We read of the perfection the cane has been brought to in the Sandwich Islands by the liberal application of coral and sea shells. This they apply in its natural state. Shells and coral are composed of lime with a little sand, and, by the absorption of moisture from the air, also carbonic acid, become carbonate of lime. Applying them as taken from the sea is considered the best mode of applying lime to sugar lands not too deficient of same. Being less liable to sink deeply in the soil than burned limestone slacked, it consequently lasts longer from yearly giving off a certain amount of carbonate, as it absorbs moisture from the air, and if we are to try and cope with our German friends, we must, along with choosing varieties of cane of the most profitable description, try and put our lands in a condition to yield the maximum quantity of sugar as well as a heavy weight of cane, as it is tons of sugar that will pay, and not tons of cane.

Varieties of cane.—The cane we require here is the one that will yield the most sugar per acre, not necessarily the greatest weight of cane. The Rappoe is a variety with which, I suppose, more than three-fourths of our cultivation here is planted, from the fact that the C. S. R. Co. found it a superior cane. From what I have seen of it here I would term it a bad rooter. Perhaps this is not altogether the fault of the cane, as our soils may not be in a condition to allow of its

rooting deeply. You will, however, observe the Singapore and what is called the New Guinea cane growing quite erect side by side with the Rappoe, the latter being much 'lodged. The yellow Otaheite is a good cane. The British Guiana no other variety is grown. Many varieties have been tried, but all have had to give way to this favorite. This the Lahaina and the Bourbon are supposed to be one and the same cane. Mr. Wray, who wrote a work on the cane and sugar manufacture, spent much of his early life in the West Indies. In 1889 I had the pleasure of meeting him in the Straits. He has been in most of the sugar countries, and is of opinion that these named three varieties are one and the same cane, somewhat altered by change of soil and climate. A cane I think that would do well here is the Salangore. It is of very erect habit, ratoons well, and yields a juice rich in saccharine matter, and easy of clarification. It has somewhat more fibre than the Otaheite. I saw a great deal of this cane grown in the Straits, and it grows the greatest weight per foot of any cane I have seen, sometimes almost two pounds weight per foot of cane. This cane ranks second to the Giant Claret cane for freeness of growth, and although not so stout as the Giant cane, it was heavier per foot, and of course contained much more sugar. Through experiments we tried with a great number of varieties in the Straits, the Salangore proved itself the best cane, standing more erect on the same soil than any other variety. The next in order was the Otaheite, Lahaina, or Bourbon, as it is variously named. I saw a great deal of Rappoe or Rose Bamboo grown in Mackay district, where it seems much in favor. However, I saw none of it long enough to cause it to lodge, although some of it was longer than anything I have seen growing erect here, and there is no doubt it was found a good sugar producing cane by the C. S. R. Co. before they recommended it being planted, as they take every care and have every means of finding out the varieties that pay the mill best. Still I am confident a cane of more erect habit will pay us better here. * * *

If we would take an example from the Germans in the care they take in selecting the roots of beet they are to keep for seed, we would do well. They have by this careful selection

improved the beet as a sugar-producing root so in the space of 16 years that it is yielding about double the sugar; so that not only must we select the varieties of cane, but the best of them for seed, and by analysis I think you will find it will be one of more erect habit than the Rappoe. The ones I would recommend are the Green Salangore and the Otaheite.

Cutting Cane.—The Dutchman's saying comes about correct here, that one inch at the bottom is worth three at the top; consequently the cane should be cut evenly with the ground, an inch under if you can get it done, not alone to get the most of the sweetest portion of the cane you can, but to insure strong ratoons, as if the cane is cut high the uppermost buds of the cane burst forth, growing first, and soon assume the appearance of our blady grass, and so choking the lower buds that they are reduced to the same weak growth, producing a great number of small stunted cane.

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SEEDLING AND OTHER CANES.

Mr. J. H. Hart, F. R. S., Director of the Botanic Gardens, has just issued a report on seedling and other canes under cultivation at the Botanic Gardens. The document is accompanied by several tables. The following is the text:—The canes under cultivation were: 1st, some 2,000 seedlings raised from seed harvested in 1896; 2nd, 6 stools of canes grown from Barbadoes seed; 3rd, eight varieties of new canes raised in Demerara; and 4th, the "Bourbon," "Burke," "Caledonian Queen" and "Red Ribbon," cultivated as standard varieties.

The area available for cultivation was a limited one, and the work has been performed by the ordinary garden staff, without extra help.

The general idea has been to raise improved varieties of canes, 1st, suitable for different classes of soil; 2nd, possessing a healthy constitution not subject to disease; 3rd, having a high sugar value; 4th, large croppers, and 5th, canes which can be easily and economically treated in the factory. The question before us is, how to obtain these results? It is now known that the sugar cane can be easily reproduced from seed, and it has been found also, that the cane plant is no exception to the rule of variation which obtains among seed-

lings of all plants more or less; in fact, it has been found that sugar cane seedlings vary in a greater degree among themselves than is generally found to be the case with other plants. This fact, (viz.) the prominence of variation, is the great hope of the raiser of new varieties; for although it is well known that the larger proportion of these seedling varieties will prove inferior to the older kinds, yet there is the hope that, as has been the case with the beet, varieties may be raised which will be a vast improvement of the kinds which have been so long under cultivation. The raiser knows therefore, that when he grows a thousand seedlings, probably not more than one or two, will be of sufficient merit to be retained under cultivation. It will be seen also, that the attempt to grow seedlings as a crop without their first being proved or tested, can only result in the production of fields of inferior material, and unless the grower is prepared to give all plants, individually, a yearly test, he cannot expect to succeed in detecting the superior kinds from the inferior.

The plan adopted in our experiments is as follows:—Seed harvested from “arrows,” of well known varieties of cane when perfectly ripe, is sown in sterilized soil under glass cover. As soon as the plants are large enough to handle they are transferred or “pricked out” into fresh soil, in boxes also under shelter. As soon as the plants are two or three inches high, they are put into pots, or bamboo joints, and placed in the open air, and a skeleton frame is placed over them on which canvas can be thrown to protect them in the middle of the day from strong sun and also from being beaten down by heavy showers. Every care is taken to render the plants hardy, and they are exposed to the dew every night, except when heavy rains are falling, when the canvas cover is allowed to remain as a protection. The plants are kept under these conditions until they are some 12 to 15 inches in height, and are then gradually exposed, so that they can at least stand full exposure in the open air. They are then planted in the field at suitable distances and allowed to grow into canes. Our seed crop ripens in or about the months of October and November, and is sown at once. With reference to the set of seedlings on which I am now reporting, the seed was sown in November, 1896, and the canes were cut in April and May,

1898, or 18 months after planting. In the two thousand seedlings planted, there was to be seen variation of all kinds. From a red parent some canes were a bright yellow, some green, some purple, some "transparent."

On the other hand seed from yellow canes produced all degrees of purple, red, yellow and green canes. In habit, some of the canes were weak and spindle-stemmed, some were of large size, and some canes not larger than a pencil. The leaves in many of the plants showed a marked difference in form, the blade in some being long, in some short; and in the width of the leaf there is just as great divergence of character. Some of the plants were at once attacked by borer and other insects, some were free of these pests, some had a habit of falling to the ground while other canes stood almost perpendicular. Some grew in large clumps with many canes to a clump, while others had only a single cane. Some produced aerial roots on the stem from the ground upwards, while others were clean-stemmed all through. Some of the canes produced large growing side-buds, while in others the bud was so dormant as to be scarcely observable.

From such a varied collection of characters the experimentalist has to select the best, and in doing so, it is evident that field characters must come first; for it is clear that if a cane gives a very high sugar content and cannot be economically or successfully grown owing to its habits, to its susceptibility to disease, or from any other of the causes indicated, it is useless to the planter. If on the other hand it is possible to select a cane having a healthy constitution, which yields well, which resists disease, and has, above all, a prime sugar content, it is needless to urge how soon the intelligent planter would recognize the fact and take advantage of it.

When the above points are duly considered, it will occasion no surprise to the reader when I record that I could only select out of our 2,000 some 126 for the purpose of testing, which appears a very small percentage, but quite as high as could be expected. The sugar value of the 126 canes which have been tested is given in attached table,* and it will be seen that this is also subject to a very large amount of variation.

*Not reproduced.

It is to be noted that the ten canes selected from the seedlings raised from seed of D 95—a high class Demerara cane—have the highest average value among all the canes tested, a fact which if shown to be a permanent feature in seedlings from the best new kinds, will be no little encouragement to the raiser. The results of the examination of the seedlings from “Caledonian Queen,” said to be synonymous with “White Transparent,” are somewhat disappointing, as they have a low average value. High sugar value is seen in the two seedlings from D 74, a Demerara cane which has proved out well when grown in the Southern United States. I am quite aware of the amount of variation in sugar contents which may be obtained in the examination of canes from different plants or stools of the “Bourbon,” or any other cane, and also of the differences shown in the analysis of canes during dry and during wet weather, or before and after a shower. Such results are sometimes pointed to, as lessening the value of the experiments of which we report, but when the matter is carefully examined these objections are seen to have but little force.

The methods of test are the best available, and that they are fairly suitable is shown by the results of the work on the Demerara fields. The Demerara experimentalists, Messrs. Jenman and Harrison, have produced canes, which, test them as you may, and when you will, in dry weather or in wet, give high results, but these gentlemen as well as ourselves fully recognize that the only true test of the success of a cane, is to give it field culture on a large scale. Now no planter would go to the expense of planting an unknown cane, or a cane only once tried, on a large scale for fear of failure, and therefore the progress of the growth of any new variety is necessarily slow; for it is clear that a new cane must have fully proved itself on a small scale against all competitors, before its claims to be grown on a large scale can be properly considered. Messrs. Jenman and Harrison have, very modestly, given in their reports the results they have arrived at, but have refrained from making any special recommendation with regard to any new cane, contenting themselves by simply putting before the public the fact that these canes have passed their tests successfully for a series of years, and this policy is,

apparently, the only safe one to pursue. A cane must be proved on a small scale for several years, and if it gets its certificate of value from these proofs, it may then be recommended for more extensive trial on estates.

Another thing to be considered in the selection of a cane is the value of its "megass," or "trash," as fuel. Now, there is a wonderful amount of variation in this particular, and also in the character of the outer rind or skin of the cane. I have particularly noticed that a soft skinned cane is one which is first attacked by "borer," and the hard-skinned cane the most free so that although the soft-skinned cane may be the largest sugar yielder, it would be better to grow the hard-skinned variety as so much sugar would not be lost in the one case, as in the other. The character of the megass as seen going through the mill is surprisingly variable, for while one cane may be seen going through the mill simply flattened out, the next one cannot be made to draw through the mill at all without considerable trouble, owing to the shortness of the fibres. Where megass is used as the principal fuel of a factory, this is of no small importance, as the larger the amount of woody fibre the better fuel it makes.

Our examination for 1898 was made during a season when but little rain fell, so that the results obtained from the one case, are directly comparable with those from the next. Contrasted with the results of the examinations of the older varieties in previous years, however, the record reads high which is certainly due to drier weather.

The mill used for extracting the juice is a three-roller hand mill; the canes were passed through twice, and the megass and juice weighed, with the result given in columns 2 and 3 of the table. The chemical part of the examination is effectively checked by the Hydrometer test in column 8, and also by the record of specific gravity, as taken by Mohr's Hydrostatic Balance, given in column 7. The result of sowing some 30 boxes of seed of the Bourbon variety was only four plants, three of which were tested, and only one of which proved to be a good sugar producer, they are all of the Bourbon type, and show but very little variation, all being of the same color as the parent. This fact points to a possibility of the variation in color having taken place in the seedlings of other varieties,

owing to the fact of the parent plants having been grown close together, so as to admit of cross-fertilization. This point is, of course, capable of further elucidation; and it is highly desirable that experiments, with seeds, grown on isolated parents should be proceeded with. With cross-fertilization—following known facts in the raising of other classes of plants—it is probable that more varieties would arise, than would occur in growing from self-fertilized parent plants, and it is therefore fairly clear that the seed parents to produce this result should be grown close together so as to admit of such cross-fertilization, and thus insure as great a degree of variation as possible. It also shows that the grower, having found an undesirable variety, should carefully exclude it from the proximity of his seed producer. In Messrs. Jenman and Harrison's reports, it is stated, page 23 (Report 1891 and 1892), that the seedlings from the "Caledonian Queen" showed a "considerable range of saccharine strength," and at page 35 it is stated that it "gives rise to seedlings of exceptional vigor and size. Such has not been our experience as will be seen from our table of results, and it is not easy to understand why this should be so, unless it is due to being cross-fertilized in the one case and not in the other, which may have easily occurred through their having flowered with us, or with them, at times when no other varieties were in bloom; and if this was carefully noted in future years, much advantage might be gained. There is another point which may also be noted. May it not be possible that the greater fertility of the seeds, where varieties are grown close together, is really due to cross-fertilization and "vice versa," as in the case of the Bourbon seed? We can hardly, from the nature of the present circumstances, know anything but the maternal parent, but the full parentage might, I think, be ascertained in a fairly reliable manner, by growing two seed producers together, and observing the character of the progeny; at the same time growing both isolated, and comparing the character of the plants raised with those of the other set. Our success this year with the seedlings raised from the Demerara seedling canes is in direct contrast to the experience of our Demerara confreres, for in their report for (93-95) page 16, they write that "little good is to be expected from seeds obtained from seedling canes,

and this being so, it is apparent that there is some controlling factor in the one case which does not exist in the other, which it is hoped may be discovered." These gentlemen, however, leave no stone unturned, and as they have had a more lengthy experience, their deductions may be proved tenable, and our illusory. The records, however, stand for themselves, and are, I think, deserving of the attention of all those who are devoting themselves to the improvement of the sugar cane. The results of the examination of the last 18 numbers of our table, shows that the several kinds have maintained their relative value as in former years, and afford "data" for comparison with results of the seedling record, the difference between the two records of D 95 is owing to difference in the ripeness of the sample from two different stools.

"All the canes were grown in the same kind of soil, close together, and had no manure of any kind, nor had they more than ordinary cultivation. Facts which should be duly noted." The examination of the whole series was personally carried out by myself, and on the same lines as the Demerara experiments. The work was commenced on April 15th, and finished on May 13th, during which time 132 samples were carefully examined, and in cases where a doubtful result was obtained, the operation was repeated.

I am personally indebted to Professor Harrison; of Demerara, for much advice and assistance, and for affording me the opportunity of visiting the Laboratory in that Colony, for the purpose of obtaining the requisite information to enable me to pursue the experiments in Trinidad, as they are carried on in Demerara, and although my results, probably, cannot be compared with those of a professional Chemist, I venture to hope that they will be found reliable, and without serious error.

Our seedling plants for next season's test are planted on the new Economic Grounds at St. Clair; they consist of seedlings from Nos. D 117, D 95, D 102, D 116 and D 74, and are doing well; being at the time of writing, some two feet high.

The percentage of sucrose has been given in the table of results this year in addition; although it is easily ascertainable from other "data" in the table, "Pounds per gallon" is the common method of calculation on Trinidad estates, and is better understood than percentages.

Our primary object in conducting the chemical experiments is to obtain relative value, so that we may proceed with the work of selection, and if any slight error may have occurred in our method of working, it may be taken as running all through, and in no way affecting the relative value of the various kinds as given in the table.

I have purposely omitted the columns formerly devoted to "Quotient of Purity," and "Quotient of Impurity," as these can be easily calculated, from the data given in the other columns, by those interested.

The remarkable sugar value shown by No. T 111 is worthy of note, although it is somewhat reduced by the small percentage of juice. I point to it, however, to show the possibility of ultimately producing a cane of even higher richness, coupled with an increased yield of juice and yield per acre. If the sugar planter could only get an average of 20 per cent. yield of sucrose out of his crop, there would be little need to fear the competition of the beet root; and we have a strong belief that this is capable of being effected, and it is also our belief that by the initiation and carrying out of these experiments, we are taking the right road to accomplish a long-wished-for result.—Barbadoes Mirror.

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A QUEENSLAND PLANTER'S VIEWS ON THE BEST VARIETIES OF CANES.

The cane we require here is one that will yield the most sugar per acre, not necessarily the greatest weight of cane. The Rappoe is a variety with which, I suppose, more than three-fourths of our cultivation here is planted, from the fact that the Colonial Sugar Refining Company found it a superior cane. From what I have seen of it here I would term it a bad rooter. Perhaps this is not altogether the fault of the cane, as our soils may not be in condition to allow of its rooting deeply. You will, however, observe the Singapore and what is called the New Guinea cane growing quite erect side by side with the Rappoe, the latter being much lodged. The yellow Otaheite is a good cane. In British Guiana no other variety is grown. Many varieties have been tried there, but all have had to give way to this favorite. This, the Lahaina and the

Bourbon are supposed to be one and the same cane. Mr. Wray, who wrote a work on the cane and sugar manufacture, spent much of his early life in the West Indies. In 1889 I had the pleasure of meeting him in the Straits. He has been in most of the sugar countries, and is of opinion that these named three varieties are one and the same cane, somewhat altered by change of soil and climate. A cane which I think would do well there is Salangore. It is of very erect habit, ratoons well, and yields a juice rich in saccharine matter, and easy of clarification. It has somewhat more fibre than the Otaheite, well, and yields a juice rich in saccharine matter, and easy of grows the greatest weight per foot of any cane I have seen, sometimes almost two pounds weight per foot of cane. This cane ranks second to the Giant Claret cane for freeness of growth, and though not so stout as the Giant, it was heavier per foot, and contained much more sugar. Through experiments that we tried with a great number of varieties in the Straits, the Salangore proved itself the best cane, standing more erect on the same soil than any other variety. The next in order was the Otaheite, Lahaina, or Bourbon, as it is variously called; third was a Borneo cane named Camar Morte; and the fourth was the Horne cane. The latter much resembles that called the New Guinea cane here. I saw a great deal of Rappoe or Rose Bamboo grown in Mackay district, where it seems much in favor. However, I saw none of it long enough to cause it to lodge, although some of it was longer than anything I have seen growing erect here, and there is no doubt it was found a good sugar-producing cane by the C. S. R. Company before they recommended it being planted, as they take every care and have every means of finding out the varieties that pay the mill best. Still I am confident a cane of more erect habit will pay us better here. The Red cane of Bengal is a good strong cane. This the Malays name Tibboo Mirah. A good deal of it is grown in the Straits. When visiting the Acclimatization Gardens in Brisbane I saw what I took to be the ratoon of a graft, and reckoned some thirty canes of apparently distinct varieties at the same stool. We must try and raise new varieties. I have a few grafts planted of the Rappoe and the striped Singapore, also the Rappoe and New Guinea cane, and I hope to show you what

varieties emanate from them. If we would take an example from the Germans in the care they take in selecting the roots of beet they are to keep for seed, we would do well. They have by this careful selection improved the beet as a sugar-producing root, so in the space of sixteen years that it is yielding about double the sugar; so that not only must we select the varieties of cane, but the best of them for seed, and by analysis I think you will find it will be one of more erect habit than the Rappoe. The ones I would recommend are the Green Salangore and the Otaheite.

As to cutting cane, the Dutchman's saying comes about correct here, that one inch at the bottom is worth three at the top; consequently the cane should be cut evenly with the ground, an inch under if you can get it done, not alone to get most of the sweetest portion of the cane you can, but to insure strong ratoons, as if the cane is cut high, the uppermost buds of the cane burst forth, growing first, and soon assume the appearance of our baldy grass, and so choking the lower buds that they are reduced to the same weak growth, producing a great number of small stunted canes.

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HAWAII AND THE SUGAR INTERESTS.

With Hawaii a part of the United States refined sugar will be admitted free, and here is where the injury to the Sugar Trust comes in. Annexation means that the Sugar Trust would lose advantage in buying and might encounter the opposition of Hawaiian refined. The Hawaiian Commercial Co. is in a position where, with a moderate outlay, it could refine sugar. It has already an investment of \$4,064,222 in mill buildings. This is the nut in the coconut and explains the opposition of the Sugar Trust to the annexation of Hawaii. Much of the denunciation of the Sugar Trust is mere demagogery—as we have repeatedly asserted—but the interests of this big concern should not control in a question of National policy.

Opinions differ considerably as to just how this supposed injury to the Sugar Trust would work out. The clearest point in the case is that Hawaiian refined sugar is at present kept out of the country by the duty. The Sugar Trust buys raw

Hawaiian refined sugar and is able to make a profit on refining it. Under annexation Hawaiian raw and refined would come in free and the Sugar Trust would therefore have to meet the competition of Hawaiian refined.

Under the Hawaiian reciprocity treaty refining grades of raw sugar already come in free, but that treaty does not admit duty free either refined sugar or light colored raw sugar.

Under existing conditions, therefore, Hawaiian sugar can come to the American market only in a crude state, fit only for refining; because the duty imposed upon refined and light colored raw sugar is so great as to prohibit importation. Present conditions, therefore, give the Trust free raw material and prohibit competition with its refined product.

In case of annexation, however, all this will be changed; for, as Hawaii will be American territory, all sugar produced by it—refined and high-grade raws, as well as low-grade refinery grade raws—will be exempt from duty, and the Hawaiian sugar producers will be able to refine their own sugar or make a light grade raw sugar which can successfully compete in the American market—with the refined sugar produced by the Trust.

The Sugar Trust makes a profit of from a quarter to a half a cent, equal to from \$5 to \$10 a ton, on every pound of sugar produced by it.

The Hawaiian Sugar Crop last year amounted to 240,000 short tons.

A profit of \$10 a ton on 240,000 tons amounted to \$2,400,000.

There is no reason to believe that Hawaiian sugar producers will sell their raw sugar to the Sugar Trust when the law will allow them to do their own refining and themselves sell their sugar in the open market.

Under annexation, the Hawaiian producers being able to refine and sell their own sugar, the Sugar Trust will lose its present supply of 240,000 tons of raw sugar per annum and the profit which it would otherwise have made in refining such amount of sugar, amounting, as above shown, to approximately \$2,400,000 per annum.

Under former conditions the Sugar Trust has for years been the only purchaser of raw sugar in the American market. Hawaiian sugar producers have therefore been obliged either to sell their sugar to the Sugar Trust or ship it to England. The greater cost of shipping to England, by reason of increased

freight, insurance, interest and deterioration of the saccharine strength of the sugar, amounts to approximately an eighth of a cent per pound, or \$2.50 per ton. The trust has taken advantage of this situation to compel the Hawaiian planters to sell their product to it at \$2.20 a ton less than the American market price, which reduced price the Hawaiian producers have been obliged to accept, because, first, there was no other purchaser in the United States; second, they could not themselves refine their sugar, because the American tariff has been so high as to prevent them from sending refined sugar to the United States, and, third, there was no object in shipping it to England, because in so doing they would get no higher price, while the market being more distant, the returns would be slower.

If annexation takes place, if the American sugar refiners do not offer the full market price for raw sugar, the Hawaiian producers will be able to refine and sell it themselves. Consequently, the sugar trust no longer having the whip handle over the Hawaiian sugar producer, will lose this \$2.50 per ton which it heretofore has been receiving as a pure bonus. A profit of \$2.50 per ton on 240,000 tons, the annual Hawaiian crop amounts to \$550,000 per annum.

The above figures demonstrate, therefore, that annexation will cause a loss to the sugar trust of \$2,400,000 plus \$550,000, or \$2,950,000 per annum.

The principal involved is not changed by the fact that a part of the Hawaiian sugar crop for 1898 has been secured by a new rival refinery, and that for the first time in ten years the sugar trust has failed to secure the entire Hawaiian sugar crop and the profit accruing therefrom.

The Hawaiian high-grade or "washed sugar" is preferred by many people to the refined sugar of the trust. It is a superior article, of fine, sparkling granulation, and would command a ready sale. The sugar trust knows this full well, and seeks to kill the possibility of competition. Hawaii, kept out from the United States, cannot sell this most desirable product, on account of the high duty.—Am. Grocer.

SUGAR MAKING IN CUBA.

When the present war began Cuba had 1,521 prosperous sugar plantations. To-day "the sound of the grinding is low," for only six of them are in operation. A few weeks ago I visited one of the six, which is situated in the south-eastern corner of the Province of Matanzas. It was an all-day journey, leaving Havana at 5 a. m. and reaching the goal soon after sunset. Probably the distance is not more than 200 miles, as the crow flies, but the road—originally built to accommodate some large estate—zigzags too and fro like the tacking of a ship. Traveling by rail in Cuba is never unalloyed delight, and in these troubled times discomforts are doubled. Besides the usual slowness and irregularity of service, the heat, dust and absence of waiting stations—nowadays train are in momentary danger of being fired to, derailed or exploded by bombs, and each has its disquieting attachment of two iron-clad cars filled with Spanish soldiers standing by their guns at the loop holes. Sophisticated travellers watch every thicket, hill and hollow which might possibly shelter an insurgent, and throw themselves flat on the dirty floor of the car at the first indication of attack.

After hours of slow riding through a totally unoccupied country, between burned cane fields the smoke from more burned field visible on either side, at nightfall we reached a miserable little hamlet of palm-thatched huts. What was our astonishment, on alighting in the mud of this desolate place, to behold a modern horse car. Everything about it was fresh and trim—spotless windows, cushioned seats, straps to hold on—nothing missing but the nickel box or the conductor with his bell-punch. We were within the boundaries of the sugar estate, and the car is the private property of the planter, who had come with his family to meet us. Then away we were whisked over three miles of car track, between rows of stately palms, hedges of giant aloes and boundless stretches of sugar cane to the door of the manor house. There new surprises awaited us. The great two-storied casa, with its latticed veranda and innumerable windows was brilliantly illumed with electricity, and is furnished with all the comforts and elegancies of city life. The apartment assigned to my use was the most beautiful I have occupied in many a day, with its handsome French furnishings and delicate frescoes, under the soft

glow of electric lights in the form of pink lilies, and better than all, after the long day's dusty ride it had the welcome adjunct of a perfectly appointed bath room.

Presently dinner was served in the wide, cool hall, and fine old silver monogrammed china, requisite drapery, well-drilled servants, oysters, game, rare wines, made it difficult to remember that we were in the heart of an impoverished, war-beleagured island. I have been told that the wealthy cuban planters live like princes, and now believe that many Old World potentates might change places with them and get the best of the bargain.

The estate of which I speak is by no means one of the largest in Cuba. The proprietor told me that it is only sixteen miles long by ten miles wide, comprising about 30,000 acres. At present it supports something over 5,000 people, collected in four villages. In ordinary times, 2,000 was the average number of retainers, all employed upon the estate. Since the war the planter has been compelled to maintain 1,500 Spanish soldiers, in twelve forts, erected at his own expense along the edges of the estate. After Weyler's concentration order 2,000 re-concentrados were also quartered upon him. The poor people were driven from their homes, and forced to go to the cities or the fortified plantations. There is no city in this end of the province, and no other plantation in operation; so they flocked in here, and could not be left to starve. The humane planter built them houses and protected them as best he could, and for more than two years has furnished them with food, clothes and medicines. Of course, they have more than absorbed the profits of the plantation, but some of them are able to work a little, and are all grateful and well-behaved. The greatest trouble is with the so-called "protectors," the soldier guard. If the latter want beef they kill the first cow they can see though it be the finest Jersey; if fresh horses are needed they help themselves to the best the plantation affords. When the spirit moves them to recreation, they troop over to the Manor House and demand its use for a dance. "A high old time" but tamely expresses the night that ensues. The soldiers pick up female partners whenever they can—camp followers the daughters of plantation hands, and reconcentrado girls. Champagne (the proprietor's, of course) flows like water—or, rather, as water never flowed for the external use of these sons of Mars; and if they do not end the orgie by smashing things

generally and making a bonfire of the building, the planter considers himself lucky. There has never been any danger from insurgents to make this alleged protection necessary, as the proprietor is known to be in sympathy with the Cuban cause; but there is everything to fear from the "protectors." When the crisis comes, if Spain is compelled to withdraw her forces, they will celebrate their departure burning the place. If not murdering the family upon whose bounty they have so long subsisted.

The magnitude of things in this "small" estate amazes the stranger. Besides this tramway, there are twenty-five miles of broad-gauge railway within its limits, equipped with five locomotives of largest size, 300 freight cars and 150 box cars. There are thousands of mules and horses and carts; a general supply store; pharmacy, school house, church, ice-making plant, machine shop, carpenter and blacksmith's shops; in short all the requirements of an isolated community. The grinding house contains several enormous engines, and a wilderness of wheels, bands and machinery. It is lighted by electricity, and has 720 tanks, each of which holds a ton of crude sugar—a railway to run them on, scales for weighing and an apparatus for hoisting them and emptying the contents into bags. In prosperous times, this plantation turns out 100,000 bags of crude sugar every year; but this year, when more than ever ought to be made, in order to meet unusual expenses, it will hardly make half that amount. The sugar is sent to New York to be refined, and this year it will bring low prices, because of a large admixture of scorched cane. Passing bands of soldiers or insurgents often burn a few acres, by accident or design, and the scorched stalks are generally ground with the rest, but the juice comes from the first squeezing black as ink. It lightens considerably in the process of refining, but is yet too dark for first-class sugar.

We occupied a long day going over this plantation; but several days would be required to see all its points of interests. Besides the flower gardens which surround the house, with their fountain and statues and acres of roses, there is an extensive park, containing the choicest trees and shrubs of the tropics—a regular "zoo" and botanical garden combined; artificial lakes covered with water-fowl; an aviary, deer and other animals. Then we took a steam-car ride of sixteen miles, to visit one of the villages at the farther end of the plantation.

What would my reader give to have just one of those sky-scraping palm-trees in his front yard? and here were thousands of them to spare! Our host sent a man to climb one of them, to show how it is done. The smooth, round trunk looked like a telegraph pole—fully 70 feet from the ground to the tuft of splendid plumes on top, with out a branch between. The man took a bit of rope, thrust one bare foot into a loop at the end of it, and wound the rest around his waist and the tree; then holding his machete in his teeth, up he shinned like a lizard—to the very top, where he whacked off one of the huge leaves. As with most things in this wicked world, the descent was more rapid and dangerous than the ascent; but he came down grinning, elated by the 20c piece, for which reward he would gladly climb palm trees the rest of his natural life.

Later we went to witness the cutting of a field of cane. Several hundred men and women were ranged in long lines, each line headed by a leader, who starts the tune and takes the initiative in every movement. All together they swing the machete, grasping the cane stalk with one hand and bending in unison, as though moved by machinery, the whizzing sound of blades cutting the air and the click of falling cane making an appropriate accompaniment to the wild song they are singing. The newly-cut cane is thrown into ox carts and conveyed to a queer machine, patented by a Cuban, which hoists the stalks, weighs them, and dumps them evenly into waiting cars, to be carried to the mill. There an army of women throw it into the grinders, chanting a rude chorus as they work, in which one detachment responds to another in musical recitation.

This letter is already too long to go into the details of sugar-making. Cane is cultivated like Indian corn, and closely resembles it in appearance—only more yellow in color. At the first laying-out of a plantation, which afterwards continues fruitful for years by simple processes of renewal, the cane is planted in rows (not in hills like corn), and must be hoed and weeded until it gets high enough to shade its own roots, after which it needs no more attention till the cutting. When thoroughly ripe, the long yellow leaves are streaked with red, the top a dark green, from the centre of which a silvery stem shoots up two or three feet high, tipped with a lilac plume. A canefield in its maturity, shining like gold in the torrid sun, and gently undulating in the breeze, is a picture to live in the memory. Sugar cane, unlike most tropical products, yields

only one crop a year. Between the time when enough of it is ripe to warrant getting up steam in the mill and the season when rain and heat spoil its quality, all the sugar of the year must be made. In Louisiana the grinding season lasts only eight weeks; in Cuba it continues four months. It is always a very busy time, relays of "hands" working night and day; and this year, with war on hand, there is greater haste and industry than ever for the mills may be burned down any day.

The juice, pressed out by machinery, leaves the stalks as dry as tinder, so that they serve well for fuel. The crude sugar when thoroughly dried in the tanks is put into jute bags, each bag containing 240 pounds. These sacks, by the way, furnish a fair sample of Spain's methods. The cost of an English jute bag is 9c; but the duty thereon, unless it be made in Spain, is 10c. and its price to Cubans is 20c. So the thrifty mother country gets the job of making the bags and supplies them to her colonies at twice their value and 5 per cent. over! That is no worse, however, than the matter of flour. Cubans might get it direct from the United States for 6 dols. per barrel, but it sells in Havana, in the best of times, at 15 dols. per barrel, because every ounce of it must first go to Spain and come back with a brand on the barrel. A few years ago the value of Cuba's plantations, all told, was officially estimated at 380,553,527 dols., yielding a net yearly income of 34,000,000 dols. Remembering that only about one-third of the island's 117,000 square kilometers is under cultivation, these figures speak well for its fertility. Heaven knows it ought to be fertile, from frequent baptisms of blood through 400 years. Within the last two years it has been enriched by upwards of 400,000 human carcasses.—Fanny F. Ward in St. Louis Globe Dem.

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DISEASES OF THE SUGAR CANE.—CONCLUDED.

It is known that bacteria, which are the cause of so many animal diseases, are not infrequently present in enormous quantities in plant cells without seriously affecting the life of the tissues; and comparatively few diseases in plants can be traced to their action. It is all the more necessary therefore to exercise caution in attributing any disease among plants to their sole agency. An almost exactly similar controversy has recently been raging concerning imputed bacterial diseases of the vine.

11. The great mass of literature so briefly referred to is of quite recent date. This may be due to the gradual extension of the Tropics of the recent biological activity in Europe. As it becomes more difficult to find subjects for investigation in temperate climes, the overwhelming richness of tropical life in subjects of interest is gradually forced upon one. The earlier conservers were unacquainted with parasitic fungi, and their works deal mainly with the insect enemies of the cane. On the other hand, the presence of trained botanists in the Java Experimental Sugar Stations has resulted in the description of numerous parasitic fungi not recorded elsewhere. Not only have the most destructive forms been carefully studied, but numerous less important discolorations of stems and leaves have been traced to the presence of hyphae in the tissues. There is not the least doubt that many of these diseases, or corresponding ones, are present in every sugar-growing country.

A good deal of attention has always been paid to the insect pests in the Java cane fields, and a zoologist is specially attached to the East Java Experimental Station. We have, therefore, a long series of papers on insects attacking the canes. In studying these insects, many of them are found to be severely checked by parasites. As an example let us consider the "moth-borer." Two species of minute egg-destroying Hymenoptera have been described from Java—*Chaetos-tichanana* and *Cerapheon beneficiens*. Attention had previously been drawn to the fact that, in the West Indies, but for the presence of a minute undescribed species of *Trichogamma* (?) destroying the moth-borers' eggs, it would be next to impossible to grow the sugar-cane. A species of *Mikrogaster* and a Chalcid assist in keeping down the moth-borer in New South Wales, attacking respectively the living caterpillar and the pupa. Lastly, a fungus, recently described as *Isaria Rarberi*, has been met with attacking the caterpillars of *Diatraea Saccharalis* in the West Indies; and a similar form of "vegetable caterpillar" has been noted in Java.

Wherever dilligent search is made plenty of new species are forthcoming; and it is probable that additional forms of disease will be described when the cane fields of Fiji, Cuba,

and the Sandwich Islands are more carefully studied. The history of the first observation of the "shot-borer," *Xyleborus perforans*, and the "rind fungus," *Tricosphaeria sacchari*, in the West Indies favors this assumption, in that when once attention was drawn to these diseases they were speedily found to exist over wide areas.

12. In view of these wide-spread disease phenomena it has been asserted that the cane industry is in danger of being wiped out from natural causes independently of the beet competition; and that disease is much more prevalent than ever before. Certainly the stricken canes are visible enough. But it may well be that, in the former days of good prices, the planter could with equanimity leave the loads of rotten and rat eaten canes upon the fields, while he cannot afford to lose a single cane to-day. We read that the sugar crop in Antigua was 3,382 hogsheads in 1779, and 15,102 hogsheads in 1872; while owing to severe droughts, in 1770, 1773, and 1778, there were no crops of any kind, and the whole body of negroes were in danger of perishing.

The records of the condition of the cane fields in the past are very fragmentary. When the sugar planters were in great prosperity, the remembrance of the individual years of failure was quickly obliterated by succeeding plenty. Nevertheless, we do read of severe epidemics among the canes, and the majority of these appear to have been much worse than any at the present time. A few instances will suffice:—

It is recorded by Patrick Browne, in 1756, of the "Aphis blight," that it was "generally pernicious to all plants on which it breeds; it has been, some years, known to destroy whole fields, nay, whole crops of canes. When they are very numerous, people are obliged to burn everything about them, even the most promising plants."

In 1760 enormous numbers of "Sugar ants" (*Formica Omnicivora*) infested the cane fields in the French and English West Indies. These caused such devastation that it was deliberated whether Barbados, formerly so flourishing, should not be abandoned. In 1876, the Government of Martinique offered a million of their currency for a remedy against the plague,

and the Legislature of Grenada offered £20,000 for the same object.

In 1771, Samuel Martin wrote concerning the "Blast" that it was "probable that the island of Antigua would in time be ruined by this disease." This latter appears to be similar to the aphid of Patrick Browne. It is occasionally found in Antigua to this day.

In 1814, Lunan complained of the "Blast" in Jamaica, "which often destroys whole fields of canes, and is caused by myriads of an invisible insect for which no effectual remedy has been found."

The Mauritius planters were greatly alarmed in 1848 because of the appearance in the fields of enormous quantities of grubs, which tunnelled into the heart of the canes.

We read that the introduction of the Bourbon cane into India was followed, in 1857-8, by such severe diseases that the canes were literally eaten out of the ground; and this valuable variety disappeared altogether from cultivation.

During the same years, in Louisiana, a similar infestation of grubs appeared, which caused great destruction on the lower Mississippi. The canes broke to pieces in the fields and no reaping was possible.

In the years following 1872, a terrible outbreak of rust appeared in Queensland and practically swept the cane fields bare. About the same time we read of great epidemics in the Malay Archipelago, Mauritius, the Society Islands, and Bahia.

13. In attempting to form a conclusion as to relative abundance of present and past cane diseases, we are thus confronted by many difficulties. Our records of the past are exceedingly incomplete; increased scientific activity has of late years brought to light numbers of new parasites in the cane fields; in these evil days the planter cannot bear the loss of the hundreds of rotten canes which so regularly litter the fields during the crop, and he becomes clamorous; we are still in ignorance of the causes of many diseases in the canes, and scientific opinion is not unanimous as regards those most studied.

There are many reasons for thinking that the assumed increase in disease during late years is more imagined than real. Taking a general survey, the cane fields of the world appear

to be fairly normal. Java, with all its diseases, seems to have them well in hand. It is principally in our West Indian possessions, where scientific work is largely discredited, that the wave of disease is rising which threatens to carry away the last survivors in the economic struggle with the beet producers.

14. Our knowledge of the biology of the cane fields has made rapid strides during recent years, and we are better able to distinguish the work of different parasites than in the days of the "Blast." It does not seem, with all their variety, that the diseases are more fatal nowadays. In this, and in other respects, the cane epidemics of former days remind one of the "plagues" of the Middle Ages. The list of diseases to which the human frame is liable has been vastly lengthened by the advance of medical science; but the means of fighting them has increased in a much greater degree. The net result is healthier lives: may it be so in the cane fields too!

It has been said that a healthy human stomach is cholera-proof: and a parallel may again be drawn with healthy cane plants. A cursory examination of the latter is sufficient to convince one that most, if not all, the diseases of past years are present in a subdued form. The Aphis of the "Blast," the "Sugar-Ant" of Barbados, the "Blackblight" and "Cuckoospit," even the dreaded "Rust" of Queensland are all at the present moment widely distributed in the cane fields, but not injuriously so.

On the other hand, just as new and obscure maladies appear at intervals among human beings, there are evidences of incipient parasitism among the cane pests. Saprophytic forms appear to have become parasitic, and feeble parasites have been changed into dangerous and destructive pests. The "Rind-fungus" of the West Indies appears to afford an example of this. *Trichosphaeria sacchari* is regarded as an undoubted and dangerous parasite in these islands. Although usually requiring a "bore-hole" for its starting points, evidence from Barbados appears to denote that this is not always necessary; for, as crop proceeds, an increasing number of diseased plants are met with which, after the most careful search, reveal no traces of borers. In Queensland the *Trichosphaeria*

has been proved by inoculation experiments to be an undoubted parasite, although it is far more abundant as a saprophyte upon the dead pieces of stems and leaves. In Mauritius it is doubtful whether the fungus is parasitic, although fairly abundant. In Java, repeated inoculations have failed to produce any effect, and this fungus is therefore to be regarded as purely suprophytic. There seems to be evidence that this form, belonging, as it does, to a saprophytic alliance, is acquiring parasitism.

It has been advanced that the altered behavior of the fungus in various parts of the world is due to the different varieties of cane grown there. The determination and formation of resistant varieties is being prosecuted with vigor in many parts of the tropics. The rind-fungus appears to be only parasite upon the soft, juicy canes of the Bourbon type. The "hard" Caledonian Queen and White Transparent varieties, even in Antigua, where the *Tricosphaeria* is rampant, are usually successful in resisting it. But the parasite appears to be gaining power. In a certain area in St. Kitts, in which island the Caledonian Queen has been largely grown for nearly twenty years, this hardy cane is already severely attacked; while one of the "hardy" varieties is reported to have been cleared out of parts of Martinique by the same disease.

15. Of a similar nature to this incipient parasitism is the occasional change of habit in insects which may cause much destruction in the crops. This may be the case with respect to a small beetle, *Xyleborus perforans*, which has appeared in incredible numbers in West Indian canes during recent years. The case is interesting because this form was previously described as destroying wine casks, and the change from dry wood to juicy rotten cane is an extreme one.

There appears to be no doubt that such a change of food has been observed in a minute Tomicine beetle found in Nevis. This species has been described as *Hypothenemus eruditus*, from its first discovery in the binding of a printed volume, and it has since been found in various dry substances. In Nevis, however, for a short time, its habits completely changed, and it burrowed into the youngest enrolled leaves of the cane shoot, causing a considerable amount of destruction. The case is

remarkable in that beetle of this class do not attack the green tissues of plants.

Sereh is known to have existed in Java for years before it assumed its epidemic character. The rind-fungus is generally believed, in the West Indies, to have lived saprophytically on the cane for years before it acquired strength to attack the living cell; and the shot-borer probably lived in the decaying stumps of the tropical forest for many years before its food demands drove it to attack the canes. There are, so to speak, a host of lurking enemies ever ready to assume the offensive if by any means the cane becomes weakened.

16. With these facts before us, we seem to catch a momentary glimpse of a grand rotation of disease phenomena. The cane plants are constantly guarding themselves against the parasites attacking them; and many of the former pests, although present in the fields, have lost their parasitic power. Saprophytic forms as constantly acquire power to pass from the dead tissues and attack the living cells beyond; while those already feebly parasitic gain in power till they threaten to sweep all before them. From the few surviving canes again arises a more resistant variety, in its turn to fall a prey to new forms of disease—and so the cycle proceeds.

We may be encouraged if we can adopt this view. The inroads of the present-day pests will, in due course, be checked by natural means, even if the researches of scientific men fail to shield the planters from present ruin.

It is also encouraging to note that the patient application of scientific knowledge is producing results in fighting these diseases. While the West Indian planter has been too often content to fold his hands in resignation or despair, the Java cane growers are reaping the benefit of their more enlightened policy. The cane diseases are accurately studied, and their causes, where possible, determined. Regular warnings are issued and special laws are passed; and thus alone is it that so terrible a disease as Sereh, although not stamped out, is restricted within reasonable bounds.

CUBA, PORTO RICO, PHILIPPINES AND HAWAII.

Henry A. Brown, an excellent authority on sugar matters says, speaking of the effect of an occupation of Cuba, Porto Rico and Philippine Islands, all cane sugar producing countries, that "in the year ended June 30, 1894, Cuba and Porto Rico sent us 983,474 tons of sugar, or above the average annual quantity exported to us. In the fiscal year 1897, we received 296,606 tons of sugar from Cuba and Porto Rico. We had of sugar from the Philippines in the year ended June 30, 1890, 64,776 tons of sugar, her largest shipment to us. Last year only 32,500 tons of sugar came here from these islands. Hawaii sent us in the year ending June 30, 1897, 192,547 tons of sugar. Taking the highest figures of these imports of sugar for one year, as above, we received from all the countries named a total of 1,240,767 tons of sugar, while Germany sent us in the last fiscal year named 711,756 tons of beet sugar, and other European countries added to it 198,329 tons, in all 910,805 tons of beet sugar from Europe, and the quantity of beet sugar exports to this country annually increases, while the quantity of cane sugar rapidly decreases, a condition more dangerous to our producers than exists elsewhere. England takes most of the product of the Philippines, her imports from thence being in 1896, 345,691 tons of sugar, against 64,766 tons of sugar sent to us in that year from the Philippine islands. Leaving out Cuba there remains the small quantity of sugar likely to reach us from the Philippines, not to exceed an average of 60,000 tons per annum, and an average of not more than 200,000 tons of sugar from Hawaii, in all some 270,000 tons of sugar per annum from countries in the Pacific coast affecting us as against over 900,000 tons of beet sugar with which we were loaded last year. It is true that the Philippine islands produce about 500,000 tons of sugar per annum at their best. So much the better for us if we retain the islands, as England will gladly buy four-fifths or all of it; in fact, the scare is practically reduced to Hawaiian sugars of which the production is limited, and not likely to exceed its present production to any material extent, while our capacity for producing beet sugar is equal to the present production of Europe to say the least. American sugar producers are borrowing trouble, only to perceive or imagine impending ruin to our sugar industries, which there is no reason to apprehend under existing conditions, or any conditions likely to come about. The fact is, this country consumed in the year ended June 30, 1897, 2,387,237 tons of imported sugar and 330,356 tons of domestic sugar, (a total of 2,717,593 tons, or 6,087,418,388 pounds, 83.75 pounds per capita. Home producers have ability, capital,

energy and skill enough to get a lion's share of this vast sugar producing industry, and need not fear either Hawaiian or Philippine islands as competitors, but should beware of the floods of European bounty-fed beet sugars that are rushed to this country far more to their hurt."

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WHAT QUEENSLAND SAYS OF HAWAII.

Our sugar growers can learn a good deal from the planters of the Hawaiian Islands. Their American energy and mechanical genius have been brought to bear upon a remarkably fertile soil and a favorable climate, and their methods are well worth studying. Among other "dodges" the use of the diluted juice from the third mill to macerate behind the first mill has been tried with satisfactory results at Onomea and Kohala sugar companies' mills. This process was introduced by Mr. Faron, the engineer at Pahala mill, about seven years ago. At that time it was tried at Paauhau mill, but abandoned, as the fine trash from the juice choked the spray pipe. At Kohala no spray pipe is used, the juice being pumped into a trough which is set level over the trash, from one side of which trough it flows over the trash in a thin and tolerably even stream.

In the matter of transportation, too, the Hawaiian planters are progressive. The conditions are unique, it is true, but as the sugar country in Queensland is settled upon similar conditions it will be found amenable to similar treatment. On plantations where the lands are steep enough for gravity roads, but broken up by gullies, so that the gravity road could not be fed by wagons to advantage, a rope tramway may be used. One of these was installed at the Kukaian plantation by Mr. Horner with satisfactory results. This plan comprises a permanent stationary wire rope, supported at intervals by frames; the cane is bundled and tied together by a rope sling, the bundles weighing about 125 pounds each. The bundles are attached to small pulleys which, when placed on the stationary rope and liberated, travel by gravity to the terminus, either to cane carrier, car, or railroad; the small pulleys with bundling ropes are packed back to the field to be used with other bundles of cane. This system has many advantages where the lands are too rough for wagon work, and its adoption will probably be greatly extended in the future. The main permanent wire can be fed by a shorter one, which can be swung around the field to avoid unnecessary handling. A good deal of trouble has been caused, for example, in the Blackall Range district, which comes within the sphere of influence of the Moreton central mill, by the difficulty of finding a passable route for a tramway connecting some of the farms in the more broken country with the mill. In such a case as this the Hawaiian rope tramway system should be both inexpensive and effective.—Queenslander.