THE

PLANTERS' MONTHLY.

PUBLISHED FOR THE

Planters' Labor and Supply Company,

OF THE HAWAIIAN ISLANDS.

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Sugar, at the latest advices from New York, April 7, had advanced to 6½ cents, with a prospect of still further improvement. In almost every commercial center the supplies are reduced below the average, and crops have turned out less than they were estimated at.

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The very rough weather along the Hawaii coast in March, kept the sugar back from market, but planters will not lose by it, as the price has advanced in the interim. At some shipping points the stocks in the warehouses had accumulated to over 10,000 bags. The weather having moderated, large quantities have arrived here, and the shipments during April will be unusually large.

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Col Spalding with his family left for the United States and Europe in the Umatilla, to be absent several months. While in Paris he will act as one of the Hawaiian Commissioners at the Exposition. The Hawaiian exhibit sent to Paris is probably larger and more attractive than that which went to the Centennial at Philadelphia, and if well placed and attended, cannot fail to attract much notice.

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A correspondent asks us to furnish some information regarding the earliest efforts to make sugar in these islands. We have no data at hand, but will endeavor to secure some. In the mean time we print on pages 160 to 167, an account taken from the *Hawaiian Spectator*, published in 1838, describing sugar enterprises at Waimea and Koloa on Kauai. If any of our readers have historical accounts older than these we should be glad to hear from them.

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A sale of the American Sugar Refinery was made on April 1, to Messrs. Havemeyer & Elder, of New York. The business of

refining sugar will be carried on by the purchasers the same as formerly, and the contracts between the Refinery and the Hawaiian planters have been assumed and will be carried out by them in the same manner and on the same terms as if the Refinery had not been sold. By the sale, the business is placed on a more secure basis, and therefore more advantageous to our planters.

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Advices from Maui state that the Spreckelsville mills are now running twelve and one-half hours a day, making daily 120 tons of sugar. The cane is very rich, juice standing 22 Brix, Pol. 20, and yields two pounds of sugar per gallon of juice. The plant cane has nearly all been rolled, and will yield about 12,000 tons of sugar. The ratoons still remain to be ground, and will swell the total to 13,000 tons. Hamakuapoko and Paia mills, on Maui, are running night and day, the cane is very rich and yields wonderfully well. At Paia they have ground nearly four thousand tons of sugar and not yet finished.

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The Iron Foundry is very busy filling orders for plantations, and the engagements in hand will require twelve months or more to complete them. Mr. Young informs us that he is making important additions to his labor saving foundry machinery, and among them is a steam boiler riveting machine, which will enable him to execute orders for the largest marine or land boilers, with much greater dispatch and less cost than heretofore. He has also made contracts to furnish three new mills, with all the late improvements, not excepting his vacuum cleaner and superheater. The experience of the Waiakea mill, where all these have been tested and perfected, shows that a large increase of sugar can be extracted by their use, at a cost which will astonish those who cling to the obsolete methods of making sugar.

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There is now every prospect that the long-talked-of road from Hilo to the volcano will soon be an accomplished fact. Work has commenced at the Hilo end under the charge of Mr. Marlin, who has a gang of fifty or more men at work. What is first needed is a good carriage road, with a substantial track, at least twelve feet in width, throughout the entire distance of twenty-nine miles. This will at once open up a large section of land for settlement by immigrants, who can raise coffee, oranges, limes, sugar cane and other produce, for which a market can be secured without excessive charges for transportation. When this road is done, Government should by purchase, acquire possession of Captain Lee's road from the Volcano to Pahala, and open up a continuous thoroughfare from Hilo to Waiohinu, which will unquestionably attract much more travel

through those districts than is now seen. Good roads help more than anything else to people the country.

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The shipment of bananas by the S. S. Umatilla to San Francisco this month was unusually large, over 6,000 bunches. This vessel had exceptionally fine accommodations for shipping them so as to ensure despatch and good care, and it is not unlikely she will be able to take 7,500 or even 8,000 bunches, should they be offered next month. For the New York and Boston trade with the West Indies, steamers are specially fitted up for carrying this fruit, and take aboard from 10,000 to 20,000 each trip, discharging them at destination in twelve hours. In the Boston and West Indies fruit business, twelve steamers are in service, making weekly trips. This is a trade which can be largely increased here, if the steamers furnish the proper accommodations to take the fruit offered. Probably 20,000 bunches per month would not more than supply the regular demand of the Pacific States and Rocky Mountain Territories. They are largely consumed in every hotel from Victoria to San Diego, and in many private families, keep well and are relished even alongside of grapes, apples and peaches.

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Private advices from the United States, give assurance that there will be no great changes made in the sugar tariff, though it is not unlikely that some modifications will be made. The encouragement of the sugar interest of the United States —beet, cane and sorghum—is of paramount importance just at this time, when the possibility of the profitable manufacture of beet and sorghum sugar is almost an assured fact, provided the tariff is maintained as at present, affording a protection to the industry sufficient to secure its success. It would be suicidal to encourage any legislation which would weaken the public confidence which is now being placed in it. Confidence once secured, capital will follow, and large investments in various sections of the Union—California, Nebraska, Kansas and elsewhere—will be made, which will establish a new industry, which may in a few years, rival that of France and Germany. If Congress is wise and discreet in this matter, it will refuse to strangle this new national industry in its very infancy, and move cautiously in any legislation relating to it.

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THE FOREIGN SUGAR MARKET.

(From Willett & Hamlen's Circular.)

The improvement in prices seems already to have commenced, which has been foreshadowed for some time, by the changing of the statistical position towards a more favorable outlook for sugar. From all directions indications point to higher prices in the near future. Cuba, which has virtual con-

trol of the situation, is not disposed to let go at present values, and a local speculation has set in there, which has carried prices ¼c. above the present American market value. The British West Indies are also holding sugars back for more money; and even the beet countries are marking up their pretentions, particularly for summer deliveries. American buyers are taking no part in these movements thus far, but are looking on with more or less anxiety as to the outcome, as they perceive the spot stocks gradually disappearing, and their own supplies melting away to meet an increasing demand for the refined article. The stock in all hands decreased 5,700 tons for the week—3,800 tons of which came from refiners' own holdings—leaving stock in United States 35,182 tons less than at the same time last year. * * * Cuba crop reports are favorable for considerable appreciation of prices, for in many districts planters are finishing grinding with from 20 to 60 per cent deficiency, while the total crop, from present indications, may fall considerably short of the last year's by 50,000 tons, and possibly by 100,000 tons, if no improvement in condition is reported. The beet crop also, which started off with a large excess, according to Mr. Licht, is constantly being corrected on the side of smaller results, Austria being reduced this week. * * * Boston now shows but 1,949 tons old stock. One of the "Trust" refineries there is said to be permanently closed, (The "Bay State.") "Trust" certificates are in increasing demand and sold for the week to the extent of about 10,000 shares at $83½ to $86⅜, closing at $85½. Of course large profits are accumulating back of them every week—above the dividends paid—which will have to be disposed of eventually to the stockholders in some manner.

HAWAIIAN COMMERCE FOR THE YEAR 1888.

From the annual report of the Collector-General of Customs for the year ending December 31, 1888, we learn that the total exports for that year amounted to $11,903,398, of which $10,824,783.49 was the value of sugar and molasses. The following exhibit shows the export of these items for the past thirteen years:

	Pounds Sugar.	*Gallons Molasses.*		*Pounds Sugar.*	*Gallons Molasses.*
1876	26,073,429	130,073	1883	114,107,156	194,997
1877	25,575,965	151,426	1884	141,654,923	110,530
1878	38,431,458	93,136	1885	171,350,314	57,931
1879	59,020,972	87,475	1886	216,223,615	113,147
1880	63,584,871	19[illegible],355	1887	212,761,647	71,222
1881	93,789,483	263,587	1888	235,888,346	47,965
1882	114,177,938	221,293			

The falling off in molasses exported has been owing chiefly to a decreased amount produced, caused by greater skill in the

boiling-house, resulting in more sugar and less molasses from a given amount of juice than formerly.

The rice exported in 1888 was 12,878,600 lbs.

The imports during 1888 were $4,540,887, a falling off of about ten per cent from those of the previous year. Of the imports, nearly three-fourths ($3,529,512) came from the U. S.

The total commerce of the Kingdom, exports and imports, has amounted to $16,248,486, showing a gain of about eight per cent over the previous year.

The number of passengers arrived during 1888 was 7,065, of whom 4,039 were Japanese and Chinese. The departures have been 4,922, leaving an excess of arrivals of 2,143, which represents the increase in our population from this source during the past year.

The revenue of the Customs Department for the year is placed at $546,142, against $595,008 for the previous year. The revenue from spirits has been $242,415.45.

JAPANESE IMMIGRANTS.

Few of our readers are aware of the very small cost attending the Japanese Immigrants arriving by late steamers. The only charges that the employers of these men and women have to pay are $65 for passage money and $1.79 for charges in Honolulu, a total of $66.79, all which is refunded to the employer, so that the actual cost is nothing except the wages paid. No laborers have ever been introduced here on such easy terms. And what is still better, the Japanese readily learn the English language and habits, and make good house, farm and plantation servants. The number now in the islands is not far from 6,000 and that they are provident and thrifty is shown by the fact that their savings in the Postal Savings Bank have amounted to $132,816, most of which has been withdrawn for remittance to Japan.

We have been furnished by His Excellency the Minister of the Interior with the following statistics regarding the number of immigrants which arrived in the S. S. Omi Maru, in March, 1889, from Japan. There were in all 820 men and 136 women. Of these, 818 men and 127 women were distributed among the several plantations below mentioned. Two men and four women were sick or otherwise incapacitated for work, while eight women arrived to rejoin their husbands, who are already residing here as contract laborers.

The cost per man to planters is :

Passage from Japan, and charges	$65 00
Acknowledgement to contract	1 00
Expenses at Honolulu, including landing and supplies, while awaiting reshipment	79 1-5
Total cost to planter at depot	$66 79 1-5

These immigrants were distributed as follows:

	Men.	*Women.*
Hawaiian Commercial Sugar Co., Maui	120	18
Reciprocity Sugar Co., Maui	30	4
Kilauea Sugar Co., Kauai	55	9
Hutchinson Plantation Co., Hawaii	20	3
W. G. Irwin & Co., Paauhau, "	60	9
Hilo Sugar Co., "	75	10
C. Afong, Pepeekeo "	130	25
Waianae Co', Oahu	25	3
W. H. Purvis & Co., Kukuihaele, Hawaii	25	3
Honokaa Sugar Co. "	24	4
J. M. Horner & Sons, Kukuihaele, "	25	4
R. M. Overend, Honokaa, "	15	2
W. Y. Horner, Lahaina, Maui	30	4
Lihue Plantation, Kauai	40	6
Honomu Sugar Co., Hawaii	24	4
J. Wight, Kohala, "	12	2
R. R. Hind, Hawi Mill, Hawaii	5	1
Paia Plantation, Maui	25	4
Haiku Sugar Co., "	24	4
R. Halstead, Waialua, Oahu	24	4
Kohala Sugar Co., Hawaii	30	4
Total	818	127

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PROGRESS IN SUGAR MANUFACTURE ON HAWAII.

The following letter from Mr. Kennedy, of the Waiakea Mill, indicates the rapid advance towards perfection now being made in the manufacture of sugar by the introduction of new and improved machinery. The large amount of sugar (289 pounds) extracted per short ton of cane—not from a single ton only, but the average of a field of 130 acres, shows an advance which may well arrest the attention, not only of our own planters, but of those in other countries. The Waiakea Mill is probably fitted with the most complete machinery for extracting sugar of any mill on Hawaii, though there are others that can turn out larger quantities in a given time. Another point to which we wish to call the attention of our readers, is the importance of weighing the cane as it comes to the mill. This is done in all other sugar countries, while only a part of our plantations follow the practice. For purposes of comparison with what is done abroad, this is an absolute necessity in all records of mill work.

WAIAKEA MILL, HILO, April 14, 1889.

EDITOR PLANTERS' MONTHLY:

Having used Young's Superheater at Waiakea Mill during the last four months, permit me to state for the benefit of your readers the results obtained. After the superheater was put in place we have been able to macerate freely, our second mill juice being reduced to five or six degrees Brix, and we make

from 5,000 to 6,000 gallons of juice per day more in the same time than in the two previous years, trash being sufficient for fuel.

Having read in your PLANTERS' MONTHLY so much about diffusion in Louisiana, and the remarkable results obtained of 236 pounds of sugar to the ton of cane as the largest outcome yet reported, and that Lahaina cane will yield a much larger return by the same process; allow me to state that the two past seasons gave us 266 pounds to the ton of cane (plant and ratoon) and we did not diffuse. We macerated all the time our second mill juice down to five or six degrees Brix, and on one field of 130 acres we got 289 pounds to the ton of cane. Not being satisfied with this result I did not write about it, but when so much is said and done about diffusion, I mention these facts to encourage maceration as well as diffusion to aim for 300 pounds.

Yours truly, C. C. KENNEDY, Manager.

COLD STORAGE FOR ORANGES AND OTHER TROPICAL FRUITS.

The following is from a New York paper of a late date, and indicates that another step is being taken to introduce the cold storage principle in the transportation of fruits to distant markets. Last month we printed articles on the subject of providing cold storage in cities by temporarily preserving fruits and meats where there is an excess in the market. From a gentleman engaged in this business in Portland, Oregon, we learn that even in that city, where the average temperature is comparatively cool, the cold storage business pays well, and is constantly used in various branches of trade. But it is still in its infancy, and it will not be many years before every city has its cold storage warehouses, as it now has its ice factories. And more than this, the day is not distant when steamers will be fitted up with cold storage apartments, to carry tropical fruits across the ocean, such as pine-apples, bananas, oranges, alligator-pears, mangoes, guavas, etc., delivering them in as perfect condition as when taken on board. Some of these fruits are now sent in small lots to San Francisco in the steamships' refrigerators in perfect order, which settles the feasibility of transportation in this way. These islands can produce the tropical fruits named in unlimited amount, if some means be provided to keep and deliver them in the foreign market in fresh condition, as wanted for trade and consumption. This can and will be done, whenever the demands of the fruit trade warrant it.

A few months ago, we noted in this journal the fact that the banana trade between Boston and New York and the West

Indies had increased to such an extent that steamers are now built expressly for the purpose of carrying them in a manner that keeps them in nearly as perfect condition as when picked, so that they are marketed and consumed without loss to the trader. This accounts for the wonderful development of the West India banana business during the past few years.

"A small consignment of California oranges was received at the auction rooms of R. M. Montgomery & Co., the tea auctioneers," says the New York *Mail and Express*. "The consignment was not sent to be sold on this market, but was intended to demonstrate the practicability of 'preparing' oranges and other fruit of a perishable nature for transportation in such a way that they will not decay.

"The oranges are branded as 'Sunnyside,' and are entirely seedless. They were shipped by B. B. Barney of Riverside, San Bernardino county, Cal., to Chicago in the course of a regular shipment to that market, and were then forwarded to New York by express. When the boxes were opened the oranges were found to be in perfect condition right through the boxes, not a single sign of decay being visible. The plan was conceived by Mr. Pierce, of Chicago, who represents a number of capitalists interested in the subject of fruit transportation. The plan for preparing the fruit for shipment is a secret, but Mr. Pierce claims that by it he can guarantee the arrival of the fruit in as good a condition as it was shipped. The fruit is prepared for shipment in a warehouse and then is shipped on refrigerator cars especially prepared for the purpose, and the fruit can be carried any distance within any reasonable time without damage.

"Mr. Pierce further stated that the plan proved very successful last season, 125 carloads having been shipped from Southern California to Chicago and the Northwest, and orders had been given for building 200 additional refrigerator cars to be run over the Atchison, Topeka and Santa Fe system.

"On being asked whether it was the intention of the company to introduce California oranges on the Eastern markets in large quantities, Mr. Pierce replied that the high railroad rates seemed to him an obstacle to a very profitable business in that direction, and he declared further that his object in bringing the fruit on to New York was to demonstrate to the dealers in and growers of Florida oranges that the process could be applied to Florida oranges as effectually as to California. 'The work has been done,' he said, 'as a preliminary measure to introducing the system into the South, to let the growers see that there is no necessity for their receiving only $1 per box for their fruit on account of decay.'

"Mr. Pierce stated, in reply to a question, that the consignment was by no means a specially selected one."

CORRESPONDENCE AND SELECTIONS.

CHEMICAL AND OTHER FERTILIZERS FOR CANE.

A PAPER READ BY MR. T. MANN CAGE BEFORE THE LOUISIANA SUGAR PLANTERS' ASSOCIATION, FEBRUARY 14, 1889.

At the request of the President, Hon. Duncan F. Kennek, eleven years since, I had the honor of reading a paper on fertilizers at the February meeting of the Louisiana Sugar Planters' Association, when numbers of our planters were still despondent from the disastrous results of the crop return of 1877, which many attribute to their use, but which in reality was caused by a sunless autumn and winter freeze.

Had the season of 1888 been similar from the 15th of September until Christmas, results would have been equally disastrous, and even more so when the average tonnage was very large. Last year demonstrated to the most skeptical how much really depends on climatic influences, and that it requires bright sunlight, a dry atmosphere and cool nights to develop saccharine rapidly in the cane, regardless of how well we may have cultivated and intelligently fertilized our fields.

In the *interim* much progress has been made here and elsewhere in the increased yield obtained per ton of cane, produced by mechanical appliances generally, and in some instances those coupled with improved agriculture.

There has been a marked increase in the use of fertilizers of various kinds, but it is to be feared due attention has not been paid to the possible development of saccharine in the cane, as has been the case in Europe with beets.

We too must seek for that combination of ingredients which will produce the best financial results, regardless of first cost.

The relative conditions of the agriculturists of to-day and the farmers of fifty years ago is very noteworthy as relates to the production of the varied products of the soil. Formerly to augment and maintain the manurial richness of soils the farmer had to have resource to the most judicious system of rotation of crops, and the enlargement of the manure pile and compost heaps. When guano, which then contained from 14 to 17 per cent of ammonia, came to be used, many farmers imagined that a panacea for comparatively exhausted land had been found, as was the case with many of our planters when cottonseed meal came into vogue. Ere long they learned that the strong stimulant soon exhausted the soil of its soluble mineral plant food, as our people will if they still continue the use of cottonseed meal alone, should it maintain a high standard of excellence.

Thanks to a beautiful and all-wise provision in nature's law man cannot exhaust the fertility of many soils. If strong stimulants are used soon the production of crops ceases to be profitable, because the mineral necessary the paying produce are wanting. The soil can only give them off in limited quantities. They must be supplied to produce satisfactory results, particularly where the development of saccharine is desired in the plant.

Through the scientific researches of Liebig, Baussingault, Lawes, Ville and other eminent chemists, we can now enrich our fields with some degree of intelligence, and are not forced to wait for a term of years to render our soils productive. We can purchase all the necessary components of plants in a concentrated form, and we are informed that to produce maximum results we *must* return to the land *more* potash and phosphoric acid, in a *soluble* form, than the crops grown require or remove, and an adequate amount of ammonia, which will vary according to circumstances.

In the earth, nature's great laboratory, are ever being wrought chemical changes and combinations yet unknown to man; and Mr. Ville justly states: "I defy the most expert chemist to say in advance what will be the crop yield of a soil submitted for analysis, and to what fertilizer one must have recourse." From the above will be seen how vast the field for investigation, and how imperative that experiments should be conducted with care, and the material used in making the tests should be of known quality.

In 1886 our legislature enacted a law, the object of which was to protect those engaged in agriculture from manufacturers and dealers in spurious and comparatively valueless ingredients, styled fertilizers. In the main the law is a good one, yet defective in comprehensiveness. That passed by the legislature of the State of Massachusetts last year is more to the point, broader in scope, and specifies that "every lot or parcel of commercial fertilizer, or material used for manurial purposes, sold, offered or exposed for sale within this commonwealth, the retail price of which is $10 or more per ton, shall be accompanied by (a plainly printed statement, clearly and truly certifying the number of net pounds of fertilizer in the package; the name, brand or trade mark under which the fertilizer is sold; the name and address of the manufacturer or importer; the place of manufacture, and chemical analysis stating the percentage of nitrogen or its equivalent in ammonia, or potash soluble in distilled water, and of phosphoric acid in available form soluble in distilled water and reverted, as well as the total phosphoric acid." Great care should be taken in the purchase of *all* fertilizers, and their chemical composition should be guaranteed, and their mechanical condition noted, as will

appear from the following extract (by Prof. Goessman of Amherst, Mass., in Bulletin 31): "The *mechanical condition* of any fertilizing material, simple or compound, deserves the most serious consideration of farmers when articles of a similar chemical character are offered for their choice. The degree of pulverization controls almost, without exception, under similar conditions, the rate of solubility, and the more or less rapid diffusion of the different articles of plant food throughout the soil. The *state of moisture* exerts a no less important influence on the pecuniary value in case of one and the same kind of substance. Two samples of fish fertilizer, although equally pure, may differ from 50 to 100 per cent in commercial value, on account of mere difference in moisture."

The planter, in justice to himself and his manager, cannot be too particular in the selection of fertilizers to be used and the amount applied. How can the manager on an estate where the owner is parsimonious, and supplies an inferior article and in limited quantity be expected to obtain the same tonnage per acre or pounds of sugar per ton as another on a plantation the owner of which fertilizes abundantly and with intelligence?

To accomplish great results we must cease to grow canes to please the eye, but strive to produce those which will yield the most net money per acre. The luxuriant leaf growth of July and August, which may be pleasant to contemplate, does not always contribute to the development of very rich saccharine juice in October and November.

From the foregoing it will be seen how necessary it is to know what we buy; the proportions of manurial ingredients, their mechanical division and amount of moisture. Of the fourteen elements of which plants are composed (four organic and ten mineral) we only have to deal with one organic and three mineral substances—namely, nitrogen, phosphoric acid, potash and lime. Those we meet in every-day life only under other names and slightly different forms.

The nitrogen in another form is the ammonia in the harts-horn bottle, or the odor arising from the manure pile. The phosphoric acid is ground bones dissolved in sulphuric acid, and potash (kainite, pottassium, oxide, etc.) is simply the lye from wood ashes, etc., and calcium oxide, our common lime.

It is not necessary that the planter or manager should be conversant with agricultural chemistry, yet he ought to know when he fertilizes his fields how much of each element of fertility he is returning to the soil, as thereon hangs his chances of success. He should know how many pounds of nitrogen of its equivalent in ammonia (41 of nitrogen equals about 50 or ammonia per Lawes), of phosphoric soluble in water (and pay but little attention to the reverted, as he wants the acid re-

verted into cash as rapidly as possible); of potash soluble in water and as to lime, in most cases it can be dispensed with. That amount of knowledge is necessary and due to the manager of the place, unless he has full charge. How can the owner of an estate expect his manager to produce him fine stubble canes (ratoons) on a field which has been manurially exhausted of phosphoric acid, and more particularly of ammonia, by a heavy crop the previous year, when he supplies only 300 pounds of cottonseed meal per acre, containing twenty-five pounds of nitrogen, ten pounds of phosphoric acid and six pounds of potash, when there should be at least twice that amount of ammonia, and probably three times the quantity of the acid to hasten maturity?

Mineral manures alone will produce canes with juice of high saccharine strength, but *too limited* in quantity (except on new lands), and too much woody fibre. Nitrogeneous manures will produce soft canes with an abundance of juice poor in sugar; therefore our planters should study for themselves those combinations which will give the best money results on their several estates.

As cottonseed meal is our cheapest source of nitrogen it would seem advisable to apply it as the first manuring to plant and stubble, yet tankage and pure, finely ground bones are admirable where capital is abundant and where the planter *expects* to retain possession for a term of years. Thus, to get a high saccharine yield per acre, use a chemical fertilizer containing sulphate of ammonia, nitrate of soda, a high grade phosphate and sulphate of potash. Such a mixture, containing six per cent of ammonia, seven to nine per cent phosphoric acid, and five per cent potash, in such concentrated form, will probably cost in, or be delivered at New Orleans, for from $44 to $45 per ton. The advantage to be derived from the use of *pure* chemicals is, that the plant food is in a soluble, not potential form, given off by gradual decay, as in cottonseed meal; and the plants will grow rapidly in July and August, and as the ammonia will be about exhausted by September, the cane will commence to ripen and rapidly develop sucrose, the weather permitting.

On the average Louisiana lands, where cane follows pea-vines, it will take from 30 to 40 pounds of ammonia to produce 25 tons of cane, and from 50 to 60 pounds for 18 to 20 tons of stubble, if the stand is good. There is but little fear of an excess of phosphoric acid or potash being applied. Owing to defective drainage, etc., it will be found that the (*terre grasse*) black lands will require more ammonia than sandy soils. Should green canes be anticipated the first fertilizing of plant canes can then be dispensed with, and the chemicals increased to 400 pounds

per acre. Cottonseed meal, for cheapness, can be substituted for chemicals, with the phosphates and potash.

Thousands of tons of linseed and rape cake (similar to cottonseed meal) are produced in Europe, but we never hear of its being applied to beets. It is extremely doubtful if even ten per cent of sucrose could be produced by the application.

If we wish to augment the sucrose content in the cane we should experiment with those compounds which have given the best results elsewhere. It is not the first cost of the fertilizer which must be regarded, but the *net proceeds* of the product per acre.

In the tropics, the home of the cane, intensive agriculture is not necessary, as there canes have from twelve to eighteen months to mature; but here, where the period of growth and maturity is limited, the planter must in a measure hasten both, where a comparatively large tonnage of cane, relatively rich in sugar, is desired.

The value of a fertilizer to the planter can only be arrived at by comparison. Two plats of from one to ten acres of identical quality, and cultivated under similar climatic influences, should be selected, only differing in that one be fertilized and the other not.

When harvested the amount of woody fibre per ton in each should be accurately ascertained, the ratio of sucrose in the juices arrived at by polarization or actual analysis, and the difference in tonnage per acre learned. With the above data the available sugar can be estimated, and the value of the fertilizer known by the increased sugar in the cane per acre.

The primary object is to induce our planters to make accurate field experiments. The beetroot growers, their most important competitors, have seen the necessity of becoming cooperative, not only in field culture and fertilizing, but in the methods of manufacture. It is to be hoped our planters will be in the van in emulating so laudable a purpose.

Modes of extraction and manufacture may become identical in Louisiana and other cane growing countries, but the system of cultivating and fertilizing canes, to arrive at a high state of perfection, must materially differ, owing to climatic and other influences, and it will require great perseverance and constant research to successfully compete with other sugar-producing regions of the world.—*Louisiana Sugar Planters' Report.*

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Tea cutivation in India has reached great proportions. Last year Great Britain derived more than 50 per cent of its supply of tea from that country, the amount imported being 113,000,000 pounds, while the quantity received from China was only 110,000,000 pounds.

THE DIFFUSION PROCESS IN DEMERARA.

After seventeen weeks of practically continuous work with the new system at Nonpareil, operations for the season have been or are being brought to a close, and the results, so far as at present ascertained, are represented as entirely satisfactory. Some allowance must, of course, be made for the effect of unforeseen and temporary obstacles in the manipulation of unfamiliar appliances; but the authorities of the estate do not appear to be of opinion that the loss therefrom has been considerable. The average extraction per ton of canes sliced has been 84.6 per cent., which Mr. Garnett estimates as about 20 per cent. better than could have been obtained by double crushing in a first-class mill, and the extra return in sugar and molasses has been in almost exactly the same proportion. To this result the superiority of the Rillieux quintuple effect over the old triple has no doubt contributed in some degree, but the exact proportion we are not in a position to state. The total cost of the machinery, including erection, has been about £11,500 sterling; but it is calculated that in future it will be possible to furnish and erect plants of equal capacity for little if any more than half that cost—say £6,000 at the outside. The process is almost entirely automatic, and requires but little tending. The feeding of the canes into the slicers has, necessarily, to be done by hand, but after that no further manipulation is required. One man to each of the eighteen hoppers suffices, and that number of feeders enables the machinery to dispose of thirty tons of canes per hour with the greatest facility. The actual process of slicing is invisible, taking place as it does in a concrete tank in the mill dock, on to the platform of which the canes are discharged from punts and then fed through the hoppers into the machine. From a cavity into which the slices fall they are taken up by an endless wire rope and conveyed to the diffusion battery, consisting of a dozen vertical boilers arranged around an elevated platform into which the sliced canes are delivered by the carrier, which can be moved from one to another by a single attendant with very slight exertion. This diffusion battery is the central point of the system. It is here that the entire process of diffusion is accomplished. At a first glance, with its multiplicity of pipes and valves and heat and pressure gauges, it seems to the uninitiated an extremely complex and somewhat appalling arrangement, but is really exceedingly simple, the whole number of boilers requiring only one man to attend to them. And when the diluted saccharine, or juice of diffusion as it is called, has once passed through the series, all trouble with regard to it is at an end, its subsequent treatment being exactly the same as that of ordinary juice. It will be remembered that

when, in June, 1887, the process was first tried in the colony the machinery for slicing the canes could not be got to work satisfactorily, and Mr. Hogg was at that time apprehensive that the difficulty would prove insuperable. It has, however, been completely overcome, no difficulty whatever being now experienced. To change the knives once in two days is found to be amply sufficient, and the process involves a delay of only a very few minutes. Another difficulty was anticipated in the disposal of the chips, an accumulation of some four hundred tons a day during a continuous working being a serious obstacle to face; but the discovery that, after being run through an ordinary cane mill, they would be available as fuel, and might be used immediately without any further drying process effectually disposed of it. The crushed chips are not so valuable for combustion purposes as ordinary megass, but the difference does not appear to be very great. Mr. Garnett has obligingly furnished us with some figures, indicative of the results of the recent working of the process, which we hope will prove intelligible to our planter readers:

			Per cent.
Percentage of sugar in canes	13.041	=	100,000
" " in massecuite	11.749	=	90,092
Total loss	1.292	=	9,908
" " on exhaust slices	.823	=	6,318
" " undefined	.469	=	3,590
Percentage of sugar in molasses	1.666	=	12,775
" " in second sugar	1.292	=	9,907
" " in first sugar	8.791	=	67,410

	Tons.
Cane worked up	26,144.929
Massecuite made	4,015.511
First sugar made	2,384.535
" " polarization	96.4
Second sugar made	417.293
" " polarization	81.0

Percentage of first sugar on weight of cane	9.120
" second sugar on weight of cane	1.5
" all sugar	10.620
Average dilution	29.2
Coal per ton of first sugar	22 cwt.

In relation to the value of the crushed chips as fuel, Mr. Garnett says that the chips contain on an average 55 per cent. water: *i.e.*, assuming the canes to contain 12 per cent. of fibre for every 100 tons of cane sliced, 25 tons of crushed chips should be available as fuel. But the fuel is of very poor quality. With good 70 per cent. double crushing, there should be in the megass, for every 100 tons of cane crushed, 12 tons of fibre, 3 tons of sugar and 15 tons of water; whereas, after diffusion, and crushing in a mill, the crushed chips contain

only 12 tons of fibre, 0.5 of sugar, and 13 tons of water. And he adds: "With mill crushing and burning the megass under suitable boilers, for every pound of coal burnt under the boilers 14.5 lbs. of steam were generated. With crushed chips instead of the megass, only 10 lbs. of steam are generated, which shows that the chips are not by a long way as good fuel as megass. Had it not been for the Rillieux considerably more coal must have been burnt." This is possibly not a perfectly complete scientific demonstration, but practical men will readily comprehend that the abstraction from every hundred tons of cane by means of diffusion, of three tons more sugar than could be secured by simple crushing, must materially reduce the value of the chips as fuel.—*Demerara Argossy, Feb. 9.*

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EARLY SUGAR ENTERPRISE AT KOLOA, KAUAI, 1838.

This district is situated in the southwest part of the island, and its appearance as approached from the sea is prepossessing. The land is undulating, watered by several streams, and is green to the sea-side. Upon the right is seen the crater of an extinct volcano, while the horizon is bounded by a range of low, but well-wooded mountains.

The surf breaks heavily along the shore, but a safe landing is effected at the mouth of a small stream. Clusters of native dwellings are scattered on the plain, but the principal village, where the head man resides, is situated a mile from the beach, at a short distance from the missionary buildings. These buildings, which are encircled by a pretty garden, are neat and substantial. A new church, capable of holding nearly two thousand persons, surrounded by a thatched veranda supported by neat wooden columns, shows prettily in the distance. Fields of sugarcane, taro, yams and other vegetables, bespeak a more than usual attention to agriculture.

The population of Koloa, which is about three thousand, is increasing rapidly by emigrations from other districts. But the principal attractions here are the estates of Messrs. Ladd & Co. and Messrs. Peck & Titcombe, American gentlemen. Simply as plantations, they would merit but a passing notice, but from the important effects they are producing upon the Hawaiian nation, both physically and morally, they deserve a more particular examination than the writer is prepared to give them.

However, a mere sketch of their operations will, we trust, be acceptable to those who feel an interest in every plan which tends to the improvement of this interesting people, and may also afford a few useful hints to those who shall undertake similar enterprises.

In the fall of 1835 Messrs. Ladd & Co. obtained from the King

a long lease of a large tract of land at Koloa, for the purpose of cultivating the sugarcane. It lies three miles from a good anchorage; the soil is rich, and watered by a fine stream, which affords sufficient water-power for the necessary mills.

During the first year all the difficulties incidental to a new country, and a total want of agricultural implements, and an ignorant, indolent people, unavoidably retarded the immediate execution of their plans. They at present have eighty acres under cultivation, and intend the ensuing year to cultivate two hundred more. The necessary buildings are now erected, and, in addition to these, a sugar mill will soon be completed at the village below for the purpose of grinding the cane that may be cultivated by the chiefs and people. The quantity of sugar which may be exported annually from this valley, is estimated at from two to four hundred tons.

In 1836 Messrs. Ladd & Co. leased a portion of their land to Messrs. Peck & Titcomb for the purpose of cultivating the mulberry and raising the silk. They have now upwards of forty thousand trees, which at nine months' growth, are as thrifty and forward as those of several years, in New England. As yet they have been disappointed in obtaining the silk-worm, but are daily expecting a supply of eggs from China.

Experiments are also being made in the raising of coffee and cotton which bid fair to be equally as successful, though not so lucrative as sugar or silk.

As the plan and objects of the two estates are materially the same, the following description and remarks will equally apply to both. With the leases orders were given for thirty-six men as laborers upon the two estates, as the common people are held rigidly by the chiefs, who consider their dignity enhanced by the number they control, it was with much difficulty that they could be obtained, and, when procured, proved to be the off-scourings of the island. Of this number nearly one-half were soon discharged for various misdemeanors, and punished by the authorities of the place after a fair and legal trial by jury. To the others, houses with lands to cultivate were for their own benefit allotted. These were joined by a few stragglers, who seemed to have no master, but proved themselves valuable servants, and now constitute the real population of the plantation.

A large number of day-laborers are also employed. To all twelve and a half cents per day and their food are allowed. This sum may appear small, but, when compared with their wants, is fully equal to a dollar per day in the United States.

Mr. Hooper, the gentleman of the firm who has the immediate care of the sugar plantation, estimates the daily cost of furnishing food to each man, which consists of fish and poi, at one cent.

All ardent spirits are tabooed by the Government, so that none are brought to the island. A superintendent and several other white men were also employed.

At sunrise all the laborers are turned out by the ringing of the bell, and work till sunset, sufficient time being allowed for their meals. At night they are assembled and paid by a sort of bank note system. These notes are considered as good as money over the whole island. They consist of small pieces of card, upon which are printed different values, and which are redeemable in goods on Saturdays, which time is allotted them to cultivate their lands and as a general market day, when they make their purchases and bring their produce to be sold. A strict regard is paid as far as is possible to their morals and health, the effect of which is perceivable in improvements in their houses and gardens, and in the dresses of their wives and children.

Their indolent habits are rapidly giving way before the prospect of gain, and the idea of property, the ambition to acquire it, a sense of the value of time and the use of money are rapidly spreading among them, though as yet in a very crude way. Slowly, but surely, their intellects are beginning to comprehend their own rights and importance in the scale of political economy. In proportion to this increase of knowledge does the servile fear of the chiefs, which has heretofore formed a part of their nature, diminish. This influence is spreading rapidly over the island. Two years since a chief needed but to breathe his commands and they were implicitly obeyed. Now he is obliged to stipulate with his men, and allow them a certain proportion of the fruits of their labor.

Much credit is due to the proprietors of these estates for the zeal they have manifested in opposing the *tabu* system, and refusing to employ men on purchase of the chiefs without the poor natives being recompensed for that labor which inevitably devolved upon them. The effect of this new system of policy varies of course with the individual character of the natives. While one has not missed a day's work for two years is as naked as when he came upon the estates, always giving away his earnings to his friends, another has laid up his money and realized a handsome sum by the cultivation of his little spot of land. This he has invested in various articles for his own use and comfort, and to pay his workmen with. The other natives look to this man and reason thus: "He has got by his industry plenty of *waiwai* (property); now if the chiefs do not take it away from him, we will try to accumulate some also." As yet his waiwai is respected, and of course such an example is of more value than a thousand precepts. Thus far the Government have encouraged the undertaking by affording every facility desirable. The reason is obvious. These natives, both

the *ignobilis vulgus* and the patrician few, require something palpable, something before their eyes, before they can be convinced of the utility of a plan proposed, and when they realize the hard dollars for their soil without the debt contracted in the experiment eating their profits, as has heretofore been the case, they are satisfied that to lease their lands to worthy men is the best course for them to pursue. Such is the present opinion of the King and his council, who have said that they derive more revenue from this one plantation than formerly from all Koloa.

No one can visit this island, and candidly examine into its political aspect, without being convinced that a great and radical change is at work among the people; one which will eventually overturn the present despotic system of government, free the bodies as well as the minds of the natives, and give them inducements of a higher character to exertion than they ever before sustained; one which may save them from what would otherwise inevitably be their fate, a rapid diminution of numbers and a miserable remnant lengthening out their fate as "drawers of water and hewers of stone" for their paler brethren. True the change must be slow, where centuries have been at work, in forming the character of a nation; but it will be permanent, and well deserve the attention of all philanthropists.

"A thousand years scarce serve to form a state—
An hour may lay it in the dust."

The experience of those who have been the most intimately associated with his people, who have mingled with their labors, partaken of their hospitality, and by an upright and honorable course of conduct gained their confidence, confirms this opinion. What nobler cause does the world afford than this—a nation it may be debased and degraded, but both willing and striving to lift its head from the dust. A nation which might have been led as a little child till it grew to manhood, had it not too often been made the prey of designing and avaricious men. A nation which has within itself both the resources and intellect to become not only wealthy, but civilized and powerful. Look to it then, you who are placed as guides among them—you who reside in their midst and enjoy pecuniary advantages that no other country would afford—your responsibility is great; deceive them not, and if your precepts are of no avail, let your conduct be such that hereafter no "still small voice" will be heard troubling your rest.

These remarks forced themselves into my mind after having been for six weeks an eye-witness to the operations of the estates mentioned above. The fine forms and the comparatively healthy constitutions of the laborers, the cheerfulness with which they labored through the long and hot day, and

the pleasure which sparkled in their lively eyes upon receiving their daily wages, which were now literally their own, all made a deep impression upon me. Upon asking them one evening, as they were receiving their pay, "why they preferred to work for Mr. Hooper to their chiefs?" all were for some time silent, and looked inquiringly at each other. At last one held up his little card, "this," said he, "is the reason," followed by a spontaneous burst of noisy assent from the whole group. This was an unanswerable argument.

These laborers are the envy of the whole island, and whenever the chiefs allow their natives holidays, the estates are crowded with applicants for work. Their families feel still more strongly the effects of this system. Instead of compulsory labor, as was formerly the case, they now work or enjoy their active pastimes as suits their various whims.

And what has produced this change? Simply this: benevolence and philanthropy allied with habits of business, thus promoting the best interests of all. Let a number of similar estates be established, and let the missionaries persevere to give that instruction to their congregations, in health, and domestic employments, habits of industry and economy, hints in business and agriculture which they consider due towards their own families, and who will doubt the most favorable results? Not only this, but they must teach the Government their own rights as connected with the rights and laws of nations. Christianity cannot advance here except by enlightening and building up the nation.

These opinions and statements appear too strong to many, but they are the result of an honest conviction of their truth, after a careful inquiry into the nature of the government, habits and character of this people, and the means which have hitherto been used for their advancement in the arts of civilized life. Let him who doubts visit Koloa, not hastily or with preconceived opinions, and then determine whether they are *vox et preterea nihil.*

After the preceding article was written, the author received a report of a lecture on the objects and tendency of the South Sea Exploring Expedition, delivered in Boston by Capt. Joseph P. Couthoy, a member of its Scientific Corps. In referring to the Sandwich Islands, he makes this statement: "Upon one of these islands William Hooper, a citizen of Boston, has established himself, and is successfully engaged in the cultivation of sugar, equal to that made in Cuba. Mr. Hooper has erected two steam-mills, and a vessel has sailed from this port with the necessary implements to carry the proposed improvements into operation." As this statement may mislead some in regard to the magnitude of the operations mentioned, we deem

it necessary to correct the mistakes into which Capt. Couthoy has unintentionally been led. Instead of two *steam* mills, one rude wooden one is erected, the materials of which may literally be said to have been gathered from the four corners of the earth. An iron one has arrived and will shortly be in operation. Until within a few months not an agricultural implement, except of the rudest nature, was to be procured, consequently the plantation advanced but slowly. Last year no sugar was made, and at the present time the crop for this year is being ground, and it yet remains to be proved whether the sugar will equal in quality the best Cuba, though from the nature of the soil and cane there is every reason to believe it will. That which has been made this fall is perfectly clear and white, and of excellent flavor. The sugarcane grows luxuriantly in this district, as its name denotes—*Koloa*, or great cane.—*Hawaiian Spectator, Vol. 1, 1838.*

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SUGAR MANUFACTURE IN THE SANDWICH ISLANDS IN 1839—CHINESE METHOD OF MANUFACTURING SUGAR.

Mr. Editor,—While on a visit to Waimea, Kauai, a year or two since, I happened in at a sugar-mill then in operation under the management of three Chinamen; it being the first establishment of the kind I had ever seen in operation, I was induced to spend nearly an hour in noticing the mode which the Chinese adopt in producing sugar from the cane; and, with a view of amusing some of your more distant readers, I herewith send you an outline of the mill, as it then stood, and a partial description of their method of setting sugar pans.

Some ten or a dozen upright posts supported a straw roof which protected from the sun the mill, boilers, three or four jaded horses and a score of hogs, which at times seemed to claim a part of the juice which flowed from the mill. In the centre of the building a heap of earth was thrown up, in which were implanted two upright posts of rough granite, their upper ends being hewn off to something resembling a tenon; a plank extended from one post to the other, having in it two mortices to receive the tenons; also, two circular holes to receive the necks of two rollers. These rollers were of granite, about two and a half feet in diameter, and two feet high, and were morticed near the top at proper distances to receive wooden cogs, which apparently were made with no other tool than a broad ax. The bed of the mill was a granite slab imbedded in the earth, and had in it two round holes to receive the lower necks of the rollers; also, a channel extending from four to five inches round the rollers, the outlet to which (when the lump

of mud was received) allowed the juice to flow through a gutter under the horse-walk to a small tub. The necks of these rollers were all of wood, about six inches in diameter, and their bearings protected by an iron band. On one of these was secured the arm or lever to which the power was applied; this arm was merely the branch of a tree (imported with the rollers). Some pains must have been taken to select one whose natural crook should answer the purpose; it was secured to the neck of the roller by a rope; a single horse attached to its end, with a plentiful application of the lash, gave motion to the rollers. He whose business it was to feed the rollers with cane seated himself in front of them, and generally kept three or four sticks of cane between the rollers, allowing it at first to be gently squeezed, the second time more so, and on passing it between the rollers the third time it was also drawn through a stout iron funnel, which effectually took all the remaining juice.

The evaporating pans contained about twenty gallons each, and were set triangularly. The furnace was built of sun-burnt bricks, 18 inches long, 9 wide and 6 thick. These bricks (if they can be so called) are made of common earth, hens' feathers, goats' hair, hogs' bristles, and water, and laid up with the same compound; the mouth of the furnace was about two feet high by one foot wide, and directly over it was a small hole to allow the smoke to pass off. The capacity of the pans was increased two-fold by extending the brick-work two feet above the rims; this brick-work was protected from the action of the syrup (at least for a time), by being covered with mats, tapas, banana leaves, lime, brick dust, etc.

Pan No. 1 seemed to be used for a clarifier only, and was separated from the other by two boards projecting from the brick-work to a common centre. Pans 2 and 3 served for evaporators, and, when the ebulition was great, flowed into each other; this was prevented by occasionally throwing in a small quantity of an offensive, greasy preparation, the principal ingredient of which is the lees of ground-nut oil.

The syrup was concentrated in pan 3, thence removed to cooler 4. To ascertain when the syrup had arrived at the crystalizing point, a small coarse-grained stone, made for the purpose, was placed in the bottom of a saucer of cold water, on which a portion of the syrup was dropped; the boiler rubbing his thumb over it soon determined whether it was sufficiently boiled. From the cooler it was removed to conical clay pots holding about 20 lbs. each. These pots were not filled till after three successive boilings. I noticed the Chinese did not *clay* their sugar, but used rice straw well saturated with water; this was placed on top of the sugar-containers to the depth of three or four inches, the water from which passing through the sugar removed all the molasses.

This sugar was crushed and exposed to the sun before sending to market.

The mill, indeed the whole apparatus, was exceedingly rude, but it appeared to answer a good purpose. I was told that they had made 300 lbs. of sugar per day with it.

It is to be regretted that some plan could not have been devised which would have rendered it for the interest of all concerned to keep the mill in operation.—*Hawaiian Spectator, Vol. II, 1839.*

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MACERATION COMPARED WITH DIFFUSION.

The average of the crop on Mr. Dan. Thompson's Calumet Plantation for the last season will amount to 200 pounds to the ton, although the exact figures cannot yet be given, as the wagon sugars are not all tried out. Learning that this phenomenal yield was in a measure owing to the maceration of the bagasse I wrote to Mr. Wibray J. Thompson, to whose excellent management of the sugar-house the result was due, asking for information on the subject, and requesting him to make a comparison between the maceration and diffusion process. His kind response is the following able paper on the subject:

CALUMET PLANTATION, BAYOU TECHE, LA., Jan. 31, 1889.

Mr. J. B. Wilkinson Jr., Asso. Editor *Daily City Item*, N. O., La.

DEAR SIR:—Your request of the 29th inst. for data covering recent Calumet experiments in the maceration of bagasse between mills is cheerfully acceded to.

The mills with which these were performed are actuated by a single engine, cylinder 24 inches diam., by 48 inches stroke, provided with Corliss valves and the Joy adjustible expansion gear. The cut-off being ordinarily accomplished only at 24 inches, the engine is practically controlled by the wire-drawing of its governor—a custom rendered permissible by the use of its exhaust, under about four pounds average pressure, in juice concentration. An average of 43 revolutions of the engine is maintained under 95 pounds initial steam pressure. For every 100 revolutions of this the first or three-roller mill accomplishes 5.142 and the second or two-roller mill 4.210 revolutions. The principal dimensions of the two mills are given below:

	Length of rolls between collars, inches.	Diameter of rolls inches.	Diameter of Driving-shaft, inches.	Length of Journals, inches	Diameter of Journals, inches.
Three-roll mill	59.50	29.50	12	12	11
Two-roll mill	66	40	18	20	16.50

Both mill are heavily double-geared, with steel pinions and crown-wheels throughout, neither, however, being provided with hydraulic or other safety pressure regulating attachments. The two-roller mill is driven by its lower roll-shaft, and is provided with a roughening device, believed to possess much merit.

The mills are fifteen feet between centers and are connected by a horizontal rubber carrier.

The apparatus is operated upon a plan unlike that customary in the local milling of cane, in that the feed upon the carriers is maintained as uniform at all times as possible, variations in the amount of cane consumed being regulated to that received from the field, as nearly as practicable, by altering the speed of the engine, the governor to which is provided with a speeding device. The otherwise constant necessity for change in the mill's set is thus obviated, insuring a uniformity of expression and a reduction of time lost; to be better secured only, as is believed, by the hydraulic pressure-regulator. The average juice extraction of this mill for a series of years, without maceration and without allowances for trash, expressed in per cents of the canes' weight, has been:

	1885–86.	1886–87.	1887–88.	1888–89.
Extraction 5-roll mill juice in per cents of cane	76.30	73.09	74.60	72.45

That of the three-roll mill, prior to the erection of the supplementary rolls, the same engineer remaining in charge throughout:

	1881–82	1882–83	1883–84	1884–85
Extraction 3-roll mill—juice in per cent of cane	64.70	Inundated, no campaign,	69.84	65.03

This indicates an average advantage by campaigns, of 7.58 per cent juice on the canes' weight to the credit of the supplemental mill, in which no account is taken of variations in the character of the canes or the quantities of these treated per hour, both remaining in Louisiana far more constant than on more tropical estates.

The experiment in maceration covered 3,993.26 short tons of cane crushed without, and 3,388.31 tons treated with water. The water employed was cold, no sufficiently adequate reason, so far as known to us, ever having been assigned for the use of hot, especially where precaution against inversion in an immediately subsequent sulphurous acid process seemed advisable. No such inversion worthy of consideration was indicated by the glucose ratios at any time during the experiment.

The water was evenly distributed by a single, finely-perforated pipe, placed parallel to and of equal length with the rolls, under sufficient hydrostatic pressure to be delivered directly into the bite of the three-roll mill, in order that a maximum imbibition might take place during that expansion of the bagasse which occurs as this comes from its severe compression on the bagasse roll.

Chemical control of the work was maintained throughout by Mr. Hubert Edson, Chemical Division, United States Department Agriculture; Dr. C. A. Crampton, of the same Division,

and Herr L. von Tresckow, late chemist to the Wanze Central Factory, Belgium, being also present in the establishment during portions of the work.

For convenience of comparison the data of the two runs, which explain themselves, are placed in parallel columns:

	Without maceration.	With maceration.
Cane ground, tons of 2,000 lbs., no allowance for trash...	3,993.26	3,388.31
Cane ground, lbs	7,986,525	6,776,623
Sucrose in cane, 10 per cent fibre assumed, lbs	1,016,365.24	843,486.44
Juice obtained, dilute, gals	.....	675,243
Juice obtained, normal, gals	650,878	599,213
Juice obtained, dilute, lbs	.....	5,963,388
Juice obtained, normal, lbs	5,786,909	5,327,383
Sucrose in juice obtained, lbs., by analysis	818,268.93	736,478.41
Sucrose left in bagasse, lbs., by difference	198,096.31	107,008.03
Sucrose left in bagasse, per cent sucrose in cane	19.49	12.69
Sucrose obtained in juice, per cent sucrose in cane	80.51	87.31
Sucrose obtained per 1000 in cane, lbs	805.10	873.10
Gain sucrose per 1000 by maceration, lbs	.....	68.00
Sucrose lost, first period, by not macerating, lbs	69,112.84	.....
Sucrose lost, first period, ditto, per ton cane, lbs	17.31	.....
Sucrose gained, second period, by macerating, lbs	.....	57,357.08
Sucrose gained, second period, per ton cane, lbs	.....	16.93
Av'age dilution on entire volume of juice, by volumes	.....	12.69
Average dilution, ditto, by weights	.....	11.94
Mill extraction, normal juice per cent of cane	72.45	78.61
Average tons crushed per hour	14.22	14.03

The fact that by this simple expedient the mills' extraction of 100 per cent sugar would have been increased over seventeen pounds per short ton of cane had similar maceration been practiced during both periods of the experiment, requires no comment. The gain of normal juice attributable to it is seen to be 6.16 per cent on the canes' weight, against that of but 7.58 per cent, already stated as due to the erection of the powerful supplemental mill itself.

Notwithstanding these significant figures I cannot recommend an advocacy of its promiscuous adoption. The dilution, estimated daily on the whole volume of juice secured, varied from 9.46 to 15.49 per cent. This last figure approaches that of diffusion, as this season exemplified at Sugar Land and Magnolia. In incompetent or inattentive hands the most unreasonable extremes might be anticipated, with a predominating tendency always toward maxima. Even more than diffusion, if possible, should its practice, therefore, be under unremitting chemical control. Its efficiency must be directly and closely related to the excellence of the bagasse produced by the first mill, the excellence of the second mill and the distance between these two, which last, in Louisiana, is probably most often inadequate to its best performance.

It demands multiple effect evaporation, as a safeguard against inversion and as an economy of fuel, scarcely in less degree than diffusion itself. It is by no means so efficient as is the last named process, and, if my experience is a guide, reduces

notably the steaming quality of the green bagasse. In a well balanced establishment, already worked to full capacity, it demands an increase, at least in defecator, filter-press and evaporative power all but equal to the requirements of diffusion. It is a makeshift only, and as such, excellent as it is, should, in my opinion, not be permitted to delay for an hour the introduction of the better process.

Whereas, yet superior work to that here reported is now confidently expected of it during the next campaign of this factory, I must unequivocally dissent from the recently expressed opinion of Mr. Alexander, of Demerara, which holds it possible for maceration to attain economic results equal to those of the diffusion process. [See *Sugar Cane*, volume XX., No. 233, page 633, and *Louisiana Planter and Sugar Manufacturer*, volume I, No. 26, page 303]. In Louisiana at least, quite aside from the abundance of good water and the relative cheapness of fuel, it can do nothing of the sort. I trust you will pardon digression from the line of your inquiries; but this matter seems too vital to the best interests of our cherished industry to be passed lightly over at this crisis.

It has now come to be known that a mill establishment has attained average crop results in commercial sugar certainly exceeding those of two, and probably those of all three houses possessing diffusion apparatus. The moral effect of this, it is said, must operate in the direction of further delay to the rehabilitation and reorganization of the industry, upon a basis of diffusion in central factories, which appear to us so essential and seemed so near at hand. Against any such effect I desire here to enter my most earnest protest, trusting that it may be permitted me to speak the more authoritatively and, it is to be hoped, the more convincingly that the mill establishment which has accomplished this result has done it under my direction.

In the case of each among these three batteries extraction has been carried to a point quite beyond the utmost dream of mill enthusiasts. In the case of each all the difficulties incident to a first campaign with new installations had to be met, yet these in no instance attaching to the batteries themselves after the first few days of operation. Two of them handled canes greatly inferior to those of this section. Of these, one started fires too soon; the other is even yet unfinished. One of them, during a run on superior cane, secured over 12½ per cent of merchantable sugar—*over 250 pounds per ton of cane!* As to the third, that most likely of selection for disparaging comparison, the discouragements of its campaign, none of them after the first in the remotest degree traceable to diffusion, are altogether beyond the belief of any but those who, like myself, witnessed them in part. Magnolia's experience in

1888 has, in many ways, been parallel with that of Belle Alliance in 1874. Forbid it that any such after parallel exist in the misinterpretation of her results! No such victory for crushing will ever again be won. Indeed, had it not been for recourse to milling during a repair of leaking heaters, Magnolia would, beyond all peradventure, to-day hold the record, despite her every other misfortune. Ever so presumptious as it may be thought, I do not hesitate to tell you, as my most deliberate conviction, that, had her diffusion juice entered the defecators of this house, the average register of commercial sugar would not have fallen under 245 pounds per ton of cane. It might well have proved more.

Happily for the partial substantiation of the views, means are at hand for the immediate, and withal satisfactory institution of an interesting and valuable comparison between the effectiveness of diffusion and maceration, both as applied to the cane so lately treated here by the latter method.

During a two-day visit at sugar land, the exhausted chips were reported to me by its chemist, Mr. Hart, as assaying 0.4 per cent sucrose, with an average dilution of 18 per cent. At Magnolia I found the chips carrying off at the time, by Mr. Spencer's analysis, only 0.3 of a per cent, with about the same juice dilution. Both batteries were in regular, industrial practice. I conclude, therefore, that 0.4 per cent loss of sucrose in the bagasse and 20 per cent dilution are reasonable figures to assume as industrial averages under a faithful control of this process with 14 to 16 cells. At both factories it had been ascertained that the weight of exhausted chips corresponded almost exactly with that of the fresh.

In our Calumet experiments, with a complete model apparatus, it had been demonstrated to our own satisfaction at least, as explained to you under date of January 13, that in point of purity and crystalizing power the advantage resided always with diffusion, as compared with strictly corresponding mill juices. I therefore conclude, in like manner, that the yield of commercial sugar would bear essentially the same ratio to pure sucrose present in the juice, extracted by diffusion, as it would to that secured by maceration.

Lastly, whereas we are yet engaged in drying the final products from it, it is now none the less evident that the return per ton of cane for our maceration run will not greatly vary from 215 pounds commercial sugar. These accepted as premises, the following direct comparison becomes one which further experience may be expected to justify :

	Maceration. (as before.)	Diffusion.
Cane treated, tons, no allowance for trash	3,388.31	.....
Cane treated, lbs	6,776,623	.....
Sucrose in cane treated, lbs	843,486.44	.....
Extraction of sucrose, per cent of cane's content	87.31	96.68

	Maceration. (as before.)	Diffusion.
Sucrose in juice extracted, lbs	736,478.41	816,379.95
Sucrose lost in bagasse, etc., lbs	107,008.03	27,106.49
Sucrose lost in bagasse per ton cane, lbs	31.58	8.00
Gain sucrose in juice by diffussion, per ton cane, lbs		23.58
Commercial sugar obtained per ton cane, lbs	215.00	238.31
Gain commercial sugar by diffusion, per ton cane, lbs		23.31
Dilution by weight, per cent	11.93	20.00
Excess of dilution chargeable to diffusion		8.06

From this comparison it is evident that maceration emerges with less than a-half victory. After making a neat gain of 17 pounds per ton of cane over mere double crushing, it yields in turn by some 23 pounds to its more potent rival.

Were this diffusion's sole claim on our most favorable consideration it would yet appear sufficient. But when it adds thereto inimitable simplicity and durability, and a reliability which is unquestioned—a freedom from breakdown and consequent ruinous delay, such as is all but absolute; when it promises a simplified and perfected depuration, and along with this a rational mechanical filtration; when it assures riddance to scum-tank and filter-press nuisances; and when, most certain and most important of all, it opens an easy avenue to the realization of the central factory—surely it has the inalienable right to expect of our proverbial ingenuity a speedy and a satisfactory solution of its only serious remaining problem—the rational disposition of its exhausted chips. If it required a generation and more to solve this same for our mill bagasse, we need feel no discouragement because for diffusion this has remained a stumbling block through a single year.

It needs scarcely be added after this that, should its present far-seeing and indefatigable proprietor live otherwise to prepare the factory for the reception of such, and inimical national legislation opposes in the interim no undue obstacle, Calumet will not, by any means, be the last equipped with diffusion plant, however that for the fourth time it may now have broken all existing records with its mill.

I believe you will quite agree with me that any discussion in this place of the fuel problem, which so intimately connects itself with the foregoing, would be adventitious. While, at best, juice is concentrated to syrup only in double-effect, and sugar continues in our most advanced practice to be irrationally boiled in single; while at Wonopringo and elsewhere abroad diffusion chips continue to be burned with marked economic success; and, finally, while sugar here remains at five cents a pound and coal at five dollars a ton upon the grates, it would appear in poor taste and worse judgment to lay that disingenuous stress upon this, which attaches always, as a last resort, to the last forlorn hope of every factious opposition.—*From "Diffusion Process."*

Yours very truly, WIBRAY J. THOMPSON.

REPORT OF EXPERIMENTS ON CANE AND BEET SUGAR

BY DR. T. L. PHIPSON, F.C.S., ETC.

The object of this investigation was to determine by means of accurate experiments what difference existed between pure cane sugar and pure beet sugar.

Of late years it has been several times asserted that there exists a very notable difference between these two products, so much so, that the first has been termed *Saccharose* and the second *Betose*. We have also heard it stated on various occasions that beet sugar is not so profitable for making jams and preserves as cane sugar is, nor that it can be used as advantageously as the latter in various other circumstances. It came to be suspected, therefore, that cane sugar and beet sugar were really *isomeric* but not identical; that is, have the same composition, but somewhat different properties, as we know to be the case with many other substances belonging to the group of sugars.

I pointed out some time ago how this question might be solved experimentally, but for that purpose it was necessary to have perfectly pure refined cane sugar, and equally pure beet sugar, *the origin of each of which could be guaranteed.* This was no easy matter, because it is customary to mix these sugars in refining, and it was some time before I could become possessed of samples of perfectly authentic origin, the one being pure cane, and the other pure beet sugar. Thanks to the very kind exertions of the editor of the *Sugar Cane*, I have been able to make my experiments upon specimens which fulfilled the conditions alluded to. The first consisted of pure crystals of refined cane sugar from the West Indies, and the other absolutely pure crystals of Austrian beet sugar.

Both these samples were in white, translucent crystals, of the *same form* (oblique prisms), and bearing the *same modifications* on the edges and angles. The crystals were in each case identical, except that those of the cane sugar were much larger. In all the experiments made the *same weight* of each sugar was taken, in every instance. They were both devoid of odor, and when placed dry upon the tongue the cane was the sweeter of the two, though when *equal weights* were dissolved in the *same quantity of water*, the sweetness was found to be absolutely identical.

Each of these specimens was found on analysis to give the composition:

	Cane.	Beet.
$C^{12}H^{10}O^{10}$	99.76	99.88

They were, therefore, extremely pure.

Equal weights of each were dissolved in equal quantities of

water, and the *specific gravity* of the solutions, taken with the greatest care, gave absolutely identical results.

To test the viscosity and action of gravitation upon the two samples, equal weights were dissolved in equal quantities of water, and the solutions introduced into a large glass tube with an elongated bulb, containing exactly 1000 grain measures, and in communication with the instrument known as a *metronometer*. The liquid was allowed to run from the minute orifice of the tube, and the beats of the metronometer counted. In each case the 1000 grain measures of solution were delivered in exactly the same number of beats of the instrument, that is, in absolutely the same interval of time.

These *physical* results proving identical in each case, it became necessary to determine whether any difference would be discovered in the action of various *chemical* agents on the two specimens of sugar under examination.

For this purpose a very considerable number of experiments were made, which it would be far too long to notice here in detail, many of them having been repeated several times; but the results may be given in very few words.

In the first place, equal weights of each sugar were dissolved in the same quantities of water, and the solutions allowed to remain in the cold for three days after the addition of minute quantities of some *mineral acid*. The inversion was found to be perfectly alike in both cases.

Several other similar experiments were made, with identical results in each case, and finally I proceeded to the crucial test which I proposed some time ago, and which was likely to prove whether these sugars were unequally acted upon by the *organic acids* generally present in jams and preserves.

For this purpose the same weight of each sugar dissolved in the same quantity of water was acidified with a minute quantity of a solution containing equal parts of citric and tartaric acids. The two test tubes of equal sizes, holding the solutions, were placed in a water-bath, at a temperature of 99 deg. Centigrade, for the space of twenty minutes. The two solutions were then immediately analysed by means of Fehling's copper reagent as usual, and the *same amount of inversion* was found to have occurred in each case.

It remains only to conclude from the results of these experiments, that physically and chemically the two specimens of sugar were absolutely identical; and that when chemically pure, or nearly so, there is certainly no difference whatever between cane sugar and beet sugar.

How then are we to account for the preference universally given to cane sugar for the making of preserves, etc.? It can be explained in the following manner:

If the impurities got rid of by refining were absolutely re-

moved *in toto*, as in the case of the two specimens which have formed the subjects of my experiments, there would be no preference to be given to either. But in case of a partial purification only, *which is the general condition*, the impurities left behind in beet sugar are more noxious than those left behind in cane sugar; and as chemically pure sugar is never met with in practice, it is natural that those most interested in this subject should have determined to use cane sugar in preference to beet sugar in all circumstances.—*Sugar Cane.*

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HOW TO MAKE AN ORANGE GROVE AND PAY EXPENSES AT THE SAME TIME.

This is the great question that has been asked and answered many times and in many ways, while I do not pretend to have found a new answer to the query, yet I am going to present that plan which I think will most satisfactorily answer the question to the greatest number.

Most that I have seen written on the subject is as to what *can* be done, and while the possibilities of Florida are great and many of them undiscovered, yet an answer as to what *has* been done is what most satisfies the practical man.

Just beyond the corporate limits of Orlando is a small vegetable farm; at the usual distance the owner set small orange trees, some of which were budded at the setting, the others have been budded since. He has been cultivating vegetables among them for two years, and of course while the vegetables are receiving a liberal manuring and cultivation, the orange trees are getting their full share of both. Some of them have commenced bearing—not enough to ship, but enough this year to supply his large family, perhaps, with what they can eat.

On the farm the owner also has a dairy of ten or twelve cows, of Guineas and graded Jerseys. They are doing very well, especially the Guineas are doing almost too well, as they are getting so fat that they don't give as much milk as they would if a little leaner. They run in the woods, eat wild grass, coming home at noon for a rest and a bite, and at night every one goes into her stall to a tubful of cooked vegetables and bran, or meal mash. Sometimes it is given raw, and seems to do nearly as well as when cooked. Of course the milk is rich and sweet, and the manure abundant and valuable.

Now let us look at the expenses and profits. I wish I could give the cost and value of each item, but will give the items, which is sufficient for a practical business man to figure from. We will commence our summing up after the land is bought and some of it cleared, the trees set out and the cows on hand. The items of expense then are: Some commercial fertilizers to give the seeds a start (until the cows come to the rescue); a

horse to work the farm and draw the market and milk wagon; feed for the horse; the hire of a man to help the owner and his little boys to work the farm and milk and feed the cows; the ground feed to cook with the vegetables for the cows; and, of course, the usual farming tools.

The items of profit are: An abundance of vegetables for the family the year round; the income from vegetables shipped and from those sold in home market. The trees that are now bearing were set three or four years ago, and are getting large enough to preclude the planting of vegetables among them. —*Cor. in Florida Dispatch.*

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SUGAR AND COFFEE PLANTING IN JAVA.

(From the L. and C. *Express*, Jan. 4th.)

AMSTERDAM, Jan. 2.

According to the annual report of the Colonial Bank for 1887-88, the bank continued its relations with thirty-six agricultural undertakings and granted working capital to twenty-six of them. Of five undertakings the production was received without giving advances. To five undertakings working capital was granted for account of others, and shipments were affected by the bank's agents. To the first sort of undertaking belong nine for sugar, ten for coffee, two for cinchona and coffee, two for indigo and two for wood cutting; to the second sort belong two sugar manufactories, one coffee land and two indigo undertakings; and to the third sort one coffee land and four indigo undertakings. With eight of the nine sugar manufactories the bank was already in relation in former years. and of the ninth the production was received in the course of this year. The bank has two-fifth share in a sugar manufactory, which appeared in the books for fl.200,000, but this amount has been reduced later on by fl.162,548. The result of this undertaking during 1887 was very favorable, 104 piculs of sugar being harvested per bouw at a cost price of fl.690½ per picul. Considering the quantity of the crops of the eight sugar manufactories, the average cost price was fl.6.77 per picul of sugar, or fl.7.42¼ for No. 14. The average sale price was fl.8.08¼ per picul, or fl.8.74 for No. 14, for showing a profit of fl.1.31½, making on 311,447 piculs sugar (being the production of eight undertakings) fl.409,502. The interest on the capital debt is not included in this calculation. In consequence of the sereh disease the crops of three of the undertakings were much smaller. Effective measures are practised, and the directors trust that the consequences of the disease may be limited in this way, that the result of these manufactories may still be remunerative. The coffee estates produced 5,014 piculs washed

coffee, and 8,935 piculs in parchment. On two estates there are 186,000 cinchona trees. Disease of the leaves only appeared to a small extent. The profit on interest, commission and doubtful debtors is fl.603,410, less expenditure fl.194,505, and writing off on one sugar undertaking fl.162,548, balance fl.246,356.

This amount, the directors observe, could be carried to the account for writing off, but this has not been done, as the directors will not allow that the debt is increased by those undertakings which are already under heavy financial burdens, and of which the debt would reach in the books the amount of fl.329,477, being fl.251,167 for sugar and fl.78,310 for coffee. The directors, therefore, have taken fl.83,120 from the account for writing off, by which the total amount written off on agricultural undertakings is fl.492,026. The balance of the profit and loss account of the head agency is fl.191,755.

Java securities have all shown a considerable improvement in prices. During the past year some of them, as the Trading Company Handels Vereen Amsterdam, paid large dividends, and others did the same, though on a more moderate scale. All of them seem to have favorable prospects, and especially those with which coffee cultivation is the chief business. Several newly established companies made an appeal on the Money Market which they found there on behalf of undertakings for coffee and cinchona cultivation.

In tobacco shares the year was less advantageous. Excited by the favorable results obtained in Deli, numbers of new concessions were asked in Siak and Borneo, so that there were many companies established, some of which, in the former place, were obliged afterwards to stop the cultivation, causing thus a great loss to the eager shareholders.

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CLEANING STEAM ENGINE BOILERS.

The following extract from "Chemical Engineering," in the *Chemical Trade Journal* will be interesting and useful:

Before I leave the subject of steam raising, it may be as well to insist on the necessity for cleanliness inside the boiler. The loss of heat taking place in some works through scale in boilers is simply incredible. I have only just finished the analysis of a boiler scale sent me for examination, which measured no less than three and one-eighth inches in thickness, and which doubtless could have been prevented by proper means.

The subject is simple enough: water contains carbonate and sulphate of lime, and very often salts of magnesia. The sulphate is held in simple solution, but the carbonate owes its solubility to an excess of carbonic acid present in the water.

Upon heating this acid gas is expelled, and down falls the carbonate of lime. If this be done quickly the carbonate falls as a sludge to the bottom of the boiler, while if it is deposited slowly a scale is produced and is bound together by the sulphate of lime which falls simultaneously. There are many nostrums in the market for preventing and removing scale, but only two substances need be employed. The cheaper is caustic soda, pumped in with the feed water: the other, tribasic phosphate of soda, which is especially useful where the degree of "permanent hardness" is excessive. Many manufacturers have told me that they have tried caustic soda and not found it effective, but on careful inquiry, I have always found that far too little was employed. If we suppose a boiler consuming 40 tons of fuel per week with an evaporation of 7-5 lb. of water (of 15 deg. "total hardness," of which 7 deg. are "permanent") per lb. of fuel, we can readily find how much caustic soda is required. The quantity of water per week for one boiler would be 300 tons or 67,000 gallons, which at 8 deg. of "temporary hardness" per gallon, would mean at least 76 lbs. of 60 per cent caustic soda per week to simply absorb the carbonic acid holding the carbonate of lime in solution, thus enabling it to drop quickly.

The caustic soda thus introduced becomes converted into carbonate, which acts further upon the sulphate of lime, converting it into carbonate and becoming itself transformed into sulphate of soda. It will thus be seen that something more than the mere addition of anti-incrusting agents is necessary. The sulphate of soda formed by the decomposition of the carbonate remains in solution, and where soda crystals have been used without frequent blowing down, I have found as much as 500 grains per gallon of soluble matter in the boiler water. Then again, there is the carbonate of lime sludge which must be systematically removed, as in the case already cited, the wet sludge will amount to at least two cwt. per week.

Some have objected to the employment of caustic soda owing to the action it has upon brass fittings; but this has arisen when a large quantity of caustic soda has been put into a boiler newly cleaned, and allowed to lay say for three weeks or a month. Of course, during the early stages of the new running, the water is excessively alkaline, and the tendency to froth and prime, and even to attack brass work is very great. The only sensible way is to mix it with the feed water in due proportion whereby the caustic becomes carbonated at once; but it is a question whether the steam boiler should be made the receptacle for all the dirt and filth from the water; I think not, for I am strongly of opinion that it would pay much better to effect the purification of the feed water before it entered the boiler.

HON. ALEX. YOUNG'S ACCOUNT OF WAIAKEA PLANTATION, HILO.

TWO HUNDRED AND EIGHTY POUNDS SUGAR FROM TWO THOUSAND POUNDS OF CANE.

(From *Louisiana Planter*, March 30.)

Editor Louisiana Planter:—In your issue of March 2d, I notice some very interesting statistics regarding the season's work at Calumet, which leads me to compare the work done there with double crushing and maceration in our best equipped factories in the Hawaiian Islands at the present day.

At Waiakea, Hilo, Hawaii, with maceration to such an extent that the juice from supplemental mill stands one-fourth to one-third the density of that of the first mill, we have no difficulty in obtaining an extraction of 80 per cent of the weight of the cane. And we can easily average one ton (2,000 pounds) commercial sugar from seven tons (14,000 pounds of cane—no allowance being made for leaves (trash). And this too, without the use of wood or coal as fuel—the bagasse alone being sufficient.

Over 70 per cent of the above sugar sells at a purity of from 98.5 to 99 per cent.

The object I have in view in writing is—first, to show that the results at Calumet do not show the "highest yield from tropical cane that is done in any factory in the world," and, secondly, to spur Mr. Thompson, who is evidently an intelligent and progressive gentleman, and others engaged in the same industry, on to a still more profitable state of things. And in order to accomplish my purpose I will trace briefly the main features of the mode of working at the Waiakea factory.

The cane is brought to the mill on cars, holding on an average enough to make 500 gallons of juice. These cars are drawn in a continuous train alongside the cane carrier, as required, by a gypsyhead on the end of the upper roller-shaft; the same man who takes the weights attends to this. The bottoms of the cars are on a level with the cane carrier, and when one side of the car is removed the cane is hauled off by three men with rakes, and distributed evenly on said carrier in suitable quantities for feed of rollers. Two men attend to the feeding and a boy to the juice strainer. Great care is taken to obtain the best possible crushing in the first mill. The rollers of first as well as of second mill are 30x60 inches, fitted with steel shafts and pinions. An 18x42 inch high pressure engine is used for first mill, and a 16x24 inch engine for second mill. Just as the bagasse is leaving the three-roller mill a constant shower of hot water, drawn partly from the heating drum of the second cell of the double effect, is thrown upon it in such quantities that it is well drenched.

The bagasse from the three-roller mill, thus soaked with hot water, slides from the elevator into the automatic feeder of the two-roller bagasse mill, by which it is fed positively and uniformly into the mill, and pressed very dry, the feeder preventing a rejection of the feed, no matter how great the pressure may be on the rollers thus insuring a better extraction and much dryer fuel. From this mill the bagasse shoots into tipping cars, is weighed and taken direct to the furnaces, where, being so dry, it burns very freely.

The juice from both mills flows in one channel into the clarifiers, where it is at once heated to a proper temperature and limed, and brought up to a boil for a few moments. After settling a little in the clarifiers it is drawn off through float pipes into the subsiding tanks, and the dirty froth and muddy settlings washed out quickly into the receptacle for the filter-presses.

The juice, after standing for, say fifteen minutes in the subsiders is drawn off through float pipes, as required by the vacuum cleaning pan, which is connected to all the subsiders by pipes having controlling cocks, so that any one of the subsiders may be drawn from as required.

Having gotten rid of the heavy impurities in the subsiders the lighter dirt is now thrown off in the vacuum cleaning pan, which is usually worked at a vacuum of fifteen inches. At this vacuum the temperature is such that the juice taken from the subsiders is almost hot enough in itself to boil, and the additional heat needed to do the work of cleaning is supplied through the copper pipe coil in bottom, and steam cone in center of pan, exhaust steam only being used.

The cleaned juice is constantly pumped off into supply tank for double effect, and the muddy skimmings by a separate pump into the receiving tank for mud presses.

The double effect and vacuum pan are worked in the usual manner, graining first and second sugar in the pan. The only difference being that superheated exhaust steam only is used in both double effect and vacuum pan, except when there is no exhaust steam, which is seldom.

The wagon sugar is the third grade, and the molasses from that is boiled and run into large stone tanks, where it is allowed to stand six or eight months, and centrifugaled previous to starting on next season's crop. Sometimes the sugar thus obtained is worked back with the third sugar, so that there may be only three grades.

The washings and bottoms of all tanks go to the mud presses, so that nothing may be wasted. The mud cakes, furnace ashes and fourth molasses, with other refuse, are mixed together and used as a fertilizer, than which for that purpose we have found nothing better.

Following the fuel now, we have the bagasse dumped in front

of the furnaces, where there is room to hold enough fuel for half a day's run. The feeding of the furnaces is done by hand through a double furnace mouth, which is always kept so banked up with bagasse that cold air is not allowed to enter. There are only two furnaces, and it takes one man to each. The grate bars are of the step-ladder style, and answer well for the fine bagasse, there being no waste of fuel through the grates. Hot air pipes inserted in the bridges are used with excellent results.

There are one pair of tandem boilers, consisting of one tubular 15 feet 6 inches and one Galloway 19 feet 6 inches, both 6 feet diameter, connected by a steam drum on top and water pipes below; and a combination boiler similar in its working but in one piece 25 by 7 feet, Galloway tubes and flue in one end and tubular at the other.

Where the gases of combustion leave the boilers their temperature is about 600 degrees. And in order to utilize as much of that waste heat as possible we have placed at the end of the boilers two superheaters—not to superheat live steam, but to superheat the collected exhaust steam from every source throughout the works. Said exhaust steam is conducted through a main pipe into superheaters at a temperature of 215 degrees to 220 degrees, and there being a difference of 385 degrees temperature between the steam to be heated and the gases escaping toward the chimney, the transmission of heat to the exhaust steam is very considerable, for the superheated steam with no increase of pressure often reaches 450 degrees temperature and is never less than 375 degrees. As will be noticed, this is now gaseous steam, and temperature and pressure bear no relation to each other, and therefore the vapor from any of the cells of a multiple effect may be superheated to a temperature far beyond that of live steam without increasing the pressure or changing the vacuum in pans, and then used in the heating drums of following cell or cells as shown in specifications of patent. In the present mode of working at Waiakea the superheated exhaust steam runs the vacuum cleaner, double effect, vacuum pans, and does most of the heating in clarifiers, but as soon as one more cell has been added to the "effect" the vapor from the first cell will also be taken through a portion of superheaters, on which the waste gases act later, and returned to the heating drum of second cell under a vacuum of 8 inches say, and with a temperature equal to that of live steam. There will then be left in the gases enough of heat to produce a good draft with a chimney 100 feet high. If, however, it is desired to carry the utilizing of heat further, forced combustion may be adopted and high chimney dispensed with.

In arranging new works of any magnitude I would prefer having a multiple effect of five pans, arranged two and two,

set opposite each other in pairs, and one—the first pan—at one end and so connected that the superheated exhaust steam would operate it, and the vapor from it, rising from the boiling juice, passed through section of superheaters and returned to first cells of each of the two pairs of pans, vacuum in first cell of the five being about 8 inches. In this way of working the most extensive maceration or diffusion of sugar cane may be carried out comfortably without any fuel other than that furnished by the bagasse or chips.

As arranged at present at Waiakea a dilution of over 40 per cent may be made by maceration in the whole juice, and all the work done on the bagasse alone as fuel.

The crop runs from 3,500 to 4,000 short tons, and the daily output of sugar 20 to 25 short tons in eleven hours, crushing 10 hours, and the usual number of hands employed about thirty.

When the above factory was started and for several years after it took over ten tons of cane and half a ton of coal to make a ton of sugar: but after doing away with all open pans and introducing double crushing and maceration, with automatic feeder on bagasse mill, automatic vacuum cleaning pan, multiple effect, superheating exhaust steam and vapor by the waste heat of the spent gases of combustion on their way to the chimney, improved bagasse furnaces, filter-presses for skimmings and settlings, etc., the present state of perfection has been reached. It should also be mentioned that the quotient of purity of first grade of sugar has been raised by the introduction of those improvements, one and a-half degrees, and that of the lower grades two and a-half degrees. The quantity of waste molasses has also been very much reduced, there being much less inversion by the present mode of working.

Honolulu, H. I., March 12, 1889. ALEX. YOUNG.

THE FORMATION OF PETROLEUM.

The theory is held by Professor Mendeleef that petroleum is produced by water, which penetrates the earth's crust, and comes in contact with glowing carbides of metals, especially those of iron. The water is decomposed into constituent gases, the oxygen uniting with the iron, while the hydrogen takes up the carbon, and ascends to a higher region, where part of it is condensed into mineral oil, and part remains as natural gas, to escape wherever and whenever it can find an outlet. If this assumption is correct, and a sufficient store of metallic carbides is contained in the earth's interior, petroleum may continue to be formed almost indefinitely and yield a supply of fuel long after coal has become exhausted. Professor Mendeleef supports his views by producing artificial petroleum in a manner similar to that by which he believes the natural product is made.—*Indian Engineer, Jan. 2.*

SELLING FRUIT IN THE GROVE.

The orange industry in Florida is rapidly becoming one of the largest fruit interests in the country. The estimated yield of oranges for the current season is 2,500,000 boxes. Unless some unforseen accident occurs, such as the severe freeze of 1886, the actual yield that will be marketed will exceed the above amount.

With the exception of a few large groves, the main yield of fruit will be from groves of twenty acres or less. Probably ten acres would be the average size of groves owned by our orange growers in the State of Florida.

The question has often arisen to these owners of small groves: "How shall we dispose of our fruit at a profit, or how secure a price for our oranges proportionate to what they are worth?"

If in the past there have been difficulties in solving this question, this season presents many more obstacles to a successful marketing of the fruit. Some of the causes for these troubles are remediable, being as they are faults of the orange raisers themselves.

Thus fruit is picked and shipped when it is only half ripe, put in boxes made of unseasoned wood, imperfectly packed in various ways, not graded in size or quality, shipped in November and is thus brought into competition with the inferior fruit from Louisiana; and in shipments to eastern cities such as Baltimore, Philadelphia, New York and Boston, is shipped by ocean, for the whole or part of the way, arriving, as the commission men graphically say, "cooked."

But there are difficulties for which the producer and shipper is not responsible, and for which, up to this time, he has not found any remedy; for example, inconveniences of transportation, delay of the transportation companies in forwarding less than carload lots, the excessive discrimination in freight charges against less than carload lots, the rude manner and exposure to the weather, rain and cold, to which small consignments are treated, the unreliability of some of the alleged commission fruit dealers, and the "scalping" by various devices, of which not a few of our people have been the victims.

I have studied much and long over this problem. I do not know that I am now any nearer a solution than when I first commenced to think on this subject, but some things have been suggested which seem to be worth indicating to others.

And first of all, the remedy or remedies must commence with the producers themselves. They mu t determine to offer for sale only thoroughly ripe fruit, carefully gathered, scrupulously graded in size and quality, and neatly packed in suitable boxes

which shall be made of well seasoned wood, and so branded that consignee and commissioner can know the history of the fruit they buy.

As to transportation: this is a problem that cannot be solved in a few days nor a year, but we shall come to its solution bye and bye.

The trouble commences at our own doors. The people of Florida have handicapped themselves and their industries by bestowing franchises upon corporations with the power to make and enforce excessive arbitrary tariffs, so that whatever these corporations may choose to charge, is what is binding and compulsory on the shippers to pay. There is one hope in this regard, and that is in the fact that whatever powers a legislature has given, a legislature can also amend, modify and even revoke, and if worse comes to worst this must be done. The natural effects of competition will also do much, but the most of us have not the time nor the capital to await a slow evolution of better things; we must act quickly and advisedly. At present, as I have said, a strong discrimination is made in favor of carload lots. It is possible for shippers of small quantities of fruit to combine in their several neighborhoods and make up of their several lots a sufficient number of boxes to fill a car, consign to the same consignee, and thus take advantage of the cheaper rate of freight. In some cases this would amount to as much as twenty-five cents per box. Again quicker time to market is made by carload lots than by small shipments. For example, a small shipment of several boxes has just been received at Louisville, after being *sixteen* days on the road. Carload lots come through in four or five days. The consignee in the above case wrote the consignor that if he could not find a more expeditious line to ship by, he had better sell his fruit at the grove, which is on the St. Johns river, within twenty-five miles of Jacksonville. My own belief is, that we ought, for economy's sake and as a good business move, to endeavor to sell our fruit on the grove, or f. o. b. for a special cash price. Under our present arrangements, we, the producers and shippers take all the risks, bear all the expenses and receive, after these are deducted, whatever may be left, provided the commission merchant is solvent.

The experiment of bringing the fruit dealers to us is worth trying, in other words the experiment of selling our fruit at our local market. * * * * *

To make this local market scheme effective, I would have an incorporated inspection, whose inspection and packing of fruit should be rigid in the grading of all fruit in size and quality, and whose stamp on a box should be such a guarantee of the contents of each package that fruit dealers could know and be assured of exactly what they were buying.

But this would cost money! Yes? Would such a scheme cost more than the present system of individuality in packing, selling and shipping costs? By this arrangement all fruit would be shipped in carload lots, thus making a saving on freight of fifteen to twenty-five cents per box, time of transportation would be less; fruit would remain in car until removed by consignee, thus saving loss by rude handling. The owner of the fruit would get cash at the warehouse for his fruit the day it was sold; he assumes no risks whatever; he gets whatever his fruit is worth; his expenses are reduced to a minimum and to a precise amount; he gets no letters so harrowing to the mind, which inform him that his "fruit arrived in bad order! Please remit for excess of freight over sales!" By this method, when once established, the shipper of twenty-five boxes is placed on the same equality of advantage with the shipper of as many carloads. Under the present arrangement, I think the shipper of a small number of boxes of oranges bears a very heavy expense. From the time the fruit is laid on the platform of the station until it is sold, the hand of every man—and they are many—that touches his fruit exacts a toll.

I can conceive no heavier expense than we are now subjected to, unless it would be a system where the producer of oranges would pay for the privilege of raising and delivering fruit to the consignee, and subsist by "living on the interest of his debts!"

What would such an inspection system cost? I do not know. Like all new things it must be put on trial before any exact statement can be made thereon. When I was induced to buy land in Florida and set out a grove, which action I have never regretted and do not now regret, I was told and believed that oranges would never sell for less than one dollar per hundred at the grove on the trees. I would to-day like to get seventy-five cents a hundred. The most of us will not net even that sum. The expense attending an inspection system of packing and a local market I believe would be much less than we incur at present, and would be offset by the added gain of exactness in expenses, and the avoidance of all risks of transportation.—*Corr. Florida Agriculturist.*

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THE OVERPRODUCTION HERESY.

It is the nature of humanity to grumble, and the orange-growers of Florida are no exception to the general rule, and undoubtedly do their full share of it. If it is not about one thing it is about another, and so the sad refrain is kept up from the time the trees blossom to the time the golden fruit is

gathered. But, as a rule, the grand chorus of grumbling, groaning, etc., commences when the returns for fruit shipped come in. If these returns are not entirely satisfactory the shippers cast about them for the cause of it. Transportation companies, commission men, etc., are not forgotten, and come in for the full quota of abuse; but the chief reason to which the growers attribute unsatisfactory results is over-production. This is their constant nightmare, and they naturally think that if, on account of over-production, the business is unprofitable at present, its future outlook is gloomy indeed. Perhaps few of our orange-growers express their thoughts in words, but nevertheless over-production is something they constantly dread.

As a fact, however, they need have no fear on this point. The three orange-growing States of the Union—Florida, Louisiana and California—do not produce by any means all of the oranges consumed in this country; nor will they be able to produce more than the country demands when all their available land is taxed to its utmost capacity. Before this stage of development shall have reached, however, a larger demand will be established by reason of the natural increase in population and the diversification of the market. At present, unfortunately, Florida oranges are scarcely outside of the great cities of the East and West, which naturally become glutted, and not so much with Florida fruit alone, but with a combination of Florida and imported fruit.

There are many cities throughout the country of from 20,000 to 40,000 inhabitants which have never enjoyed the pleasure of a Florida orange. In the course of time, when our producers by sad experience have learned the folly of crowding their fruit into a few cities, these smaller places will become profitable markets for our fruit. Of course it cannot be accomplished in a single season. A demand must be established and a desire for the fruit cultivated. Where this is done over-production will be impossible.

There are numerous reasons why it is a bad plan to concentrate all of our fruit in the large cities of the East. First and foremost among these reasons is the fact that large quantities of foreign oranges are constantly being received in these places, and with which our fruit comes in competition. The average orange-grower, perhaps, has no idea of the magnitude of the foreign fruit business in the Eastern cities. Let us glance at a few statistics furnished by the foreign Fruit Exchange of New York City. . . . The reader must bear in mind that this is a thoroughly organized business, conducted on the strictest business principles, and that these imported oranges establish the price for our superior fruit. The amount

of foreign oranges and lemons received in the cities mentioned below for the week ending January 19th was as follows:

	Boxes.
NEW YORK.	
Oranges	31,897
Lemons	25,987
BOSTON.	
Oranges	529
PHILADELPHIA.	
Oranges	6,702
Lemons	4,000
NEW ORLEANS.	
Oranges	9,500
Lemons	17,700
Total oranges	48,628
Total lemons	47,687

Thus it will be seen that 48,628 boxes of oranges and 47,687 boxes of lemons were received in these ports during one week. During the next two weeks there will arrive in the ports of New York, Boston, Philadelphia, New Orleans and Baltimore 167,039 boxes of oranges, which, added to the number already received this month, will make a grand total for the month of January of 255,668 boxes. No wonder the markets in these cities are glutted. Consider the matter, and make up your mind that it will pay you to establish markets for your fruit in places where the competition will be less, and where the returns will consequently be more satisfactory.—*Florida Agriculturist.*

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"LONDON PURPLE" AS A CURE FOR GREEN BUG ON COFFEE.

"London Purple" is by no means a new remedy. It has an established reputation among horticulturists in England and the United States extending over a good many years; but we are not aware if it has ever been tried in Ceylon in connection with any of the pests which infest our plantations? If any experiment has been made either in connection with coffee grub, leaf fungus (though it is scarcely applicable, being an insecticide), or its dire successor "green bug," we should be much obliged by learning under what circumstances the application was made and the results, if any were observed. If there has been no experiment, and if such an authority as the Director of the Royal Botanic Gardens thinks well of the experiment, we believe there are several proprietors of "good coffee" both in and out of Uva who are prepared to expend money in the attempt to fight and drive away "green bug" by application of the strong arsenical poison known as "London Purple." The United States have hitherto been the great field

where this remedy has been tried, and it cannot be said that over the vast territory between the Atlantic and Pacific Oceans, agriculturists of every degree have not had their difficulties with terrible enemies, both insect and fungoid, to as great an extent as the farmers and vine-growers of Europe. By special request in 1884, we carried from Ceylon to Professor Harkness, of the Academy of Sciences, California, a specimen of our then great coffee foe, *Hemileia vastatrix*, in which the worthy scientist expressed the greatest interest; but he showed us how our experience in Ceylon had been paralleled even in extra-tropical and comparatively dry America. The Professor produced a specimen of the "black rot fungus" which had literally killed whole orchards of cherry trees over some half-a-dozen of the Eastern States of the Republic, so that not a single fruit-bearing cherry tree survived over hundreds of square miles. We mention this simply to show that the Americans have had experience of fungoid, as well as of every variety of insect pests, in the Colorada beetle, canker worm, codlin moth, pear slug, etc. Under such circumstances there is some reason for giving attention to a remedy which comes recommended so strongly by American planters and agriculturists of all degrees, chemists and professors. The manufacturers (Hermingway's, 60 Mark Lane, London) recommend their preparations as follows:

"London Purple."—This powerful arsenical poison received the highest award at the Atalanta and New Orleans Exhibitions as an insecticide for the destruction of the cotton worm, Colorado beetle, canker worm, peach borer, ants, beetles, grubs, flies and all similar pests. A single application of it in the proportion of 1 lb. to the acre destroys all insect life without injuring the plant. It is strongly recommended by the United States Government, by all the State Agricultural Colleges, and also by the Indian Government, as being superior to all other preparations. The price is 4½d. per lb. in boxes of 1 lb. each (100 boxes in a case—case free); or 3d. per lb. in bulk (400 lbs. in cask). Among the products and their specific enemies for which "London Purple"—"the planters' friend"—has been used with effect are: Cotton for cotton worms, on potato beetles, and several species of leaf-eating larvæ, apple worms, and orchard slugs generally. To show its application on a large scale on a plantation, we quote one of several testimonies to the same effect:

"A large planter, highly respected in his neighborhood, writes us from Louisiana under date February 2d, 1888: 'Last year my agent concluded to try London Purple in the same manner that the planters in Louisiana were using Paris Green. He made bags about 3 x 18 inches long (of 8 oz. Osnaburgh)

attached one to each end of a common stick 6 feet long. He put a man on a mule, and had this stick carried across the pommel of the saddle in front of him—a bag over each cotton row—the motion of the mule caused sufficient poison to escape to destroy every worm on the cotton stalk. No rain fell for several weeks after, and there was therefore no need of any further application of the London Purple. When frost fell this cotton was growing and making, while that near by was divested of every leaf. The poison was applied to about fifty acres of cotton. The yield on this fifty acres was more than double that where no poison had been used. I had six hundred acres in cotton, and estimate my loss by not applying the Purple to the entire crop at eight thousand dollars."

We think, therefore, that unless it can be shown London Purple has been already tried in Ceylon and proved a failure, there is a good *prima facie* case made out for giving it a fair trial on coffee in reference to the destruction or even mitigation of "green bug."—*Ceylon Tropical Agriculturist.*

THE SAME OLD PREDICTION.

We now and then hear the same old prediction that if this continued planting of fruit trees is kept up the business will be overdone, and there can be found no help to harvest, nor customers to buy the product. J. H. Kelly, of this place, told us that before the railroad came he was one of a few orchardists of this country; that he offered his crop of beautiful dried fruit for sale without a buyer; that he soaked it up and fed it to his swine. California is gaining population very fast. Santa Clara county now ships more cherries to Los Angeles and places in Southern California every year than were raised in the entire county six years ago. San Francisco consumes double the amount of fruit it did five years ago. The northern counties, the lumber regions, the mines, the plains, the ships are all demanding more and more fruit all the time. As may be seen in another place, five years ago one single house controlled the fruit trade with the East. Now a score or more of California firms find business, besides a long list of commission houses in all the Eastern cities.

Santa Clara county alone sent 56,000,000 pounds of fruit directly to the East during the year 1888, besides the immense amount that went first to San Francisco, and thence up and down the coast, or east from that place.

Our men who go East return and tell us that there are places of from 5,000 to 15,000 and 20,000 people who never saw a California prune or apricot. With proper introduction, such places would use from one to six carloads every year.—*Santa Clara Valley.*

A SUNSHINE REGISTER.

Among the newly acquired meteorological instruments in use at the Botanic Gardens this year is a sunshine recorder. This is a very beautiful and interesting instrument, which by means of a solid glass ball, ingeniously suspended in a frame by lateral pressure over a water-proof card gradated to time, records the duration of unclouded sunshine throughout the day. It was made by Negretti and Zambra, the celebrated meteorological instrument-makers of London, and was certificated at the Kew Observatory, having been adjusted to the latitude of Georgetown. It is set every morning at sunrise, the stand fixed duly north and south, a new card daily being fixed, matching the time of day as fixed beneath the globe. As the sun rises, a slender line, beginning as a fine point and gradually widening as the sunshine increases in intensity, to the width of the eighth of an inch, is burnt into the card. If the sun is partially obscured by a faint cloud intervening, the charred line contracts; if the cloud is dense enough to entirely obscure the sun a gap occurs in the line, the burning of the line on the card beginning again at the point the sun has reached the heavens when it comes out again. Then as the strength of the sun weakens in the afternoon the charred line again gradually narrows till it finishes in the evening as it began in the morning, at a fine point. At any period during the day, while the sun is shining, the time of day can be seen by looking at the point the charred line has reached on the scale of the card. The instrument is therefore useful, not only for recording the sunshine, but as an unerring clock or sundial to tell the time of day. And what an unerring record of time and sunshine it is! Like the law of human morals, written by the finger of God on stone, nothing can efface the record while the card may be preserved, an imperishable record, showing the slightest fluctuation of sunshine that occurred during the day it was used. Here, now, is a card for instance showing a series of contractions and expansions of the burnt line from beginning to end. This is the record in this latitude of a pleasant day to man, when the sun struggled with the cloud all the day and partially gained the mastery. Here is another card showing a series of burnt dots. In this case, too, sunshine and cloud struggled together and alternated at rapid intervals through the day. Again in another card there are dots, and longer gaps in which the card has not been touched by fire—a pleasant day too in our latitude when the clouds have been to us "as the shadow of a great rock in a weary land." Another card shows no variation or interruption in the fierce line of fire that has remorselessly burnt itself, as the wheels of

the gods are said to grind slowly, but surely, from one end to the other across it. On such a day the air seems to be the breath of a furnace, and man and all other creatures seek shelter from the noontide heat and glare. Another card, as though no day had passed, is entirely blank, only the date on the back indicating that it had ever been used. This was a day of uninterrupted cloud, and we see by referring to the rainfall register that it was a day of rain, for rarely without rain have we a day of unbroken cloud in this latitude. And think of this enduring record! A century or ten centuries hence, the possessors of these cards may take them up and say—"let us see what kind of a day our forefathers had in keeping the anniversary of this festival in Georgetown in 1889." There they will find, in the burnt or unburnt card, a record that will bring the very picture of the day before them, with its heat and glare or cloud and shade; and they will look upon it in imagination—nay, not altogether in imagination, for with the fire's embers in the card there before them, might I not say, in some measure, in actual fact—as we look back on some day past in our own life—a day that, with the dulness and gloom or vividness and pulsating life of the natural features and elements that severally contribute to make the day we are now living, has been by some circumstance engraven on our mind. Surely this is true—shall I say true?—written in infallible characters by nature herself, to last for all time.—*Demarara Argosy.*

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STARTING IN BUSINESS.

There is a universal dersire on the part of young clerks and employees in general, to get into business of their own at the earliest possible time. Of every three who leave a salaried position in the store or shop, two would have done better by remaining on salary; and the third doesn't find his business career leading through a pathway strewn with roses. No; far from it, in many cases. Some find themselves burdened with responsibilities and cares they had never dreamed of in building their air castles of a future business career.

We do not wish to discourage the young man who can see his way clear, and whom the community needs in some business calling, but there are many to whom it certainly never occurs that there are a few things as much needed as capital. One of the few is a thorough and practical knowledge of the business to be entered into; one is industry; one is firmness; another is quick and correct judgment of human nature in all its phases; and still another is the capacity for making innumer-

able friends. If you possess all of these requisites, then your success in business is assured.

We have, on various occasions, known men—good, clever men—to go into a new town, among strangers, open a store of new goods, and after running several months, or a year or two, sell out at a heavy loss, or pull up stakes and shift to some other town at a still heavier loss and try it over. Often the same result would follow after removal to another town. In the majority of such cases it is self-evident that something is lacking, and it can almost invariably be traced to the absence of some one or more of the above mentioned qualifications.

Starting a new business is too often equivalent to building another fence around the farm ten feet outside of the old fence, which already answers every purpose for which it was built. This is a condition which exists throughout the greater part of the west—business in nearly every line over-crowded. The evils of the situation, or the lack of economy we might say more correctly, is the rental of two stores when one could answer, double the amount of capital tied up that is actually necessary, and double work in keeping two stocks in order instead of one.

If you possess the ability to conduct a business of your own, by remaining with a good established business on salary, that same ability will sooner or later promote you to the position of junior partner or manager. Here in Dallas men in high salaried positions have the easiest positions, in our estimation, and their contentment is to be envied.—*Dal., Tex., Mer. Jour.*

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RAID AGAINST THE SENSITIVE PLANT IN FIJI.

We in Ceylon are aware that next to *lantana*, the *mimosa* known as "the sensitive plant," has of all introduced plants the power of spreading itself. In Fiji it must be a serious evil, interesting and beautiful as it is, for we read in the *Fiji Times:* "The Governor having noticed the alarming increase in the spread of the sensitive plant in Levuka, has sent over instructions directing that steps be at once taken in Suva in order to eradicate that noxious weed. In pursuance of those directions, a gang of twenty prisoners has been employed in the task of destroying it, and they have been busily at work in the endeavor, with the effect that it has been cleared from at least the more prominent positions in the places where it had taken hold. But that any real good may be effected, the destruction must be thorough; as, otherwise, the well-known tenacity of this pest will but render operations useless. It should be dug up and burnt, and no vestige left; its extraordinary power of reproduction rendering anything like half measures absolutely inaffective, as it spreads with wonderful rapidity."—*Trop. Agri.*